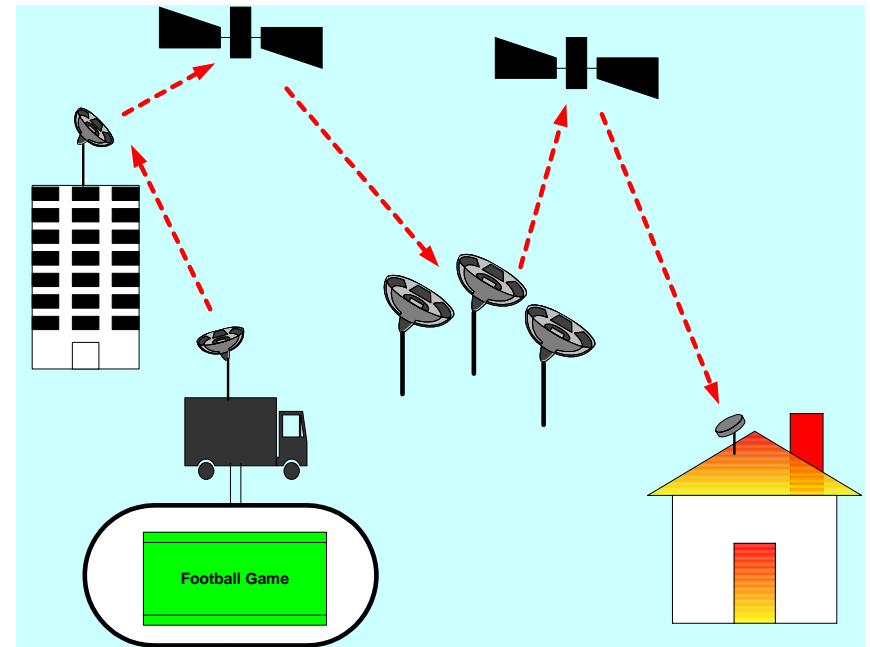


The Nuts and Bolts of Satellite Television

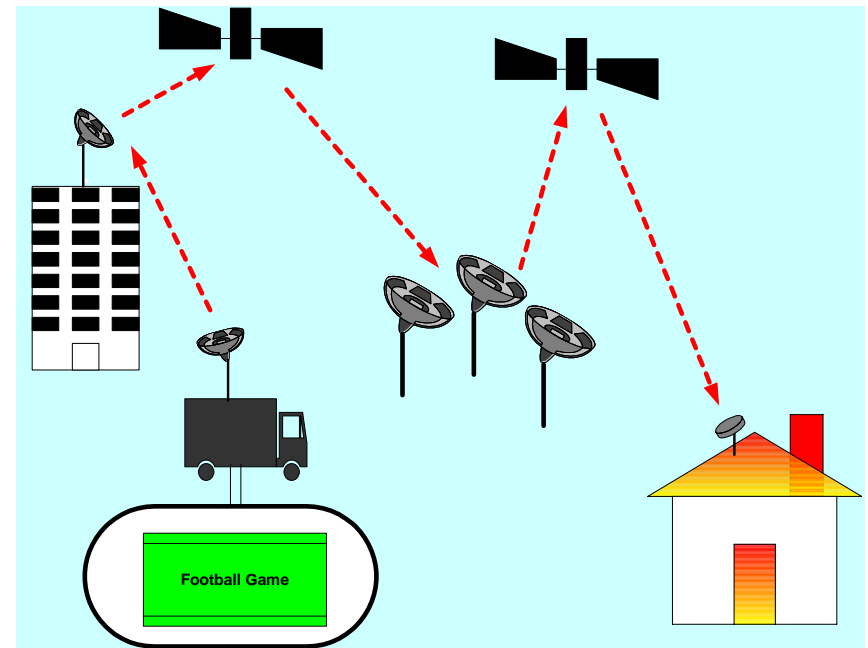
presented to the
Colorado Bar Communications Law Section
by Kevin Cross, Esq.
October 4, 2006

There are two primary types of satellite television – direct broadcast satellite or DBS, and television receive only or TVRO.¹ DBS is a relatively recent development in the world of television distribution and the term DBS can be used to refer to both the communications satellites themselves, and/or the service they deliver. DBS or ‘mini-dish’ systems utilizes the upper portion of the Ku-Band.²



