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THE CONCEPT OF ON-ORBIT-SERVICING FOR NEXT GENERATION SPACE SYSTEM
DEVELOPMENT AND ITS KEY TECHNOLOGIES

Abstract

Over the last years many companies and national agencies in different countries have been involved in development of various technical aspects of On-Orbit-Servicing. US and Russian On-Orbit-Servicing experience is described. The problem of On-Orbit-Servicing in general is considered as a bit wider. It is shown that On-Orbit-Servicing is connected with development of Next-Generation Space Infrastructure and the solution of the problem of On-Orbit-Servicing, to a great extent, predetermines the characteristics of Next-Generation Space Systems. Two equally important directions are stressed for On-Orbit-Servicing activities: first, making satellites serviceable, and the second, creating directly servicing systems. Implementation of each direction includes a wide range of developments. In first case we have to consider a capability of docking with the serviced satellite, a guaranteed access to the satellite components, block-modular structure of the serviced satellite, standardization of hardware and connectors, etc. Implementation of the second direction varies from the development of servicing methods and servicing systems to satellite orbits and constellation optimization. The existing and perspective key technologies for Serviceable and Servicing Satellite are represented. It is shown, for instance, that the economic benefit of On-Orbit-Servicing has to be justified more thoroughly taking into account the features of future Space Infrastructure. Servicing allows extending operational lifetime of satellites and thus reducing lifecycle cost. These effects could be achieved not only through refueling or repairing of the satellites, but also through satellite orbit correction. On-Orbit-Servicing creates a prospect of establishing a commercial servicing and debris-removing network, which constitutes, however, the separate technological problems, which are closely connected with On-Orbit-Servicing.