Implementing DVB-RCS With DVB-S2, ACM

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What is DVB-S2?

DVB-S2 is the “second generation” DVB system for broadband satellite services.

- Broadcast Applications

- Interactive applications.
  - Including rate adaptation ACM for corporate and consumer applications.

- Professional systems
  - DSNG.
DVB-S2, new standard for high capacity forward link over satellite
Cost improvements from DVB-S to DVB-S2

For the service provider:

• 25-30% more capacity and chargeable bits/s for same cost.
  • Same satellite power and bandwidth.
  • Same code rate and modulation to all users.
  • More efficient handling IP packets.

• Up to 2.5 times more capacity and chargeable bits/s for same cost.
  • Same satellite power and bandwidth.
  • Variable code rate and modulation to all users.
Better service quality can be offered.

Challenges with rain fading at Ku-band will be highly reduced.

- Better Forward Error Correction and lower coding rates (1/4).
- Very important in South East Asia and parts of Latin America.

DVB-S2 are integrated with DVB-RCS.
- Adaptive coding both directions gives a robust service.

Better geographical coverage under each beam with same power and bandwidth.
DVB-S2 ACM gain versus DVB-S: bit rate x 1,3 (FEC) + x2 (ACM) = 2,6
Optimum link performance

From 0.5 bits/Hz to 4.5 bits/Hz
At times 0.7 dB from Shannon limit

Source: Alberto Morello, Chairman DVB-S2
Adaptive modulation and coding

Spectrum efficiency versus required C/N on AWGN channel

- Heavy rain fading
- Edge of coverage
- Centre of beam
- Future

18 dB
Implementation.
Technical Challenges

- New demodulator
  - Channel Estimation
  - Demodulation/Synchronisation

- Adaptive Coding and Modulation (ACM) adaptation algorithms - Optimise performance for one user

- Radio Resource Management - Optimise performance for total system/all users (not part of the study)
Multiple input streams

Merger: defines the input polling strategy

BB Header (10 bytes)
(LDPC-protected)
Input adaptation description

PL Header (7 bits)
(64,7)-protected
(MODCOD, TYPE)

Padding bits when required

Block code: 64800 (16200) bits

Padding frame

Source: Alberto Morello, Chairman DVB-S2
Adaptive Coding And Modulation Modem (ACM)
For Broadband Communications

ESA ITT: AO4474.

Consortium for ACM demonstration consists of
  • Nera (Prime)
  • TurboConcept
  • EADS Astrium
  • DLR
  • Fraunhofer
  • Hispasat

Strong consortium with good representation of partners which will implement DVB-S.
Demonstrator ready Q2/Q3 2005.
Scope of work - Demonstrator for Adaptive Coding Modulation (ACM)
Availability of DVB-S2 in the market from Nera.

DVB-S2 phase 1 upgrade in 1Q 2006.

• Terminal: Insertion card for our 1910 modem.
• Gateway: Modulator (NewTec) with fixed setting of code rate and modulation.

DVB-S2 phase 2 upgrade in 3Q 2005.

• Terminal: No new hardware.
• Gateway: Adaptive change of code rate and modulation.
DVB-S2/DVB-RCS Compared Proprietary “Optimised” IP FLS/RLS?

• The performance of DVB-S2/DVB-RCS is much more efficient than all known proprietary systems.
  • Close to theoretical Shannon limit on DVB-S2.
  • Very efficient packaging of IP.
  • Minimum waste of power and bandwidth.
  • Each user gets best quality possible at his location.

• DVB-S2/DVB-RCS is a global standard.
  • Many companies will contribute to that DVB-S2 will be implemented and steadily be improved