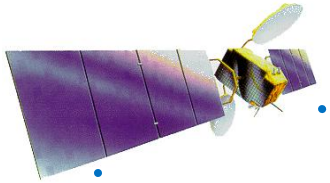
Satellite TV Technology

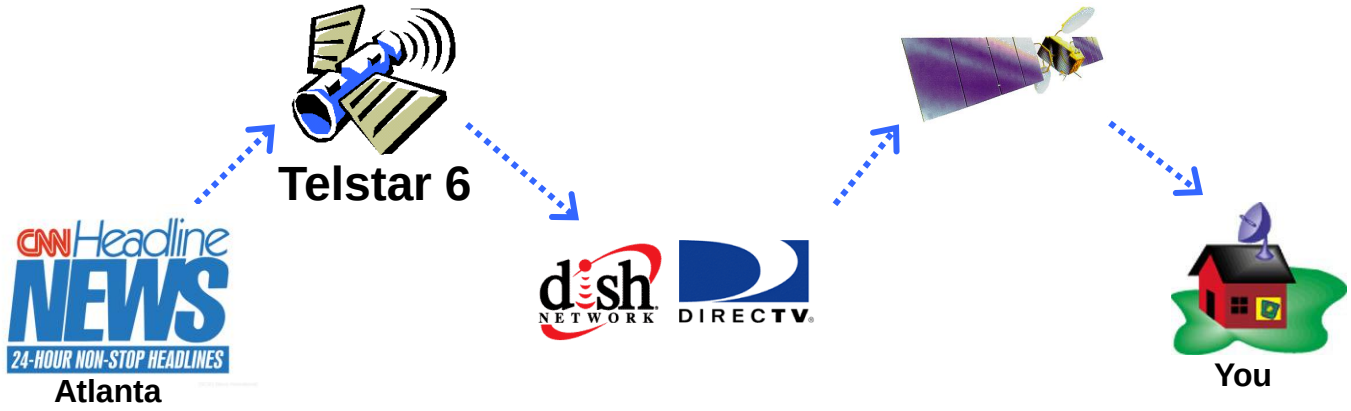
How it works and what you can do with different dishes



OldSkoolS

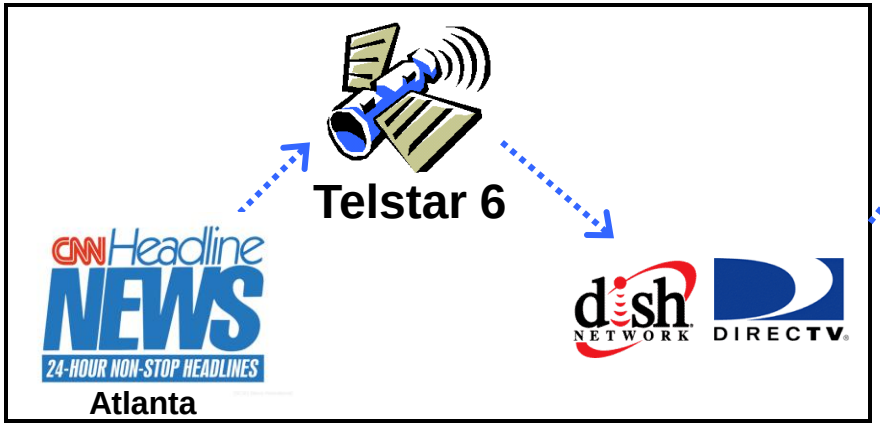
SAT.ROOTCOMPROMISE.ORG

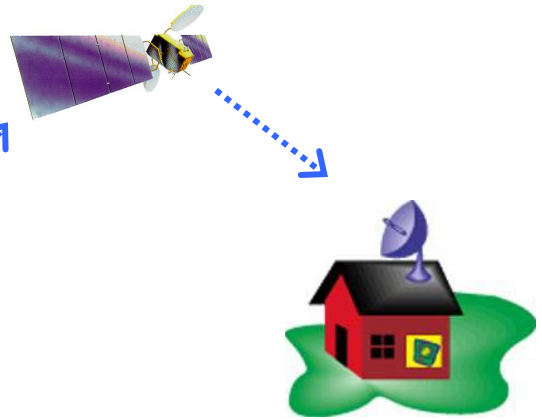
How does content get from the broadcast location to my home?



