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Broadband VSAT Services-

New Perspective for Oil and Gas Applications

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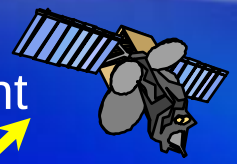
Objective

- Explain why VSAT Satellite network is important to Oil & Gas operations
- Introduce VSAT open standard technology, DVB-RCS
- Highlight potential market of Oil & Gas users and applications for VSAT systems
- Highlight issues and concerns of DVB-RCS Technology

Option 3: 2-Way VSAT Satellite System

- Independent from Terrestrials
- Independent from the environment
- Fast deployment
- Cost-Effective



Satellite
"Repeater in the Sky"

Microwave Repeaters

Coaxial or Fiber Optic Cable

Earth

Onshore Rigs

LAN Internet

Data/ Video

Voice

2 Way- Broadband VSAT Communications is Best Suited

- A symmetrical connectivity of high forward and return data links
- Used for transporting IP traffic over satellite
- Used for delivery of large volumes of data, voice and video to remote sites on a single infrastructure

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What is VSAT DVB-RCS?

- DVB = Digital Video Broadcast
- RCS = Return Channel via Satellite
- Open standard VSAT technology
- ETSI Standard **EN 301 790** established for interoperable VSAT networking in 2001 as worlds first two-way satellite standard
- There are approximately 100 fully compliant DVB-RCS Hubs & 20, 000 terminals worldwide
- **Satlabs**: Forum led by ESA grouping stakeholders of DVB-RCS (over 20 members) to ensure standard compliant & interoperability
- DVB-RCS Availability:
  - DVB-S
  - DVB-S2

SatLabs Group

http://satlabs.org

Why Use DVB-RCS?

- DVB RCS is open standard IP based platform and it is the only non-proprietary VSAT standard on the market today:
  - Forward data link from gateway to remotes up to 80mb/s
  - Return data link from remotes to gateway 2 – 4 mb/s
  - Multi-vendor competitive environment
  - Proven Interoperability which leads to low cost equipment
  - Ease of adding ne… &, Scalable Hub
  - Ease of remote cu… owerful NMS
  - DVB-RCS suppor… g IP services
- Fading & Interferenc…
  - Higher availability of terminal connectivity
  - Optimized use of satellite bandwidth

DVB-S2
is now available

Advanced Coding Schemes
- CCM – Constant Coding Modulation
- VCM – Variable Coding Modulation
- ACM – Adaptive Coding Modulation

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DVB-S2 Advantages

(ETSI: EN 302 307)

- Wide range of modulation schemes (QPSK, 8PSK, 16APSK and 32 APSK modulation)
- Supports 3 modes of modulations: CCM/VCM/ACM &
- Provides Ability to Dynamically Change Modulation: VCM/ACM
- Improves BW efficiency of 30% - 50% greater than DVB-S in CCM & ACM
- Variety FEC coding (LDPC): 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10

