

# Real-Time Wireless Sensor Network Signal Analysis for Security Applications

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# Outline

- Who is the customer?
  - Security agencies



- What is our goal?
  - To build and test a system of secure wireless communications through the use of a custom waveform

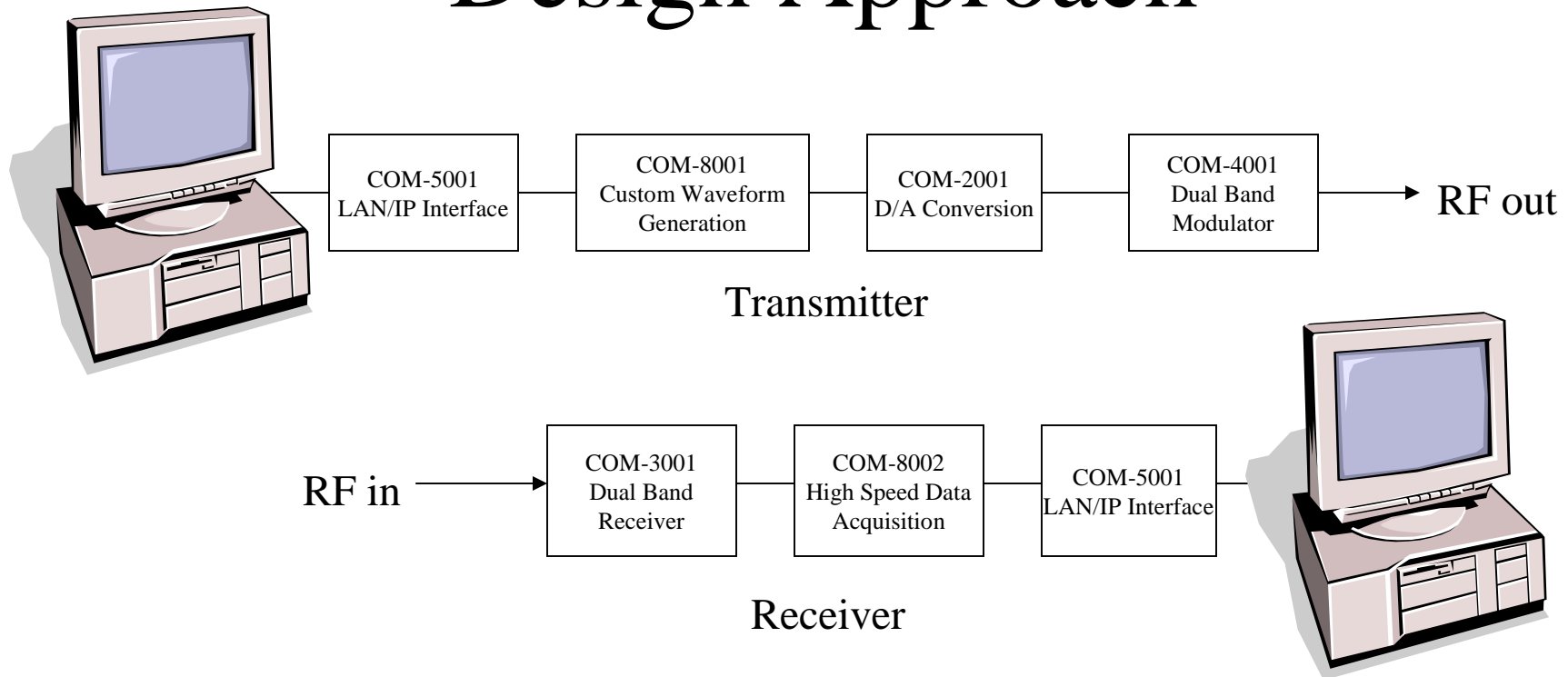
# Background

- Wireless sensor networks used today:
  - Signal can be easily detected and recognized by unwanted listeners
  - Do not utilize modern wireless technology
  - Have little or no security against active or passive attacks
- Using current technologies, networks can be optimized for:
  - Efficiency
  - Size
  - Power distribution
  - Signal security

# Problem

- Hiding the carrier waveform from unwanted listeners who want to monitor the signal with a spectrum analyzer
- How has the problem been approached in the past?
  - Spread-spectrum modulation has been used in
    - cellular networks
    - wireless LAN
  - Not in our case (sensor networks)

# Design Approach



- Create custom waveform
- Use spread-spectrum modulation to disguise waveform within noise levels

# Challenges

- **What impact will your solution have?**
  - Vast networks can be deployed and monitored without fear of interception or jamming
  - Security agencies will be able to wirelessly monitor and record valuable information easily and securely
- **What challenges do you envision and how will you get around them?**
  - Vulnerability of wireless signals
    - Using custom waveforms for spread spectrum modulation
  - Different sampling rates between Comblock Modules and accessible equipment
    - Comblock Modules will be over-clocked to match the the sample rates of accessible equipment
  - Multiple parts that will require assembly, calibration, testing
    - Using accessible laboratory hardware and software,
    - Effective communication
    - Firm project planning

# Summary

- Through custom waveform generation and spread-spectrum modulation, we will be able to disguise waveforms
- These waveforms will appear as noise and cannot be detected
- This will allow us to build a system of secure wireless communications that can be applied to a wireless sensor network