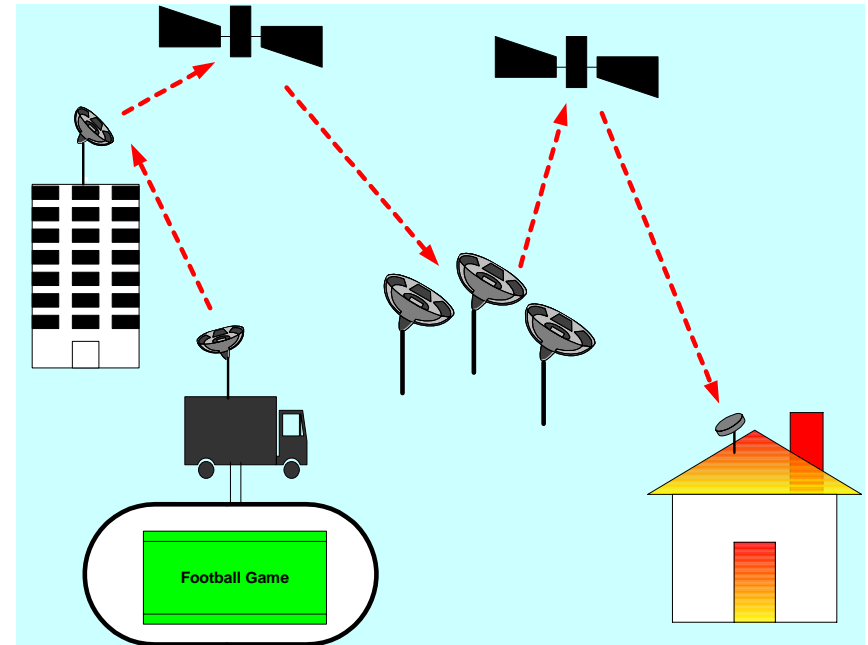
A Bit of History

- The first satellite television signal over North America was relayed from Europe in 1962 (via Telstar).
- The first domestic North American satellite to deliver television services directly to customers was Canada's Anik 1 in 1973.
- Remember the 6 foot dish of the 1980s?

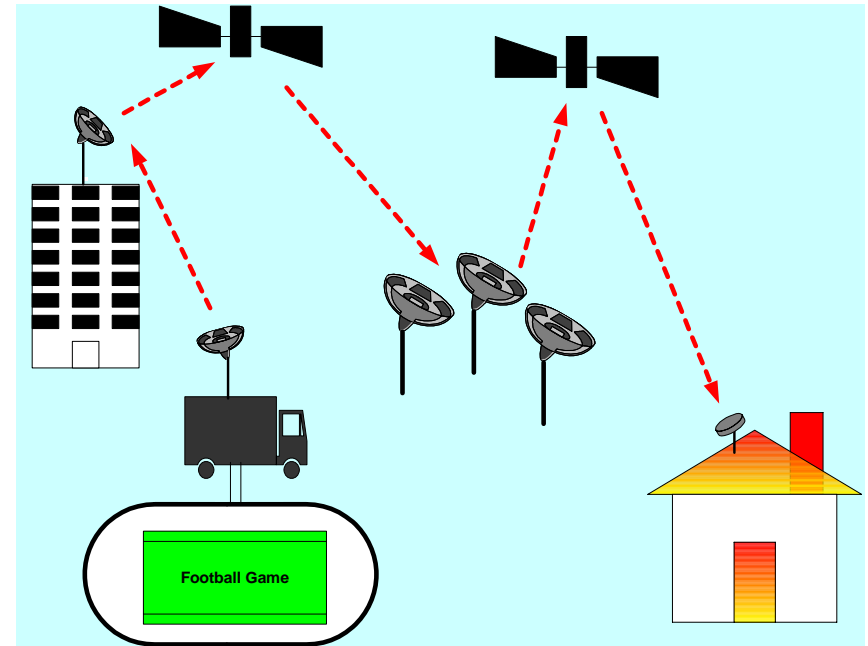


Fast-forward 15-20 Years

- The first commercial DBS service, Sky Television, was launched in 1989 in the United Kingdom.
- DirecTV (then owned by Hughes) became the first high-powered DBS system in N.A. when it went online in 1994.
- Two years later, in 1996, EchoStar's DISH Network went online and to this day remains DirecTV's fiercest competitor. As of today, DirecTV has approximately 15.5MM customers and DISH Network has approximately 12.5MM.

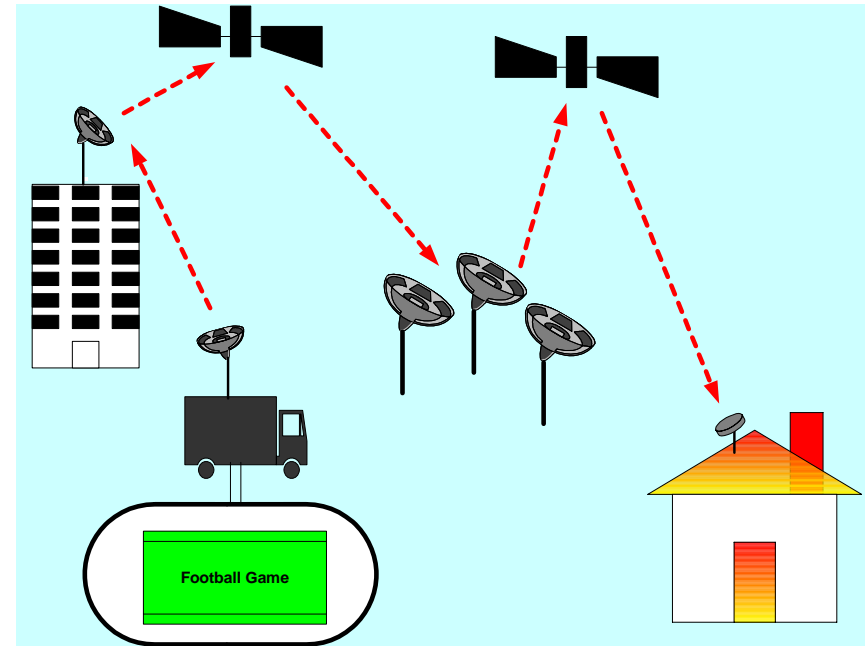


- With a combined subscriber base of over 27MM, DBS providers DirecTV and DISH Network have taken a considerable chunk of Cable operators' market share (nearly 25%), and have thus become the primary competition to cable system operators.

