

IAF SPACE OPERATIONS SYMPOSIUM (B6)  
Ground Operations - Systems and Solutions (1)

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A UNIQUE MULTI-BANDS S-X-KA FEED COMPLIANT TO FUTURE EESS AND LUNAR  
STANDARDS

**Abstract**

Currently, most of satellite missions for Earth Observation still operate in S band for TTC and S or X bands for space-to-earth data downlink, while the Ka-band space-to-earth in 25.5 - 27 GHz is progressively adapted. Deployment of X-band TTC with new earth-to-space uplink in 7190 - 7235 MHz band has already started, while the next step envisions 22.55 - 23.15 GHz Ka-band for high data rate earth-to-space uplink, for Earth observation (WRC-23) and space research in Lunar region (Prov Rec SFCG 41.1). These evolutions are driven by congestion in S-band, potential IMT threats in X-band and growing need in uplink data transmission. Today, Safran ground stations are delivered with a first version of S-X-Ka Bands single concentric feed, with transmission (Tx) in S-band. In order to address the presented trends in Earth exploration and Space research, Safran, together with ESA, is conducting an evolution of this feed to also support X and Ka bands Tx. Our contribution presents the detailed design of such complex multi-bands feed. Key items, main technical trade-offs and innovations related to key characteristics - among them the high power handling for simultaneous transmission in all bands - are presented in details. Finally, the most relevant RF performances are presented and compared to requirements for NASA LEGS (Lunar Exploration Ground Sites) stations.