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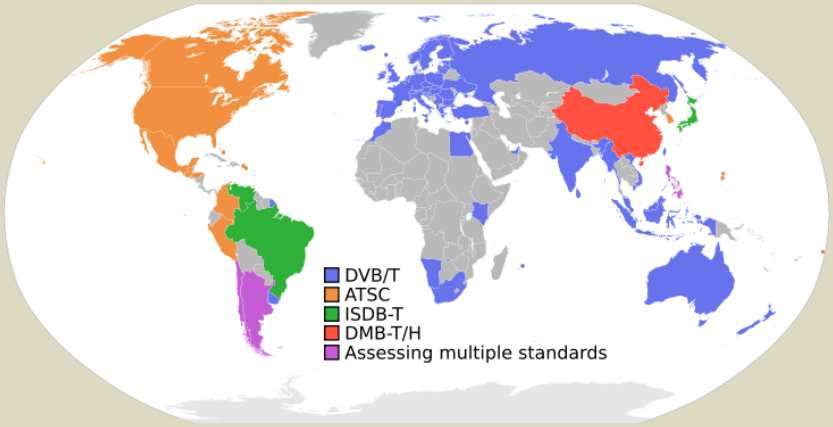
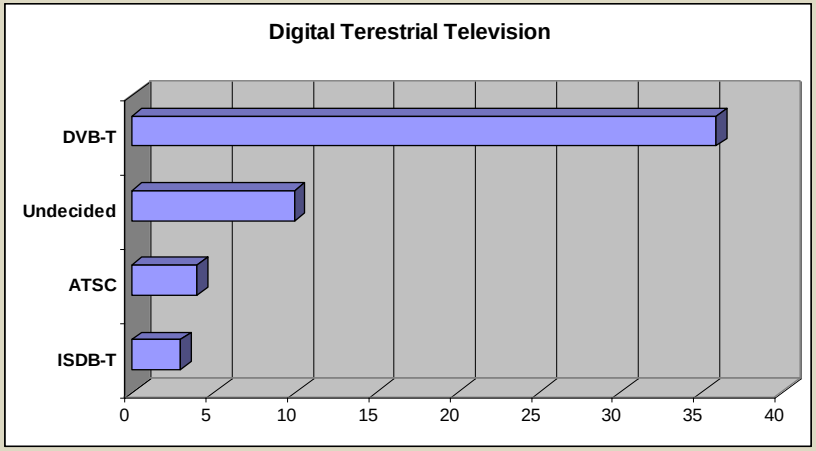
Using Satellite to provide Ubiquitous coverage for DVB-T/H content Distribution

New services – new tomorrow

- Digital Terrestrial Television (DTT)
  - DTT is the means of distributing television and radio programs wirelessly to the homes from a number of transmission towers and repeaters.
  - A worldwide phenomena which will improve television services for consumers and lead to greater revenue generating opportunities for carriers.
  - Over 50 networks deployed and 60 million receivers deployed.





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What is DTT?

- **Digital Terrestrial Television**
  - In analog television, a typically 8Mhz frequency range carried a single channel, whereas DTT allows for higher modulation and thereby the ability to carry more content in the same range (ex. 32Mbps with 64QAM).
  - Digital content (i.e Program Streams) are multiplexed into MPEG-Transport Streams (TS) and carried to the subscriber homes over the radio frequencies.
  - Broadcasters can opt for Multiple Frequency Networks (MFN) vs Single Frequency Networks (SFN). Tower and traffic synchronization considerations are a challenge.
  - **Support for SFN is key to early distribution.**

Operator Challenges

- DTT distribution challenges
  - Speed of deployment of a new network. Most countries face “analog shut-down” legislated due dates (Brazil date is July 2016, USA is Feb 2009)
  - CAPEX and OPEX of rolling out a new network
  - Remote monitoring, control and security of content
  - Integrating local content with universally distributed content.
  - Ensuring synchronization of content.

