A Modern HF/VHF/UHF Transceiver for All Applications – What Would it Look Like Today?

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ABSTRACT

Modern RF Transceivers represent more than just separated receiver and transmitter functionalities within the same box. As long as receivers and transmitters are operated at different locations and far away from each other, neither the receiver nor the transmitter are required to provide very good RF performance. In such a scenario the only really relevant receive parameter is sensitivity (noise figure) while the only relevant transmit parameter is the output power (and low spurious emission.) The closer a transmit signal comes to the receiver the more relevant become some additional performance characteristic for both the receiver and the transmitter. While the receiver must increase its robustness to withstand the strong transmitter signal at its frontend the transmitter must increase its spectral purity to ensure that no spectral component from the transmit signal is falling into the adjacent receive channel. (ACPR) Within an operational scenario involving several transceivers even a "perfect" receiver will only be able to show a High End performance if the spectral purity of the transmit signals is sufficiently high. As a consequence a transceiver design must align all major RF parameters and building blocks between transmit and receive paths to form a combined optimized transceiver architecture!

During this presentation some challenging practical cases for transceivers will be shown and a fitting data sheet for a modern High End transceiver will be derived. Following it, a State of the Art "perfect" Transceiver SDR Architecture will be described which is able to fulfil these challenging parameters leading to an outstanding RF system performance. The SDR architecture allows easy performance update and upgrading, multi-channel/multi-mode operation, avoids obsolescence and aging.