Modern radiocommunication devices are designed to ensure the best possible access to broadband data transmission. To meet this requirement, cellular network standards such as LTE-A or 5G assume an increase of the number of smaller base stations and usage of multi-antenna transmission technology called Multiple-Input Multiple-Output (MIMO) and enhanced version utilized in 5G called Massive MIMO. MIMO technology is also known from usage in home devices such as WiFi routers. Therefore, an important aspect is to ensure the highest possible efficiency and reliability of devices, while ensuring long range and appropriate quality of the received signal.

Multi-port amplifiers may play an important role in meeting the above requirements. Due to high reliability and flexibility in power distribution, the considered architecture was and is often utilized in satellite radiocommunication standards using multi-channel transmission. Due to their architecture and properties, multi-port amplifiers are often used in RF front-ends together with beamforming circuits.

Despite many advantages, the multi-port amplifier have several disadvantages. The first is the relatively narrow operational bandwidth, which depends on the utilized unit power amplifiers and frequency response of the passive power distribution are that are consisted in the multiport architecture. Another issue is internal inter-channel interference and return losses resulting from non-ideal elements that directly affect the performance of the amplifier.

The aim of the proposed research topic is to develop innovative methods of designing multi-port amplifiers with improved performance and the possibility of their implementation in radio communication devices supporting multi-channel transmission. As part of the research, the possibility of extending the operating band, reducing inter-channel interferences, improving efficiency and circuit miniaturization will be considered. The final verification of the developed design methods will be the measurements of the circuits made in the PCB and MMIC techniques.