This section will describe, in detail, how content from CNN Headline News' broadcast center gets to your home. This information is characteristic of how most channels are transmitted from the broadcast location, to the service provider, and then to the home user.

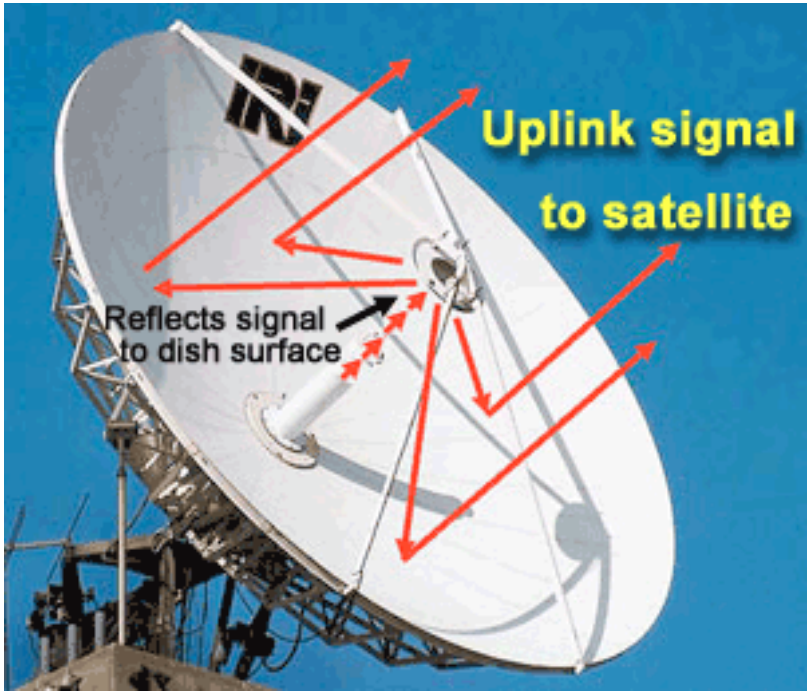
Section 1: Satellite TV Terminology and Broadcast Diagram : **Signal Information**



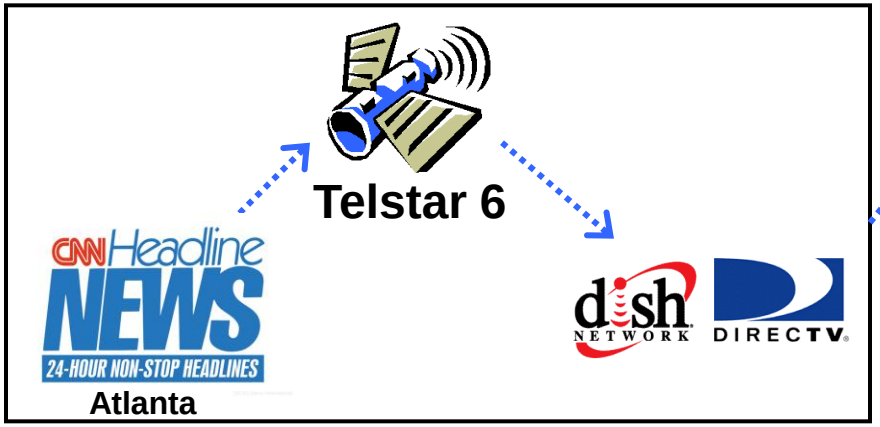


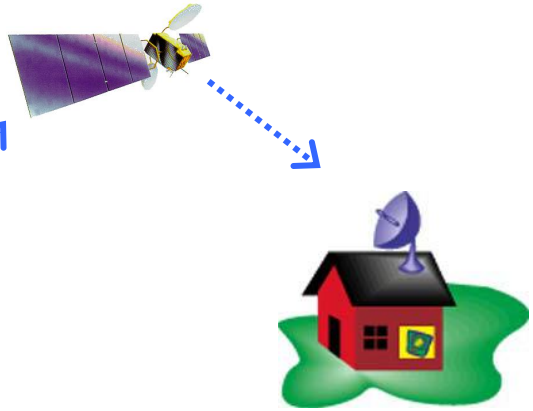
CNN uplinks (sends) their signal to the Telstar 6 satellite located at **93.0° West** on **Transponder** 22. The location of a satellite is given in degrees away from the Greenwich meridian.

