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(Roles will be assigned in the final proposal)

PrivacyRadar: AI-Enabled Network Intelligence and Privacy Analyzer

Purpose

PrivacyRadar is an intelligent, privacy-focused network monitoring platform. Its core mission is to

- Provide real-time network traffic monitoring and analysis at an application level
- Empower users by transforming complex network analysis into actionable privacy intelligence
- Identify privacy violations, unauthorized data collection, and suspicious application behavior.

Target Users

- **Privacy-conscious users:** Individuals seeking transparency into their applications' network behavior.
- **Network enthusiasts:** Users who want deep insights into system-level network activity.
- **Security researchers & digital rights advocates:** Professionals needing tools to automatically identify privacy-violating applications and collect research-grade data.
- **IT professionals:** Those managing personal or small business network security.

Benefits

- Complete transparency into what your applications are really doing online and

subsequently privacy decisions backed by actual network data
- Simplifies network troubleshooting by correlating traffic with specific applications
- Helps identify malicious software or unwanted network activity
- Enables network traffic monitoring per application
- Export capabilities for further analysis in specialized tools
- Eliminates the complexity of traditional network analysis tools like Wireshark

Major Functionality

Network Monitoring

- Real-time display of running processes and their network activity
- Packet capture and filtering by selected applications
- Network traffic visualization (graphs, charts, data usage over time)
- Process-to-network connection mapping
- Traffic analysis and statistics with bandwidth usage per application
- DNS query monitoring and analysis
- Live connection status and protocol identification

System Logs Tracking

- Cross-platform system log integration
- Network-to-system event correlation for complete activity context
- Application installation/update tracking linked to network behavior changes
- Hardware permission change monitoring
- System-level privacy event detection and logging

AI-Powered Analysis

- Intelligent traffic classification (telemetry, updates, user data, malicious activity)
- Automated privacy risk scoring for applications
- Behavioral anomaly detection for suspicious patterns
- Natural language explanations of app behavior and privacy implications
- Context-aware privacy alerts distinguishing legitimate vs. suspicious usage

Data Management

- Historical data retention with configurable periods
- Export capabilities for captured data and reports
- Comprehensive reporting and analytics dashboard
- Search and filtering capabilities across all monitored data

Future Extensions

Hardware Access Tracking

- Camera, microphone, and location usage monitoring (which apps, when, duration)
- Screen recording and screenshot detection
- Clipboard access monitoring with content classification
- File system access tracking (reads, writes, modifications)
- Hardware sensor access monitoring (accelerometer, gyroscope, etc.)

Enhanced Platform Support

- macOS system-level tracking to monitor Apple/macOS network behavior
- Router-level integration for household network analysis

Technologies

- Electron (Framework for building cross-platform desktop applications using web technologies)

Frontend

- React with Next.js (Modern web framework with SSG/SSR capabilities)
- Tailwind CSS (Utility-first CSS framework)
- D3.js (Data visualization and network traffic graphs)

Backend

- Node.js with TypeScript
- Fastify (Web framework for API endpoints)
- Socket.io (Real-time communication for live monitoring)
- Platform specific Node.js packages for network monitoring

Database

- SQLite (Lightweight, embedded database - perfect for desktop apps)

AI/ML Integration

- LLM APIs: OpenAI, Anthropic, open-source Hugging Face models
- Ollama: for local models