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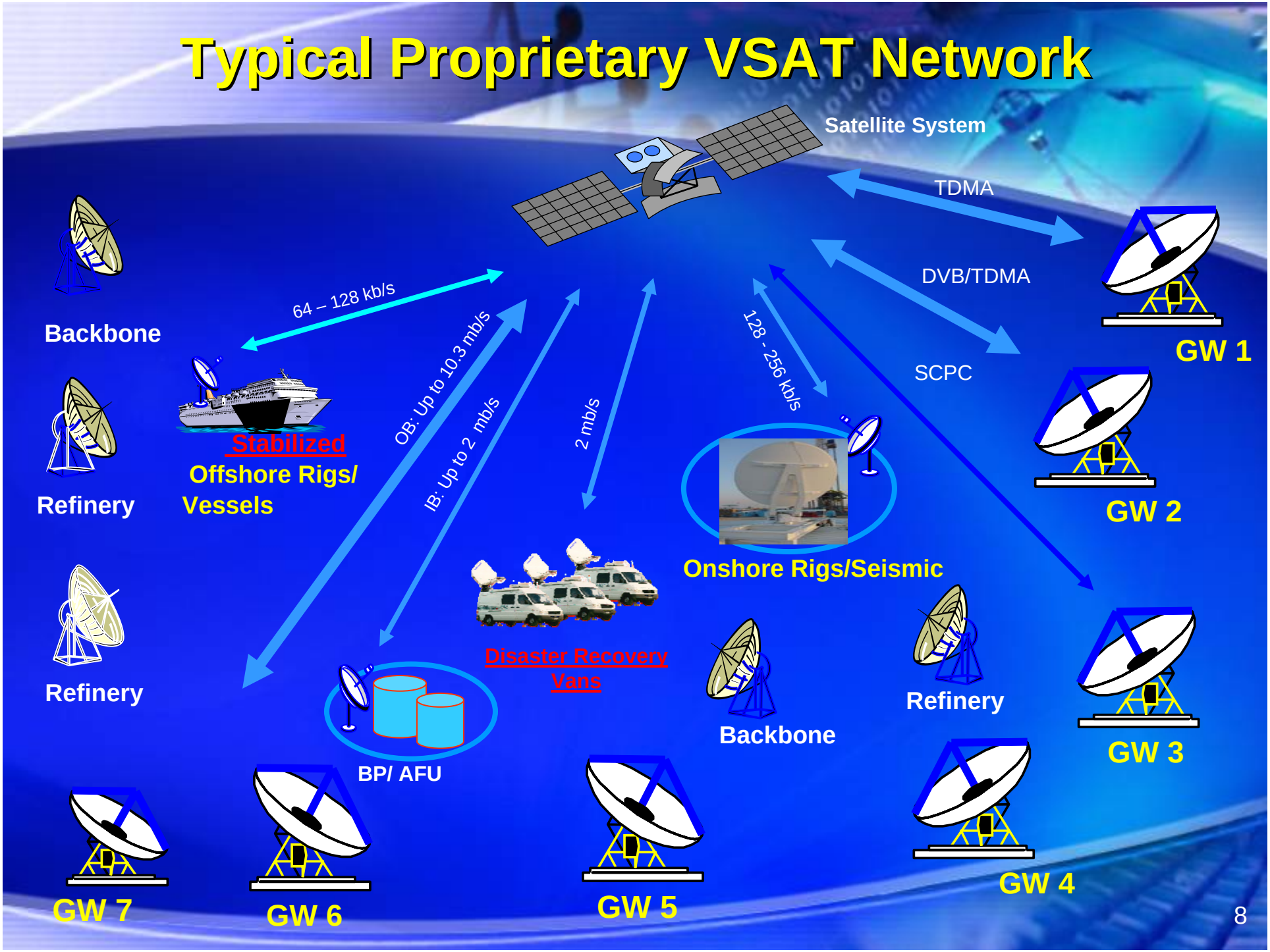
Typical Proprietary VSAT Network



DVB-RCS VSAT Network supporting current Oil & Gas operations

- Perform the D&WO operations Online Geosteering real data analysis
- Perform the Seismic operations online Quality Check
- High data rates & better voice quality
- Centralized NMS platform
- Introduced advanced drilling technologies:
  - Batching Drilling
  - Intelligent Well
  - Intelligent Field
  - Real Time Monitoring

Challenges to DVB-RCS

- Higher data rates is needed
- Majority of existing VSAT systems are still proprietary
- Some VSAT leaders are still watching the DVB- RCS VSAT technology & market

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Conclusion

- DVB-RCS VSAT technology meets Oil and Gas current and future requirements
- DVB-RCS organization shall continue improving the technology by providing:
  - Full interoperable VSAT systems
  - Higher data rates
  - Smaller/Lighter VSAT terminals
  - More competitive prices

Drive Oil & Gas operations to DVB-RCS VSAT Technology to successfully implement and perform Oil & Gas current & new applications