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New services – new tomorrow

- Mobile TV
  - Mobile TV is the means of distributing television content wirelessly to handheld or mobile devices.
  - Still in its infancy, 120 plus commercially launched Mobile TV services worldwide
  - Cellular operating are targeting Mobile TV as a means to increase ARPU.
  - Consumers enjoy the freedoms of TV on the move and/or on demand.
  - Generally, two modes of delivery are used
    1. Two way cellular services available across high capacity 3g (WCDMA/HSPA) networks
    2. Broadcast services: such as DVB-H, MediaFlo, 1seg, etc

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What is Mobile TV?

- **Mobile TV**
  - All standards used, including DVB-H and -SH, MediaFLO, CMMB and T-DMB support digital content multiplexed into MPEG TS and use multi-carrier digital modulation (COFDM) and the broadcast transmitters work in Single Frequency Network mode.
  - This means they all transmit on the same frequency (channel) in order to use the spectrum efficiently as well as to allow the addition of gap-fillers and transceivers to guarantee good indoor coverage.
  - This mode of operation requires all towers to transmit exactly the same information in a fully synchronized way in order to prevent interference between two adjacent towers.
  - Transport can be MPEG or IP.

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Operator Challenges

- Mobile TV distribution challenges (same as DTT)
  - Speed of deployment of a new network.
  - Business model: specifically CAPEX/OPEX vs new ARPU.
  - Remote monitoring, control and security of content
  - Ensuring synchronization of content.

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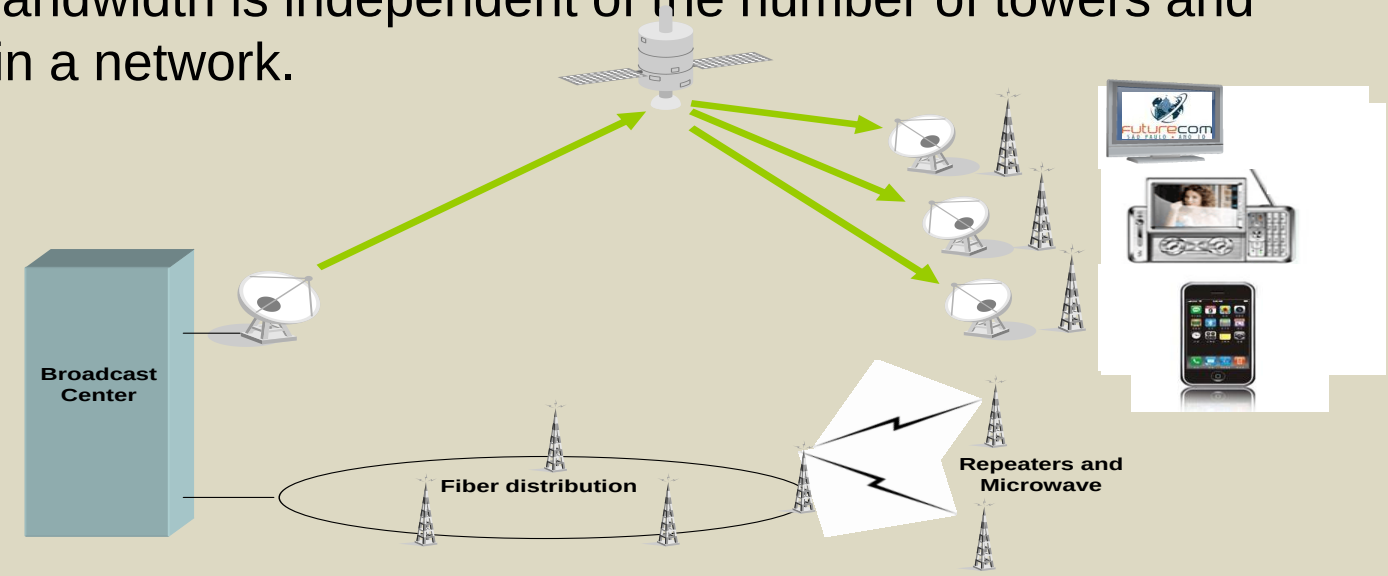
Why Satellite?