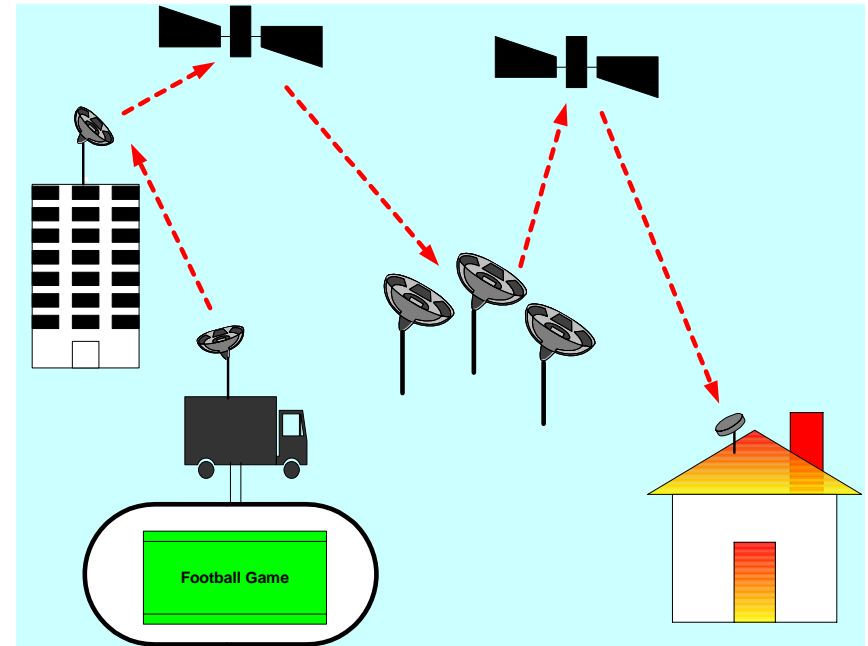


How Did This Happen???

- A question that many a cable exec has surely asked him or herself. There are a number of reasons, including the obvious economic cost/benefit analysis, but there are other, less obvious reasons too. [no need for franchises, no infrastructure required, ability to reach distant markets]

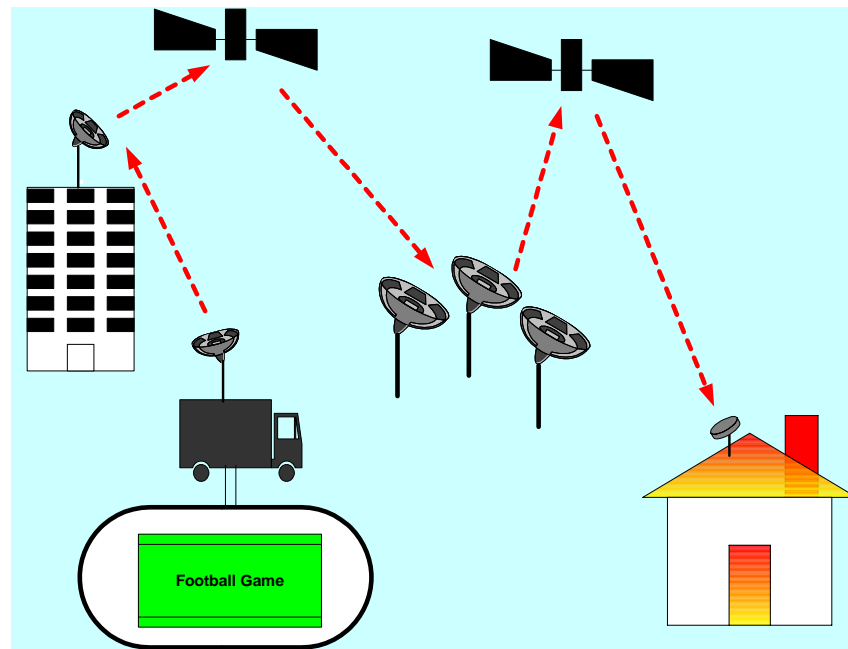


- DOJ and SEC regulators saw the rapidly-growing DBS market share as a barrier to competition and the DOJ successfully sued to block EchoStar's attempted acquisition of DirecTV in 2002. Shortly thereafter, DirecTV was acquired from Hughes by Rupert Murdoch's News Corp., the same entity that owns Sky in the U.K.

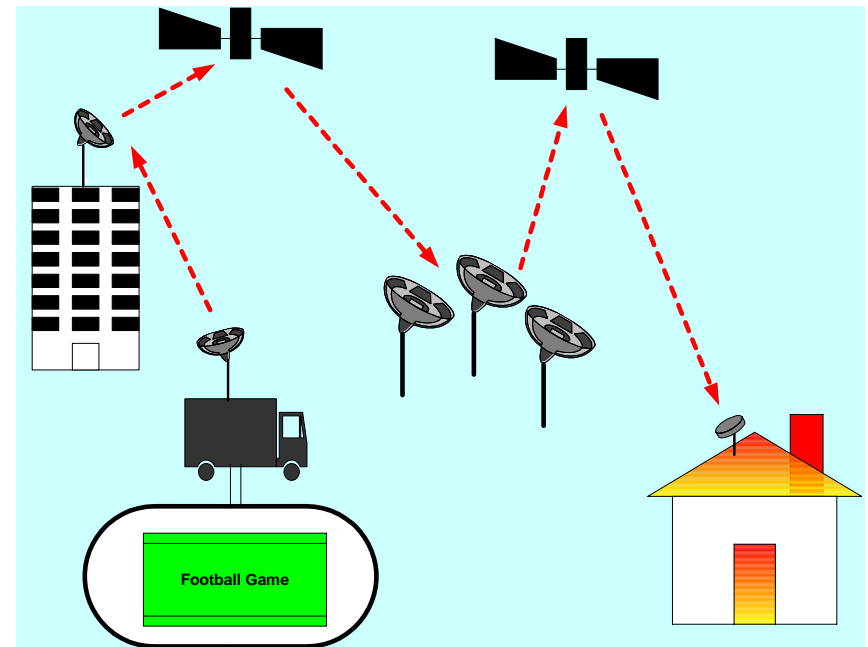


I digress. So you wanna be a DBS provider, eh?

