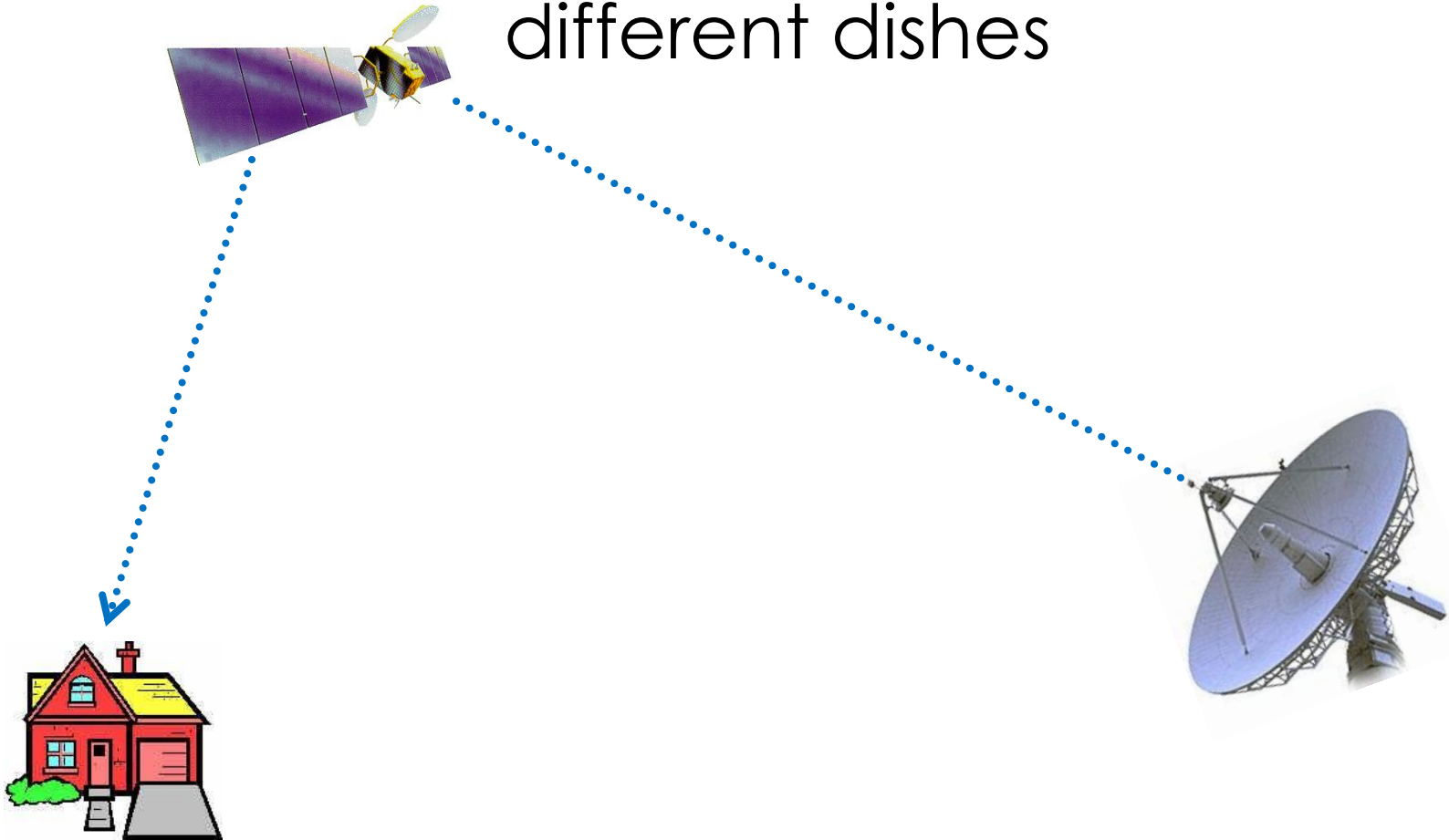


# Satellite TV Technology

How it works and what you can do with different dishes



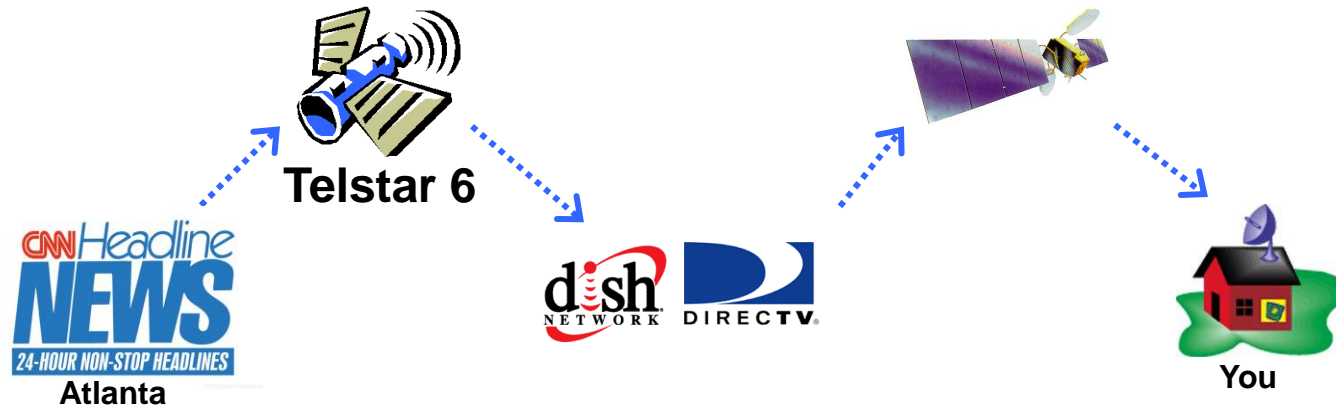