- Satellite has long been an effective means to distributing digital content as demonstrated from the overwhelming success of Direct to Home (DTH) services worldwide.
- Satellites ubiquitous coverage, reach and quick deployment, make it an ideal alternative to fixed terrestrial infrastructure for DTT or Broadcast Mobile TV content.
- Satellite bandwidth is independent of the number of towers and repeaters in a network.



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OPEX vs CAPEX

- CAPEX
  - Deploying content country wide across satellite is more cost effective that building Fiber or microwave infrastructure to support these services.
  - Mature **DVB-S2** solutions are available for transporting digital content over satellite.

- OPEX
  - Broadcast carrier stays the same, regardless of towers and repeaters in the network.
  - Mature **DVB-S2** solutions reduce total transponder usage.

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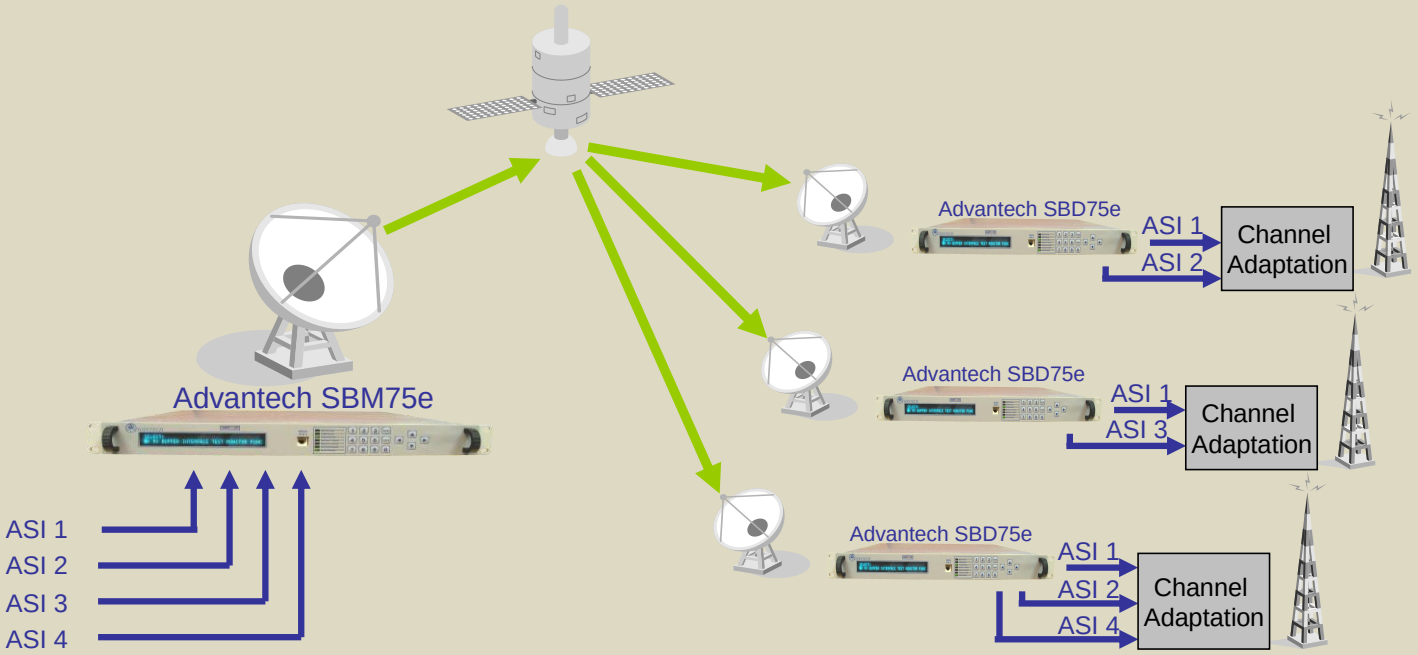
The DVB-S2 advantage

