



# SpaceMan

## Combined Shortwave-Satellite Transmission

The increasing amount of information flooding data networks such as the Internet is loading wired analog and even digital networks to the limits of their capacity. The consequences are

unacceptable waiting times and constraints on realtime applications. By combining shortwave and TV satellite data transmission, the SpaceMan system from Rohde & Schwarz does

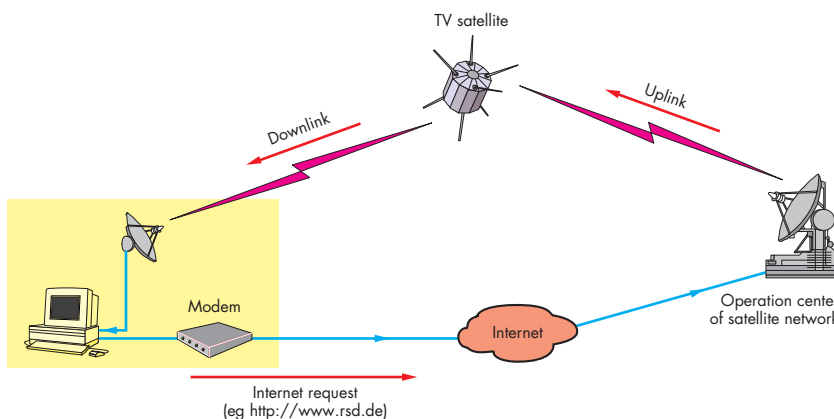
away with traffic jams on the information highway and in addition provides access to wired networks in areas lacking the necessary infrastructure.

## Internet download via satellite

In conventional Internet access, information is exchanged via modems and the public telephone network. The information request and the reply are transmitted via the same paths. While advanced computer technology allows high data rates to be handled, the public telephone network and the required modem links considerably limit transmission capabilities. A solution to this problem is the integration of digital TV satellite technology into existing communication structures. With this approach, desired information is requested from the Internet via the known wired paths as in the case of conventional transmission. The reply data stream, however, is routed from the source (server) to the operation center of the satellite network and transmitted to the user via a fast, broadband satellite link (downlink) (FIG 1).

Routing the Internet data stream in this way becomes possible by modifying the Internet protocol (IP), which is responsible for route selection on the Internet. Using what is called IP encapsulation, the IP packets are put into an "envelope" addressed to the operation center. The operation center reads and routes on the envelope contents

FIG 1 Conventional data transmission using TV satellites



and, acting as a new user with respect to the addressed Web server, sends the information to the requesting party via satellite. Satellite transmission is unidirectional in this case, ie information can be received but not sent via this path. With Internet requests usually being very short (eg <http://www.rsd.de>) and the reply data volume comparatively large, the advantages of this technique make themselves felt all the more.

## Combined radio-satellite technique

With its SpaceMan DS101 system (FIG 2), Rohde & Schwarz is the first supplier worldwide to combine the above principle with radiocommunication. Requests to the Internet are made via radio (HF/VHF/UHF), and transmission of requested data via fast satellite links. Access to this modern information technology (IT) with radio linkup is realized by means of PostMan DS100, a well-known software product which allows transparent TCP/IP radio data transmission. PostMan in conjunction with shortwave transceivers of the XK2000 family provides unrestricted access to wired communication networks via radio links from any point on the earth. Reception of satellite signals is implemented in SpaceMan by commercial system solutions adapted to radio technology (FIG 3). This provides wireless Internet access unimpeded by the constraints of low data rates.

## Uses

Through the combined use of two transmission techniques – radio and TV satellite – SpaceMan achieves data rates far above those of terrestrial post office lines with telephone modems. A user browsing on the Internet from a ship in the North Sea for example, using shortwave and satellite links provided by SpaceMan, is at no disadvantage compared with his mainland workstation. Using satellite transmission and radio technology from Rohde & Schwarz, large volumes of data such as digital maps, databases and software upgrades can be downloaded to the PC far from any infrastructure at data rates considered so far unattainable in radiocommunication. Even realtime multimedia applications can be implemented in this way.

