

## DTV IP Inserter DIP010/011, DTV IP Generator DIP020/021

### Insertion and generation of Internet data in DVB transport streams

- ◆ Insertion of additional data in Internet data format into DVB MPEG-2 transport streams
- ◆ Data transmission via DVB-C, DVB-T or DVB-S
- ◆ Utilization of unused resources (null packets)
- ◆ Exchange of data already existing and contained in particular transport stream packets
- ◆ Insertion variants
  - Utilization of maximum available data rate
  - Dynamic allocation to limited, specified bandwidth
- ◆ DVB-conformal signalling of data services
- ◆ Support of multicast and unicast IP connections
- ◆ Able to be used for public broadcasting of Internet contents or corporate applications
- ◆ Ease of operation
- ◆ Power-fail protection (signal shortcut)
- ◆ Display of characteristic parameters
- ◆ Integration via NDIS driver and IP protocol stacks
- ◆ One or two built-in WindowsNT PC boards



**ROHDE & SCHWARZ**

## Features

The Digital TV IP Inserter (DIP) is part of the Web over DTV solution. It generates or inserts data available as any type of IP frames containing outgoing MPEG-2 transport streams.

It supports services for the distribution of Internet resources and allows new applications to be established on the basis of a combination of digital broadcast systems and Internet technologies.

Web over DTV comprises the following components:

- ◆ DTV IP Inserter or Generator
- ◆ DTV Downloader
- ◆ DTV Web Carousel
- ◆ DTV Web Proxy
- ◆ Stream Connector
- ◆ Media Router

The additional data in Internet (IP) format is inserted into the data stream using the multiprotocol encapsulation (MPE) defined by the DVB organization. The data is inserted in conformity with the MPEG-2 standards. The extended transport streams containing TV and audio programs as well as data services are transmitted using any type of modulation and transmission (terrestrial, cable or satellite).

The DTV IP Inserter consists of two components:

- ◆ PID/null packet detector
- ◆ IP inserter

The DTV IP Inserter can be used independently of the other software components and products of the Web over DTV system.

## Packet detector

The transmission of additional data does not reduce the available data rate of the video and audio programs or the service information items already contained in the transport stream. This is guaranteed by the utilization of unused resources (null packets) or dedicated assigned packets intended to carry data in the MPEG-2 transport stream.

The packet detector identifies the null packets contained in incoming streams and used for stuffing. The null packets or the packets of a dedicated, freely selectable channel (specified by a PID) are replaced by IP packets. IP connections can be inserted in one MPEG-2 channel (single PID based) or in separate PIDs. This allows a logical IP subnet to be built on the basis of MPEG-2 infrastructures.

## IP inserter

The transfer of data to the computer of the DTV IP Inserter can be started from any computer within the Internet or Intranet. The data is applied as a unidirectional IP data stream. The source or target addresses of the IP packets may be arbitrary unicast or multicast IP addresses.

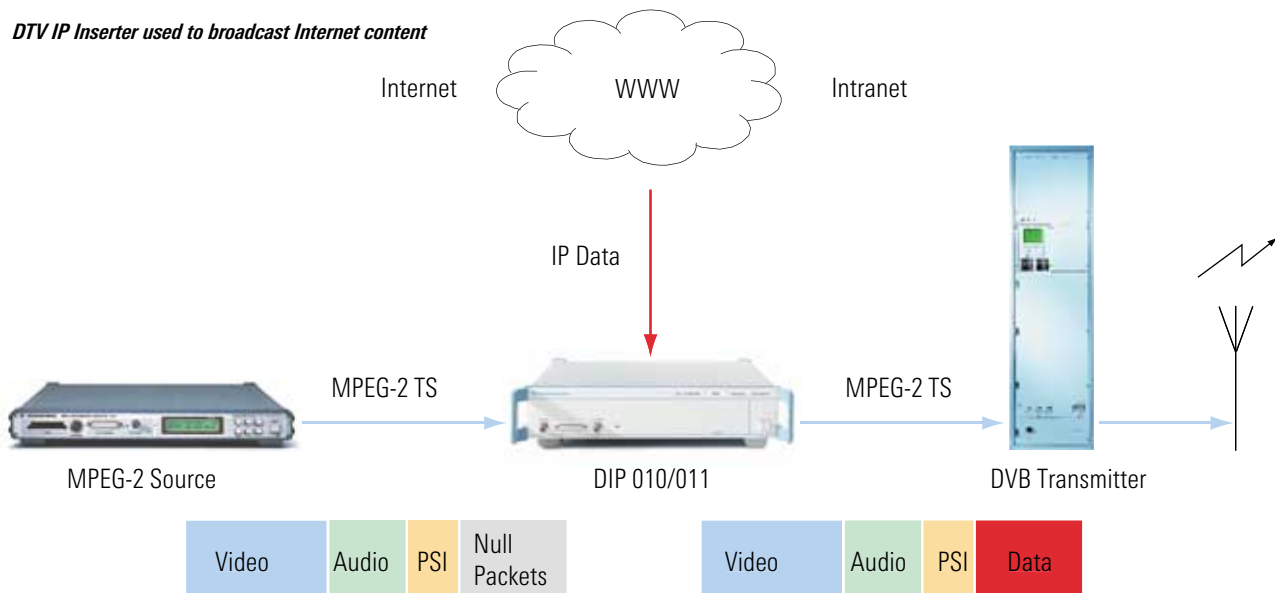
An NDIS driver transfers all IP packets to the inserter software. The standard Internet and network layer protocols are used. The NDIS driver takes the IP frames which will be inserted in the MPEG-2 transport streams using a specific built-in hardware. The driver is installed under WindowsNT and acts like any other standard network card.

