# Bluetooth Communication System

CIE 437 - University of Science and Technology- Zewail City

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#### Introduction

- Used to transfer data from computer, mobile and laptops.
- Short-range wireless technology (up to 10 meters).
- ISM bands, from 2.402 GHz to 2.48 GHz,

#### Modulation

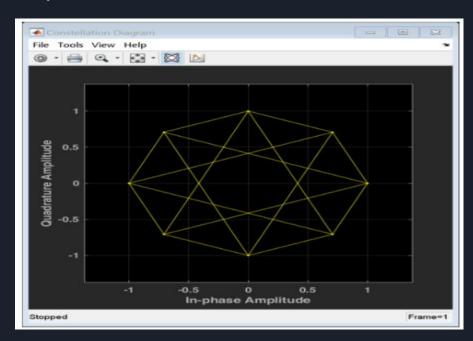
- Gaussian frequency shift keying (GFSK) for Bluetooth 1.
- (GFSK) which the carrier frequency is shifted to carry the modulation.
- positive frequency deviation for b1, while a negative frequency deviation for 0b.
- Gaussian filter is used to limit Bandwidth doesn't exceed 1 MHz
- π/4 DQPSK.
- 8DPSK.

# System Specifications.

- A) Modulation Technique: π/4 DQPSK, 8-DPSK
- B) Frequency Band: 2.402 GHz 2.48 GHz
- C) Bit Rates: 2 Mbps, 3 Mbps
- D) Transmission Bandwidth: 1 MHz

### Matlab simulation

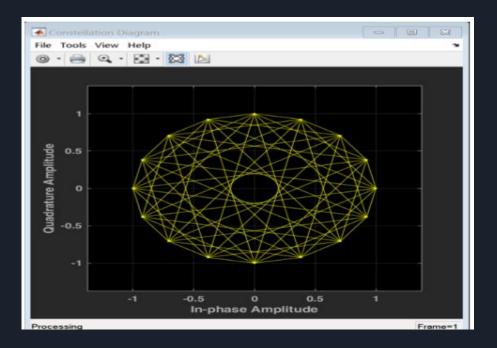
1- Constellation Diagram of the Modulated  $\pi/4$  DQPSK



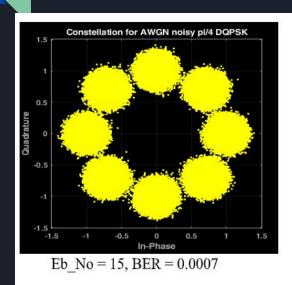
### Matlab simulation

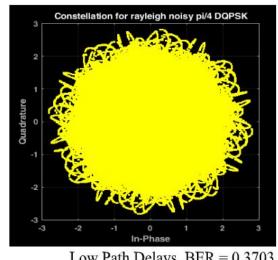
2- Constellation Diagram of the

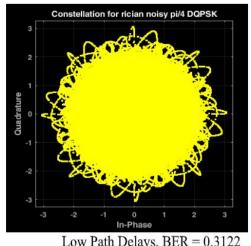
Modulated 8-DPSK Un-noisy Signal.



