B-LAN Mesh FOG Router Utility

Open Source & Local Deployment Guide for Apple iMac (macOS)

Architecture: Decentralized Fog & Mesh Routing | **Protocol Layer:** P2P / Delay-Tolerant Networking (DTN) | **Cost:** $0 / Open Source (Air-Gapped)

This installation manual details the setup and deployment of the **B-LAN Mesh FOG Router Utility** on an Apple iMac. Designed for local neighborhood resilience, this utility handles decentralized peer-to-peer routing, localized fog compute scheduling, store-and-forward queueing, and network traffic control without requiring cloud API keys or commercial dependencies.

1. System & Hardware Prerequisites

Hardware & OS Requirements

- **Hardware:** Apple Silicon (M-Series recommended for efficient packet inspection and localized model execution) or Intel iMac
- **OS:** macOS Ventura 13.0 or higher
- **Network Interfaces:** Built-in Wi-Fi / Ethernet, or secondary USB/Mesh network adapters
- **Storage:** Minimum 10 GB available SSD space for DTN message buffers and local routing indexes

Core Tooling Installation

Open Terminal on your iMac and execute the following commands to install Homebrew, network routing utilities, and Ollama:

```
# Install Homebrew if not already installed
/bin/bash -c "$(curl -fsSL https://raw.githubusercontent.com/Homebrew/install/HEAD/install.sh)"

# Install networking packages, P2P tools, and Ollama engine
brew install python@3.11 node git iperf3 nmap libp2p ollama
```

2. Local Network Scheduling & Inference Setup (Zero API Cost)

The Mesh FOG Router Utility employs local intelligence to dynamically prioritize mesh packets, manage green compute scheduling, and coordinate store-and-forward queues during network isolation—completely offline.

```
# Start the local Ollama service in the background
brew services start ollama

# Pull local lightweight model layer for network routing optimization
ollama pull gemma2:2b
```

> **Resilient Decentralized Fog Routing**
>
> By utilizing Delay-Tolerant Networking (DTN) and local peer discovery via `libp2p`, the iMac acts as a localized fog router. Traffic, routing tables, and node handshakes are managed entirely within your local mesh network.

3. Local Directory & Environment Setup

Workspace Setup

```
# Create dedicated project directory
mkdir -p ~/blan-fog-router
cd ~/blan-fog-router

# Initialize isolated Python virtual environment
python3 -m venv venv
source venv/bin/activate
```

Environment Configuration

Create a local `.env` configuration file for offline mesh routing:

```
cat << 'EOF' > .env
# B-LAN Mesh FOG Router Open Source Config
FOG_NODE_ID="imac-fog-router-01"
FOG_ROUTER_PORT=8095
MESH_INTERFACE="en0"
OFFLINE_MODE=true

# Delay-Tolerant Networking (DTN) Settings
DTN_STORAGE_DIR="./dtn_buffer"
STORE_AND_FORWARD_ENABLED=true

# Local AI Scheduler (No API Key Required)
LOCAL_LLM_PROVIDER="ollama"
LOCAL_LLM_ENDPOINT="http://localhost:11434"
LOCAL_LLM_MODEL="gemma2:2b"
EOF
```

4. Application Installation & Dependencies

```
# Upgrade package installer
pip install --upgrade pip

# Install local networking, async web, and P2P routing libraries
pip install ollama python-dotenv fastapi uvicorn streamlit requests scapy websockets
```

5. Executing B-LAN Mesh FOG Router Utility

Launch the router engine and local management dashboard on your iMac:

```
# Ensure virtual environment is active
source ~/blan-fog-router/venv/bin/activate

# Launch primary Python mesh router daemon
python3 main.py

# Alternatively, launch Streamlit Mesh Topology UI
streamlit run app.py --server.port 8095
```

Access the local Mesh Control Portal in Safari or Chrome at: `http://localhost:8095`

6. macOS Auto-Start Router Daemon (`launchd`)

Configure your iMac to automatically boot the Mesh FOG Router background daemon on startup:

```
cat << 'EOF' > ~/Library/LaunchAgents/com.blan.fogrouter.plist
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE PLIST PUBLIC "-//Apple//DTD PLIST 1.0//EN" "http://www.apple.com/DTDs/
PropertyList-1.0.plist">
<plist version="1.0">
<dict>
    <key>Label</key>
    <string>com.blan.fogrouter</string>
    <key>ProgramArguments</key>
    <array>
        <string>/Users/SHARED_USER/blan-fog-router/venv/bin/python3</string>
        <string>/Users/SHARED_USER/blan-fog-router/main.py</string>
    </array>
    <key>RunAtLoad</key>
    <true/>
    <key>KeepAlive</key>
    <true/>
    <key>WorkingDirectory</key>
    <string>/Users/SHARED_USER/blan-fog-router</string>
</dict>
</plist>
EOF
```

> *Note: Replace `/Users/SHARED_USER/` with your actual home directory path (check using `echo $HOME`).*

```
# Load daemon into macOS system startup
launchctl load ~/Library/LaunchAgents/com.blan.fogrouter.plist
```

7. System & Mesh Health Verification

```
# Check active local model status
ollama list

# Test local router API health endpoint
curl http://localhost:8095/health
```