

Very High Spectral Efficiency Wireless Communications

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Abstract

There is a growing need for wireless capacity that is being driven by an increasing number of users and applications as well as applications with ever higher data rate requirements. Since the bandwidth provided by nature is limited, the only solution is to achieve higher spectral efficiency. Remarkably high spectral efficiencies (20 to 40 bps/Hz) have been shown in indoor experiments using the BLAST (Bell Laboratories Layered Space-Time) approach. BLAST utilizes multi-element transmit and receive antenna arrays, the multi-path propagation environment and signal processing to set-up independent communications channels at the same frequency.

Under DARPA's Next Generation Internet program we are exploring the operation of BLAST in the outdoor environment, where the multi-path environment is very different from the indoor multi-path environment in a number of important attributes. We are working on an experimental program to understand the impact of the outdoor multi-path environment on BLAST and hence develop approaches for outdoor implementation of BLAST. The ultimate objective is to not only demonstrate high spectral efficiency in the outdoor environment, but also to demonstrate scalability to gigabit/sec wireless communications in bandwidths on the order of 30 MHz.