

# Report of the Roundtable

Optical communications via satellite poses great economic opportunities for satellite applications. At the same time, specific regulatory developments, like for radiofrequency communication, have not been set up yet and might need to be put in place e.g. by the International Telecommunication Union (ITU). This relates, for example, to frequency use and the protection from interception during data transmission. Against this background this interdisciplinary Roundtable of selected experts has debated technical, political and regulatory aspects and has provided insight into the current issues and perspectives for the use of this technology.

The topic of “Optical Communications” attracted more than 50 conference participants to the IAA/IISL Scientific-Legal Roundtable. As in the previous years the IAA/IISL Scientific-Legal Roundtable could benefit from the participation of the President of the IISL, Tanya Masson-Zwaan, and the Secretary General of the IAA, Jean-Michel Contant, who had been invited by the IAA/IISL Scientific Legal Liaison Committee, chaired by Kai-Uwe Schrogl. They delivered the welcome speeches for this Roundtable. The Chairmen introduced the topic and the speakers. All four expert speakers who had been invited were present and introduced their view on the topic.

The presentational part of the Roundtable was opened by Bernard Laurent of EADS-Astrium who provided a very informative introduction to the application of the technology. He recalled the advantages of optical communication for business use, namely a large bandwidth in high frequency band, a low divergence of the beam, and a miniaturization of the sources/detectors. Particularly due to the latter two points the technology is interesting also for small and cost efficient satellites. Major constraints are high accuracy pointing requirements and transmission limitations linked to clouds. Major applications involving business objectives – on top of scientific or governmental domains – are data relay for earth observation data (GEO-LEO), broadband links to ground, and global network constellations.

Erich Auer of Tesat provided an interesting insight in the technology itself as well as some demonstration missions. Those have shown the practicability of the technology also for commercial applications. The small laser communication terminals have been accommodated as demonstration payloads on various satellites. In the frame of in-orbit verification, several inter-satellite links could be demonstrated, including space-to-ground and ground-to-space links.

Mahulena Hofmann from the University du Luxembourg gave the first legal presentation pinpointing the current situation with respect to the existing legal framework. She recalled that optical communication is one form of telecommunication, but that specific regulations yet are related only to radio

communication. The ITU is the appropriate body dealing with regulations and standards, but also the Law of Outer Space is applicable. Due to the existing general legal framework (ITU and Space Law) optical communications do not face a legal vacuum.

Yvon Henri from the ITU reported on the outcome of the World Radiocommunication Conference 2012 (WRC-12). Various studies have been conducted in recent years to consider possible procedures for free-space optical links. It has been recognized that the commercialization and extensive use of bands for optical communication are still far in the future and that there is no immediate threat to the various passive services that the scientific community wishes to use for their scientific purposes. Therefore, it has been decided not to change the Radio Regulations for free-space optical systems.

Subsequently, both the speakers and the audience engaged in a lively and thought-provoking discussion addressing diverse aspects of the topic. The following conclusions and key points have to be noted:

- There is general agreement in the community that currently new regulations are not required.
  - a. The existing general legal regulations of the ITU and the Space Law provide an appropriate framework for optical communication systems and operations.
  - b. Certain parameters might need regulation in the future, responding to increasing commercialization and extensive use of frequency bands.
  - c. An ITU declaration with recommendations could be an option.
- Standardisation is to be seen separately from regulatory actions.
  - a. It is being dealt with on working group level and in international bodies involving institutions and industry.
  - b. Although standardization is not binding, it does not necessarily need regulations.
- Safety against interference remains an open question as long as there are no extensive systems in operation that might be targeted. As focus areas are small (e.g. 400m diameter) the risks of interference is limited.
- Generally, the question of liability in case of damage is to be addressed.
  - a. Technically, e.g. eye safety is a must and a basic requirement for systems.
  - b. Regulations for damage by space hardware (e.g. falling down) could be applied to damaging effects from electro-magnetic operations.
  - c. National law sometimes does not address optical systems, in which cases international rules should be followed.

## Table of Speakers

	<b>Name</b>	<b>Presentation</b>	<b>Institution, Country</b>
1	Bernard Laurent	Optical communications applications & regulatory aspects	EADS-Astrium, France
2	Erich Auer	Laser Communications @ Tesat – Technology, Heritage and Applications	Tesat-Spacecom, Germany
3	Mahulena Hofmann	Optical Communications in a Legal Vacuum?	University of Luxembourg, Luxembourg
4	Yvon Henri	WRC-12 outcome on AI 1.6-2	ITU, Switzerland