

**Westminster eForum  
After Whitehaven - Next  
Steps for the Digital  
Dividend Review**



# Satellite Delivery of High Definition Digital Television

*Can satellite make DTT future proof?*

Presentation by Dave Robson - January 2008

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-V8-

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# Astrium is a leading provider of satellites



Telecommunications programmes are 70% of business

- Fixed services unicast/multicast, broadcast
- Mobile services
- Telephony, audio, video and data
- Direct-to-home TV and digital data
- Internet and broadband multimedia



**Inmarsat-4**

**Anik F3**

**Astra 1M**

**Hot Bird 8, 9, 10**

**Nimiq-4**

**Hylas**

**BADR-4, 6**

**Eutelsat W2M**

**Alphabus**

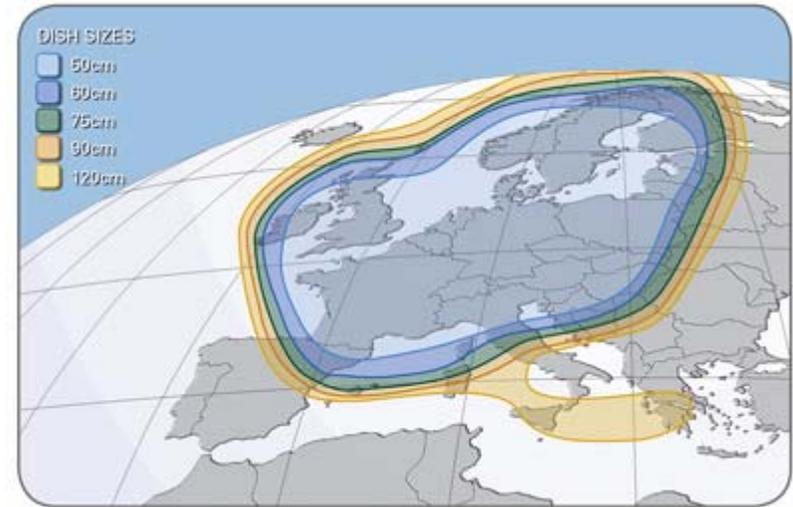
**SkyNet 5**

**KaSAT**



# Today DTH provides greater choice and geographic coverage than DTT at lower cost

- Satellite TV transmissions in Ku band are line of sight
- The edge of coverage is clearly defined and predictable but is slightly larger if a user selects a larger dish.
- Polarisation reuse is standard
- Frequency reuse currently occurs between continents but could be provided locally if there is a demand
- A single modern communications satellite can carry over 300 digital TV channels
- Satellites for TV are backed up by spares and have anecdotally higher availability than terrestrial transmitters



# Technology Neutral?- Spot the Illegally sited antenna!



**This house is situated high in the Orton Fells on Wainwright's Coast to Coast Walk  
Such Areas of Outstanding National Beauty do need to be protected from unsightly  
development**

**The Sky dish contravenes the planning recommendations.**

**The terrestrial TV aerial is fine as it is a necessary infrastructure to receive PSB**

# Satellite technology – in orbit tomorrow?

- Satellite antenna size increasing by x4 per decade
- Largest unfurlable antenna available today is 25m aperture
- Would produce Ku band beams over UK similar in size to terrestrial TV transmitters
- Frequency reuse by spatial isolation between Wexford, Milford Haven, Swansea, Bristol, Southampton, Oxford, Westminster, Clacton, Hastings, Calais etc.
- About 500 local channels per beam
  - Less than 1w RF per digital channel
  - User accesses beams from multiple orbital slots providing huge capacity



# Nevertheless DTT is preferred over Satellite DTH



Quote from Final Report of Digital Broadcasting Migration Working Group on The Proposed Switchover from Analogue Broadcasting to Digital Broadcasting in South Africa

- In a large country such as South Africa, widespread digital television coverage can more easily and cost effectively ....be achieved by means of satellite DTH than by terrestrial DTT platforms. Satellite DTH has the added advantage of being able to broadcast more content than terrestrial DTT.
- It was conceded that cost is only one factor. Factors in favour of DTT include
  - Greater robustness than DTH where there is a risk of catastrophic satellite failure
  - DTT provides a greater level of local content
  - DTH can be blocked by local clutter
  - Indoor reception is possible with DTT