This feed has a **Symbol Rate** of 4 **MegaSymbols** per second. The **Forward Error Correction** is set to ¾. This particular channel feed uses the PowerVu © encryption system.



Section 1: Satellite TV Terminology and Broadcast Diagram : **Clarke Belt**





93.0° West – This refers to the location from the Greenwich Meridian. There are only east and west coordinates for satellites (and no north/south coordinates) because all the major TV and Data satellites are at the equator in a geosynchronous orbit (they move around the earth at the same speed the earth moves, therefore appearing to be stationary).

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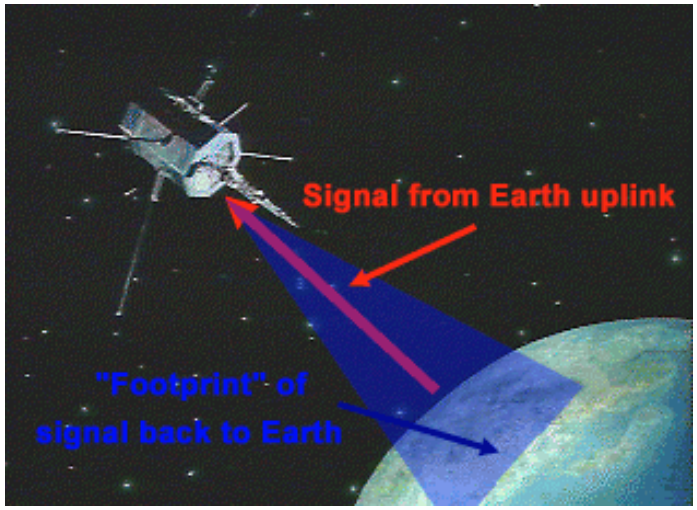
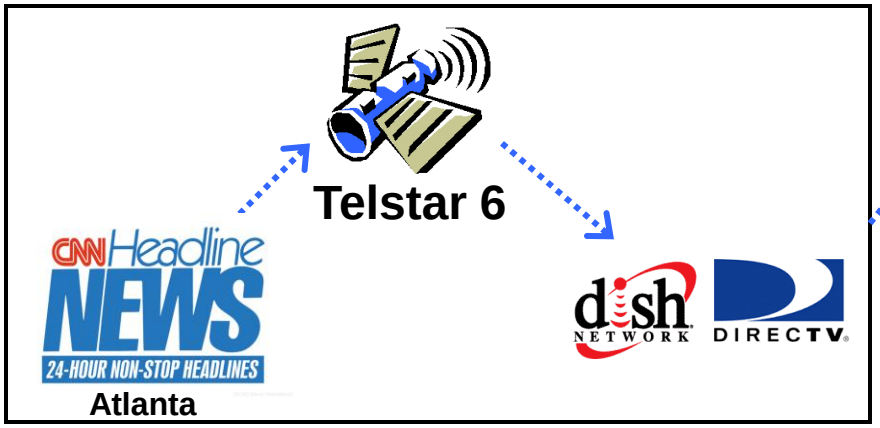
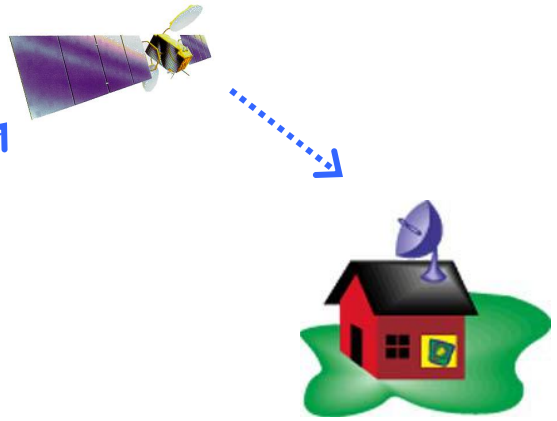


This video shows how a moving big dish system pans the “arc” of satellites located in the Clarke Belt.