**OldSkools**



**SAT.ROOTCOMPROMISE.ORG**

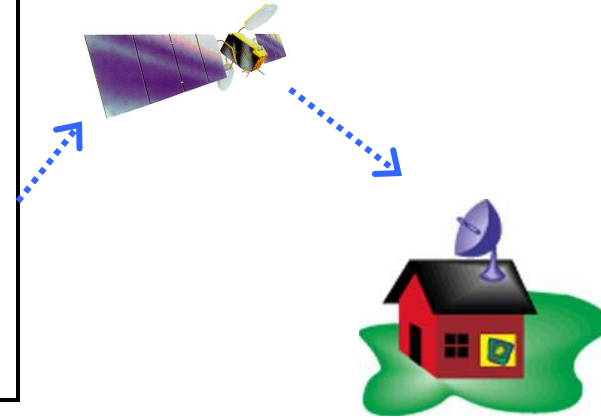
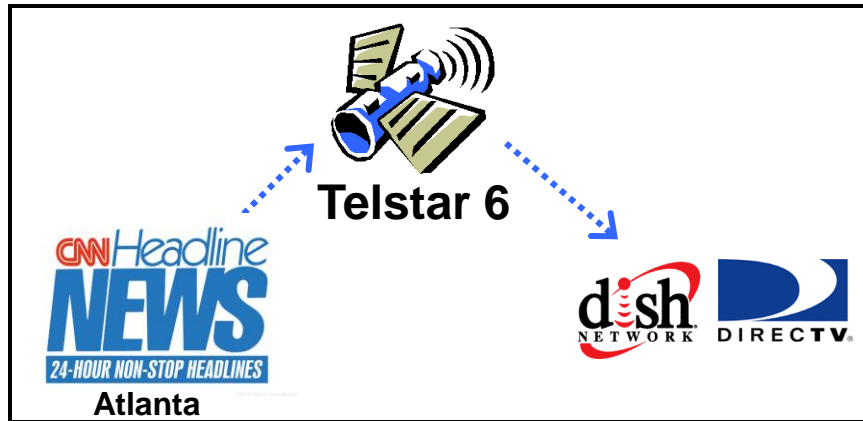