- The DVB-S2 advantage:
- DVB-S2 is at least 30% more efficient under similar channel conditions, than DVB-S. This implies,
  - lower roll-out CAPEX through lower power requirements and smaller dishes or;
  - lower OPEX through increased channel capacity for equivalent power to traditional DVB-S.
- DVB-S2 also provides additional broadcast class features which further improve the efficiencies vs DVB-S. These include:
  - ISI Multiplexing
  - Variable Coding Modulation (VCM)
  - BISS Encryption

ISI Broadband Multiplexing

- ISI Broadband Multiplexing:
  - When operating in a multiple ASI environment each transport stream (TS) can be tagged with an Input Stream Identifier (ISI) feature of the DVB-S2 technology.
  - The ISI label allows the demodulator to extract individual or multiple TS from a multiplex of TS in a given VCM carrier.



ISI Broadband Multiplexing/cont

- Single carrier vs multiple carriers:

WITH DVB-S

- 2 DVB-T MPEG TS at 31.7Mbps (QPSK 7/8 EbNo=6.4 RO=0.35)

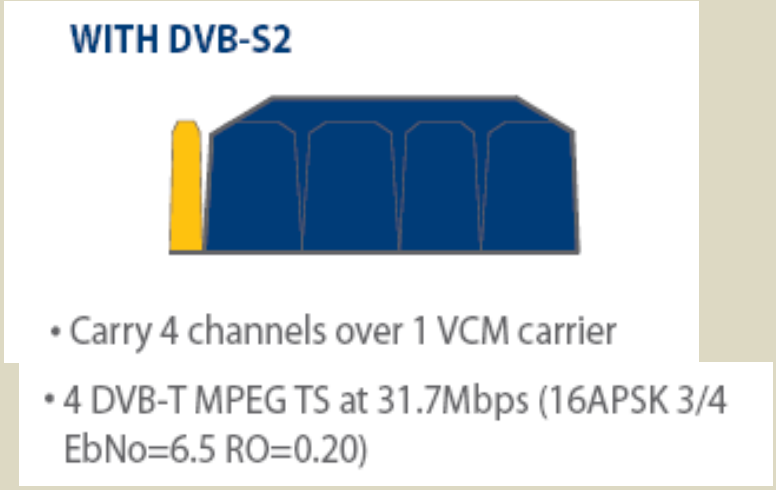
WITH DVB-S2

- Carry 4 channels over 1 VCM carrier
- 4 DVB-T MPEG TS at 31.7Mbps (16APSK 3/4 EbNo=6.5 RO=0.20)

  - Power savings can also be made using only one DVB-S2 VCM carrier for multiple streams as opposed to using DVB-S or DVB-S2 CCM
  - Using a single carrier for the transmission of multiple transport streams means that the RF can be operated at power nearer to the saturation point without compromising inter-modulation distortion performance

VCM Stream Multiplexing

- DVB-S2 VCM Stream Multiplexing:
  - Variable Coding and Modulation can be used to apply different modulation and coding combinations to separate streams in a multiple ASI/Transport stream (TS) environment.
  - Local streams can occupy one TS and be deployed with higher modcod to minimize transponder usage.
  - National TS streams would be deployed at lower modcom providing greater protection.