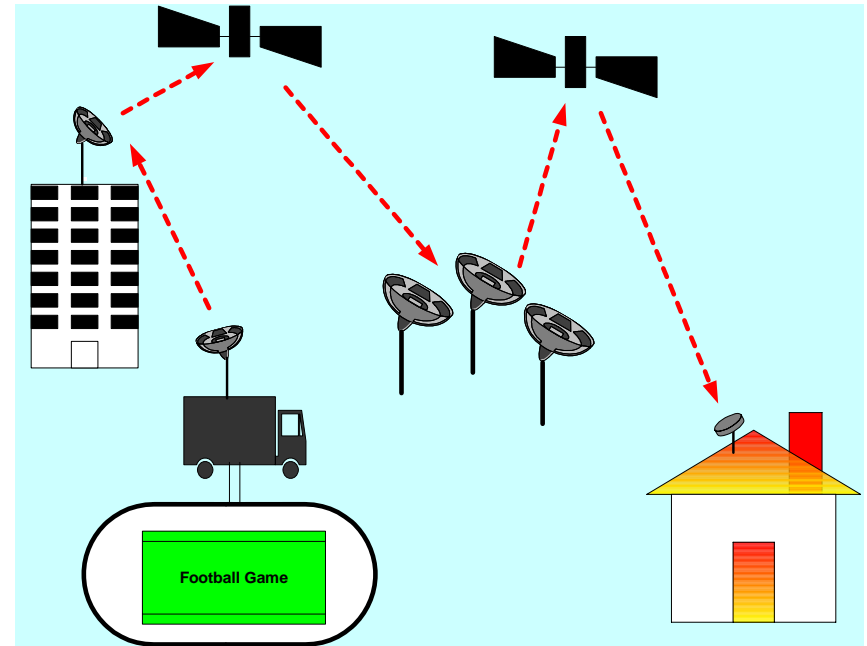
- The 1st and arguably most critical step for any would-be DBS provider is getting the 'bird.' One may simply lease transponder space on a third party's bird, or may construct, launch, own and operate one or a series of birds.



- Scenario 1 requires very little in the way of sunk costs. But, much like leasing apartments all your life, you may look back years later and determine that it would have been more economically advantageous had you purchased a home instead.

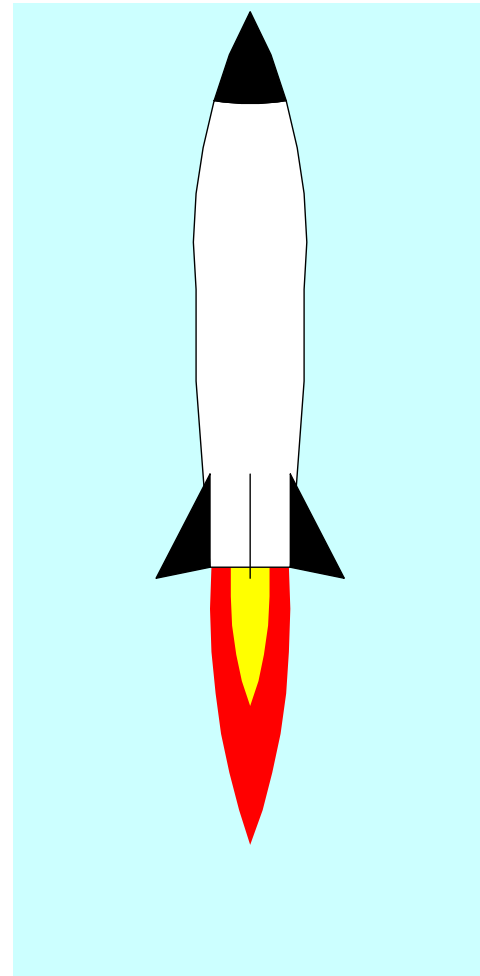


- Scenario 2 is a bit more complicated. To begin with, a would-be DBS provider would have to submit an Application for Satellite Space and Earth Station Authorizations, along with all required fees of course, to the FCC. While the FCC doesn't regulate DBS in the sense that it regulates the networks and even cable (think Howard Stern on Sirius satellite radio), it does control the waves over which DBS providers deliver their ware.

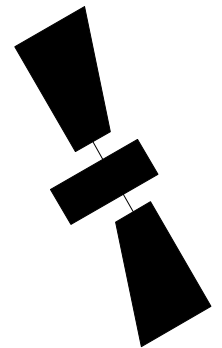


Got your license?

