ShieldNet: Secure Hybrid Web Based File Transfer System

1. Title

ShieldNet – Secure Hybrid Web Based File Transfer System

---

2. Abstract

ShieldNet is an innovative and secure hybrid web-based file transfer system designed to provide **fast, lossless, and private** data sharing between users. Unlike traditional transfer methods that rely entirely on the internet or complex setups, ShieldNet enables users to **manually choose** between **LAN Mode** (for ultra-fast local transfers) and **Web Mode** (for remote sharing).
The platform ensures **end-to-end encryption**, **OTP/biometric authentication**, **multi-user support**, and **automatic file deletion** — combining **speed, security, and simplicity** within a single browser-based interface.

ShieldNet redefines how files are exchanged across academic, professional, and personal environments by giving users full control over privacy and transfer methods.

---

3. Introduction

In today's connected world, the need for **secure and efficient file transfer** is more important than ever.
Traditional sharing methods like email, social media, and even cloud storage either reduce file quality, require third-party apps, or risk privacy breaches.

To address these issues, **ShieldNet** introduces a **hybrid web-based solution** where users can **manually select** between **LAN (offline)** and **Web (online)** modes depending on their receiver's location.
This dual-mode flexibility ensures both **speed** and **security** — with encrypted transfers, temporary storage, and real-time OTP or biometric verification.

---

4. Objectives

- To develop a **secure hybrid file transfer system** supporting both LAN and Web operations.
- To provide **multi-user parallel transfer** capabilities.
- To implement **OTP or biometric-based verification** for secure access.
- To maintain **data integrity and privacy** through end-to-end encryption.
- To ensure **automatic file cleanup** after successful transfer or session timeout.
- To make the interface simple, fast, and responsive for all platforms.

---

5. System Overview

ShieldNet provides two primary operating modes:

1️⃣ LAN Mode (Offline Local Transfer)

- Transfers occur within the local network (Wi-Fi or Ethernet).
- Requires **no internet connection** — ideal for labs, offices, and classrooms.
- Speeds up to **1 Gbps**, providing **instant transfer** for large files.
- Data never leaves the local network, ensuring **maximum privacy**.

2️⃣ Web Mode (Online Transfer)

- Transfers files between users located on different networks.
- Uses temporary **encrypted storage** on the ShieldNet web server.
- Files are **auto-deleted** after a single download or expiration.
- Includes **OTP or biometric verification** to ensure identity validation of both sender and receiver.

---

6. Key Features (Highlights)

☆ **Manual Hybrid Mode Selection**
Users manually choose between **LAN Mode** or **Web Mode** as per the receiver's network.

☆ **End-to-End Encryption**
Data is encrypted during transmission and decrypted only upon download — ensuring total confidentiality.

☆ **OTP / Biometric Verification**
Each session or transfer is protected by one-time password (OTP) or fingerprint verification for **double-layer security**.

☆ **Multi-User Parallel Transfers**
Multiple file exchanges can happen simultaneously with **independent session tracking** — no interference between users.

☆ **Temporary Secure Storage**
All files stored on the server are **automatically deleted** after transfer completion or session timeout.

☆ **Lossless Transfer**
Maintains the **original file quality**, unlike apps that compress media.

☆ **Cross-Platform Web Access**
Runs directly in a web browser — no need to install any app or software.

☆ **User Dashboard & Notifications**
Users can view upload/download status, progress bars, and expiration alerts in real time.

---

7. Uniqueness & Innovation

- **Hybrid Architecture:** First web-based system to combine **LAN and online file transfer** in a single interface with manual selection.
- **Integrated Biometric / OTP Verification:** Enhances identity security — a rare feature in browser-based transfer systems.
- **Multi-User Parallel Sessions:** Allows multiple users to share data simultaneously without affecting each other's performance.
- **Zero Installation:** Operates entirely from the browser; no dependencies, setup, or configurations.
- **Privacy-by-Design:** All sessions are temporary and auto-expire to ensure zero trace.

---

8. Comparison with Other Transfer Methods

Feature	Bluetooth	ShareIt	Google Drive	ShieldNet (LAN)	ShieldNet (Web)
Internet Needed	✗	✅	✅	✗	✅
Transfer Speed	⚡ 2–3 MB/s	⚡ 20–30 MB/s	⚡ 10–15 MB/s	🚀 **Up to 1 Gbps**	⚡ Depends on Network
Data Privacy	Low	Medium	Medium	✅ **High**	✅ **High**
Installation	Required	Required	App-based	✗ None	✗ None
Multi-User Support	✗	Limited	Limited	✅ Yes	✅ Yes
OTP / Biometric	✗	✗	✗	✅ Yes	✅ Yes
Auto File Deletion	✗	✗	✗	✅ Yes	✅ Yes

---

9. Benefits

✅ **Lightning Fast:** Especially in LAN mode.
✅ **Ultra Secure:** Encrypted sessions with OTP/biometric access.
✅ **Flexible:** Works both offline and online.
✅ **No Installation:** Fully browser-based.
✅ **Parallel Support:** Multiple users can send/receive simultaneously.
✅ **Eco-Friendly:** No permanent data storage or heavy cloud usage.

---

10. Technology Stack

- **Frontend:** HTML5, CSS3, JavaScript
- **Backend:** Python Flask Framework
- **Database:** SQLite / Redis
- **Security Layer:** SHA-256, OTP Authentication, Biometric API Integration
- **Hosting:** Localhost (LAN Mode) & Cloud Server (Web Mode)

---

11. Innovation & Research Potential

ShieldNet's model introduces a **manual hybrid switch** and **integrated user authentication**, setting the foundation for advanced file-sharing systems.
In research or enterprise environments, it could evolve into:

- **AI-driven auto-mode detection**
- **Blockchain-based transfer tracking**
- **Smart device pairing for IoT**
- **Federated or decentralized file exchange systems**

---

12. Future Enhancements

◈ Add **AI-based auto mode detection** (automatic LAN/Web switching).
◈ Introduce **encrypted chat/voice** alongside file sharing.
◈ Implement **real-time transfer analytics dashboard**.
◈ Develop **dedicated mobile app** versions.
◈ Support **resume-on-failure** for large files.

---

13. Conclusion

ShieldNet bridges the gap between **local privacy** and **global accessibility** through a secure, browser-based hybrid system.
With features like **manual mode selection**, **OTP/biometric authentication**, and **multi-user transfer**, it brings both **efficiency and trust** to digital sharing.
This project not only showcases strong technical design but also reflects innovation in **user-controlled cybersecurity** — a must for the future of web technologies.

---

14. Team & Acknowledgment

Project Developed By:
Vishal Prajapati , Shubham Kumar, Krishna Kumar, Suman Verma, Yuvraj Patel

Under the Guidance of:
Department of CSE (Artificial Intelligence & Machine Learning)

Institution:
KIET Group of Institutions