## Different channels output for $\pi/4$ DQPSK



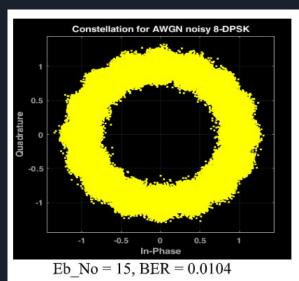


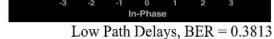


Low Path Delays, BER = 0.3703

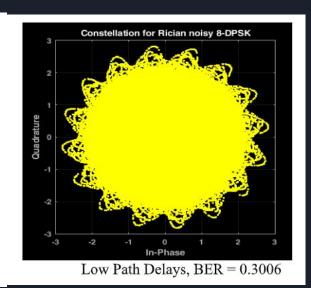
Low Path Delays, BER = 0.3122

# Different channels output for 8 DQPSK

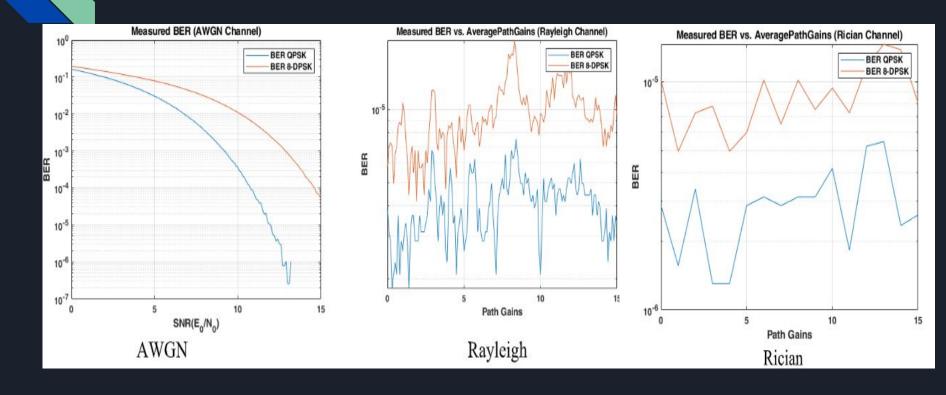




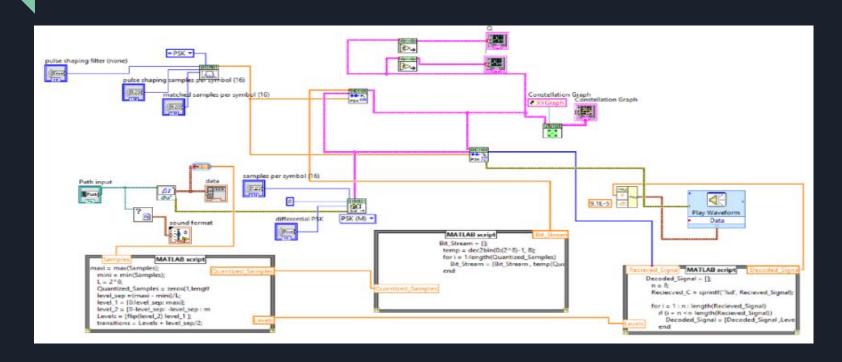
Constellation for Rayleigh noisy 8-DPSK



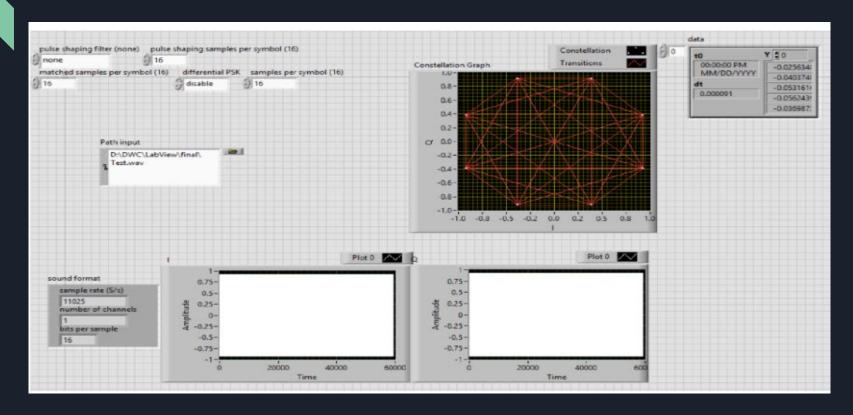
# BER Comparison



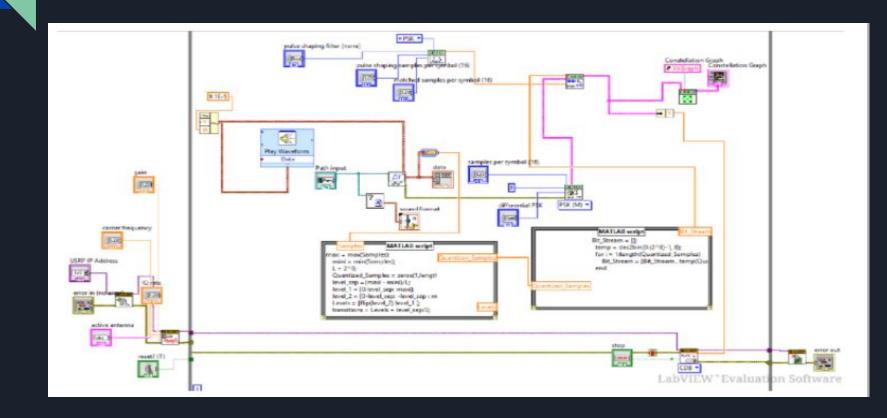
# LabView Simulation Block Diagram



# LabView Simulation Front panel



### USRP's Transmitter



#### USRP's Receiver