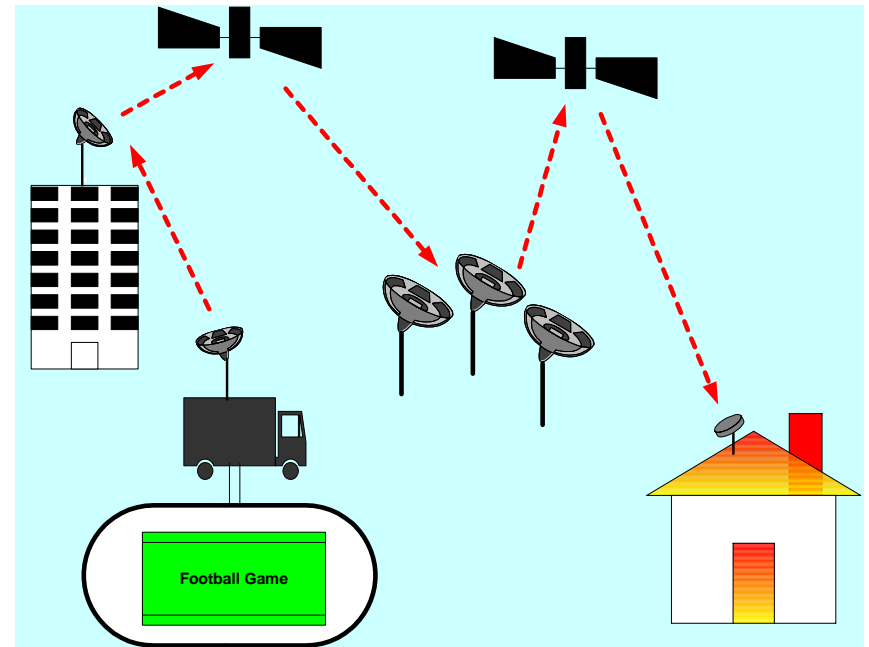
- Good. Now you need an aerospace company to build your satellite and you need a rocket capable of delivering your expensive payload to a somewhat precise orbital location (e.g. 117.3° WL) where it is to be deployed.



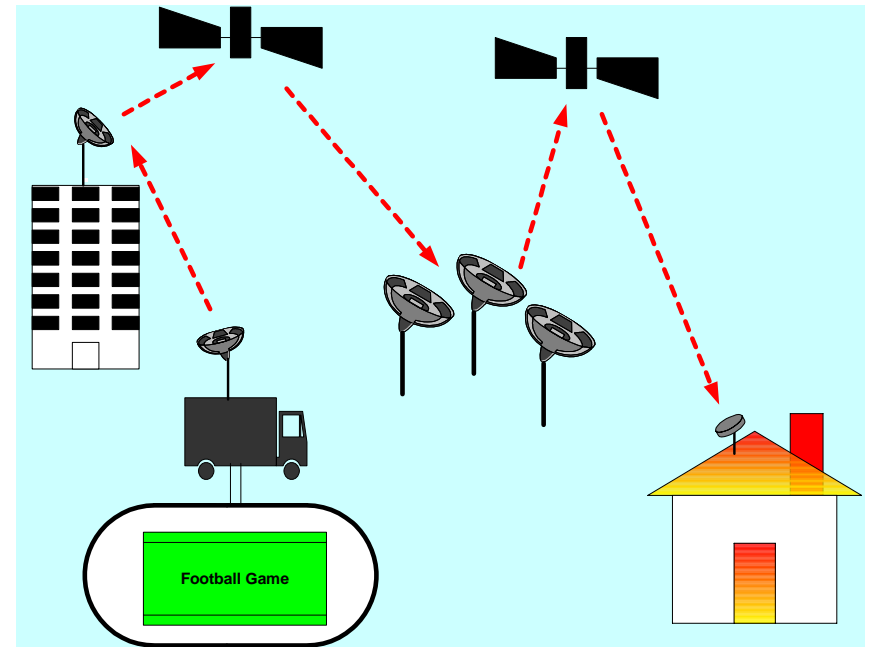
- Most domestic communications satellites orbit the earth in the Clarke Belt. The Clarke Belt is 36,000 kilometers (22,369 miles, give or take) above Earth's surface. This 'belt' is also commonly referred to as a geosynchronous orbit.



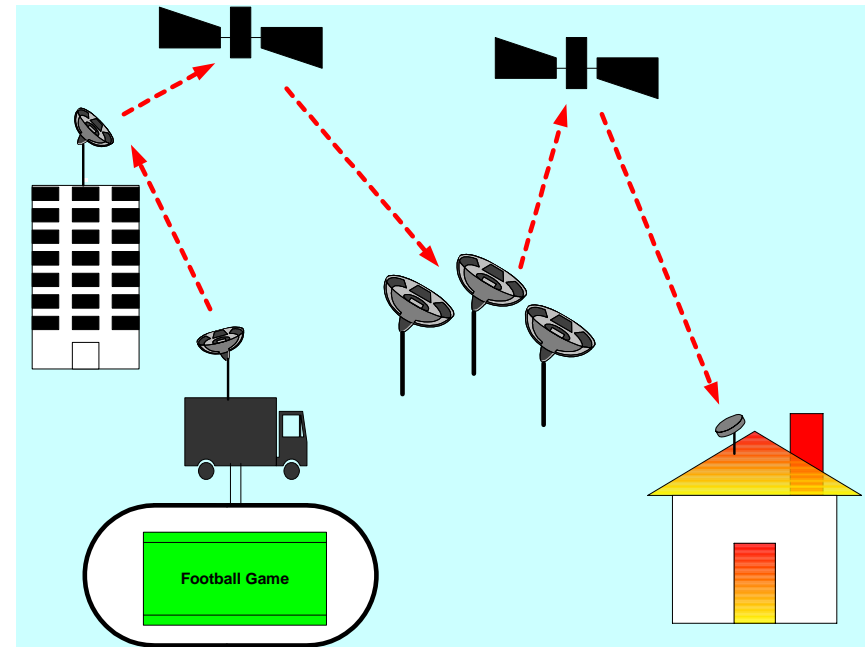
- Keeping a satellite in a geosynchronous orbit and in its orbital slot requires constant monitoring and periodic maneuvering from down here on Earth. Gyroscopes and thrusters permit repositioning when necessary. Fuel is limited and, as a result, so is the lifespan of a commercial communications satellite. Sadly, they are virtually all destined to become space junk.



