DEGEM SYSTEMS

Com & Telecom

- Modern Communication
- Fiber Optic Communication
- Antennas
- Radar
- Cellular Communication
- Global Position Systems
- Satellite Communication
- Microwaves
- Telecommunication Networks

MDC-3251

CDMA DSS Cellular Communications Training System

Degem's MDC-3251 CDMA Training System is an ideal training equipment to teach the important fundamentals of this state-of-the-art modulation technique applied in modern cellular communications systems to technicians and engineers.

The MDC-3251 trainer provides a basic understanding of the concepts behind CDMA, and various issues that need to be considered in the design of a DSSS system. These include generation of various pseudorandom (PN) codes such as Gold, MLS & Barker with programmable taps, variable chip rate, and digital modulations BPSK, QPSK & digital AWGN noise with programmable FIR low pass filter. Bit error rate (BER) measurement with known data sequence, overall data rate dependency parameters, spreading & dispreading with DSSS, SNR control, offset control and so on can be performed on model MDC-3251a.

The signals at various processing points can be conveniently displayed on an oscilloscope or on the optional PC-based logic analyzer.

- Simulation software
- Programmable CDMA DSSS transmitter
- Programmable CDMA DSSS receiver
- Programming software
- Several communication parameters can be set by the students from their PC
- Convenient test points for monitoring signals provided

Specifications

TECHNICAL CHARACTERISTICS

- Direct Sequence Spread Spectrum (DSSS) modulator and demodulator
- Programmable chip rates up to 10 Mchip/s
- Spreading codes:
  - Gold sequences up to 2^{23}-1 chips
  - Maximal length sequences up to 2^{23}-1 chips
  - Barker codes, length 11 or 13
- Code modulation: BPSK, QPSK, OQPSK with output spectral shaping filter: raised cosine square root filter with 20%, 25% and 40% roll off
- Internal generation of pseudo-random stream and unmodulated carrier for test purposes
- Built-in channel impairment:
  - Additive white Gaussian noise
  - Frequency offset (Doppler)
- Sequential code search
- 4-bit, soft-quantized demodulated bits
- Extensive monitoring:
  - Receiver lock
  - Carrier frequency error
- Weight – 2.8Kg (main unit)

EXPERIMENTS

- To study theory of Direct Sequence Spread Spectrum Modulation and Demodulation (DSSS).
- Selection and study of various PN codes (MLS, GOLD, BARKER)
- Generate (spreading) DSSS modulated signal.
- Demodulate (dispreading) DSSS modulated signal.
- Selection & comparative study of various code modulation techniques:
- BPSK/QPSK/OQPSK.
- Modulation and Demodulation using internal generation of 2047 bit PN sequence as modulator Input and unmodulated carrier.
- Spreading and Dispreading using additive white Gaussian noise generator and frequency offset.
- Perform spreading and dispreading using extensive monitoring at the receiver for code lock, carrier lock, carrier frequency offset and code acquisition.
- Study the effect of Synchronization. Sequential, code search in dispreading.
- Voice communication using DSSS concept

SUPPLIED ACCESSORIES

- Software supplied on CD
- Experiment manual
- Programming software
- Serial interface cable to PC USB or COM1 port

REQUIRED ACCESSORIES

Personal computer with MS-Windows

OPTIONAL ACCESSORIES

- Oscilloscope, 2-channel, 20MHz or more
- Logic analyzer, 8 channels, 50 mega-samples or more

INSTRUCTIONAL MATERIALS

The experiment manual was written by pedagogical experts in modern CDMA cellular communications. The essential theory to understand and perform the experiments is provided. The procedure for each experiment is clearly written to allow the students to easily complete each experiment.