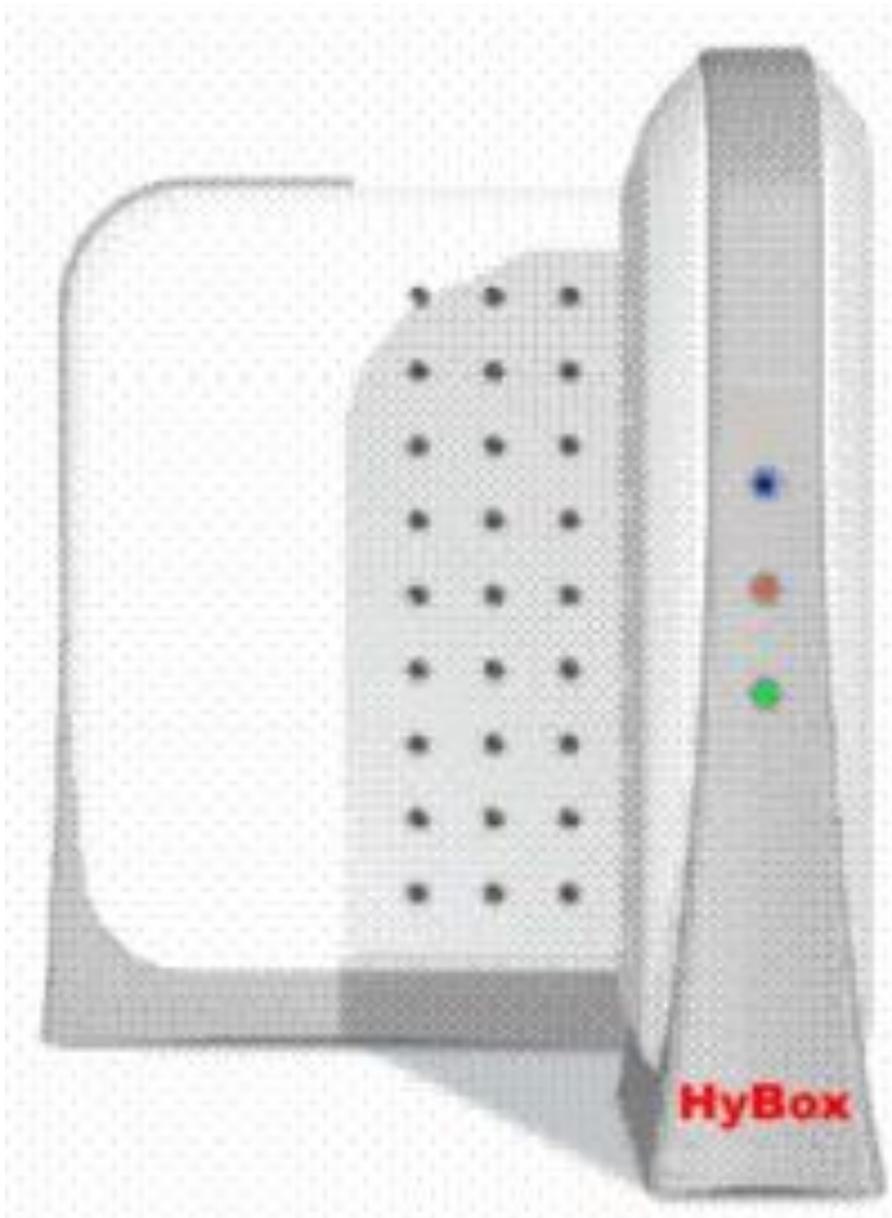


M M D S
Hypercable

HyBox Gigastream-S2

Digital IP TV & TCPIP Full Wireless Duplex – MVDDS - GPRS EDGE Modem.



