DVB-S2 Encapsulation – GBS Activities

Presentation to IETF WG IP over Digital Video Broadcast

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Background / History

DVB-S2 Encapsulation: what's done

First meeting in Dec '04, study mission initiated within GBS following a mandate of DVB Technical Module (TM)

Requirements received from DVB-RCS (TM-RCS 529r1)

Requirements consolidation (GBS 305, GBS 339) and brainstorming 71st GBS meeting in Jan'05 and 72nd GBS meting Torino March

May '05: draft GBS0531 with requirements, approach for evaluation procedure, measures, final version expected within next weeks

Document will be provided for information to IPDVB

IP over DVB-S2 GS Encapsulation (II)

Active work group participants: Akelia Wireless, Alcatel Space, EADS Astrium, EMS Satcom, ESA(*), Eutelsat, GCS, Nera, Newtec, SES-Astra

Definition of assumptions for comparative evaluation of technical solutions is ongoing

- Work group meeting on 14/6/05
- Agreement on functional requirements, performance measures, scenarios, evaluation procedures and criteria

Work plan

- Phase 1: Elaboration of technical solutions, (Q IV/2005) and performance assessment through simulation (Q IV/2005)
- Phase 2: Review of technical solutions and convergence (Q I/2006)

(*) TriaGnoSys, University of Aberdeen and UdCast participate as ESA consultants

Functional Requirements

DVB-S2 Encapsulation Requirements

- More efficient than MPE, overhead shall be < 3%
- Protocol shall not mandate for specific ACM scheduling algorithm
- For IP (traffic mix), IPv4 and IPv6, and other protocols
- Broadcast, multicast, unicast
- Signaling in MPEG
- Protocol shall not prevent encryption at higher layers
- Protocol shall allow simple hardware filtering
- Error protection equivalent to CRC-32
- Max packet size >= 4 kByte
- Fragmentation of PDUs in different BBFrames shall be supported
- Change of ModCod shall be supported between fragments
- IP header compression shall be supported

DVB-S2 Fragmentation Requirements

Consecutive fragmentation

Non-consecutive fragmentation

Non-consecutive fragments with arbitrary placement

DVB-S2 Fragmentation Requirements -2-

- The protocol shall provide fragmentation of upper layer datagrams across DataFields/BBFrames with different ModCod schemes.
- Fragmentation of upper layer datagrams in consecutive DataField/BBFrames shall be supported
- Fragmentation of upper layer datagrams in non-consecutive DataField/BBFrames of the same or different ModCod shall be supported
- Non-consecutive fragmentation with **arbitrary placement** of fragments within the DataField/BBFrame and interleaving ***should*** be supported, this allows most scheduler flexibility