Section 1: Satellite TV Terminology and Broadcast Diagram : **Transponders**

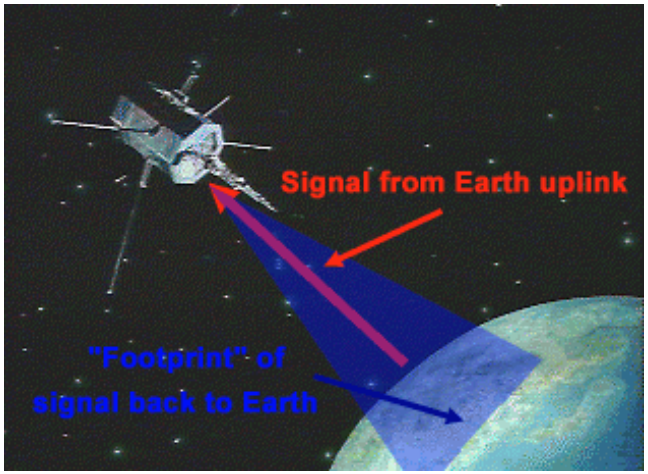




Transponder - A combination receiver, frequency converter, and transmitter package, physically part of a communications satellite. Communications satellites typically have between 12 and 24 onboard transponders.

CNN uplinks (sends) their signal to the Telstar 6 satellite located at **93.0° West** on **Transponder** 22 which operates at a frequency of 12079 MHz with a **Horizontal Polarity.**

This feed has a **Symbol Rate** of 4 **MegaSymbols** per second. The **Forward Error Correction** is set to ¾. This particular channel feed uses the PowerVu © encryption system.



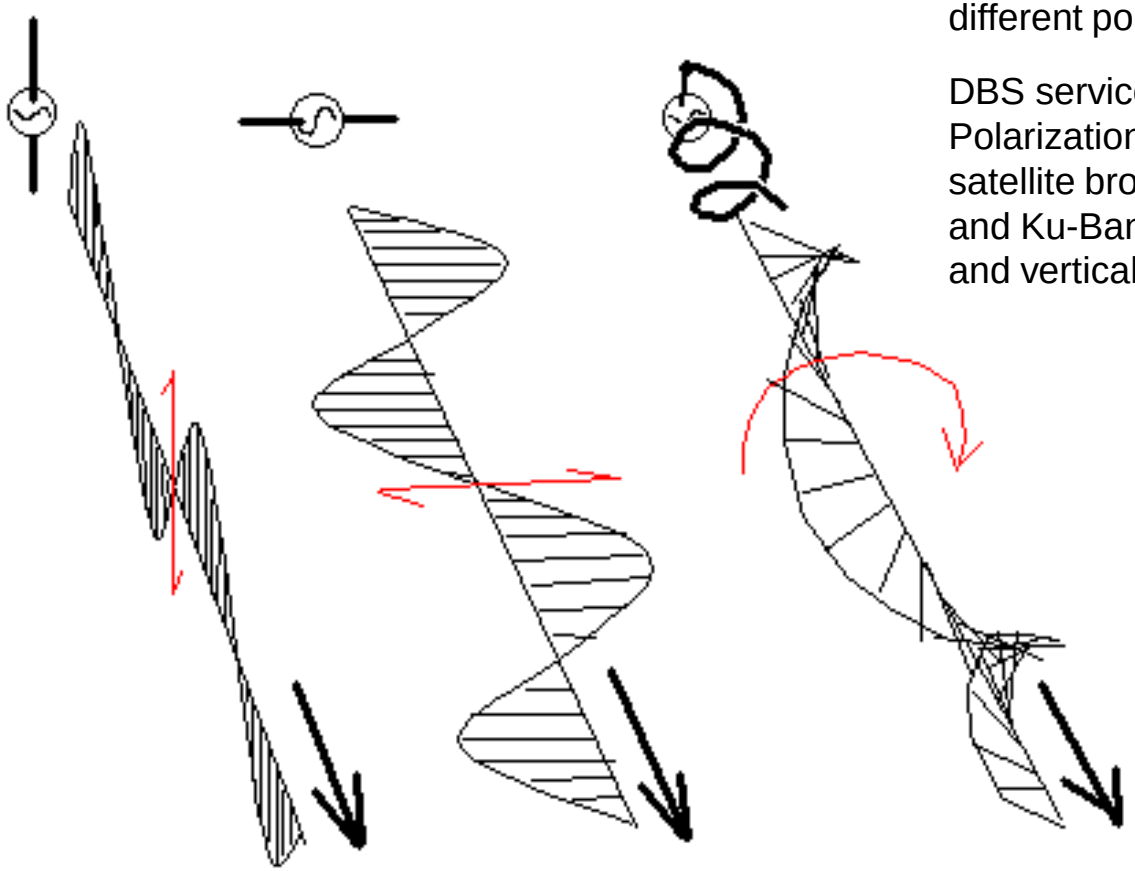
Uplink Frequency → **Transponder** → **Downlink Frequency**

