

Free Range Routing - Monitoring and Anomaly Detection Tool

Graduate



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Project Partner
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Problem: Modern dynamic routing environments often suffer from limited visibility and diagnostic capabilities at the individual router level. This is especially true for setups based on Free Range Routing (FRR), an open-source routing suite that implements protocols like Open Shortest Path First (OSPF) and Border Gateway Protocol (BGP). Operators are typically forced to inspect each router's state manually via Command Line Interface (CLI), making it difficult to detect and understand anomalies such as missing or unexpected route advertisements. These issues can compromise network stability and make troubleshooting time-consuming and error-prone.

Result: We developed FRR-MAD, a modular, open-source monitoring and anomaly detection tool tailored to OSPF in FRR, to address these issues. The FRR-MAD toolset consists of two components: the frr-mad-analyzer, which handles data processing, anomaly analysis, and metrics exposure; and frr-mad-tui, a text-based user interface acting as a monitoring unit. Below is a brief overview of each component:

frr-mad-analyzer (backend):

- Collects raw routing data and structures it into efficient serialized data structures
- Compares how the router should behave vs. how the router actually behaves
- Exposes collected metrics and analysis results with well-known APIs

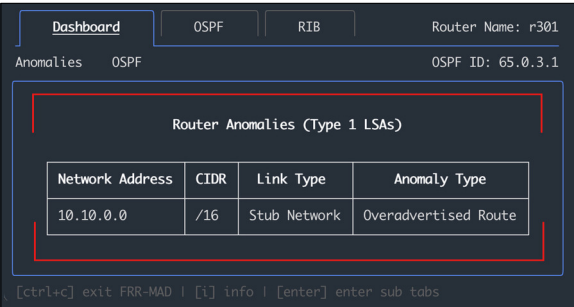
frr-mad-tui (frontend):

- Designed for clarity and ease of use
- Shows OSPF anomalies, metrics, routing tables, and more
- Helps users understand and troubleshoot OSPF behavior

Conclusion: FRR-MAD enhances the monitoring and troubleshooting of OSPF routing in FRR environments by providing live anomaly detection and intuitive visualization. Its open-source nature encourages community collaboration. We invite the FRR community to adopt, test, and contribute to the project. Developed in close collaboration with our project partner Open Systems, this tool is now being integrated into their production infrastructure.

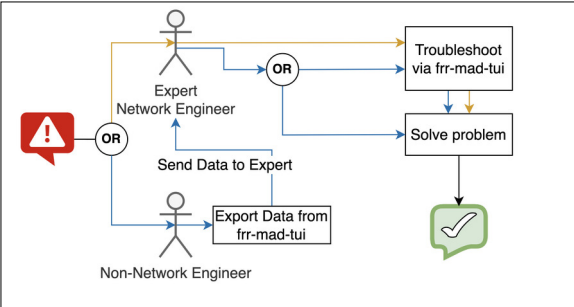
Anomaly Dashboard of frr-mad-tui

Own presentation



OSPF Troubleshooting Process with FRR-MAD

Own presentation



FRR-MAD Architecture

Own presentation

