

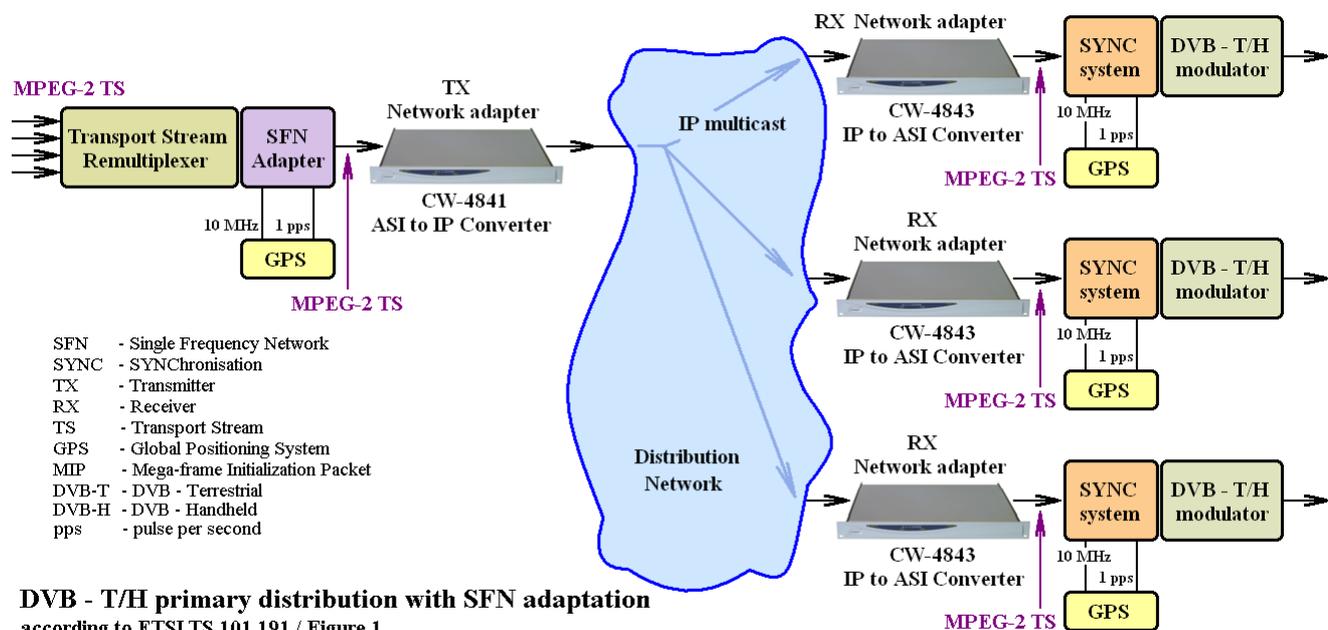
## Transparent TS transmission over IP network

- for
- DVB-T/H SFN and MFN digital television transmitter systems,
  - supplying DVB-C cable-TV headends,
  - supplying MMDS headends

## CW-4841, -42, -43 ASI-IP-ASI CONVERTER

With the rapid spreading of simple and low-cost IP networks the scope of application demands is also growing. In order to get rid of the drawbacks of the IP networks (as asynchronous transmission, varying delay time, low reliability) professional applications require special solutions. The low reliability can be fully eliminated by using segregated, dedicated IP lines; therefore in the professional field the data streams hardly ever will be mixed with others' unknown data streams.

The asynchronous transmission and the varying delay time cause problems in different ways in different systems. Therefore, for choosing the optimal solution, the characteristics and requirements of the system must be known in details. Figure 1 shows the signal supply over IP network to the transmitters of an SFN DVB-T/H system, which raises the highest quality requirements of forwarding the same data stream to multiple transmitters with nanosecond-accuracy, which can be achieved with GPS synchronisation.



**DVB - T/H primary distribution with SFN adaptation**  
according to ETSI TS 101 191 / Figure 1.

Figure 1  
Supplying the transmitters of an SFN DVB-T or DVB-H system over IP network

In the arrangement according to Figure 1, after inserting the MIP in the SFN adapter, the data stream must not be changed anymore, that is, the TS transmission has to be transparent. The delays of the IP network will be compensated for by the SFN buffer ( $t_{max}=1$  sec) of the receiving side equipment, and the clock signal of the TS is generated in a GPS based synchronising system.

The CW-4841 ASI to IP CONVERTER builds 7 packets in each of the UDP/IP packets, and sends out them with unicast or multicast addressing, according to programming. The structure of the transmitting side is similar in all systems.

In the receiving side for removing the unevenness caused by the asynchronous transmission a buffer is needed, and for delivering the clock signal a proper clock generator. In cases where the data stream must not be changed, the clock signal of the transmitting side and the receiving side needs to be synchronized with a special external (e.g. GPS based) system. If changes in the data stream are allowed, the effect caused by the difference between the clock signal of the transmitting side and the receiving side can be eliminated by removing or adding null packets.