# How does content get from the broadcast location to my home?



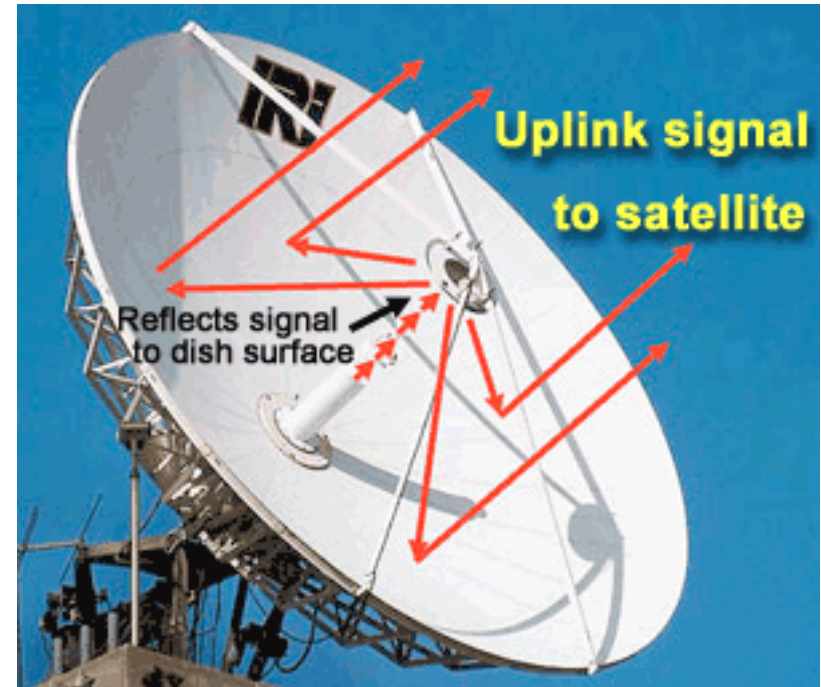
This section will describe, in detail, how content from CNN Headline News' broadcast center gets to your home. This information is characteristic of how most channels are transmitted from the broadcast location, to the service provider, and then to the home user.

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

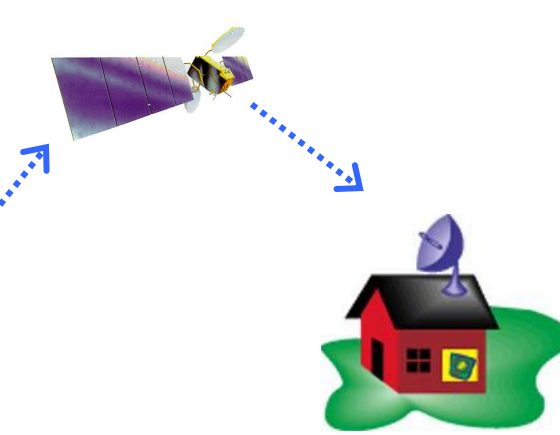
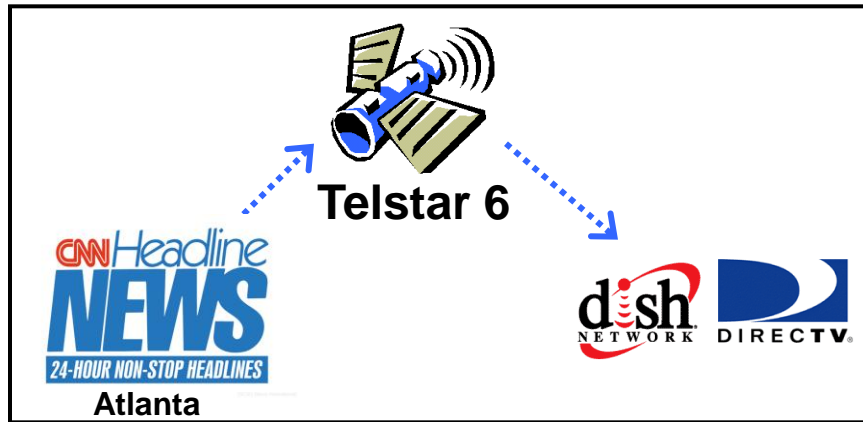


CNN uplinks (sends) their signal to the Telstar 6 satellite located at **93.0° West** on **Transponder 22**. The location of a satellite is given in degrees away from the Greenwich meridian.

This feed has a **Symbol Rate** of 4 **MegaSymbols** per second. The **Forward Error Correction** is set to  $\frac{3}{4}$ . This particular channel feed uses the PowerVu<sup>®</sup> encryption system.



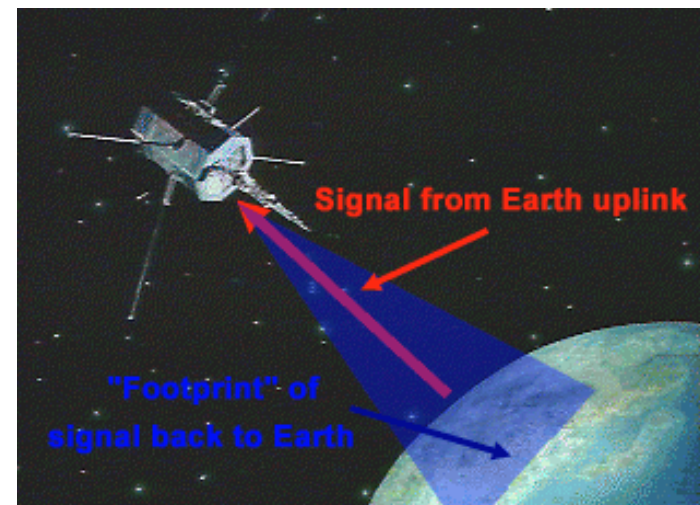
# Section 1: Satellite TV Terminology and Broadcast Diagram : Clarke Belt