Technical Specification
Triple Play MVDDS HyBox H-2 WADSL Modem

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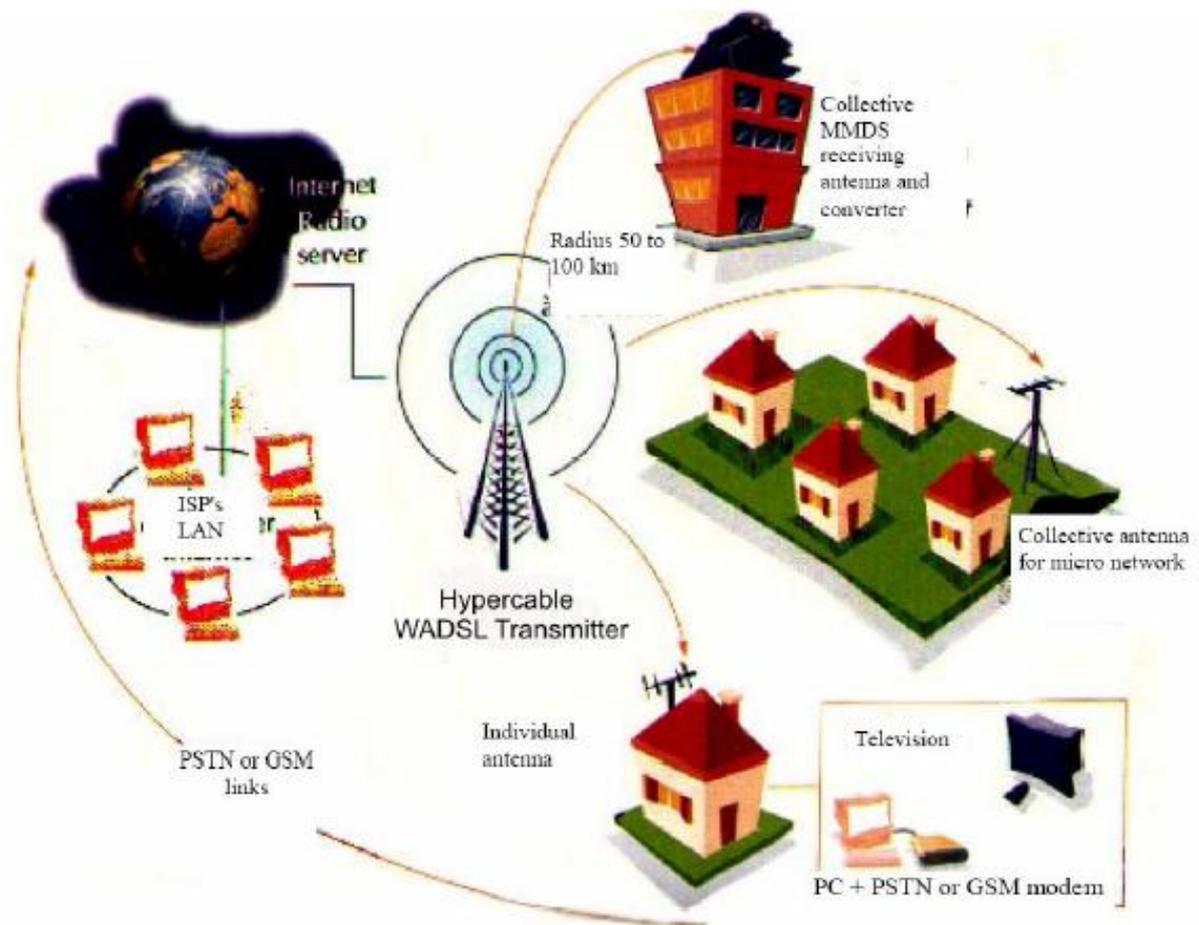
1 Use cases

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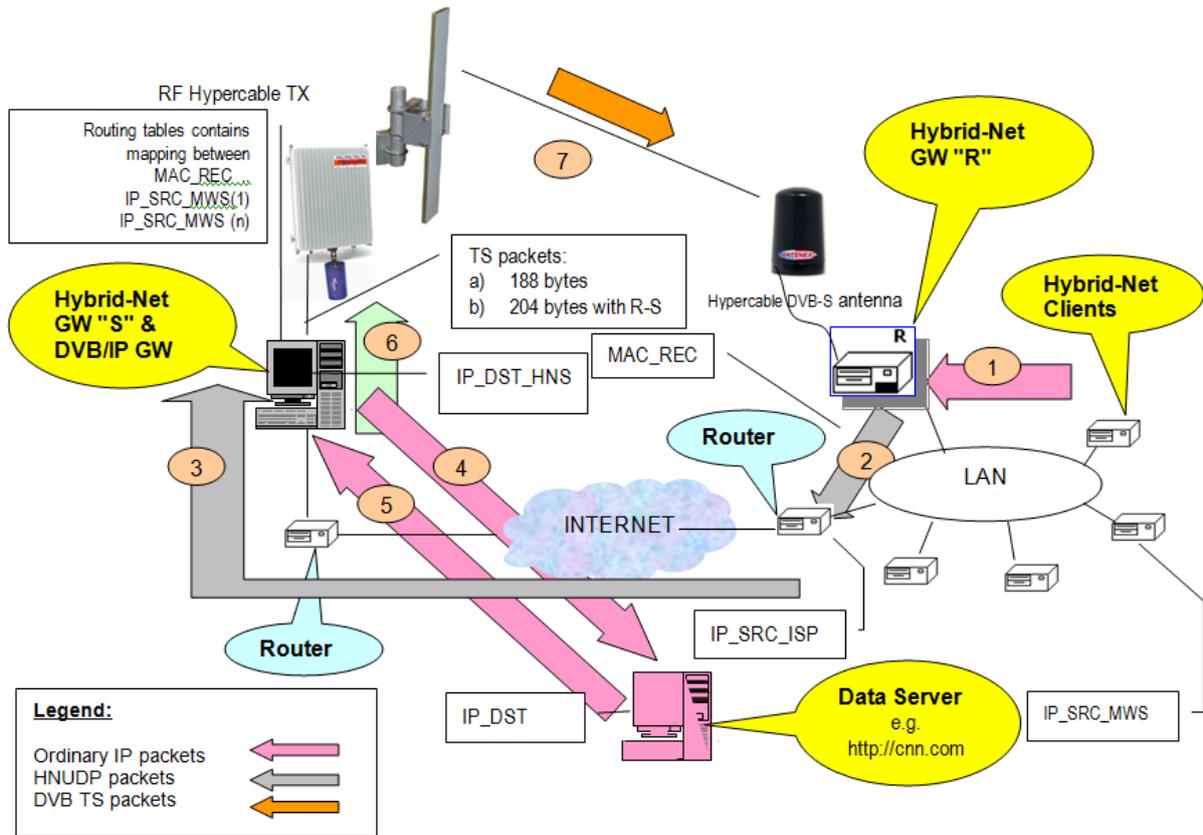
Hypercable H-2 Wadsl HyBox modem is of the one-way type. This means that a Wireless link is used for data transmissions to the user, while a land-based return channel is used for traffic to the Internet.