## System components and technology

Apart from the radio equipment, the user requires a dish for the reception of satellite signals and a decoder, which is in the form of an extension card installed in the PC. PostMan together with control software sends user's requests via radio and handles download of data from the Internet to the PC via satellite. In most cases, a commercial elliptical 60 cm dish or similar will do for the reception of satellite signals.

Satellite transmission is via free channels – the so-called transponders – of TV satellites such as ASTRA or EUTELSAT. Data transmission is based on DVB/MPEG2 (digital video broadcasting/MPEG2 is a method for moving picture compression). At the protocol level, a special ADDBS (advanced data broadcasting system) extension is used, among other things, to provide filter functions in addition to addressing and routing. ADDBS offers various protected access modes (conditional access, security, privacy). This allows individual hardware addressing of any station.



## Security and data rates

The transmitted information is DES-encrypted (data encryption standard) to protect it against unauthorized interception. Security against interception can be further enhanced by adding user-specific encryption.

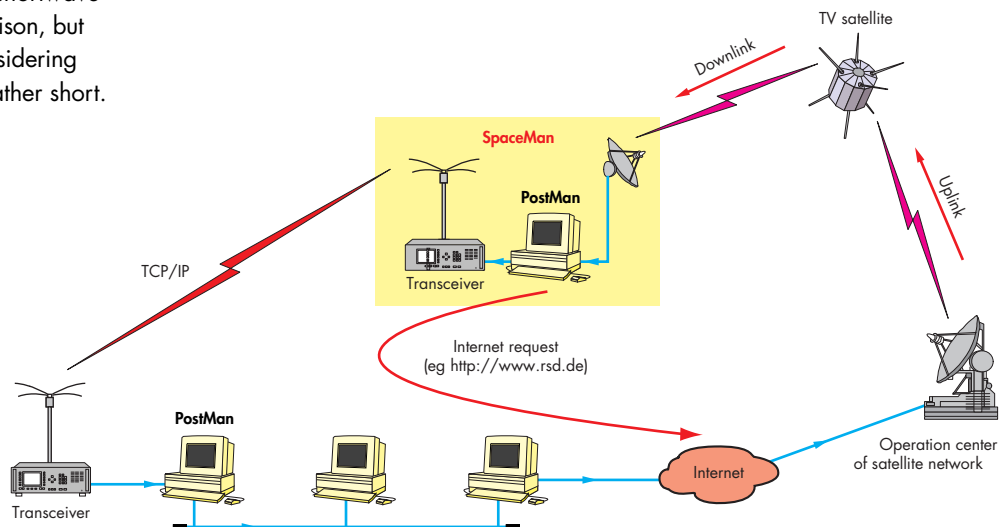
The broadband satellite links allow transmission of Internet data at rates up to 400 kbit/s. This is several times the data rate of conventional V.34 modems with max. 56 kbit/s or ISDN with 64 kbit/s. The data rate of 5.4 kbit/s afforded by shortwave appears modest in comparison, but is of little consequence considering that Internet requests are rather short.

## Summary

Thanks to SpaceMan, users who so far could not access wired communication networks due to the lack of suitable infrastructure, now for the first time can enter the Internet from any point on the earth via radio links and at data rates unattainable for wired users up to now. SpaceMan thus opens wired communication networks also for users at sea, on islands or in other remote areas, and for land-mobile applications.

FIG 2 SpaceMan DS101 system for combined shortwave-satellite transmission consisting of HF Transceiver XK2000, PC with Message Handling Software PostMan, decoder and satellite dish  
Photo 42 700/1

FIG 3 Combined shortwave-satellite transmission with SpaceMan





**ROHDE & SCHWARZ**

ROHDE & SCHWARZ GmbH & Co. KG · Mühlendorfstraße 15 · D-81671 München · P.O.B. 8014 69 · D-81614 München  
Telephone +49 89 4129-0 · Fax +49 89 4129-3398 · Internet: <http://www.rsd.de>