**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).

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  $\frac{3}{4}$ . This particular channel feed uses the PowerVu<sup>®</sup> encryption system.

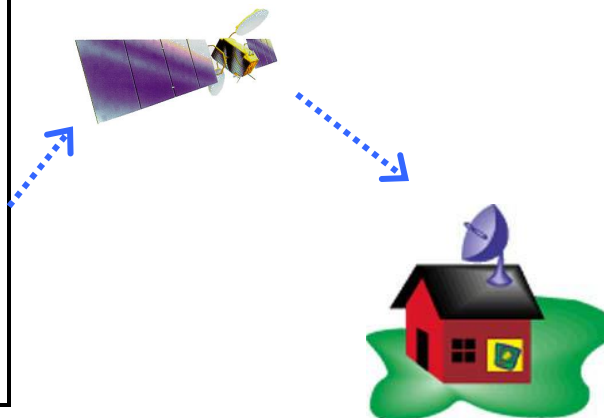
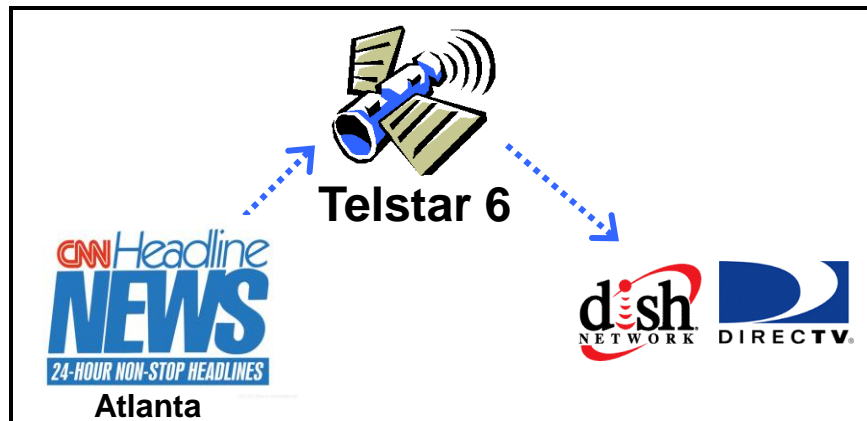


## Section 1: Satellite TV Terminology and Broadcast Diagram : Clarke Belt



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

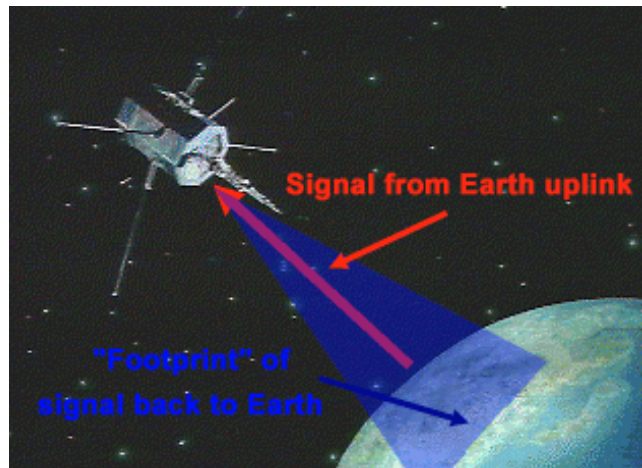
# Section 1: Satellite TV Terminology and Broadcast Diagram : Transponders



**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  $\frac{3}{4}$ . This particular channel feed uses the PowerVu<sup>®</sup> encryption system.

