SpaceOps 2013 Workshop APL

Summary of Day-1

Operations Implications with Optical Communications

Agenda day 1

Time	Topic	DAY 1 - June 11, 2013 Operations Implications with Optical Communications	Presenter
7:45-8:15		Registration, Light Breakfast	
8:15-08:30	Welcome - Dr. John Sommerer - APL Space Department Head		
8:30-8:45	Welcome - Ms. Mary Ann Esfandiari - GSFC Associate Director of Flight Projects		
Session Chairs: Rolf Kozlowski (DLR); Gian-Paolo Calzolari (ESA); David Israel (NASA-GSFC)			
8:45-9:30	1	Results of the Interagency Operations Advisory Group (IOAG) Optical Link Study Group (OLSG), ESA's way forward.	Klaus-Juergen Schulz (ESA ESOC) & Zoran Sodnik (ESA ESTEC)
9:30-10:15	2	Challenges in using optical links for LEO satellites and trade-offs to be made	JM Soula (CNES)
10:15-10:30		Break	
10:30-11:15	3	A study on influence of optical links to existing space communication architectures	Shinichi Inagawa (JAXA)
11:15-12:00	4	Notional ConOps for Interplanetary Optical Communications	H. Hemmati (NASA JPL)
12:00-1:00		Lunch	
1:00-1:45	5	Application of an Optical Data Link onboard DLR's BIROS satellite	Christian Fuchs (DLR)
1:45-2:30	6	Operation of TerraSAR LCT and Implications for Future Projects	Sven Kuhlmann (DLR)
2:30-2:45		Break	
2:45-3:30	7	Optical communication as a driver for a data-centric ground network service	Petrus Hyvönen (SSC)
3:30-4:15	8	A study for application of DTN under intermittently disrupted environment	Kiyohisa Suzuki (JAXA)
4:15-4:30		Break	
4:30-5:15	9	Strategies for Optimization of Deep Space Links: Selected Examples for Managing Propagation Path Loss	Nelli Mosavi (JHU/APL)
05:15-05:30		Theme Summary	Session Chairs

High Level Summary

- Day full of excellent presentations and discussions
- Scope
  - From studies to demonstrator missions
  - From modulations aspects to high level communications
- Broad spectrum, limited overlap, complementing presentations

General aspects

- Many LEO studies/demonstrations vs. deep space
- Directives for standardisation are given
- Approach for integration of optical communications in existing RF networks
- Hybrid concepts: Optical and RF links, e.g. RF for TT&C, LEOP, emergency
- Consolidated planning and scheduling is needed
- Usage of DTN to overcome challanges of optical link communications
- DTN feedback link is important
- On board memory concept becoming more important

LEO optical communications 1#2

- Comparison X-Band / 26 GHz / optical links
- There are not only technical challanges
  - User requirements
  - Coordination issues and planning
  - Eye Savety: coordination with civil aviation authorities needed
- Low cost experiment give hands on experience
- New channel coding options and adaptive modulation methods are needed
- Values have been measured: Experience
  Sat – Sat, Sat – Ground
- Ops experience optical vs. RF missions
- Ops concepts to be adapted to optical communications

LEO optical communications 2#2

- New requirements on planning and scheduling due to higher dynamic
- New types of SLA: more data orientation than passes
- Probability distribution of data delivery

Deep Space Optical Communications

- Unique features of deep space comms
- Higher requirements on Transmit beam width, Round-trip light-time, Point-ahead angles
- Concept of space based terminals
- Ground network options for link availability, handover, etc.
- Checklist for operations of optical link communications
- Several strategies and trades are possible