Section 1: Satellite TV Terminology and Broadcast Diagram : **Polarity**

CNN uplinks (sends) their signal to the Telstar 6 satellite located at **93.0° West** on **Transponder** 22 which operates at a frequency of 12079 MHz with a **Horizontal Polarity.**

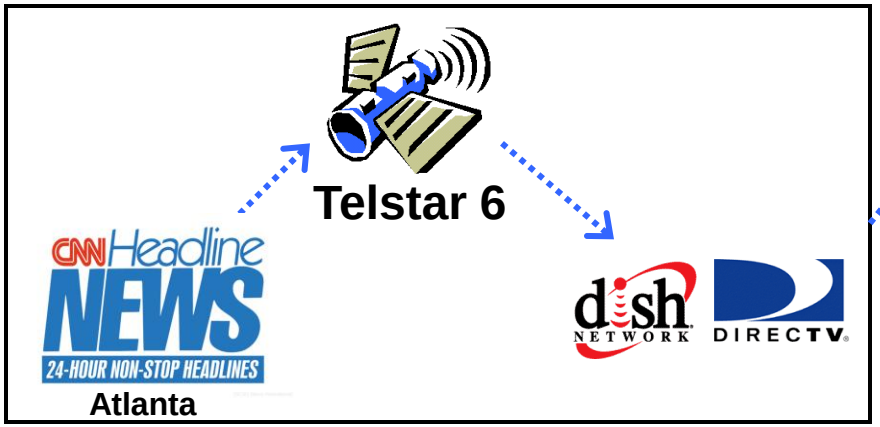
The use of opposing polarities allows for more bandwidth on the satellite because the same frequency can be reused on a different polarity.

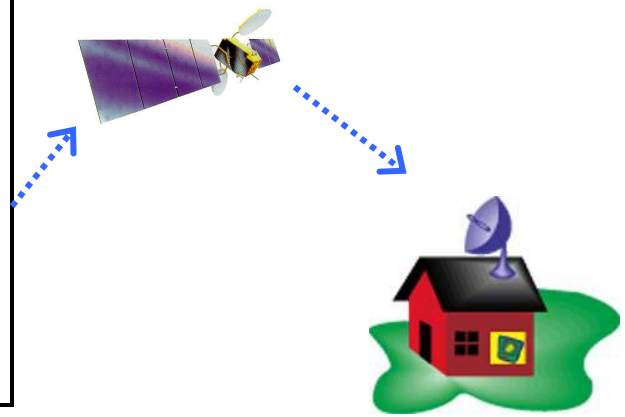
DBS services use Circular Polarization, while other satellite broadcasts on C-band and Ku-Band use horizontal and vertical polarity.



