📄 **Project Overview**

This Java project implements a simple **peer-to-peer messaging system** that securely sends and receives messages encrypted with **AES** over TCP sockets.
It supports communication between peers on the **same device** or **different devices**.

🧩 **Components**

- **Different_Device.peer.EncryptedMessenger**
  Sends encrypted messages to a remote receiver on port 5050.
  Prompts for receiver IP address.
- **Different_Device.receiver.SimpleReceiver**
  Listens on port 5050, decrypts incoming messages, and displays them with timestamps.
- **Same_Device.Peer1.Peer_1**
  Sends encrypted messages to localhost on port 5000.
- **Same_Device.Peer2.Peer_2**
  Listens on localhost port 5000 and decrypts messages.

⚙️ **How to Run**

1. Ensure the AES secret key ("1234567812345678") is the same in sender and receiver classes.
2. Run the **receiver** program first to start listening for messages.
3. Run the **sender** program and enter the receiver's IP address if needed.
4. Type your messages and see them securely transmitted and decrypted on the other side.

🛠️ **Technical Details**

- **Encryption:** AES algorithm, ECB mode with PKCS5Padding
- **Data encoding:** UTF-8 for strings, Base64 for encrypted bytes
- **Communication:** TCP sockets with blocking I/O
- **Key size:** 16 characters (128-bit AES key)

⚠️ **Security Note**

- AES **ECB mode is insecure for production** due to pattern leaks. Use CBC or GCM with IVs instead.
- **Do not hardcode encryption keys** in real applications. Implement secure key management.
- This project is for educational purposes only.

💻 **Example Usage**
Start the receiver:

```
nginx
CopyEdit
java Same_Device.Peer2.Peer_2
```

Start the sender:

```
nginx
CopyEdit
java Same_Device.Peer1.Peer_1
```

Sample session:

```
vbnet
CopyEdit
Peer1 (Sender) started. Messages will be sent to localhost:5000

Enter message to send (type 'exit' to quit): Hello World
✅ Message encrypted and sent.

Receiver is listening on port 5000
Connected to: /127.0.0.1

Received (decrypted): Hello World
```

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