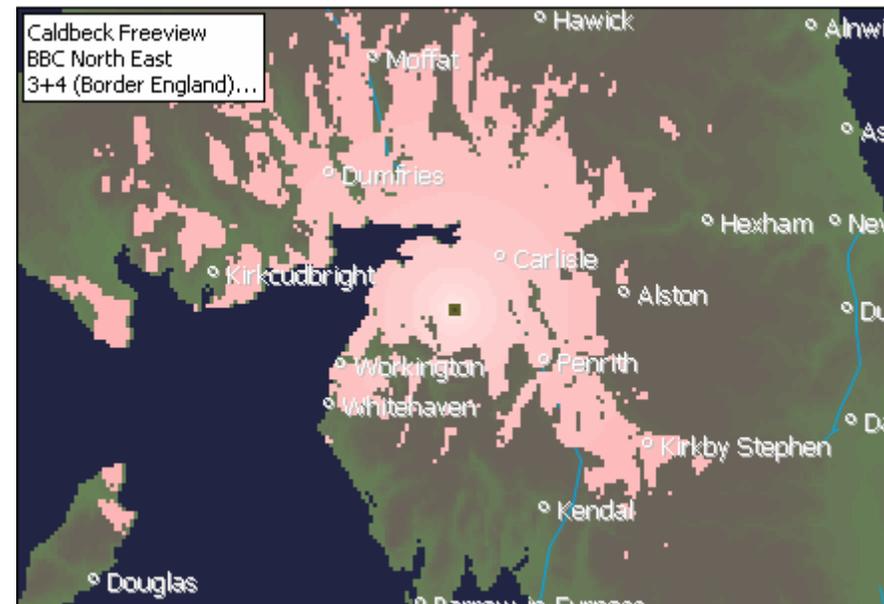
# There is a risk of catastrophic satellite failure!

- This 580ft mast in Cambridgeshire caught fire in 2004 and collapsed onto transmitter buildings
- 22 transmitters have collapsed world wide since 2000
- Taking out telephony and emergency services as well as TV
- Reasons for collapses include
  - Icing, Instability during construction, Guy wire failure, Guy anchor failure, Aircraft collision, Fire, Falling trees, Storm, Tornado, Failure during maintenance, Failure during upgrade to HDTV, Helicopter collision, Sabotage, Terrorism, Air raid, Material failure, Snowstorm, Hurricane, Earthquake



# Terrestrial Systems Enhance Local Content

- At over 300m the high-power Caldbeck transmitter is one of the tallest in the UK
- Its coverage bears no relation to a requirement based on cultural identity, language or political boundary
- Many users are shadowed by hills and clutter, requiring expensive fill in repeaters
- Many other people receive signals where geography, diffraction and multipath effects permit



# DTT can provide service indoors



- **When this close to a terrestrial transmitter!**
  - **but this is not guaranteed everywhere**
- **This is a property of UHF transmission characteristics**
- **UHF can support multiple user terminals on a broadband wireless domestic or community extension from the Point of Presence**
- **Potentially increasing satellite availability to close to 100% from reported 98%**

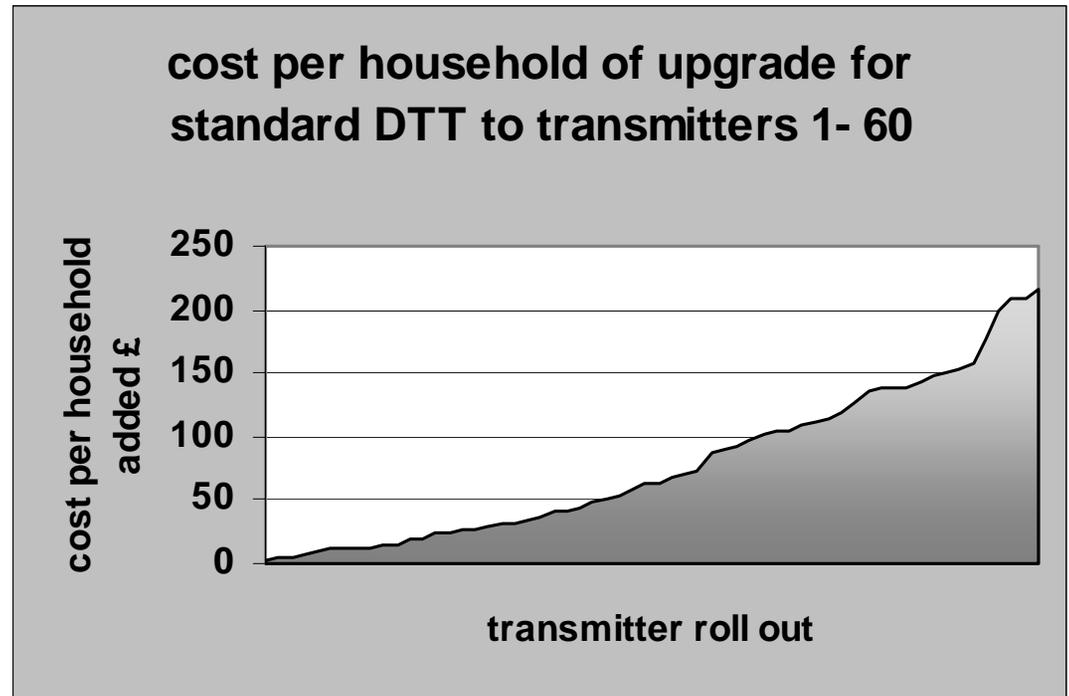
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# DTT roll-out costs escalate with coverage