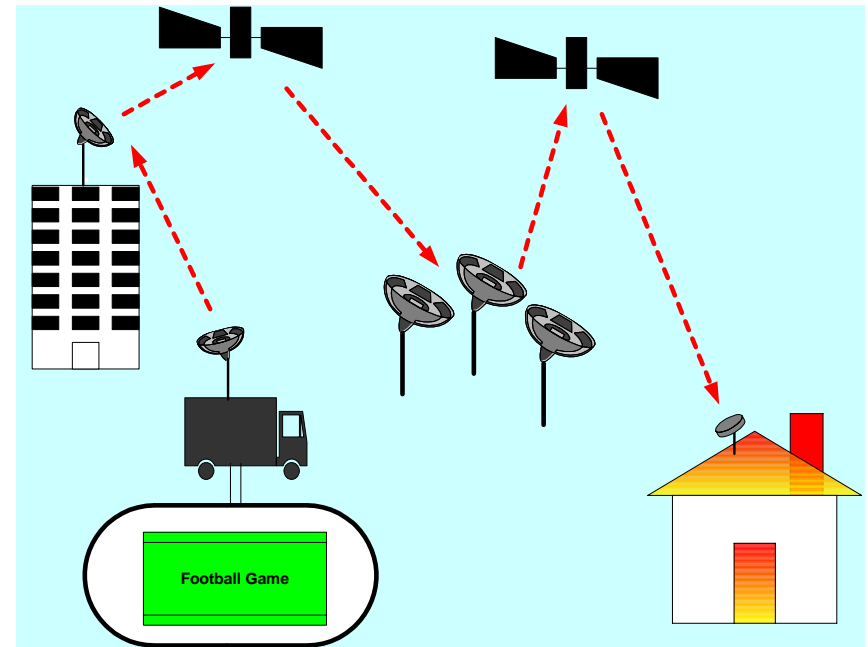
- So you've got a satellite in orbit – now what?
- You need an earth station (commonly known as an uplink facility). Oh yeah, you'll need to acquire some content too.



- The uplink facility provides, among many other things, several key infrastructural requirements – namely, a place where, and means by which, DBS providers can both transmit and receive content via satellite.

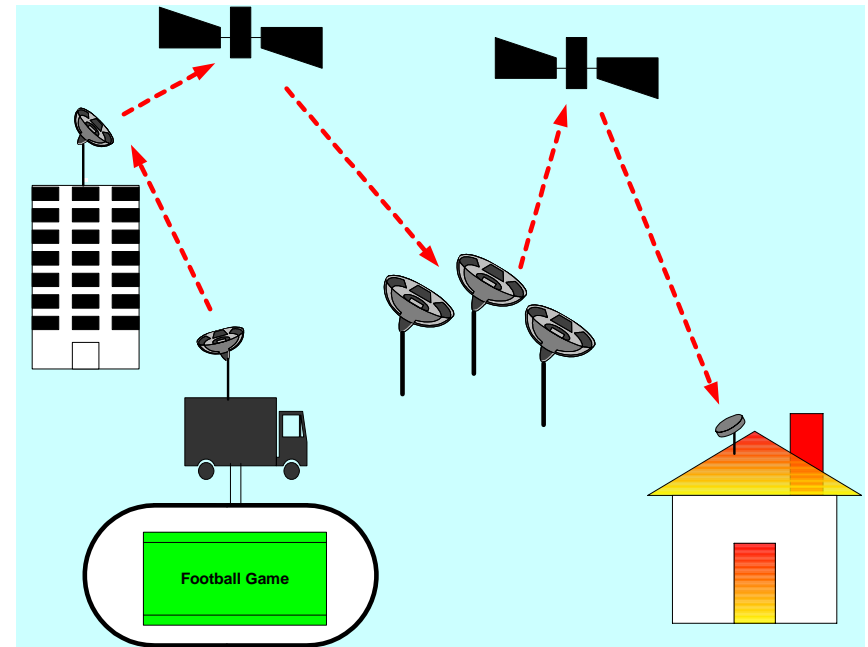


- Satellite television, like most other communications relayed via satellite, starts with a transmitting antenna located at an uplink facility. Uplink satellite dishes are literally pointed toward the satellite that they're transmitting to, and are typically very large – in some cases as large as 60 feet in diameter.

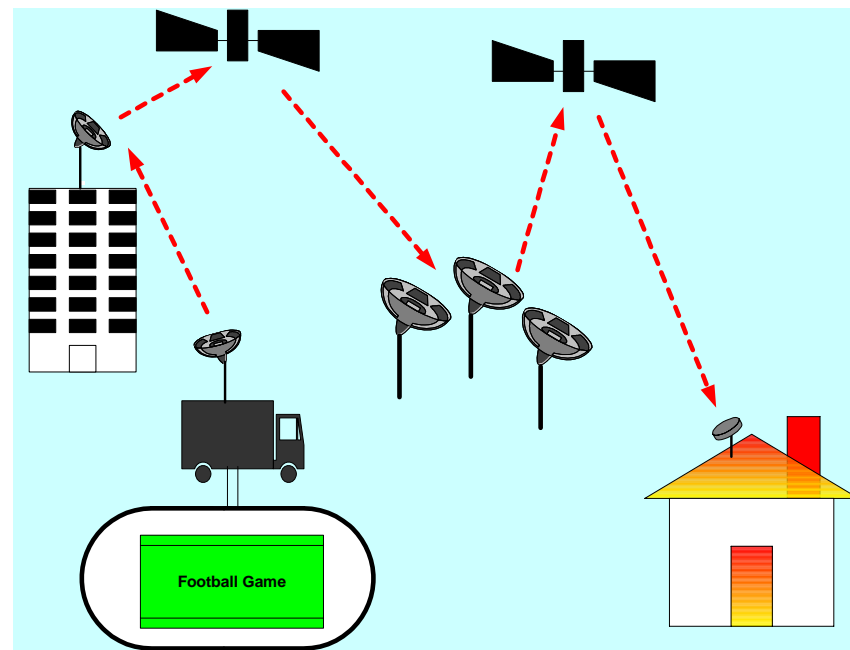


What goes up, must come down.