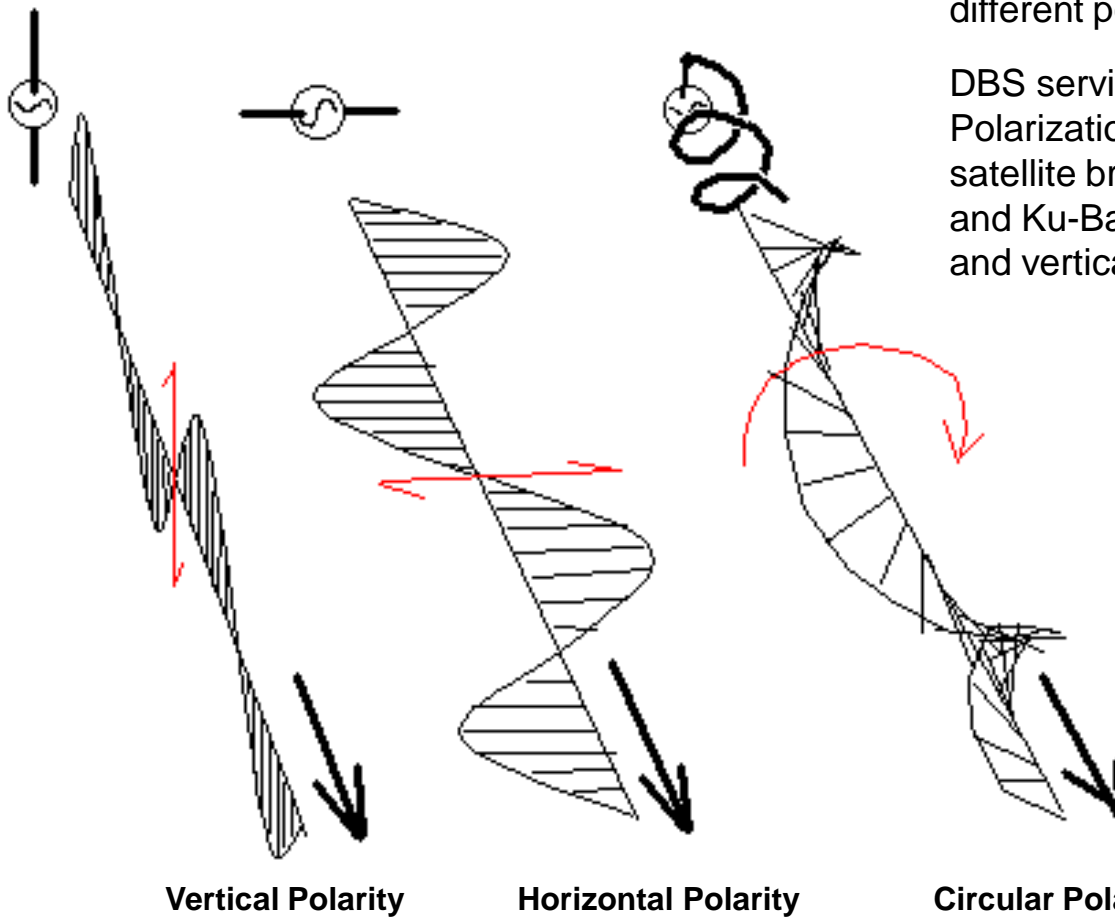


## Section 1: Satellite TV Terminology and Broadcast Diagram : **Polarity**

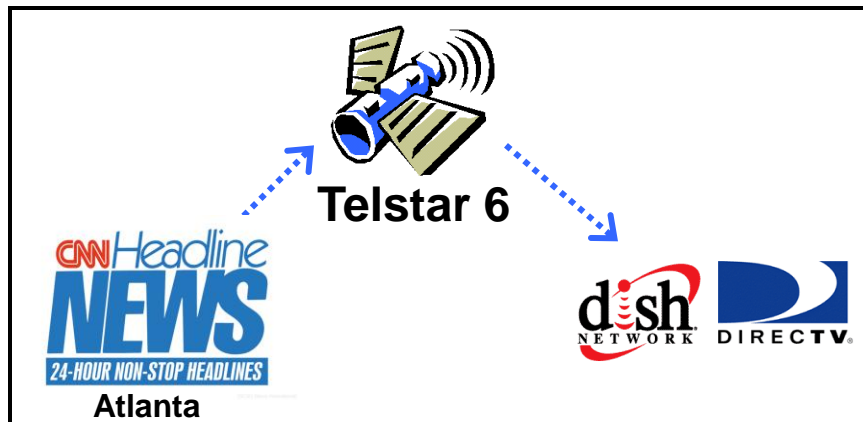
CNN uplinks (sends) their signal to the Telstar 6 satellite located at **93.0° West** on **Transponder 22** which operates at a frequency of 12079 MHz with a **Horizontal Polarity**.