Vertical Polarity **Horizontal Polarity** **Circular Polarization**

Section 1: Satellite TV Terminology and Broadcast Diagram : **Symbol Rate**





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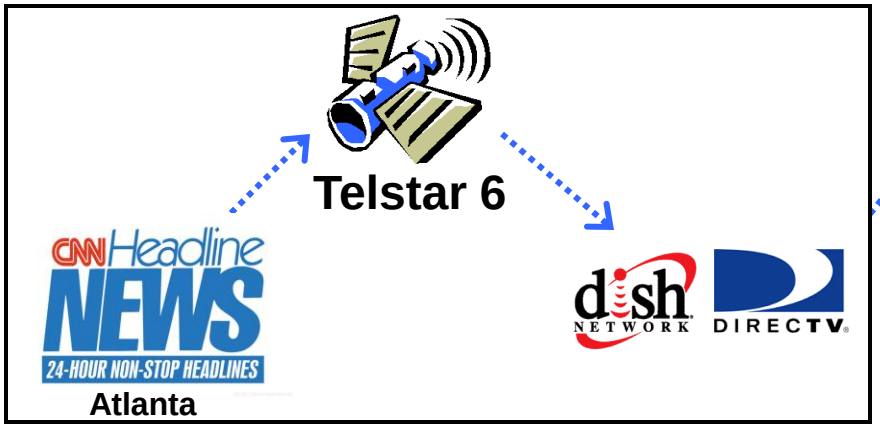
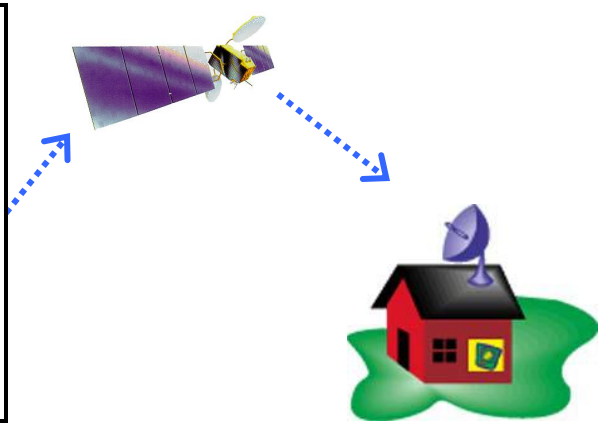
This feed has a **Symbol Rate** of 4 **MegaSymbols** per second. The **Forward Error Correction** is set to ¾. This particular channel feed uses the PowerVu © encryption system.

Symbol Rate – This is the "bit rate" of the transmission. As with most data transfer mediums, the receiver must know the rate at which the transmitter is sending information. CNN's symbol rate corresponds with a 8Mb/s data rate. Most communications satellites have capacity for about 29Ks/s on a transponder.

Section 1: Satellite TV Terminology and Broadcast Diagram : **FEC**





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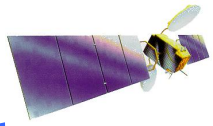
This feed has a **Symbol Rate** of 4 **MegaSymbols** per second. The **Forward Error Correction** is set to ¾. This particular channel feed uses the PowerVu © encryption system.

FEC – Forward Error Correction. Satellite transponders are rather noisy communications channels are therefore subject to a large number of errors when a signal is sent through them. As a result, Forward Error Correction is used, where the transmitter sends error correction information along with the actual signal so that should errors occur, the receiver can re-generate the bit stream. A FEC of ¾ means that for every 3 bits of real data, there is 1 bit of error correction data.

3 Bits	1 Bit
Stream Data	EC info

Section 1: Satellite TV Terminology and Broadcast Diagram

Telstar 6



CNN Headline NEWS
24-HOUR NON-STOP HEADLINES
Atlanta

dish NETWORK DIRECTV

The stream is decrypted and decoded by the service provider's equipment, where it is then re-encoded and multiplexed with other channels before being encrypted and up linked to the satellite that the home user points the dish at.