Thank You

Q&A

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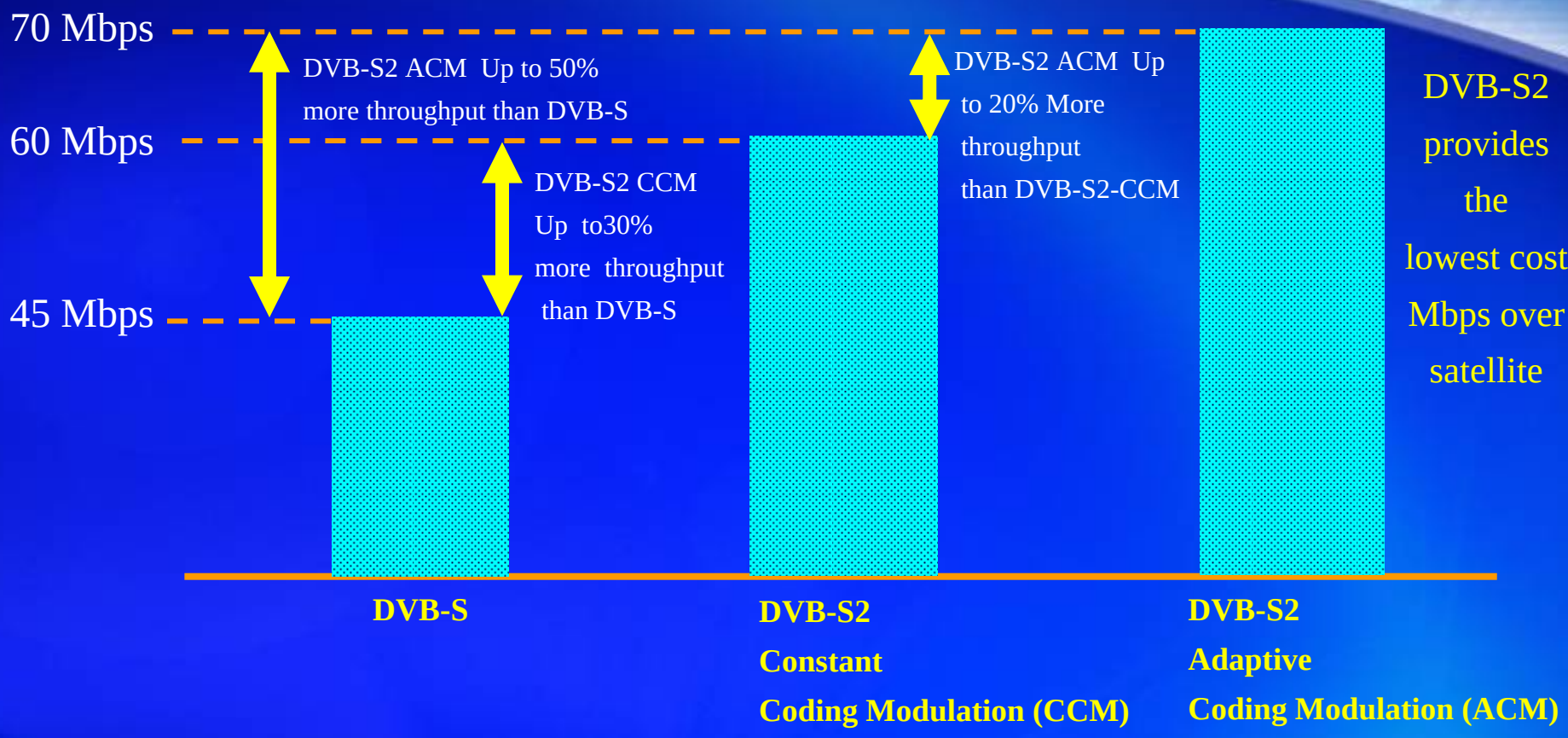
Satlabs

- International non-profit
- Committed to large-scale adoption and deployment of DVB-RCS
- Work of Satlabs:
  - Interoperability
  - Cost Reduction
  - Availability
  - DVB-RCS Awareness
  - Standard Evolution

Summary of DVB-S2 ACM Savings



For the same amount of satellite capacity :

