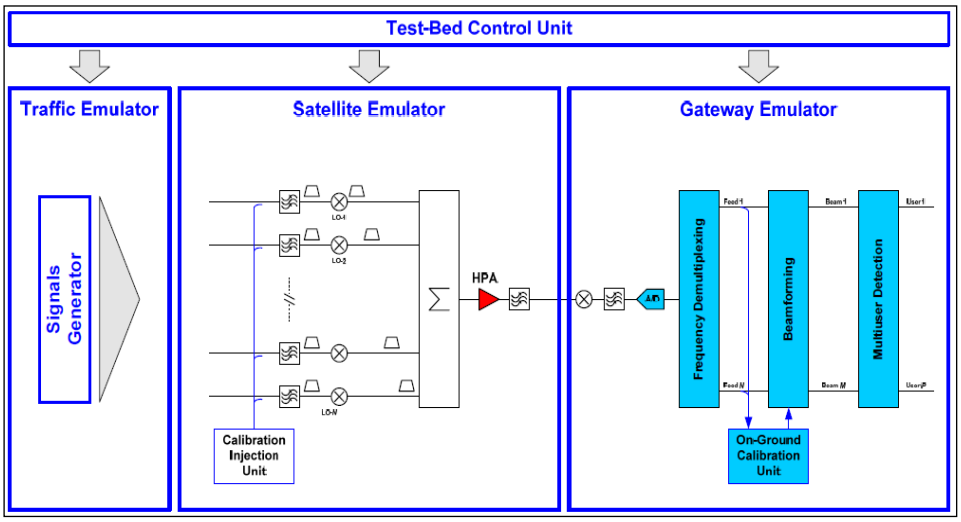
Title:	*"On Ground Beam Forming Network and Multiuser Detection Proof of Concept "*		
Contract type	*ARTES 5.1*	**Budget** *(K€)*	**1000**
Company (-ies) *(including country)*	Space Engineering SpA, Italy Mavigex, Italy		
Team *(name of the participant in the project)*	Space Engineering: • Claudio Campa (program manager) • Gennaro Gallinaro, • Filippo Di Cecca • Eugenio Rossini • Paolo Altamura • Aldo Masci Mavigex: • Rosalba Suffritti • Elisabetta Primo		
(*) **Speaker (s)**	Claudio Campa	**Email**	campa@space.it
Short Speaker Information *(experience and involvement in this project)*	Claudio Campa is the project manager of this project. He is presently the Development & Implementation Group Head in Space Engineering SpA. He was involved in many ESA projects (ARTES 1, 5.1 and TRP) as project manager in the fields of telecom and TT&C.		
Summary of the activity *(maximum 400 words)*	The main aim of the activity is to assess and show the performance obtainable improvements that can be achieved utilizing the On-Ground Beam-Forming (OGBF) technique in conjunction with Multi User Detection (MUD) in comparison with the traditional on-board beam forming. The work results will permit to draw conclusions on the viability to adopt those techniques in the context of space telecommunications. Such goal has been achieved through a study Phase (Phase 1) and an implementation Phase (Phase 2). During Phase 1, an overall OGBF-MUD architecture has initially been defined. Its performance has been comparatively assessed in two steps, namely the OGBF alone and then the full OGBF-MUD system. The activity has been concluded with issuing the specifications of a proof-of-concept real-time Test-Bed sufficiently representative of a full-fledged OGBF-MUD system, designed, developed and tested along Phase 2. Such Test Bed, implemented using both COTS hardware and ad-hoc programmed FPGAs permitted to demonstrate the usefulness and suitability of the chosen architecture for future satellite systems. The hardware OGBF demonstrator realized in this project includes the following elements and functionalities: • Traffic emulator, allowing to emulate the User Terminals traffic (with fully representative air interface) and relevant channel (i.e. taking into account variability in the power among active users) and to distribute the signals with appropriate amplitude and phase relationships to the Satellite Emulator input ports taking into account the direction of arrival of the source signals. • Satellite Emulator including Calibration Signal Injection unit, frequency conversion and multiplexing of the feed signals in the feeder-link bandwidth and High Power Amplifier (with non-linearity characteristics representative of the on-board feeder-link down-link amplifiers)		

- Impairments emulator, injecting thermal noise, uplink and downlink Doppler, phase noise and fading

- Gateway Emulator including On-ground frequency conversion, digital de-multiplexing of the feed signals multiplex, adaptive Minimum Mean Square Error (MMSE) digital beamforming (including calibration corrections) and Multi-User Detection with Successive Interference Cancellation (SIC).



(*) The speaker needs to do the registration through the website