- 80 transmitters are required to cover 90% (~ 20M) households
- Astrium calculates capital cost of Caldbeck upgrade at £357 per household actually using it
- Installed cost of Freesat is £150

*source - BBC*

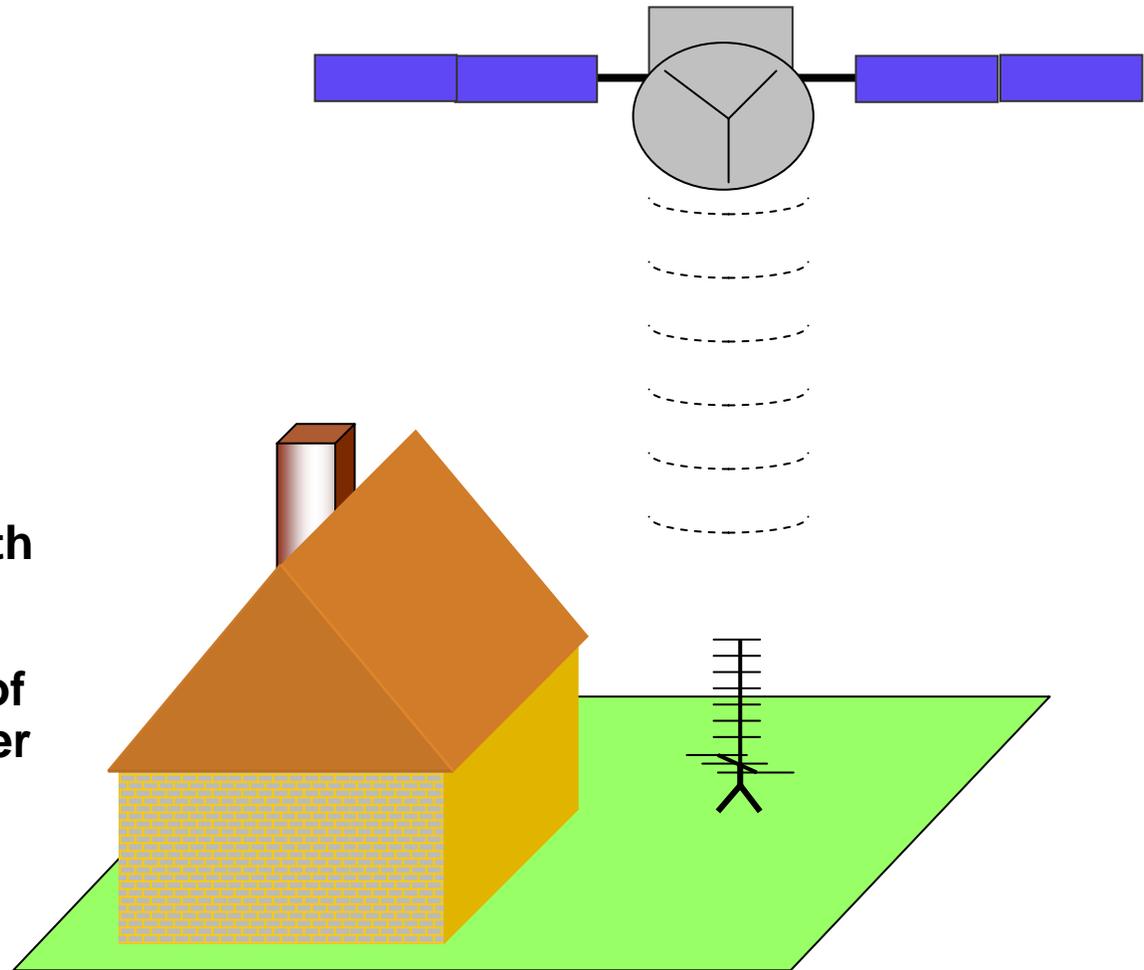


**Not forgetting the £10M p.a. cost of electricity to power the network!**

**Which doubles with DVBT2 plan for HDTV !**

# With Access to UHF Satellite DTT could provide HDTV to a simple Yagi

- TV signal arrives from point high in the sky
  - GEO in Africa
  - HEO in Europe
- Aerial can be low on the ground
- Uninterrupted signal path
- Sat. DTT combines the low infrastructure cost of satellite with the low user cost of DTT
- Could be designed to work on no interference basis with SD DTT



**Satellite based broadcasting  
Is future proof as it is able to carry any signal  
format and is green (runs on sunshine)**

**Universal coverage  
improves social development and cohesion**

**Satellite based broadcasting  
achieves universal coverage at least cost**