The main advantage of a one-way Wadsl HyBox mode mover a two-way is that it is possible to use existing equipment (Hypercable antenna, LNB, cables), supporting both television and Internet over Hypercable. This makes the installation really simple, connect the Wadsl HyBox modem to the coaxial cable from the Hypercable antenna and a computer and everything is ready. The other great advantage is that the cost of both Hypercable modem and equipment (i.e. LNB) are much lower than for a two-way connection.

The disadvantage of a wireless one-way connection is the requirement of a landline connection, making it necessary to have an additional connection and service provider. We have for this reason tried to create as much flexibility as possible by offering different solutions for the return channel (PSTN, ISDN, GPRS/EDGE).



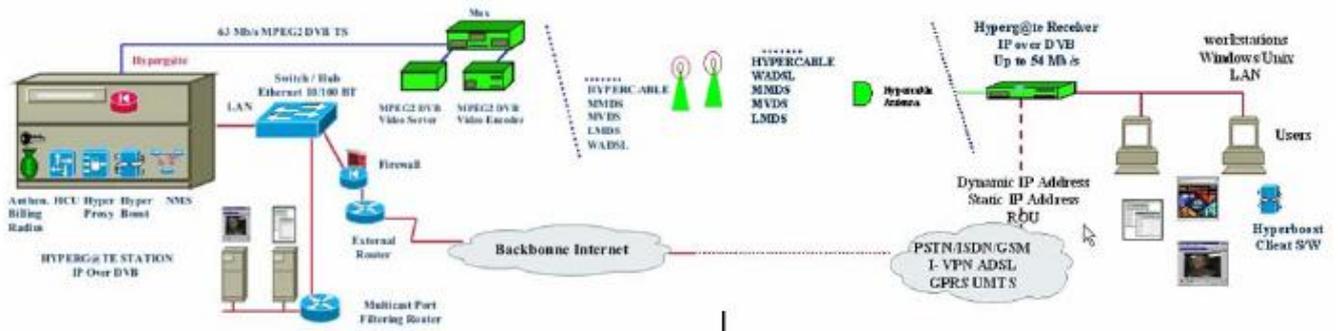
1.1 System Diagram



Internet upload can run any kind of network :

