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TÜRKSAT 6A: BUILDING NATIONAL CAPABILITY IN GEOSTATIONARY COMMUNICATION
SATELLITE DEVELOPMENT

Abstract

This paper presents a comprehensive overview of the TÜRKSAT 6A Project, Türkiye's first indigenously developed geostationary communication satellite, summarizing the overall program, highlighting the key experiences and lessons learned. The project represents a major milestone in the development of national capabilities for large-scale satellite systems, covering the full lifecycle from requirements definition to design, manufacturing, integration, testing, launch preparation, and early operations.

The collaborative project structure enabled the parallel development of multiple satellite subsystems and system level test models, providing a valuable learning environment for system-level coordination and interface management. Throughout the project, valuable experience was gained in realistic project planning, schedule margin management, and coordination between technical, administrative, and funding stakeholders. Iterative refinements in planning and review processes contributed to improved efficiency and greater schedule robustness in later phases of the program.

Significant technical maturity was achieved from equipment and subsystem development to system-level integration and verification, including comprehensive optimization of the overall test campaign. The selected model philosophy, combined with an extensive test program, supported early detection of nonconformities and risk reduction at system level, thereby strengthening confidence in the final flight model. In addition, the project provided important insights into managing indigenous development activities while maintaining program stability through appropriate risk mitigation strategies. Based on these experiences, practical recommendations are presented for future satellite projects, emphasizing enhanced systems engineering governance, improved integration planning, further optimized test strategies, and effective reuse of the developed TStar-G100 platform. With appropriate adaptations, this platform provides a strong and flexible baseline for future communication missions, enabling reduced development risk, greater schedule predictability, and improved cost efficiency.

Overall, the TÜRKSAT 6A Project has played a pivotal role in strengthening Türkiye's indigenous space ecosystem and establishing a sustainable basis for next-generation geostationary communication satellite programs.