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Carl R. Nassar
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S.A. Zekavat
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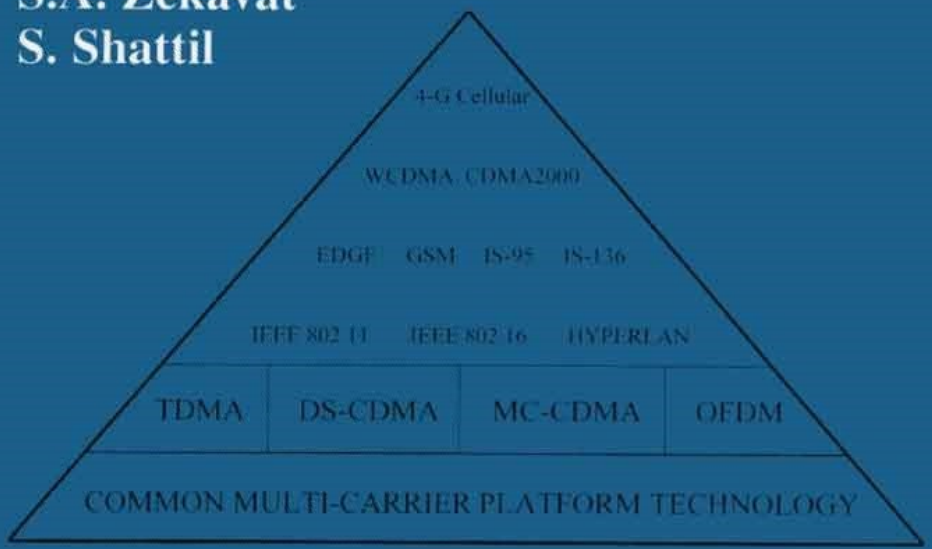

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Carl R. Nassar, B. Natarajan, Z. Wu

D. Wiegandt, S. A. Zekavat

Colorado State University

S. Shattil

Idris Communications

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Chapter 6

HIGH-PERFORMANCE, HIGH-THROUGHPUT OFDM WITH LOW PAPR VIA CARRIER INTERFEROMETRY PHASE CODING

6.1 Introduction

Experimentation with parallel data transmission techniques began as early as the 1950's [1], and in the mid 1960's a multitude of work was emerging on the topic of Frequency Division Multiplexing, or FDM [2]. The basic premise for FDM was to avoid the hazards of the frequency selective fading channel by dividing the band into many smaller bands. Specifically, serial-to-parallel conversion of the incoming information bits, and transmission of each bit upon its own unique carrier, created a data rate per carrier that was a factor of N smaller than the original data rate. Hence, the bandwidth per carrier was only $(1/N)^{th}$ of the overall system bandwidth. As a result, each transmitted bit (one per carrier) experienced a flat fade.

When the ability to avoid the frequency selective fading channel first became possible, the overall bandwidth efficiency was low. Weinstein and Ebert introduced the discrete Fourier transform (DFT) to FDM in 1971 [3], and through this addition to the modulation/demodulation process made it possible to orthogonally overlap the smaller bands. This gave way to Orthogonal Frequency Division Multiplexing (OFDM).

Since its first-introduction some four decades ago, advances in digital signal processing, specifically the Fast Fourier Transform (FFT), have led to OFDM's growing popularity. Applications to date include variable rate

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