TWO-WAY DIGITAL PAGING SYSTEM
USING SOFTARE DEFINED RADIOS

BY PULSETALK

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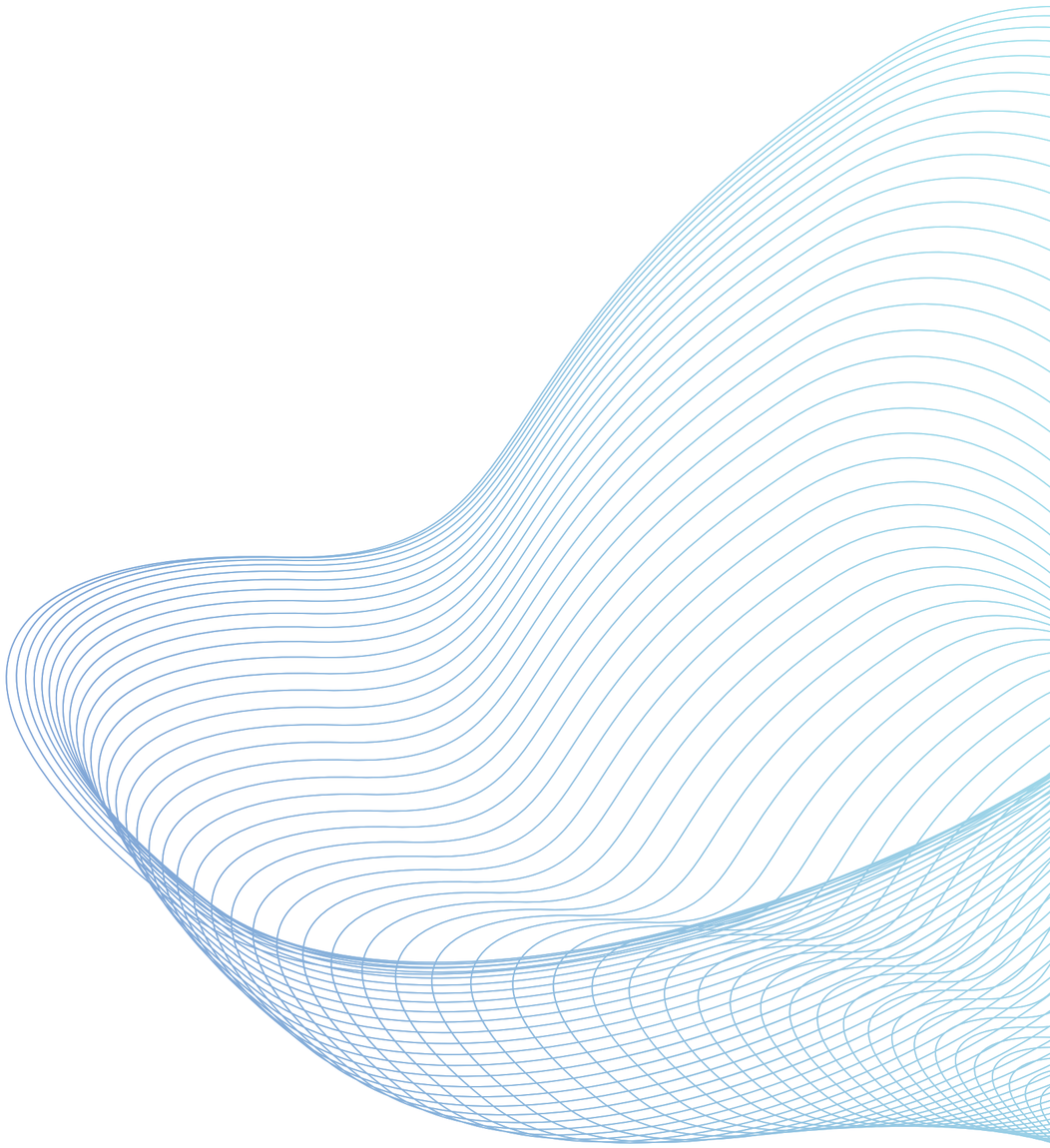
OVERVIEW