The inserter software uses the applied IP data to generate a new transport stream section in the outgoing MPEG-2 signal according to the multiprotocol encapsulation method defined in ISO/IEC 138181-6.

## User interface

Microsoft Windows is used as the user interface. In combination with initialization files the user can set the following parameters:

### DTV IP Inserter used to broadcast Internet content

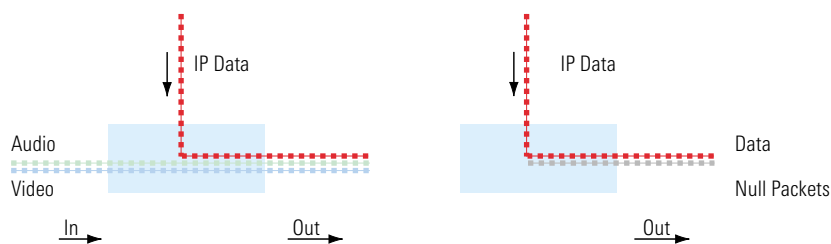


- ◆ Settings for the input port of the transport stream: ASI or SPI
- ◆ Packet identifier (PID) of the transport stream into which the IP data is inserted
- ◆ Limitation of the dynamic data rate of the IP packets in the transport stream (fill-up data rate)
- ◆ Definition of Quality of Service (QoS) parameters for IP subnets and specific IP connections
- ◆ Display of several statistics (e.g. data rate, inserted packets)
- ◆ IP source and target address used for conversion to multicast IP services
- ◆ MAC addresses referring to the IP target addresses of the sent IP packets
- ◆ Setting of the routing for incoming IP packets via the NDIS driver

The routing of the IP addresses is a setting required for the control of data connections. The IP Inserter acts as an Internet gateway connecting the Internet with digital broadcast transmission systems. In combination with the Quality of Service (QoS) engine and the Media Router application, a flexible Internet content distribution system can be built.

### Inserter DIP010/011

The DIP010 and DIP011 are IP inserters. They expect a valid transport stream signal at the incoming port. The existing program is enhanced by additional data with adapted MPEG-2 signalling which allows the receiver to recognize the data service. This device is useful to be inserted after program or MPEG-2 multiplexers and to extend existing broadcast systems.



Left: DIP010/011 with MPEG-2 input and output; right: DIP020/021 with MPEG-2 output only

### Generator DIP020/021

The DIP020 and DIP021 are IP generators. They do not support incoming, existing program streams. They generate a MPEG-2 transport stream containing only data at the output port. This signal can feed a program multiplexer in order to add video and audio if a mixed service is needed. This device is used to generate MPEG-2 transport streams containing data for pure data services and applications.

The DIP011 and DIP021 offer a second freely useable WindowsNT processor for data preprocessing or for running Internet Streaming Media servers etc.

### System requirements

The WindowsNT operating system is used to control the insertion process. The device supports standard Ethernet ports for connection to the local network (Intranet) or the Internet.

The internal hard disk has a capacity of at least 18 Gbyte. The processor board or the second freely available one can be used to execute additional software components and applications such as the Web Carousel. The devices with the second processor board (DIP011 or DIP021) can be connected via external network cables or hubs.