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.



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

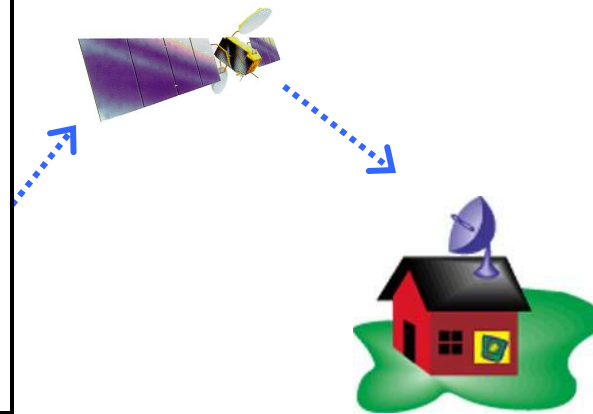
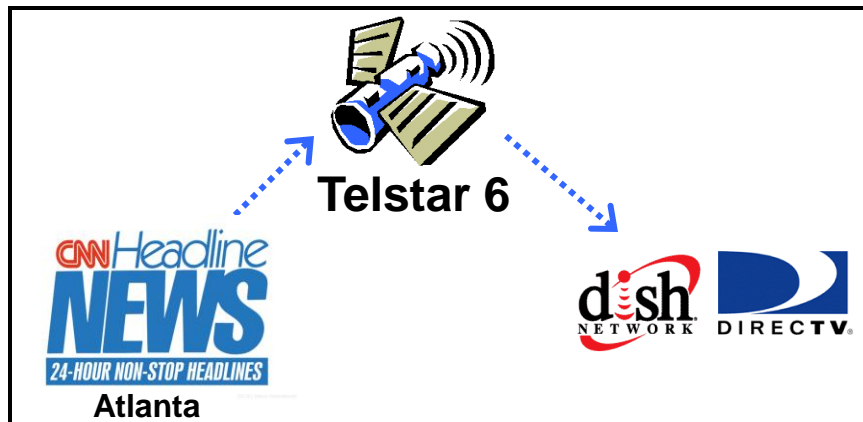


CNN uplinks (sends) their signal to the Telstar 6 satellite located at **93.0° West** on **Transponder 22**. The location of a satellite is given in degrees away from the Greenwich meridian.

This feed has a **Symbol Rate** of 4 **MegaSymbols** per second. The **Forward Error Correction** is set to  $\frac{3}{4}$ . This particular channel feed uses the PowerVu<sup>®</sup> 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