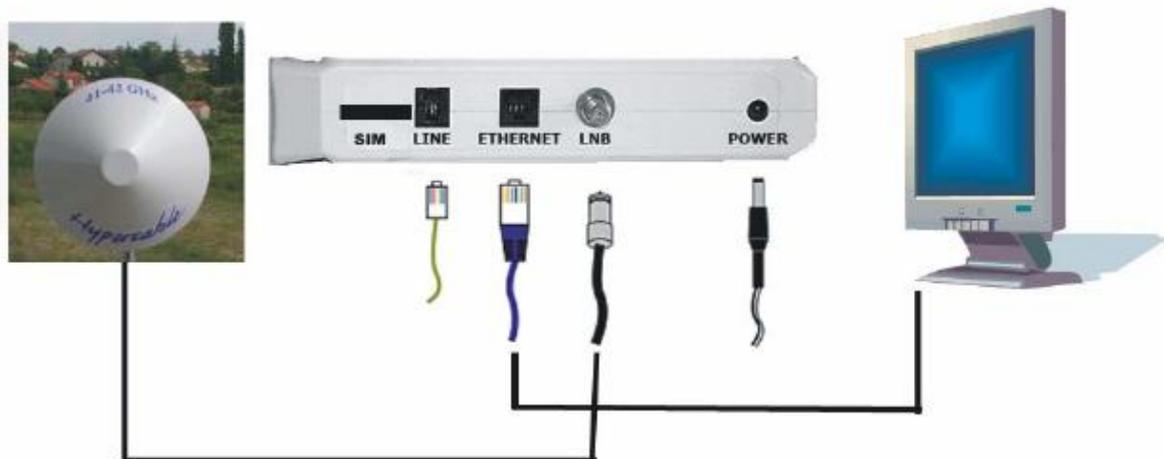
- TELCO
- ISDN
- ADSL
- GSM
- EDGE
- UMTS
- WiFi
- WiMax
- LWL

1.1 System Diagram



- Hypercable WADSL can also use the WiFi, WiMax, ADSL networks and enhance this networks to The Triple Play and also increase the internet capacity.

- Five simple steps to get online.



1. Connect the cables, Line cable (phone cable) (for GPRS/EDGE version, insert SIM card)
2. Turn on the computer
3. Open the web browser
4. Type `http://f20`
5. Press connect and wait a few second and you are **connected**

1.1 Regular Internet usage

When the WADSL HYBOX modems are used for regular surfing of the web they are using either proxy or a VPN connection to the WADSL provider for connecting to the Internet. A more thorough explanation can be found below.

1.2 Proxy solution

For the proxy solution the Wadsl HyBox modem is connected to a regular ISP with access to the open Internet. A proxy server set up by the WADSL operator is used to separate incoming and outgoing data so that incoming data is sent over WADSL. Different proxy software's can be used. The most commonly used on the WADSL HYBOX modems is Hyperboost, which is a performance enhancing proxy giving lower latency over WADSL links. With the proxy solution it is possible to define that some traffic shall bypass the proxy instead use the terrestrial link for two-way traffic. This is a way to achieve lower latency for some services.

Usage scenario for Hyperboost proxy:

This scenario assumes that the end user has the Wadsl HyBox modem on line.

1. An end user types in www.google.com in a browser on their computer connected to the WADSL HYBOX modem.
2. The modem receives the request for the www.google.com page
3. The request for the page is transparently intercepted by the Hyperboost Proxy
4. The Hyperboost Proxy forwards the request for the webpage through the return channel to their PEP server.
5. The PEP server downloads the page and embeds it in a MPEG-2 transport stream inside MPE data which is sent to a WADSL transmitter
6. The WADSL transmitter sends the MPEG-2 stream down to user
7. The front end on the Wadsl HyBox modem down converts and demodulates the transport stream
8. The transport stream is passed through the front end driver which filters out the MPE data packets based on which PID to filter on
9. The filtered MPE data packets are sent to the IP over DVB module which extracts the IP packet and inserts it into the Linux network stack
10. The Linux network stacks checks the routing table and outputs the IP packet through the correct interface, in this case the interface for the local LAN where the end users PC sits. The end user's computer receives the packet and sends a ACK for the packet back to the WADSL HYBOX modem

1.3 VPN solution

For the VPN solution a Virtual Private Network is set up between the Wadsl HyBox modem and the W-ISP (WADSL Internet Service Provider) on connection. This way the Wadsl HyBox modem will be connected to the LAN of the W-ISP. The VPN connection is automatically established when the Wadsl HyBox modem goes online.

Usage scenario for VPN:

This scenario assumes that the end user has the Wadsl HyBox modem on line.