At the output of the IP network the transport stream has to be entered in a buffer, and the proper clock signal has to be provided for. The layout of the IP to ASI converter has to match the equipment at the receiving side and the features requested by it. For different applications CableWorld Ltd. offers two kinds of IP to ASI converters according to the following:

**CW-4842 IP to ASI CONVERTER**

The **CW-4842 IP to ASI CONVERTER** has been designed for supplying at the receiving side a low-end equipment, without buffer and clock generator. The CW-4142 enters the incoming UDP/IP packets in a store first, and then removes from them all null packets. The new clock signal is generated by the programmable NCO, which - in connection with the null packet inserter - continuously inserts null packets until from the IP network packets with useful data arrive. The PCR errors caused by the re-arranged packets can be corrected with a switchable 64-member PCR corrector. The device is suitable for receiving transparent transmission as well as IP TV and CW-Net format signals, but because of the re-arranged packets the ASI output signal is not transparent anymore. We recommend its use for supplying signals to conventional QAM modulators and similar devices. The layout of the CW-4842 is shown in Figure 2.

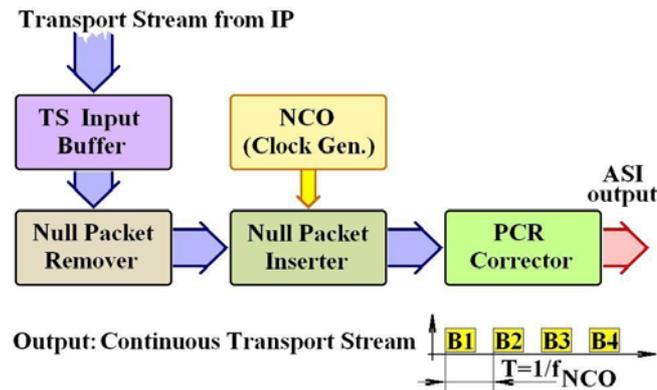


Figure 2  
Layout of the CW-4842 IP to ASI CONVERTER

**CW-4843 IP to ASI CONVERTER**

The **CW-4843 IP to ASI CONVERTER** has been designed for use with high-end systems requiring transparent transmission. The incoming UDP/IP packets will be written also here in a temporary store, but they will be transmitted in the ASI Interface without any modification. Here both large scale buffering of the packets (e.g. in the DVB-T/H system storage of data belonging to 1 sec) and restoring the clock signal (e.g. in DVB-T/H SFN systems with GPS synchronisation) have to be accomplished by the equipment in the receiving side.

The CW-4843 stores the UDP/IP packets for a very short period of time only; the data content of the packets will be forwarded to the ASI interface with the pace of the buffer readout clock signal. With 27 MHz clock signal, at the ASI output the packet bytes follow each other immediately, and the empty space between the packets will be filled in with 8 or more K28.5 characters. The output signal consists of the bursts of continuous packets according to TM1449 Rec 1, that is, the format of the output signal is bursts by packets.

When selecting the clock signal of the programmable NCO, at the ASI output the packet bytes appear with the

period time of the NCO frequency, and the space between the bytes will be filled with K28.5 characters. Thus the format of the output signal is "bursts by bytes" or, "bursts by data" according to the terminology used in TM1449 Rec 1. Without input signal no output signal will be delivered. The layout of the device is shown in Figure 3.

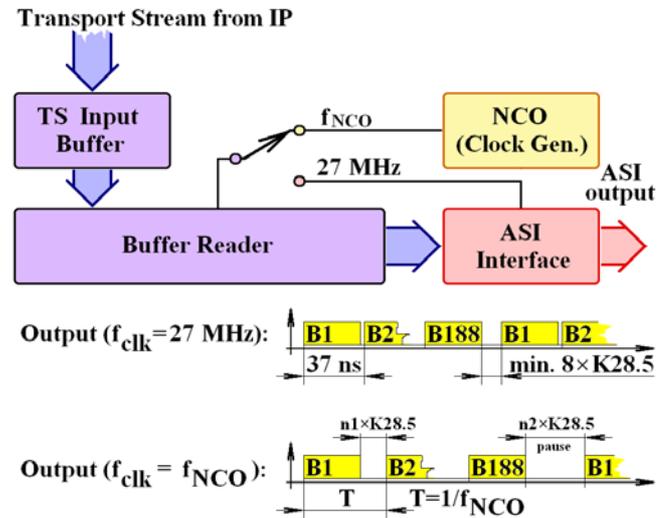


Figure 3  
Layout of the CW-4843 IP to ASI CONVERTER

**CW-4841 ASI to IP CONVERTER**

The **CW-4841 ASI to IP CONVERTER** converts the transport stream connected to its ASI input into UDP/IP packets with unicast or multicast addressing. The packets at its 100 Mbit/s Ethernet output can be programmed to following formats:

With IP TV option:

- 7x188 bytes IP TV format without null packets
- 7x188 bytes transparent transmission with null packets
- 7x204 bytes transparent transmission with null packets
- 7x204+32 bytes CW-Net format full transparent transmission without synchronisation of the transmission

Basic version without IP TV option:

- 7x204+32 bytes CW-Net format full transparent transmission without synchronisation of the transmission

Note: For performing the above-described ASI to IP conversions all CW-48xx series devices (remultiplexers, demodulators etc.) are suitable if they use the 1.51 or higher version of the Ethernet Controller. Of course, for the first 3 formats the IP TV option is also needed.

The detailed technical data of the CW-4841 and -42 are given in their common data sheet; the -42 and -43 versions differ in the way of operation only, as shown in the figures. Presetting and configuring all 3 versions is made with the SW-4841 software version 1.04, which is free available for download at [www.cableworld.hu](http://www.cableworld.hu). The CW-4841 is equipped with TS Analyzer function, thus for putting the system in operation a computer is needed only.

About the addressing modes a detailed description is given in the User manual of the SW-4841 v1.04 software.



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