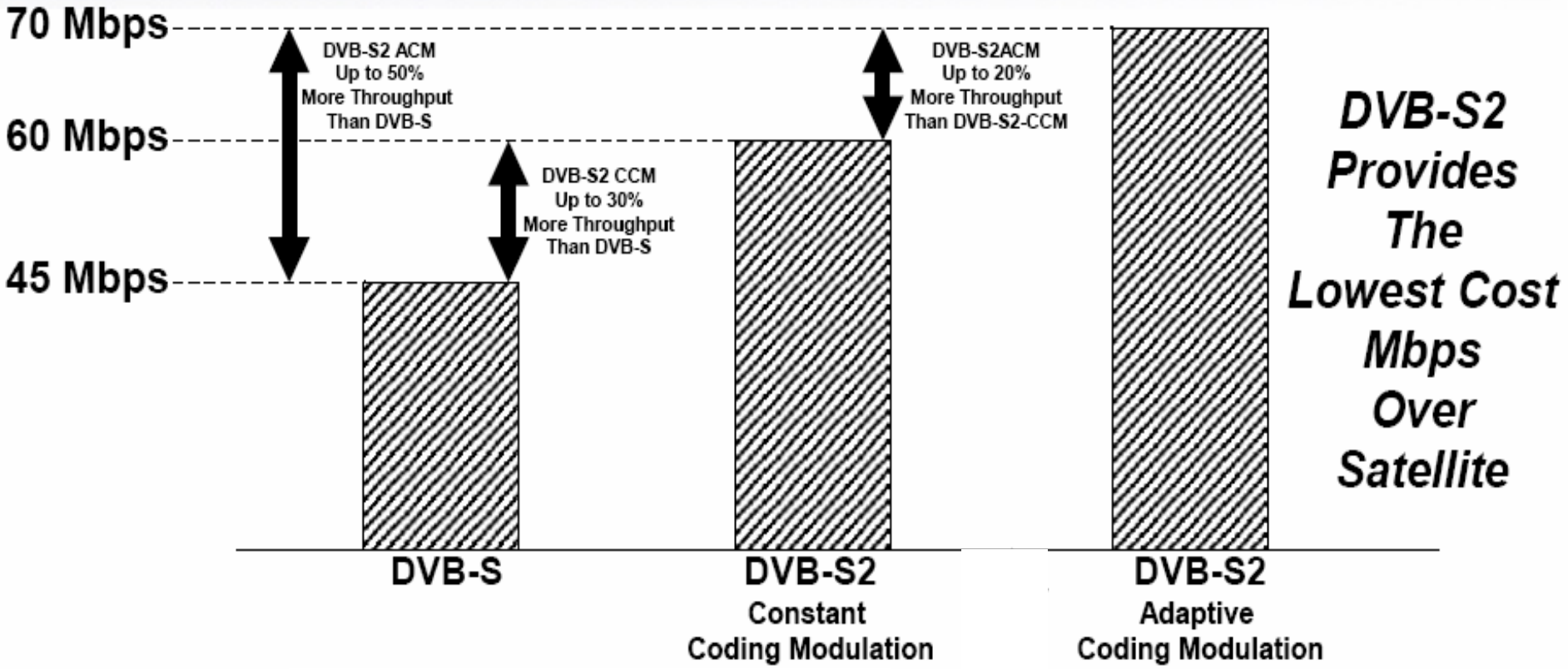
DVB-S2 ACM gives the most bandwidth efficiency or throughput