1. An end user types in www.google.com in a browser on their computer connected to the WADSL HYBOX modem.
2. The modem receives the request for the www.google.com page
3. The modem forwards the request for the webpage through the return channel to the W-ISP server.
4. The W-ISP server downloads the page and embeds it in a MPEG-2 transport stream inside MPE data which is sent to an Hypercable Transmitter
5. The WADSL Hypercable Relay sends the MPEG-2 stream down to user
6. The front end on the Wadsl HyBox modem down converts and demodulates the transport stream
7. The transport stream is passed through the front end driver which filters out the MPE data packets based on which PID to filter on
8. The filtered MPE data packets are sent to the IP over DVB module which extracts the IP packet and inserts it into the Linux network stack
9. The Linux network stacks checks the routing table and outputs the IP packet through the correct interface, in this case the interface for the local LAN where the end users PC sits.
10. The end user's computer receives the packet and sends an ACK for the packet back to the WADSL HYBOX modem. The VPN variant supports both PPTP and L2TP

1.4 Multicast streaming

The H-2 WADSL HYBOX modems can be used to receive multicast ip data. While Hypercable transmissions are true multicast, the public Internet can only manage unicast transmission. This makes multicast Hypercable transmissions superior where the same data shall be transmitted to a large number of receivers. Hypercable WADSL HYBOX modems allows for two alternative approaches to multicast reception:

1. Multicast pass through. The Hypercable Wadsl HyBox modem filters out the right PID and retransmits multicast packages on the LAN.
2. Multicast endpoint. The Wadsl HyBox modem can receive files and store the files on a connected USB storage device.

Tests have been conducted on receiving a MPEG.4 (h.264) multicast stream through the modem and then using a regular PC with mplayer in Linux to display the video of the stream.

1.5 Audio signage

Audio signage is an example of a customer specific solution. The Wadsl HyBox modem has been extended with audio-out possibilities, as well as the possibility to playback audio files and DVB radio.

With this solution a special radio channel is played, with interruptions for advertisement from location specific audio files. The whole endpoint terminal is fully integrated with multicast file reception as well as reporting to a monitor server.

2 Technical specification

This section describes the components used in the Wadsl HyBox modemH- hardware overview illustrating how they fit together.

2.1 Hardware specification

Below you will find information about all the components the H-2 Wadsl HyBox of.

2.1.1 WADSL HYBOX front-end

Main components

ST Microelectronics STB6100 tuner

ST Microelectronics STB0899 demodulator

ST Microelectronics LNBP21 LNB power supply

Details

DVB-S support

- QPSK - demodulation: 2-45 Ms/s

DVB-S2 support

- 8PSK - demodulation: 10-30 Ms/s

- CCM

- LDPC (Low Density Parity Check)

Transport Stream Demultiplexing

- 60 Mbits, 72 Mbits peak input

- 40 general-purpose PID-filter

- 32 general-purpose SI/PSI-filter

Frequency input range: 950 to 2150 MHz

Q-Ku- and C-band support

DiSEqC 2.0 22 kHz to 100 kHz interface

LNB Control 22 KHz, 13V/18V, Line length compensation (+0,5V)

2.1.2 Processor & Memory

Main components

NEC Emma2SL

Micron DDR SDRAM memory

Spansion flash memory

Details

MIPS32 core - 186 BogoMIPS

32MB 133 MHz DDR memory

8MB non volatile flash memory

2.1.3 USB & WLAN

Main components

Philips ISP1761 USB controller

ZyDAS ZD1211 WLAN USB stick (external component)

Details

Host and device functionality

2x USB-A ports (device), 1x USB-B (host) ports

USB 2.0 compliant

811.2b/g compliant

2.1.4 PSTN modem

Main components

Silicon Labs Si2493

Details

V.92 compliant

56kbps downstream speed

48kbps upstream speed

2.1.5 ISDN modem

TBA – To Be Announced

2.1.6 EDGE/GPRS modem

Main components

Siemens MC75

Details

Quad band (850/900/1800/1900)

Supports up to GPRS multislots class 12

Support up to EDGE multislots class 10

GSM data supported

2.1.7 Wimax & ADSL modem

Compliant – Supports on Ethernet port

2.1.8 Connectors/Rear panel

1 RF input connector: F-connector for Hypercable Radio input feed

1 SIM card-slot

1 External PIN antenna (SMA-connector)

1 Ethernet connector 100Mb (RJ-45)

3 USB 2.0 Connectors (2 Device USB-A, 1 Host USB-B)

1 Mains AC/DC power supply adapter inlet: 12V through DCplug

2.1.9 Front panel

LED for power on

LED for modem connection

LED for Ethernet connection

2.1.10 Power supply

The main power supply is an external AC/DC converter: 230VAC/12VDC, 2A

The total power consumption is less than 14W

2.1.11 Mechanics

HxDxW: 220x165x50 mm

2.1.12 Environmental Conditions

Operating temperature: 0 deg.C to 40 deg.C ambient

The Hypercable H-2 is designed to comply with CE, ETSI and safety approvals in mind

The Hypercable H-2 is designed to comply with the Restriction of Hazardous substances (RoHS)

2.1.13 Operating system

Linux kernel with Busybox

Based on OpenWRT

3. Hardware Overview