### Additional applications

The new solution called Media Router is to support the following additional applications and features:

- ◆ Broadcast IP router with support of Quality of Service (QoS)
- ◆ Integration of IP multicast services
- ◆ Separation of IP subnetworks (similar to class C networks) using dedicated DVB data channels

### Supplementary software

The following software applications used also in digital TV based scenarios (Web over DTV) can be used in combination with the DIP:

- ◆ Web Carousel (to send files and web content in a cyclic manner)
- ◆ Stream Connector (to establish connections to Streaming Media servers (live streams))
- ◆ Web Proxy (in conjunction with the assembler used on the receiver to rebuild files sent by the Web Carousel (free of charge or together with receiver))

## Specifications

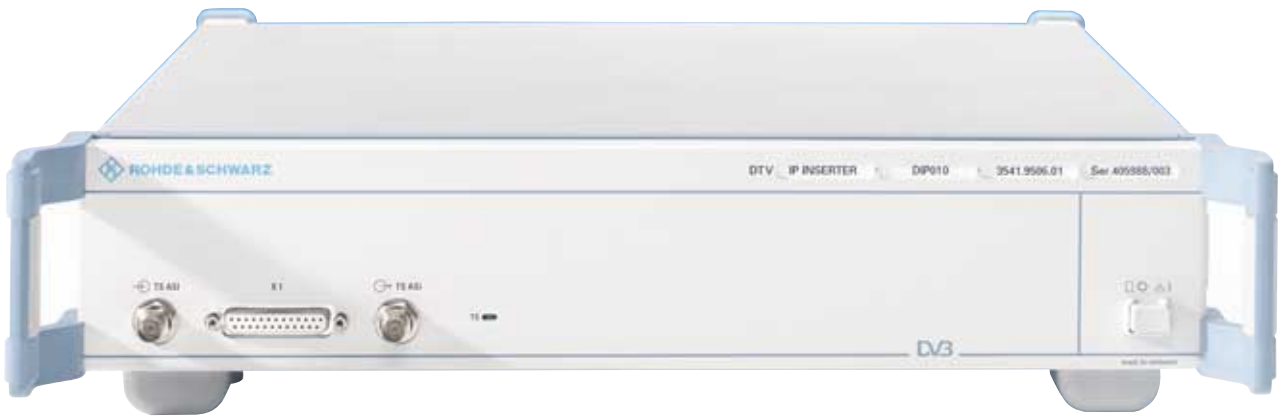
<b>Output signal</b>	transport stream according to ISO/IEC 13818-1, up to 50 Mbit/s
Useful data rate for inserted data	up to 6.5 Mbit/s
Length of transport stream packets	188/204 byte
<b>Signal input/output</b>	
MPEG-2 data stream synchronous parallel (SPI)	25-pin connector (front panel), LVDS
MPEG-2 transport stream asynchronous serial (ASI)	270 Mbit/s, BNC (front and rear panel), 800 mV (V pp), 75 Ω
<b>Data input signal</b>	
Interface on integrated PC	10/100 BaseT (100 Mbps)
<b>Ethernet interface</b>	
Connector	RJ45
Operating system	Embedded WindowsNT
Hard disk	min. 20 Gbyte

## General data

Environmental class	3.1 (ETS300 019-1-3)
Rated temperature range	+5°C to +40°C (specs guaranteed)
Operating temperature range	0°C to +50°C
Storage temperature range	-40°C to +70°C
Climatic resistance	max. rel. humidity 95% at 25°C
Electromagnetic compatibility	meets EN50081-1, EN50082-2, EN61000-3-2
Power supply	85 V to 265 V, 47 Hz to 63 Hz
Power consumption	
DIP010/020	max. 100 VA
DIP011/021	max. 200 VA
Electrical safety	meets EN 60950
Dimensions (W x H x D)	465 mm x 90 mm x 500 mm (19" cabinet, 2 HU)
Weight	approx. 6 kg

## Order designations

<b>DTV IP Inserter,</b> one processor board	<b>DIP010</b>	3541.9506.02
<b>DTV IP Inserter,</b> two processor boards	<b>DIP011</b>	3541.9558.02
<b>DTV IP Generator,</b> one processor board	<b>DIP020</b>	3541.9606.02
<b>DTV IP Generator,</b> two processor boards	<b>DIP021</b>	3541.9658.02



**DTV IP Inserter DIP010**