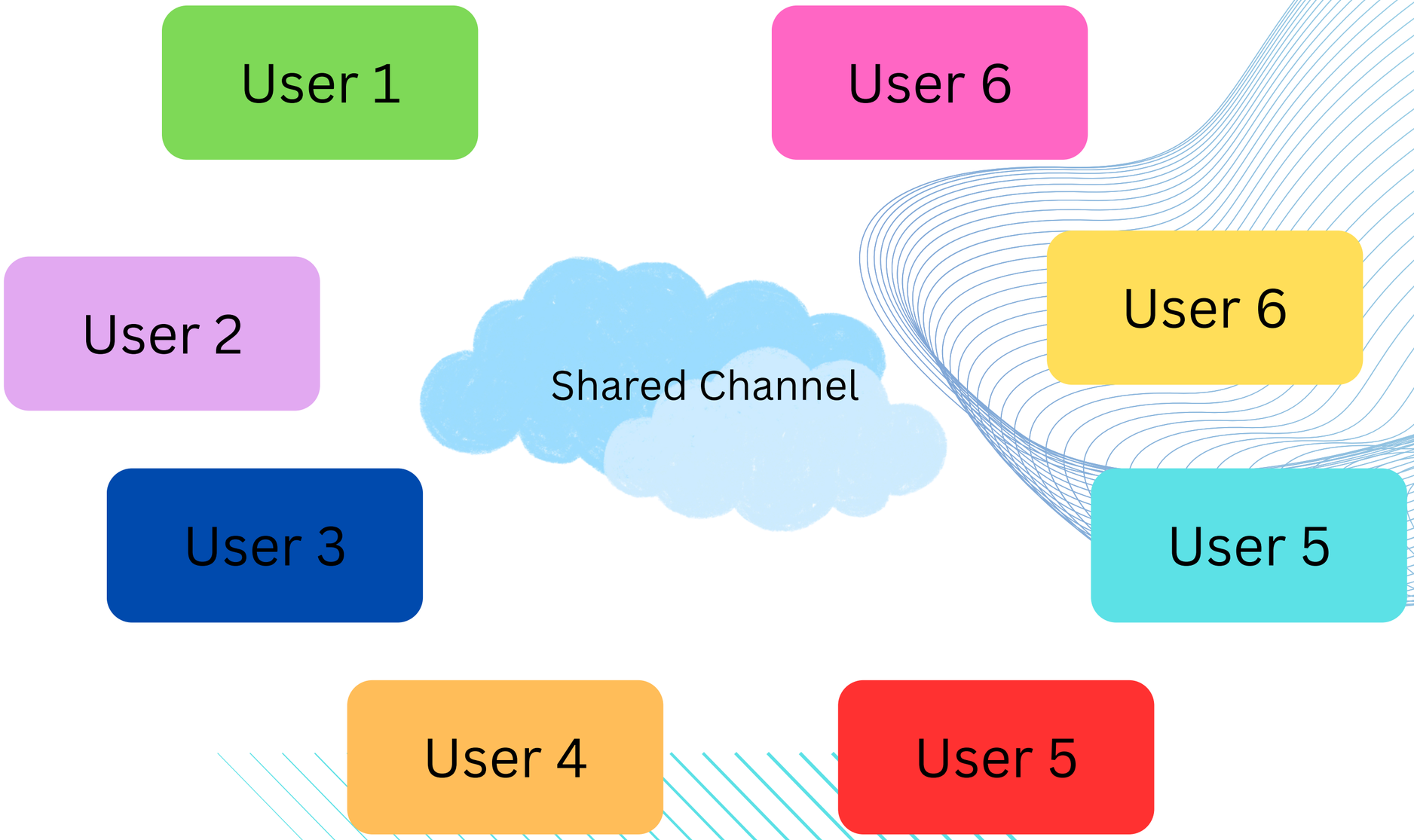
1. Introduction
2. Methodology
3. Hardware Testing



Introduction....