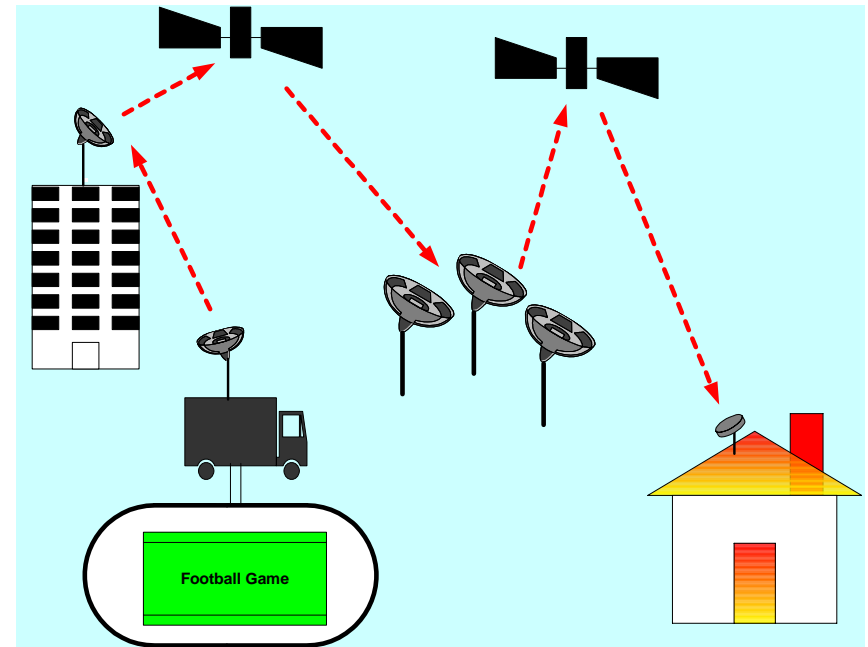
- From there, the signal is transmitted to transponders on board the satellite that in turn retransmit the signal back towards Earth at a different frequency.



- The satellite signal, rather weak after traveling tens of thousands of miles through space, is collected by a parabolic receiving dish, which reflects the weak signal to the dish's focal point. The signal is then down-converted to a lower frequency band and is amplified by low-noise block feedhorn downconverter or LNBF.
- Note: the parabolic receiving dish is the 31" or so dish you see mounted outside so many homes around Denver.

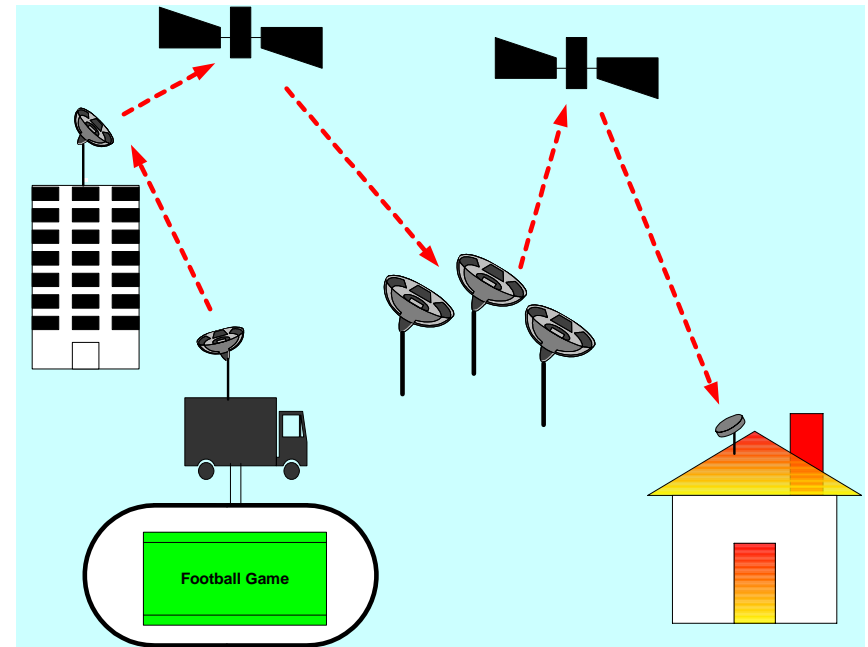


- The signal, now amplified, travels to a satellite receive device sometimes called an integrated receive device, or IRD, but more commonly known as a set-top box.



