

IAA Study Group 3.22

Next-Generation Space System Development Basing on On-Orbit-Servicing Concept

Paris Spring Meeting (Second Meeting)

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Place: 6 rue Galilee, 75116 Paris

Study Report Content

Introduction

Part 1. The Concept of On-Orbit-Servicing and its Influence on Development of the Next-Generation Space Systems (Overall Goal and Intermediate Goals, Current and Future Tasks, Types of On-Orbit-Servicing, Serviced & Servicing Space Systems, etc.)

Part 2. Lessons Learned from the Past Projects and Current Human and Robotics Missions for Satellite On-Orbit Servicing

Part 3. Methodical Approaches and Key Technologies for Making Satellites Serviceable

- 3.1. Providing Capability of Docking with the Serviced satellites
- 3.2. Providing Guaranteed Access to the Satellite Components
- 3.3. Creation the Serviced Satellites basing on Block-Modular Structure
- 3.4. Providing Detachability and Installability of Satellites' Blocks and Modules
- 3.5. Unification of Detachable Blocks / Modules
- 3.6. Standardization of Hardware and Connectors
- 3.7. Maximal Mission Complication On-Board a Single Satellite
- 3.8. Selection of the satellites' Periods of On-Orbit-Servicing

Part 4. Methodical Approaches and Key Technologies for Creating Servicing Satellites

- 4.2. Development of Servicing Methods and Servicing Systems (Human and Robotic Technologies)
- 4.3. Creation of Robotic Technologies for On-Orbit-Servicing and Experimental Automatic Servicing Satellites
- 4.4. Creation of the Space Complex for Transferring Satellites, Upper Stages and their Fragments to the Disposal Orbits
- 4.5. Creation of Systems for Refueling and Replenishing Expendables
- 4.6. Creation of Systems for Replacement of Separate Modules, Devices and Systems
- 4.7. Creation of Systems for Upgrading of the Old On-Board Equipment, Dismantling Out-of-Order satellites and Utilizing their Elements
- 4.8. Creation of Systems for Refueling Upper-Stages of the Carrier Rockets on the Parking Orbit in order to use them as a Boosters for the Injection of Satellites into Geostationary Orbits and transfers to the Earth Escape Trajectories

Part 5. Methodical Approaches and Key Technologies for Orbit and Constellation Design of Serviceable Space Infrastructure

- 5.1. Complex Approach to Orbit and Constellation Design for Next-Generation Serviceable Space Systems

- 5.2. Clustering the Orbital Infrastructure to Minimize Time / Fuel Requirements for Servicing Satellite Maneuvers during On-Orbit-Servicing Operation
- 5.3. Methods for Serviced / Servicing Satellite Orbit and Constellation Optimization

Part 6. On-Orbit-Servicing Economical Benefit Estimations

Part 7. Juridical Aspects of On-Orbit-Servicing Implementation by Governmental and Private Entities

Part 6. On-Orbit-Servicing Mission Architecture Option and Roadmap for Next-Generation Space System Development

Part 7. Possible International Cooperation for Creation of the Next-Generation Serviceable Space Infrastructure

Conclusions & Recommendations