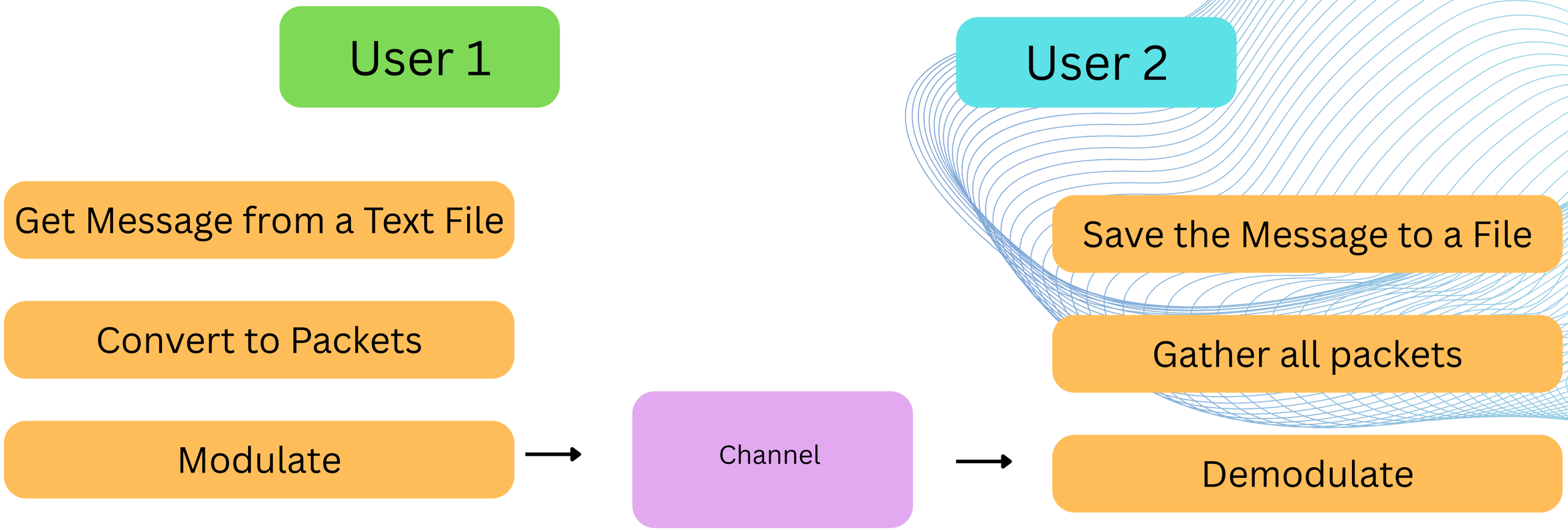
This project attempts to create a fully integrated Software Defined Radio platform capable of executing an end to end digital communication protocol stack. It features a QPSK based physical layer for modulation and transmission, a Stop and Wait mechanism to ensure reliable data delivery. Through well designed graphical interfaces and structured signal processing pipelines the system bridges physical layer operations with higher layer protocols demonstrating how modern communication techniques can be implemented and tested in practical environments. Overall the project showcases a complete workflow that spans modulation, error control and user interaction offering a hands on real world demonstration of advanced telecommunications concepts.

Intended Architecture



Progress towards the inteded system...

First Model



Progress towards the inteded system...

First Model

The first model used BPSK modulation to transmit the signal.

To ensure reliable communication, Go-Back-N ARQ protocol was implemented

Progress towards the inteded system...

Next..

User 1

Get Message from the user in real-time using an interface

Convert to Packets

Modulate

→

Channel

→

User 2

Display the message in real-time

Gather all packets

Demodulate

Progress towards the inteded system...

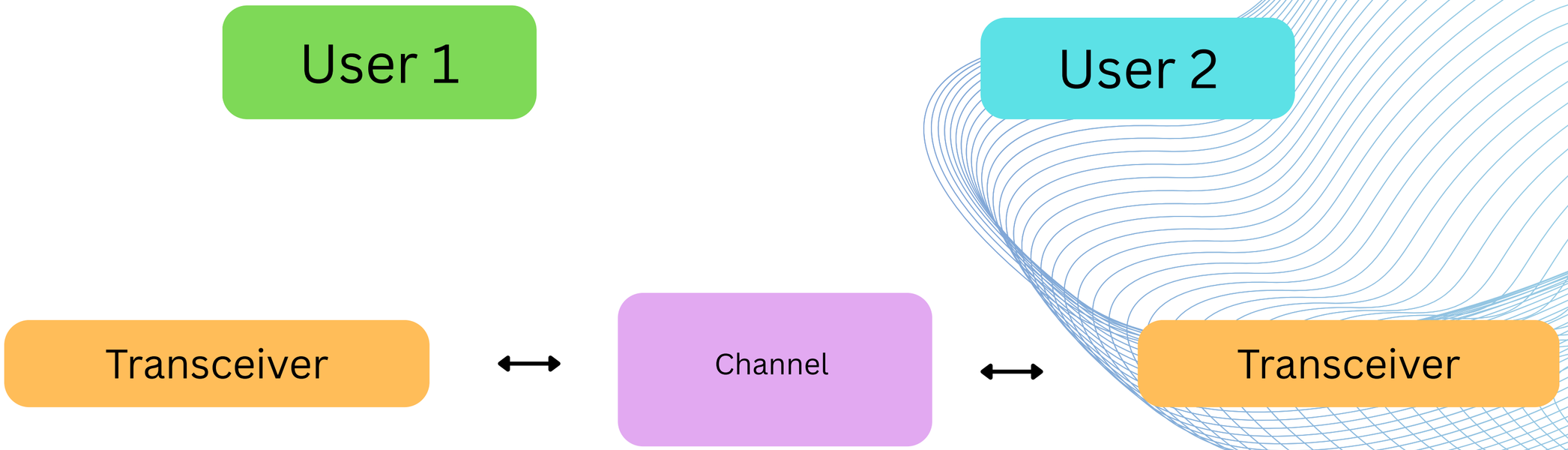
Next..

We switched to QPSK modulation considering the difficulties arose while using the SDRs practically.