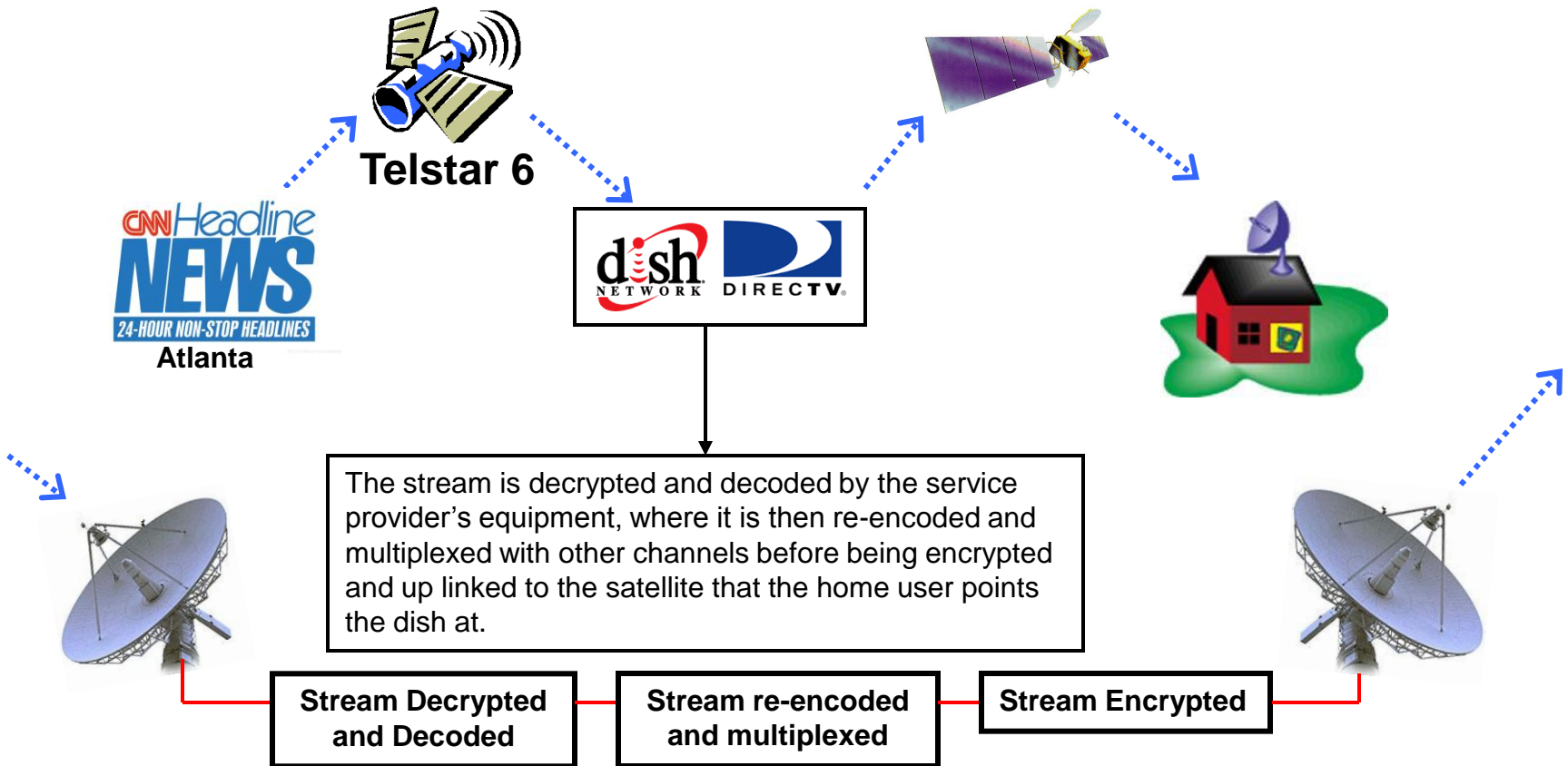
CNN uplinks (sends) their signal to the Telstar 6 satellite located at **93.0° West** on **Transponder 22**. The location of a satellite is given in degrees away from the Greenwich meridian.

This feed has a **Symbol Rate** of 4 **MegaSymbols** per second. The **Forward Error Correction** is set to  $\frac{3}{4}$ . This particular channel feed uses the PowerVu<sup>®</sup> encryption system.

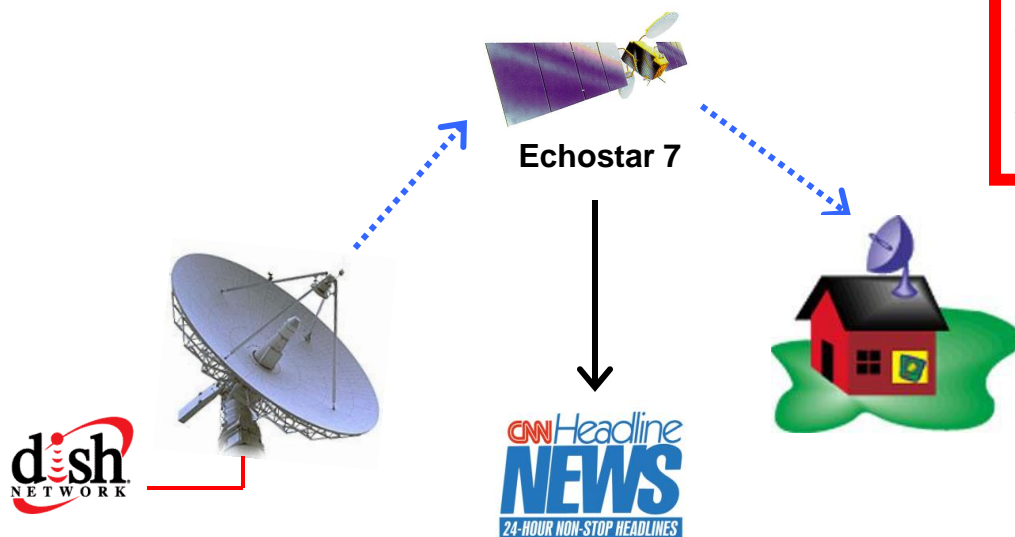
**FEC** – Forward Error Correction. Satellite transponders are rather noisy communications channels are therefore subject to a large number of errors when a signal is sent through them. As a result, Forward Error Correction is used, where the transmitter sends error correction information along with the actual signal so that should errors occur, the receiver can re-generate the bit stream. A FEC of  $\frac{3}{4}$  means that for every 3 bits of real data, there is 1 bit of error correction data.