Saudi Aramco Domestic Oil & Gas Operations

Saudi Aramco International Oil & Gas Operations

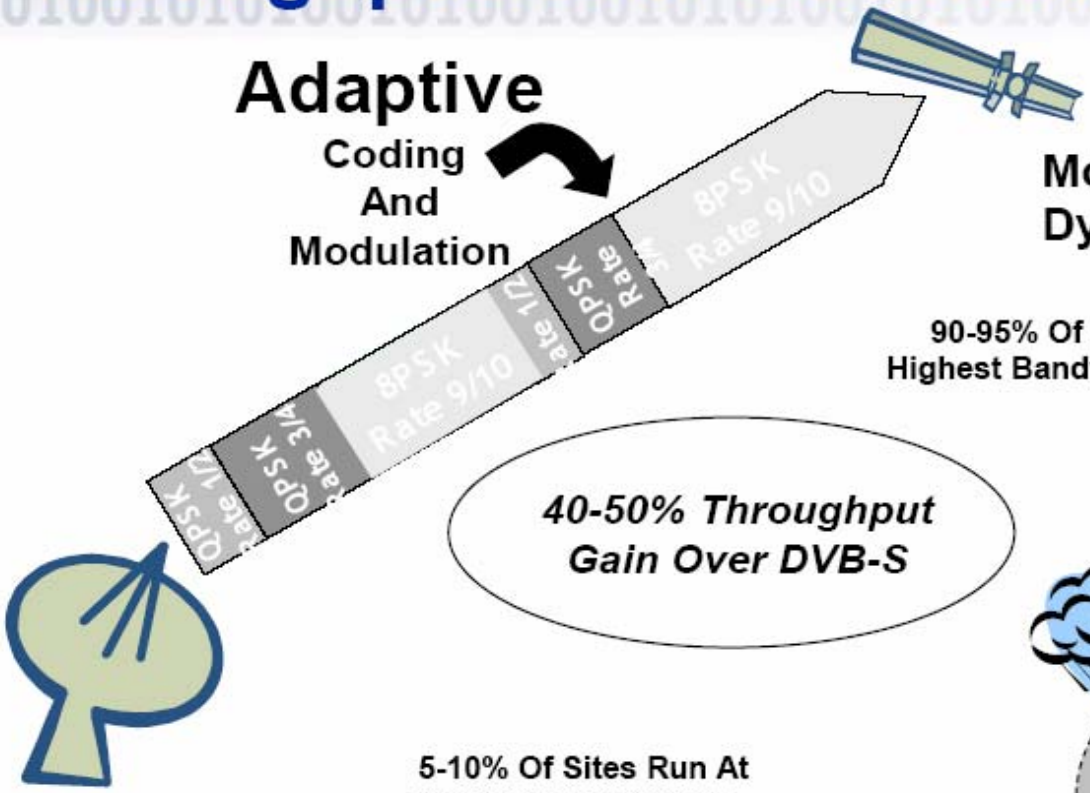
1 Houston
2 New York
3 Bermuda
4 Curacao
5 London
6 Rotterdam
7 Leiden
8 Egypt
9 Dubai
10 Beijing
11 Shanghai
12 Seoul
13 Tokyo
14 Hong Kong
15 Manila
16 Singapore
17 Kuala Lampur

Summary Of DVB-S2 ACM Savings



For The Same Amount Of Satellite Capacity DVB-S2 ACM Gives The Most Bandwidth Efficiency Or Throughput →

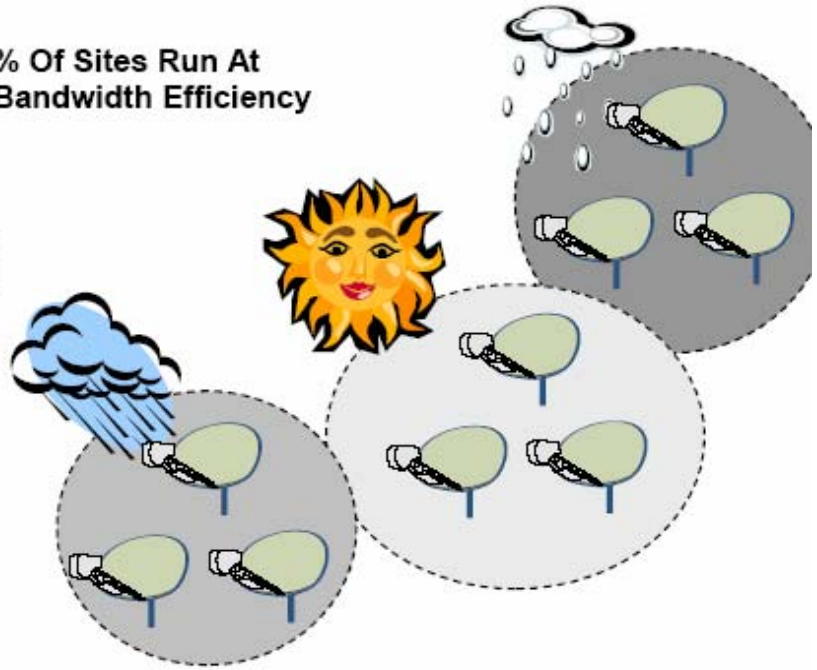
DVB-S2 With ACM 40-50% More Throughput Over Outbound



Outbound Channel
Modulation and Coding Changes
Dynamically Adapts To Rain Fade

90-95% Of Sites Run At
Highest Bandwidth Efficiency

40-50% Throughput Gain Over DVB-S



5-10% Of Sites Run At
Most Robust Coding

OPERATOR BENEFITS → ***PERFORMANCE, AVAILABILITY COST EFFICIENCY***