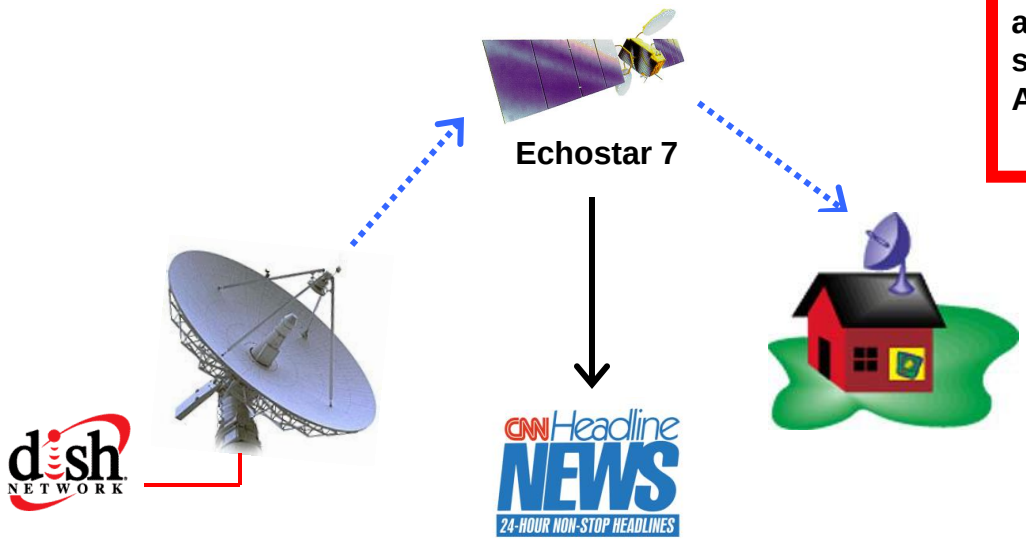
Stream Decrypted and Decoded

Stream re-encoded and multiplexed

Stream Encrypted

Section 1: Satellite TV Terminology and Broadcast Diagram

The information provided from this slide forward until the end of this section is DVB specific. Dish Network, Bell ExpressVu, and almost every European Satellite service uses the DVB standard for Video, Audio, and Data transmissions via satellite.



SID – Service ID

VPID – Video Packet Identifier

APID – Audio Packet Identifier

Encryption – Nagravision ®

Stream Type – DVB

Satellite (for CNN channel) – Echostar 7 (119.0° West)

Transponder – 16

Frequency – 12.443 GHz (DBS Band)

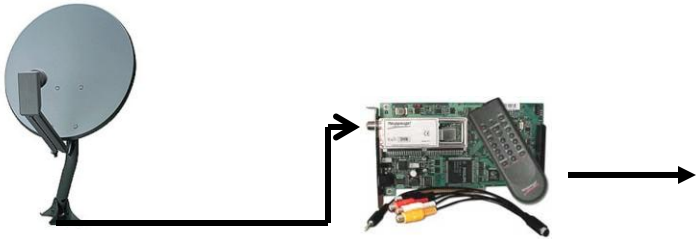
Symbol Rate – 20000 Ks/s

FEC – 5/6

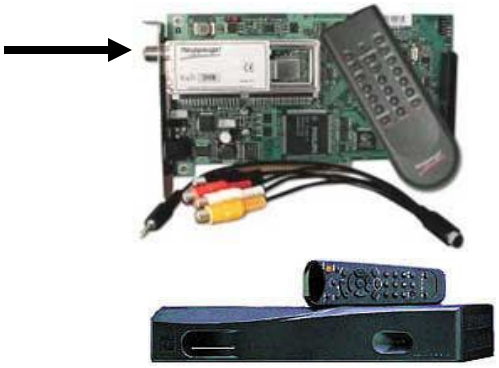
SID - 202

VPID - 4898

APID – 4899 (English)



PCI DVB-S cards are able to receive and display DVB MPEG2 satellite signals, such as the FTA channels. With the appropriate hardware CAM module, they are also able to decode subscription TV-services that use the DVB standard.



TSF of 0 or 1

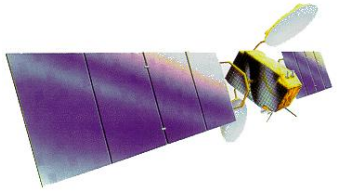
TSF of 2 or 3

MPEG Decoder

Conditional Access Module

Smart Card

FTA (Free to Air) Channels

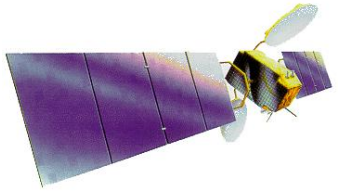


Telstar 5

FTA channels on C-Band and Ku-Band use Vertical and Horizontal Polarity instead of Circular Polarity which DBS systems use.

