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Author: Dr. Michael Bergmann
Graz University of Technology (TU Graz), Austria, michael.bergmann@tugraz.at

Dr. Wilfried Gappmair
Graz University of Technology (TU Graz), Austria, gappmair@tugraz.at
Mr. Robert Finsterbusch
Graz University of Technology (TU Graz), Austria, robert.finsterbusch@tugraz.at
Prof. Otto Koudelka
Graz University of Technology (TU Graz), Austria, koudelka@tugraz.at

CHANNEL ESTIMATION DEMONSTRATOR FOR MULTIBEAM SATELLITE SYSTEMS

Abstract

Achieving a beneficial cost per user data bit is the Holy Grail for satellite communication providers as it is a key factor in their competitiveness. Multibeam systems with aggressive (full) frequency reuse represent a technology which is capable to provide higher data throughput at no need for additional licensed bandwidth, thus this technology is of ongoing concern for research activities. The increased capacity of such links comes to the expense of high interference, which, not surprisingly, represents a major hurdle deteriorating the data throughput. Countermeasures such as beamforming and precoding are of paramount importance in that respect by mitigating the cumbersome interference, but reliable channel estimates are inevitable to exploit the potential of such methods. Recent ESA activities and investigations performed by Graz University of Technology on accurate and efficient parameter estimation methods brought up some new concepts, which provide the potential of improved accuracies increasing the system throughput. However, in order to validate the results achieved by simulations so far, a demonstration platform was established. The platform implements seven cells of a model for a multibeam satellite system and utilizes the anechoic chamber of Graz University of Technology as air interface. At present it implements the signaling necessary to perform channel estimations under symbol-synchronous forward link conditions; frame-synchronous return link conditions and data transmission are possible, but have not yet been implemented. This paper introduces the concept of the demonstration platform and investigates the practically achievable performance of estimation algorithms identified in a precursor work on the emulated symbol-synchronous multibeam satellite forward link. Appropriate performance comparisons and benchmarks are provided.