



**1st bilateral DLR-CSA WORKSHOP on
On-Orbit Servicing of Space Infrastructure Elements
via Automation & Robotics Technologies**

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Servicing satellites on – orbit by Automation and Robotics: Potential Legal and Regulatory Considerations

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The HYPOTHESIS

STATUS OF SATELLITE	ON-ORBIT SERVICE PROVIDED
End of Satellite mission lifetime due to fuel/propellant depletion. All systems operational.	Re-fuelling <i>in situ</i> to extend satellite mission lifetime.
Total or partial failure of satellite mission due to defective deployment of hardware.	Repair or replacement of failed/malfunctioning part.
Erroneous injection of satellite due to launch vehicle malfunction. Satellite in nominal condition.	Re-boost satellite to transfer/operational orbit.
Extension of satellite lifetime not worthwhile. Threat to other space assets and/or earth.	De-orbit satellite.



LEGAL AND REGULATORY CONSIDERATIONS

Prior Authorization and Licensing

- States are responsible for ensuring that any space activity carried out by entities (governmental, non-governmental and private) is performed safely and in conformity with the 1967 Outer Space Treaty, international law and the existing Regulations of that State
- On-Orbit Servicing (OOS) is permissible subject to prior to authorization/licensing by a State.



LEGAL AND REGULATORY CONSIDERATIONS

Liability and Risk Mitigation

- Commercially oriented OOS gives rise to contractual relations governed by service contracts
- Contracting parties require a degree of certainty to predict limit and insure against civil liability for negligent services or defective products
- Liability may be “first party” or “third party”
- Innovative solutions may be borrowed and/or adapted from existing commercial space service contracts



LEGAL AND REGULATORY CONSIDERATIONS

Dispute Settlement

- No universally accepted international laws and/or regulations in force applicable to disputes arising from commercial use of space by private entities
- Current practice allows contracting parties to adopt adjudication by State courts or arbitration
- Statistics indicate a preference for arbitration over litigation



LEGAL AND REGULATORY CONSIDERATIONS

Protection of Intellectual Property Rights

- Intellectual Property Rights (IPR's) forbid or permit, by license, third parties from exploiting rights registered to an IPR owner or his/her designated successor
- IPR's possess a national and international character
- Two major systems exist for the protection of IPR's worldwide *viz*: "First to File" and "First to invent"
- Intellectual Property arising from OOS related activity require protection



LEGAL AND REGULATORY CONSIDERATIONS

Compliance with Debris Mitigation Standards and Regulations

- No universally accepted international laws and/or regulations in force applicable to orbital debris.
- Legal/Regulatory framework is heterogenous and varies from State to State
- Examples include Laws, Regulations and Standards applicable: amongst member States of the European Space Agency; The Russian Federation; the United States of America



LEGAL AND REGULATORY CONSIDERATIONS

Efficient use of the Geostationary orbit and frequency spectrum

- Spectrum/Orbit resource is finite and scarce.
- Use of spectrum/orbit resource is subject to International Conventions (Article 44(2) - Convention of the International Telecommunications Union, 1994) and Radio Regulations
- States are obliged to use the spectrum/orbit resource efficiently and economically



CONCLUSIONS

- Legal and Regulatory Considerations are complex but not insurmountable
- Lasting solutions require a combination of legal opinions/expertise, legal/regulatory audits, appropriate insurance cover (where necessary) and aggressive public policy involvement strategy

