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Cyber-security threats to space missions and countermeasures to address them (4)

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## RESEARCHING ON SATELLITES TECHNOLOGY IN CYBERSPACE THREATS

**Abstract**

Compared with the traditional physical space, cyberspace has the following characteristics: technological innovation, integration, invisibility, boundlessness, high speed, hierarchy, relevance, adaptability and openness. Cyberspace brings new threats, a new threat that can't be seen. This paper analyzes the cyber threats faced by the satellite, and gives typical attacks such as spoofing, denial of service, data driven and other soft attack threats and radio frequency, ion beam and directional threat. The change of cyber threat to the functional requirements of satellite system will lead to the change of satellite technology and related research. One significant change is bound to bring communications, navigation, satellite detection in architecture, capability requirements, work mode, technical system, hardware and software technology, in order to adapt to the complex and violent cyber threats. In addition, as the satellite system will make more use of cyberspace resources, it will speed up the development of satellite system to digitalization, software, intelligence and distributed networking, and bring unprecedented complexity to the development of satellites. First, in the hardware architecture of the system level, satellite antenna, transmitter, receiver, information processor will bring significant change; secondly in capacity demand, threat perception need more development requirements of satellite systems, such as environmental perception, intelligent resource scheduling, parallel computing ability of large data; then in the typical mode of constellation system coordination, threat perception, match with black threat detection capabilities and put forward a new challenge; finally, at the technical level, is bound to emerge for the signal processing technology, knowledge aided information application, signal and data processing technology, multi-source information fusion technology, distributed information processing technology, cyber threat perception technology, intelligent resource management technology, distributed constellation network collaborative technology and comprehensive based on A series of key technologies, such as anti-jamming technology, need to be tackled. In a word, under the threat of cyberspace, the form and connotation of the satellite system will certainly change significantly.