Framework for Performance Evaluation

Framework for Performance Analysis

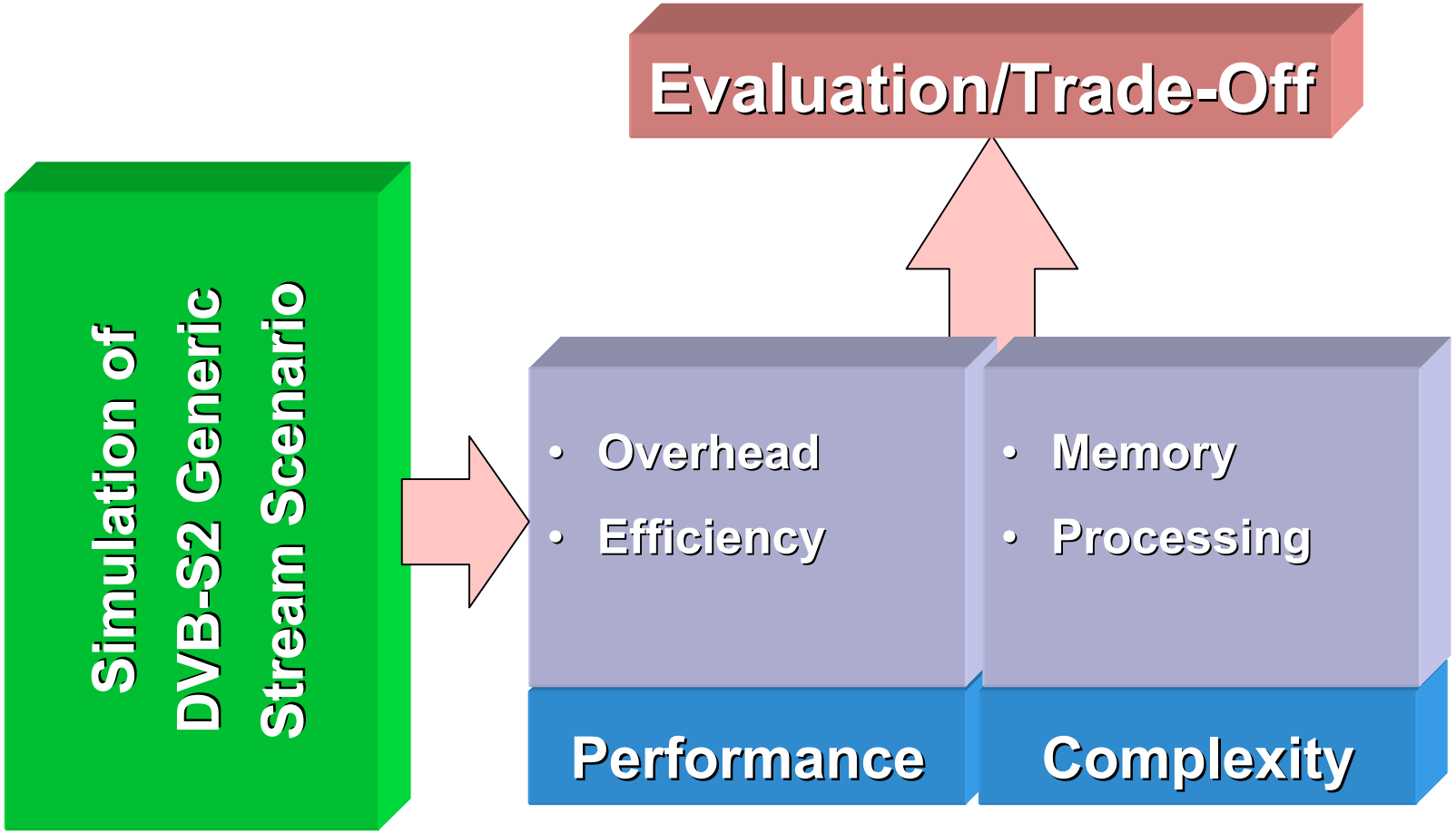
GBS work group on S2 encapsulation is expecting several protocol proposals.

Each proponent is expected to provide evaluation results together with the proposal.

Each proposal will be evaluated with several criteria:

- Functional requirements
- Performance (overhead, efficiency, complexity, criteria are defined in GBS 0531) evaluation though simulation with traffic profiles and rain fading

Framework for Performance Analysis



Compliance Matrix

Individual protocol submissions are evaluated using a compliance matrix

N°	•*Functional Requirements*	Compliant
1a	Encapsulation of different network traffic - IPv4 - IPv6 - MPEG - IANA assigned types of protocols - Ethertype compatible types	
1b	Encapsulation transparency for higher layer protocols -PEP support -Encryption support -Header compression support	
1c	Encapsulation maximum payload	
2	Addressing support - Multicast as supported > 10 000 destinations - 10 000 000 unicast destination supported - broadcast - 3 Byte RCS addressing (opt.) - Hardware filtering support	
3	Payload Integrity (CRC-32)	
4	Fragmentation -supports fragmentation across DataFields/BBFrames with different ModCod schemes -support of fragmentation in consecutive DataField/BBFrames -support of fragmentation in non-	

N°	•*Performance Requirements*	Compliant
5a	Overhead rate [%], derived by simulation a)Traffic scenario 1 b)Traffic scenario 2 c)Traffic scenario 3	Xx %
5b	Information transmission efficiency [bit/symbol], , derived by simulation a)Traffic scenario 1 b)Traffic scenario 2 c)Traffic scenario 3	Bit/symbol
5c	Encapsulation efficiency, derived by simulation Number of frames a)Traffic scenario 1 b)Traffic scenario 2 c)Traffic scenario 3	No. frames.
6	Complexity a)memory b)complexity measure	

Conclusions

Conclusions

- GBS work group on S2 encapsulation is under way following DVB-TM mandate
- Requirements included in the document GSB 0351 will be provided to IPDVB
- Encapsulation proposals are expected by the end of the year 2005; for each proposal an evaluation (including performance simulations and complexity assessment) shall be provided
- The selection of proposals will be based on the procedures described in GSB 0531 (compliance matrix)
- A consolidated encapsulation protocol definition is planned for 1st Q 2006
- IETF WG members are welcome to contribute to the DVB-GBS group activities via a DVB member, following the procedures in GBS 0351. Considering the ongoing process within DVB-GBS, this is considered the fastest way for an efficient and widely accepted standard.