# Theory of operations
# Cordless 22XX Phones
# Teledex LLC

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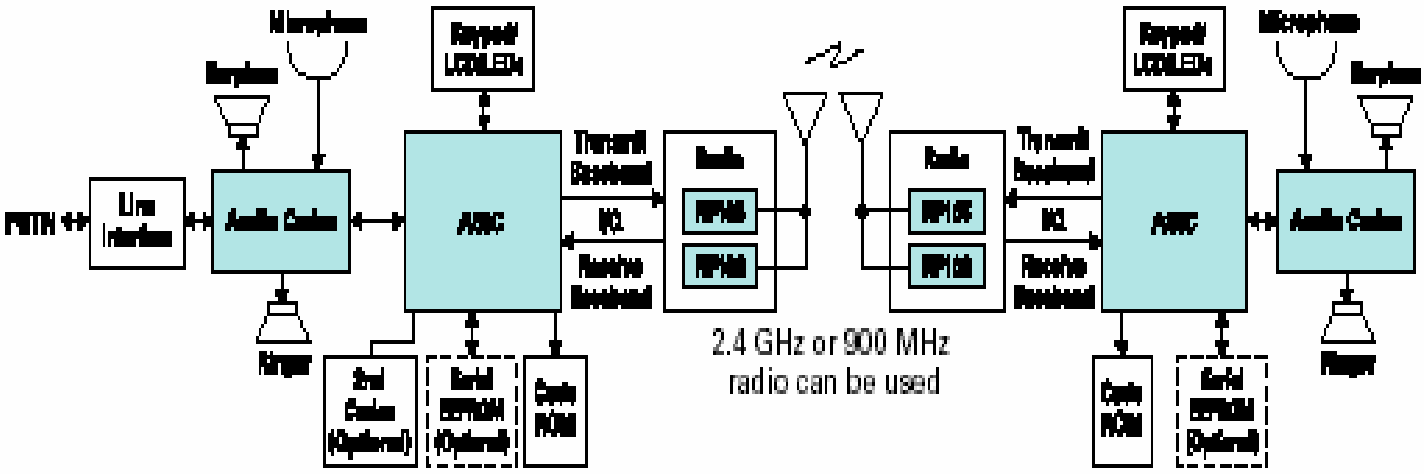
## Operational Theory

The CL22XX family is a cordless telephone for residential or business use. It is designed for analog PSTN interface. Main blocks are System Controller, Baseband Controller, Audio Codec, DSS Transceiver, Power Amplifier and Antenna.

The base unit powered by 9V wall adapter, handset is powered by 3 sell NiMN rechargeable battery.

## Block Diagram




### System Controller

The system controller handles all of the phone features, the DSS engine, the RF module settings, and the link between the base station and the handset.

The system controller provides a microcontroller with interrupt, wait-state, and system timer support. The system controller also provides General Purpose I/O (GPIO) and serial ports for peripheral control, a baseband modem (DSS engine) for signal processing of the received and transmitted data, and an audio modem for ADPCM conversion.

### Baseband Controller

The baseband modem section performs all of the spread spectrum modulation and demodulation, data timing recovery, AFC, AGC, framing, and rate adaptation required for a DSS system.

**Transmit/Receive Data Paths**

The transmit data path comprises a parallel-to-serial converter, scrambler, differential encoder, spreader, and modulator. The receive data path comprises analog-to- digital converters, matched filter with frequency compensation insertion, data demodulator, descrambler and serial-to-parallel converter.

**Scrambler/Descrambler**

The scrambler/descrambler is a 16-bit maximum length PN sequence generator. Its output is XOR'ed with TX data for scrambling and XOR'ed with RX data for descrambling. The voice and supervisory bits are scrambled. The PN sequence generator's starting location is programmable using one memory mapped register along with the two ID registers. This starting location is used to initialize the PN generator at the start of each link. The MSB of the PN generator is used to scramble/descramble. The first frame bit scrambled/descrambled uses the initialized value of the MSB.

**Spread Spectrum Spreader**

A 1 2-chip spreading code is used to meet FCC part
15.247 requirements for a DSS system. The spreading
code cyclic duration is 1 2 times that of the encoded data.
The code starts and stops on encoded bit boundaries.
The spreading code may be configured by the controller.
The data from the differential encoder is input to the modulator. An analog block exists at the TX output which will maintain a constant voltage level independent of supply operation.
Matched Filters

The spreading code is removed (despread) from the received digitized l/Q signals with matched filters.

Data Demodulation

This block determines the value for the received bit and determines a frequency error estimate that is used for the AFC. Data is demodulated by using l/Q matched filter data which is exactly 1 bit time apart.

**Power Amplifier**

Class-AB power amplifier (PA), designed for ISM band applications. It deliver output power proportional to the input signal from the transceiver IC, up to a maximum of 100 mW.

**Antenna**

¾ Wavelength Antenna is permanently attached to the PCB. It is matched to 50 OHM by low pass filter

## Specifications

- Frequency Band 2404.8-2475 MHz
- Channel Spacing : 1800 kHz
- Number of channels 40
- Modulation: DBPSK DSS
- Processing gain 11 db 12 chips/bit
- Speech coding: 32kb/s APDCM
- Frequency stability: 20ppm
- Peak Power 18 dBm
- Receive Sensitivity :<-88dbm
- Line Interface Specification according to EIA 470B
- Acoustic Specification according to EIA 470b
- Power Requirements: Handset 3V/140 mA Base 9V/300 mA

## Channel Allocation

| Channel Number | Frequency (MHz) |
|---|---|
| 1 | 2404.8 |
| 2 | 2406.6 |
| 3 | 2408.4 |
| 4 | 2410.2 |
| 5 | 2412.0 |
| 6 | 2413.8 |
| 7 | 2415.6 |
| 8 | 2417.4 |
| 9 | 2419.2 |
| 10 | 2421.0 |
| 11 | 2422.8 |

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|---|---|
| 12 | 2424.6 |
| 13 | 2426.4 |
| 14 | 2428.2 |
| 15 | 2430.0 |
| 16 | 2431.8 |
| 17 | 2433.6 |
| 18 | 2435.4 |
| 19 | 2437.2 |
| 20 | 2439.0 |
| 21 | 2440.8 |
| 22 | 2442.6 |
| 23 | 2444.4 |
| 24 | 2446.2 |
| 25 | 2448.0 |
| 26 | 2449.8 |
| 27 | 2451.6 |
| 28 | 2453.4 |
| 29 | 2455.2 |
| 30 | 2457.0 |
| 31 | 2458.8 |
| 32 | 2460.6 |
| 33 | 2462.4 |
| 34 | 2464.2 |
| 35 | 2466.0 |
| 36 | 2467.8 |
| 37 | 2469.6 |
| 38 | 2471.4 |
| 39 | 2473.2 |
| 40 | 2475.0 |