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LIGHTWEIGHT DEPLOYABLE X/KU-BAND ANTENNA FOR LAND-MOBILE SATELLITE
COMMUNICATION**Abstract**

Commercial parabolic ground antennas are widely used for first responders, disaster and crisis management, military operations, news teams and journalists, or for scientific expeditions. The key requirements that all these applications have in common are: the need for quick deployment, excellent transportability, and a very low weight. Therefore, the aim was to develop, manufacture and test a parabolic lightweight quickly deployable ground antenna for satellite communications. The design of the antenna should be in such a way that a small packing size is achieved but at the same time the accuracy of the reflective surface should not be affected to support data transmission in high frequency bands such as the X/Ku-band. Suitable materials, mechanisms for deployment, and a high frequency feeding system have been identified, selected and applied during the design process to achieve these goals. Especially carbon-fiber reinforced materials were used for the manufacturing in order to reduce the overall weight of the antenna to a final weight of 13.6 kg with a reflector size of 1.2 m. The surface accuracy and its reproducibility were analyzed via an optical 3D digitizer measurement system and were compared to the theoretical parabolic reflector shape. The overall performance and handling of the deployable antenna were also tested under service conditions. A compact antenna test range was used to carry out high frequency tests with the produced antenna including the measurement of the antenna gain pattern vs. off-axis angle. Finally, high frequency tests under typical operating conditions were performed to evaluate the antenna performance proving the end-to-end connectivity of the new antenna.