<b>3 Bits</b>	<b>1 Bit</b>
<b>Stream Data</b>	<b>EC info</b>

# Section 1: Satellite TV Terminology and Broadcast Diagram



# 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.

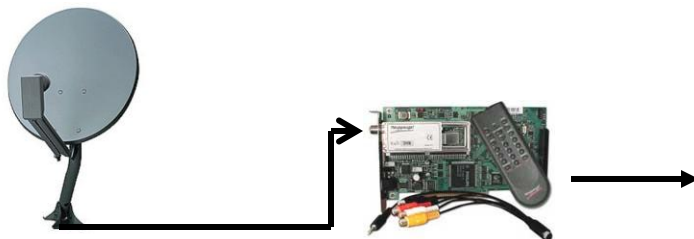
SID – Service ID  
VPID – Video Packet Identifier  
APID – Audio Packet Identifier

Encryption – Nagravision ®  
Stream Type – DVB  
Satellite (for CNN channel) – Echostar 7 (119.0° West)

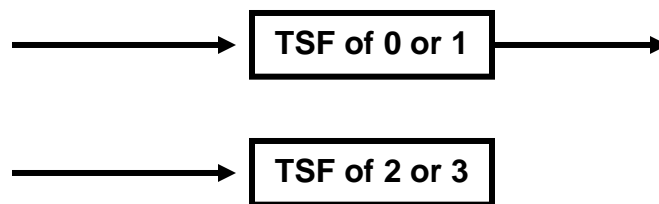
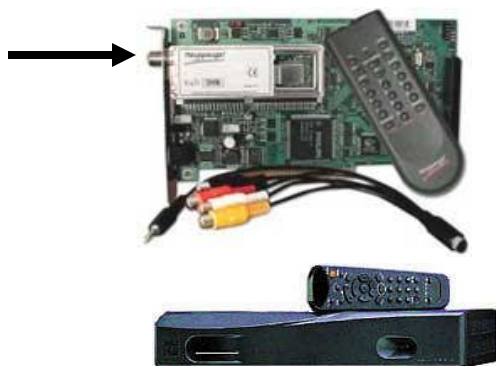
Transponder – 16  
Frequency – 12.443 GHz (DBS Band)  
Symbol Rate – 20000 Ks/s  
FEC – 5/6  
SID - 202  
VPID - 4898  
APID – 4899 (English)



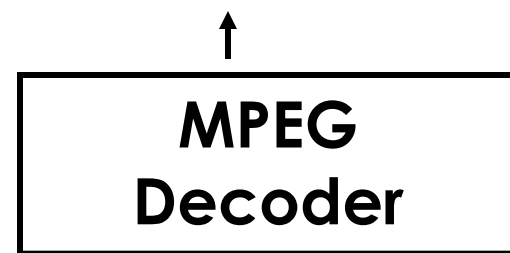
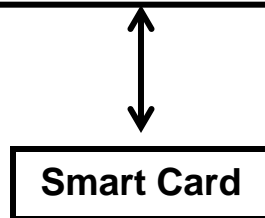
## Section 2: DVB and Conditional Access



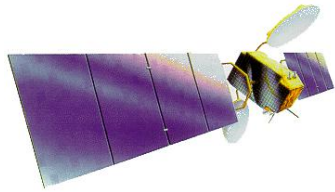
PCI DVB-S cards are able to receive and display DVB MPEG2 satellite signals, such as the FTA channels. With the appropriate hardware CAM module, they are also able to decode subscription TV-services that use the DVB standard.



Conditional Access Module



## FTA (Free to Air) Channels



Telstar 5

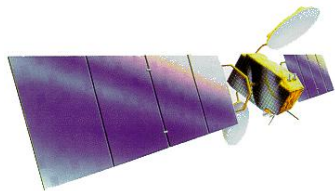
DBS

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 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

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### **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.

## Section 6: Other Information

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Thanks to Rod Hewitt of <http://www.coolsf.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](http://www.geeksyndicate.net)**

### **North American Free To Air Channels**

[http://www.sadoun.com/Sat/Channels/North\\_America\\_Free\\_TV.htm](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>



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