



White paper

Universal modem

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Customer

The Customers are Serbian governmental organizations and institutions.

Project overview

The goal of the project was to design, develop, fabricate, and test multipurpose modem for data transmission - Universal modem shown on *Figure 1*.



Figure 1. Universal modem

The modem had the ability of simultaneous connections of up to three communication networks, which could be leased lines (2 wire/4wire), circuited switched lines (PSTN) or HF and UHF/VHF radio links. Additionally the modem was providing highly reliable data transfer. The data transfer over three independent networks could utilize selection of the channel with the best signal quality. Work modes could be set via tasters on the front panel or via a control interface on a PC. Previous work mode setup had been stored and was disposed for an automatic restore.

The solution was based on an advanced embedded processor and three digital signal processors. Implementation of the modem was completely software based, with a modular approach and an open architecture for new possibilities to be implemented in the future. The modem supported nine different modulation standards.

One typical application was data transfer over three independent networks, with a selection of the channel with the best signal quality. In case of the link's failure, there were still the two remaining links to provide data to the remote side (*Figure 2*).

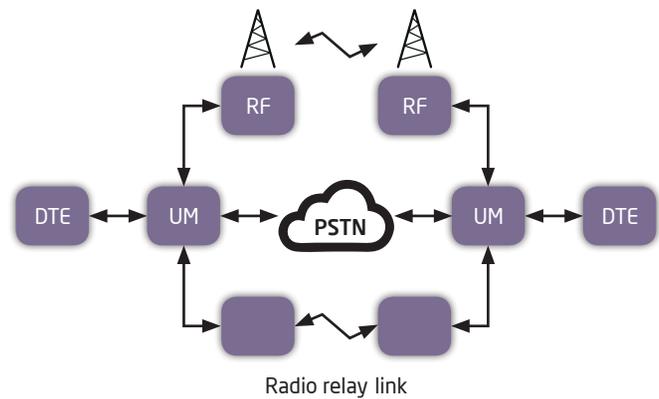


Figure 2. The modem providing highly reliable data transfer

Another typical application was distribution of data over three independent lines to three different data terminals (*Figure 3*).

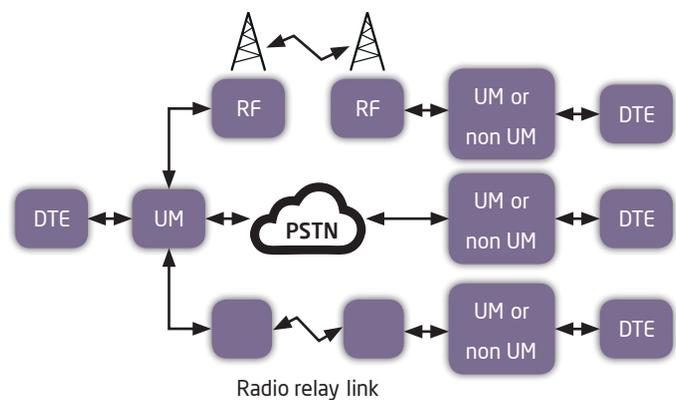


Figure 3. The modem as a data distributor

The main challenges of the project were requirements coming from the military standards. The modem needed to have a minimum predicted MTBF of 20,000 hours, with 0.999/0.997 HW/SW reliability.

The modem needed to be produced with the highest cost efficiency and satisfy strict terms of work in extreme environmental conditions. Special care was taken to provide good working performance in a low and high temperature range. The modem needed to survive impacts of shock, vibration and to work in environments with high level of humidity. Numerous EMC/EMI requirements were satisfied as well.

In order to meet such a wide range of requirements, dedicated test benches were developed and produced. Several quality assurance procedures were established

and conducted, such as Performance Qualifications Test, Environmental Qualifications Test, Quality Acceptance Test, and Environmental Stress Screening.

Benefits

The project covered development from the idea, through a proof of the concept, development of a functional model, first sample model, prototypes, and “zero” series production. The complete development, production, and testing processes and costs were transparent to the Customer via regular meetings, appropriate reports, and on-site inspections.

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