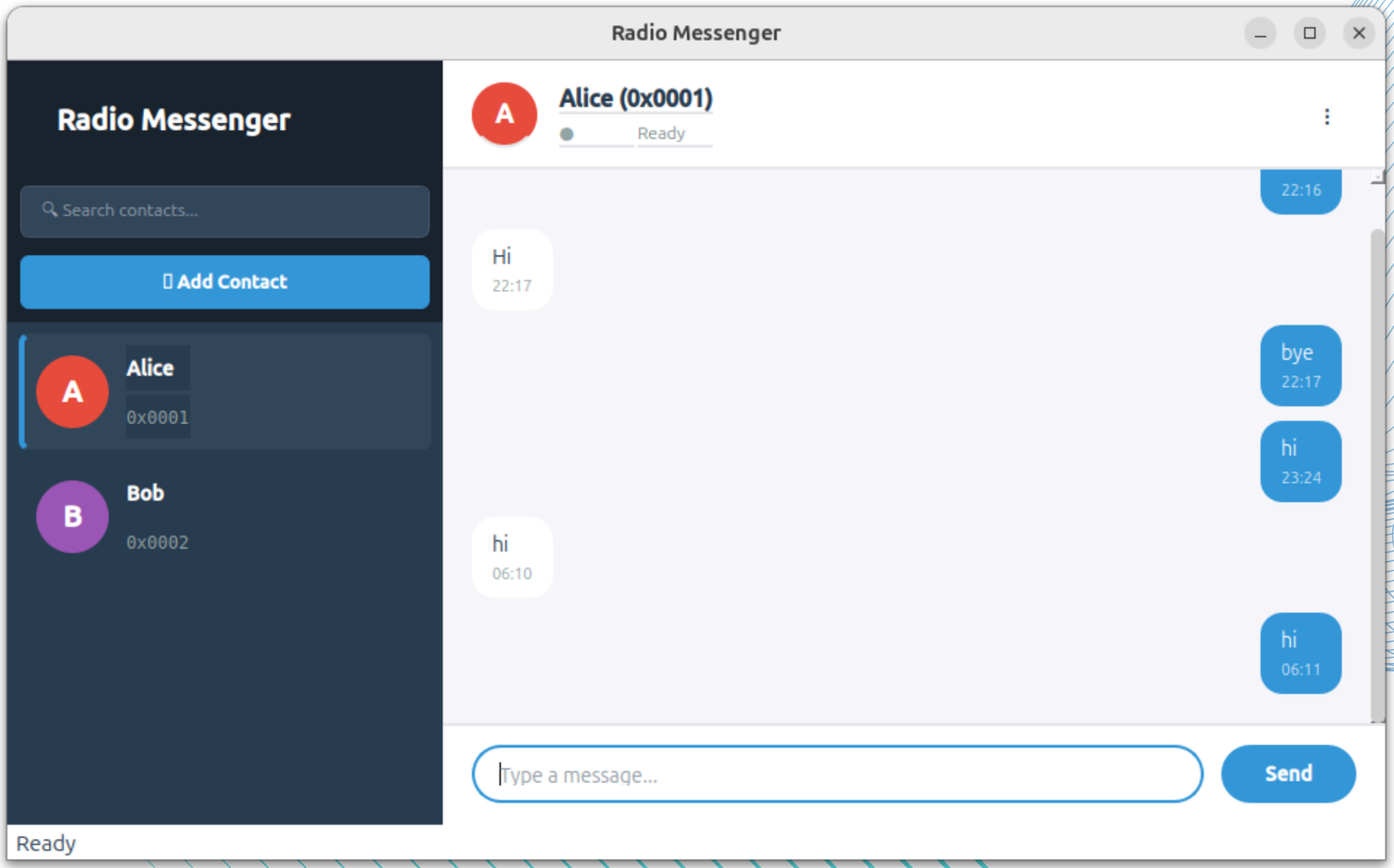
We also switched to Stop-and-Wait ARQ because Go-Back-N seemed unnecessary regarding the size of the data transmitted.

Progress towards the inteded system...

Final Model



Graphical User Interface



Frame structures

Preamble 8	Dst. Addr. 2	Src. Addr. 2	Seq. No. 2	Payload	CRC32 4

Message frame

Preamble 8	Dst. Addr. 2	Src. Addr. 2	Seq. No. 2	Flag 1	CRC32 4

Acknowledgement frame

Hardware Testing

BladeRF Setup

- Data transmission channel : 2.4 GHz ISM Band.
- Acknowledgement channel : 1.2 GHz Band.

Main Challenges

1. Clock sync difficulties

- Since the text messages are too short, the tranmitter and receiver did not sync their clocks properly.

2.Hardware driver issues

- Nuand bladeRF 2.0 drivers were unstable on windows.

Thank you