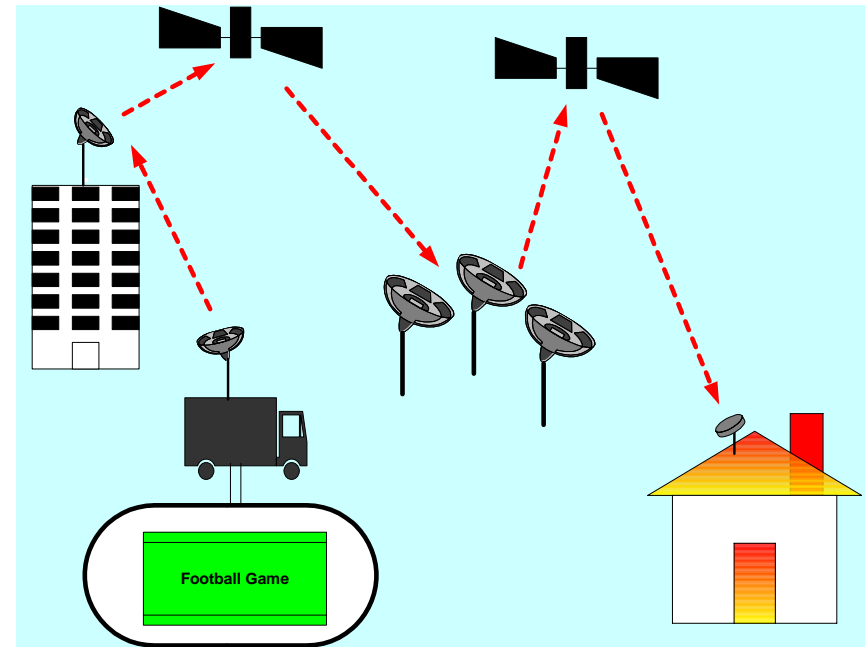
The Final Stop

- The satellite signal is sent from the parabolic dish and LNBF mounted on the side of the building to a set-top box, via coaxial cable, where it is converted by a local oscillator to the L-Band³ range of frequencies (approximately). Often proprietary hardware and software within the set-top box then decrypt the signal, once again converting the satellite signal to a frequency that, in this final stop for the signal, can be received and displayed by a television set.



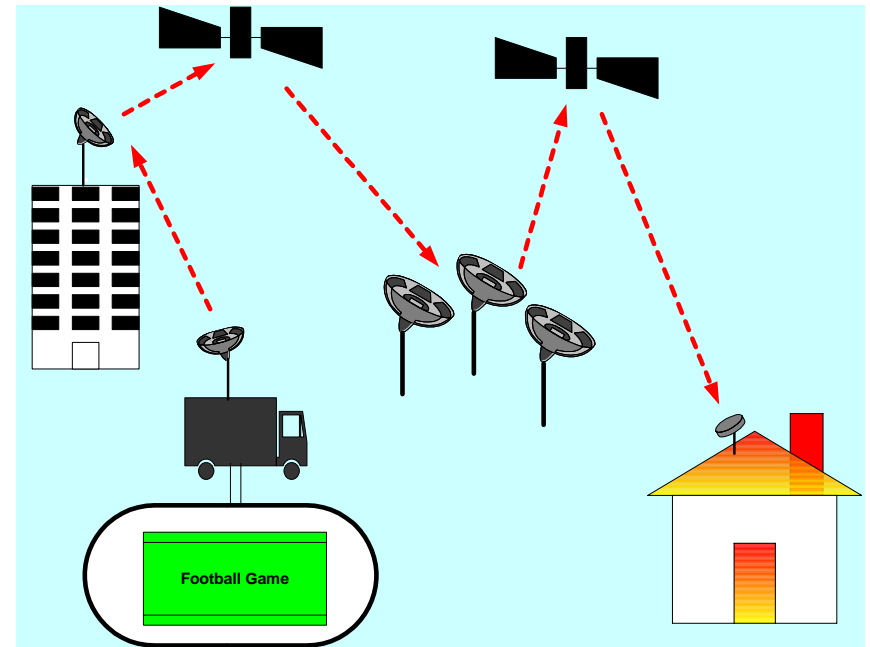
DBS: Today

- 2006 saw the advent of the MPEG-4 set-top box. HD or high definition TV, it is safe to say, is rapidly gaining popularity at both the consumer and programmer levels. Sales of HD sets are up and programmers have embraced this new format with vigor. This is widely seen as an advantage that DBS providers have over cable because cable has limited bandwidth (size and speed) to move content from point A to point B.



DBS: The Future

- But cable has one up on DBS too. Cable providers and Tel-Co.'s are forming strategic alliances at an astonishing pace (if not acquiring one another), quickly allowing them to offer the triple play, among other so-called bundled services. Satellite telephone is still cost prohibitive to most, but Moore's Law suggests these costs will drop dramatically while the quality of the technology increases. And, in any event, Wi-Fi and similar wireless solution providers present interesting strategic alliance possibilities for DBS providers that could keep DBS competitively relevant for years to come.



Glossary

- ¹ **TVRO** refers to satellite television reception equipment that is based primarily on open standards equipment. This contrasts sharply with DBS, which is a completely closed system that uses proprietary reception equipment. TVRO is often referred to a 'big dish' satellite. TVRO systems are designed to receive analog satellite signals from both C-Band and Ku-Band satellite television or audio signals.
- ² **Ku-Band** is that portion of the electromagnetic spectrum in the 12 GHz to 14 GHz range. Ku-Band is commonly used for satellites operating at 14 GHz in uplink and 11 GHz in downlink for purposes of 'man-on-the-street' interviews and other situations requiring a small, portable dish; and is also that portion of the spectrum most commonly utilized by DBS systems.
- ³ **L-Band** is that portion of the electromagnetic spectrum in the low microwave/millimeter range – approximately 0.39 GHz to 1.55 GHz.

QUESTIONS?