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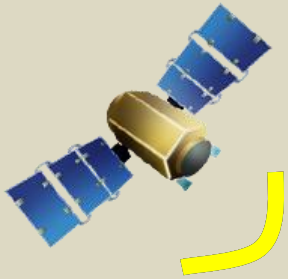
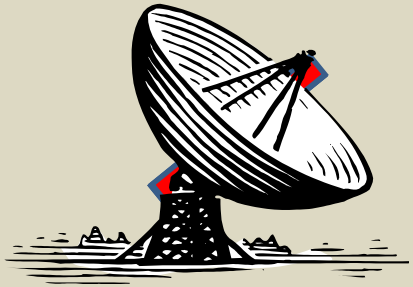
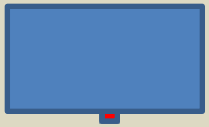
VCM operation







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BISS Encryption

- BISS Encryption:
  - Digital content is an valuable commodity requiring utmost safeguards to protect against illegal theft.
  - BISS, developed by the European Broadcasting Union and a consortium of hardware manufacturers, ensures interoperable security and scrambling to TS broadcasts.
  - BISS is based on Common Scrambling Algorithm (CSA), and uses shared "session word" or “encrypted session word” which must be matched at both the modulator and demodulator to allow for the reception of the broadcast.
  - BISS may be applied on selected TS packets or across all TS packets, meeting broadcaster conditional access requirements.

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Support for SFN

- Timing for Single Frequency Networks is very tight required precise control of delivery of content.
- Advantech supports ISSY time stamping allowing all sites to maintain tight synchronization to a single source.

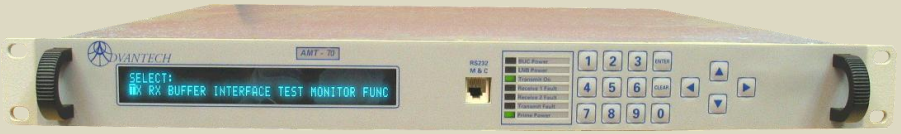
Advantech Wireless solutions

- Advantech SBM75e: Broadcast modulator designed for the broadcasting of digital content and/or transmission of high-speed data (IP) over industry standard Digital Video Broadcasting over Satellite (DVB-S/S2).

  - Integral ISI multiplexing with up to 8 ASI inputs
  - Pre-distortion Firmware upgrade available Q1/2009
  - Highest throughput BISS encryption
  - NCR time stamping for MPEG TS
  - Multi PCR streams

Advantech Wireless solutions

- Advantech SBD75e: DVB-S/S2 Broadcast Receiver is designed for the reception and forwarding of digital content and/or transmission of high-speed data (IP) over industry standard Digital Video Broadcasting over Satellite (DVB-S/S2).



- Up to 4 DVB ASI ports per demod (up to two demods per chassis)
- Linear Equaliser mitigates transponder amplitude and groupp delay variation.
- Phase correction (when pilots enabled) estimate and correct for phase noise at higher mods.
- Built in analyser for ease of install

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No forklift upgrades - Feature Keys

- Modulator and demod are fully key upgradeable
  - Feature0100 : Modulator/Demodulator Bitfield key
  - Feature0101 : IESS-308/9 BPSK/QPSK/OQPSK
  - Feature0102 : IESS-308/9 with RS + Viterbi
  - Feature0103 : IESS-310 8PSK 2/3
  - Feature0104 : TPC QPSK/8PSK
  - Feature0105 : TPC 16QAM
  - Feature0106 : DVB-S Coding
  - Feature0107 : DVB-DSNG Coding 8PSK
  - Feature0108 : DVB-DSNG Coding 16QAM
  - Feature0109 : DVB-S2 Coding QPSK/8PSK
  - Feature0110 : DVB-S2 Coding QPSK/8PSK/16APSK
  - Feature0111 : DVB-S2 Coding QPSK/8PSK/16APSK/32APSK
  - Feature0112 : DVB-S2 Coding 32APSK/64QAM
  - Feature0113 : ACM/VCM
  - Feature0114 : BISS Decoding mode
  - Feature0115 : Maximum speed grade
  - Feature0116 : BISS Encoding mode
  - Feature0117 : Demodulator Analyser

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Conclusion

- Satellite is the solution for supporting country wide DTT and Mobile TV broadcast content distribution.
- DVB-S2 is an enabling technology for cost effective deployment of these new services.
- Advantech Wireless can be your partner is rolling out industry leading DVB-S2 content distribution networks supporting DTT or Mobile TV.