T5 97o W 11749 Ku V BJ HomeSat 3 7232
T5 97o W 11749 Ku V BJ HomeSat 4 7232
T5 97o W 11749 Ku V BJ HomeSat 1 7232
T5 97o W 11749 Ku V BJ HomeSat 2 7232
T5 97o W 11836 Ku V Skylink TV 20765
T5 97o W 11836 Ku V NTD TV 20765
T5 97o W 11836 Ku V TVI (Australia) 20765
T5 97o W 11836 Ku V Melli TV (Persian/Iranian TV) 20765
T5 97o W 11836 Ku V Rang-A-Rang TV (Vienna) 20765
T5 97o W 11836 Ku V Jaam-e-Jam Network 2 (Iran) 20765
T5 97o W 11836 Ku V Al-Alam News Channel Promo 20765
T5 97o W 11836 Ku V *Scriptures for America 20765
T5 97o W 11836 Ku V *The Overcomer 20765
T5 97o W 11836 Ku V *IRIB World Service Radio 1 20765
T5 97o W 11836 Ku V *IRIB Arabic Radio 20765
T5 97o W 11836 Ku V *IRIB World Service Radio 3 20765
T5 97o W 11836 Ku V *IRIB Radio 1 20765
T5 97o W 11836 Ku V *Radio Quran 20765
T5 97o W 11836 Ku V *The Prayer Channel 20765
T5 97o W 11867 Ku V Jaam-e-Jam International 22000
T5 97o W 11867 Ku V AssyriaSat 22000
T5 97o W 11867 Ku V TV Romania International 22000
T5 97o W 11867 Ku V National Broadcasting Network (Lebanon) 22000
T5 97o W 11867 Ku V Qatar TV 22000
T5 97o W 11867 Ku V JSTV-Jesus Satellite TV 22000

C-band Feeds (Pre-Air Primetime Network TV Shows)



Telstar 5

C-Band Dish

C-band reception requires at least a 7.5ft dish. Many feeds are available on c-band including feeds of TV shows before they air on the networks.

24 (Clean)
TU 0330 T5/13 6.2/6.8
Alias (Clean)
SA 2100 G4/17 5.8/6.2
Bernie Mac (Clean)
WE 0400 T5/13 (020918)
CSI (Clean)
TH 0100 T6/24 5.8/6.2 (030313)
CSI: Miami (Clean)
FR 1600 T6/04 5.8/6.2 (030214)

Section 5: Tips for getting equipment

Ku-Band Equipment:

60cm – 120cm Dish (18" -45")

LNBf – LNB + Feedhorn (with H/V polarity)

Receiver – Set Top Box or DVB-S card

Total Cost - $250 new for a basic setup

C-Band Equipment:

7.5ft -12ft Dish – Preferably Mesh

Feedhorn – Located at the focal point of the dish

LNB - converts the downlink frequency

Skew Motor – Controls the feedhorn's polarity

Actuator – Moves the Dish

Analog Receiver – Set Top Box

Digital Receiver – Set Top Box or DVB-S card

Total Cost - $1000-$2500 **new** for a basic setup

$50 - $500 **used** for a good setup

Vendors:

http://www.skyvision.com

Pricey, but high quality products.

http://www.dvbmaster.com

Sells DVB Related items.

http://www.dvbcanada.com

Sells DVB Related items.

http://www.ebay.com

Buy your big dish here.

http://www.sadoun.com

Sells Ku and DVB equipment.

Thanks to Rod Hewitt of http://www.coolstf.com/mpeg for graciously letting me use information from his website. For detailed information on MPEG broadcasts via satellite, check out his website.

Greets to the SLC2600 Crew and www.geeksyndicate.net

North American Free To Air Channels

http://www.sadoun.com/Sat/Channels/North_America_Free_TV.htm

Digital MPEG Information

http://www.great-american-lifestyle.com/articles/sat-digital-tv.html

Mr. Video's Wildfeed List

http://www.vidiot.com/wildfeed.html

DVB Forums

http://forums.dvbnetwork.com

Dr. Dish's Satellite Espionage

http://www.drdish.com/features/

Basic Broadcast Information

http://www.internetcampus.com/tvp065.htm