**Initial Project Proposal Report**

**Project Summary**

The project's objective is to improve the existing network telemetry system by using Kafka for advanced data analysis and streaming. In order to provide a scalable, reliable, and effective telemetry system for reconstructing traffic routes in a Software-Defined Networking environment, the project intends to expand upon an existing Kafka-based event streaming framework. This system will process flow records, handle Open vSwitch switch data streams, and reconstruct end-to-end network pathways based on incremental updates using Kafka's features.

**Background**

The project expands on earlier research that showed how Kafka may be used for path reconstruction and network monitoring when combined with network telemetry technologies. By focusing on the more complicated integration of Kafka to manage large amounts of network telemetry data, enhance path reconstruction accuracy, and provide real-time insights into network performance, we can expand on the previous works of this project and provide a well-established structure for future teams to expand upon.

**Potential Contributions and Advantages**

Accurate and real-time path reconstruction in SDN systems is a major difficulty in network monitoring that this research attempts to address. Complex network topologies may demand off-the-shelf solutions that aren't scalable or have real-time processing capabilities. Using the distributed streaming infrastructure provided by Kafka, this project offers the following benefits:

**Scalability:** Managing massive amounts of network telemetry data requires a high-through and fault-tolerant data streaming, which Kafka's design provides.

**Real-Time Processing:** Kafka makes it possible to process flow records in real-time, which makes it possible to quickly reconstruct network pathways.

**Increased Accuracy:** Network path representations are more accurate when partial path updates and flow records are used to reconstruct paths incrementally.

**Broader Impacts**

Several benefits could result from this project's successful implementation:   
Community Benefits: Improves network performance and reliability by giving network managers better tools for controlling and optimizing SDN networks.

**Environmental Benefits:** Better resource usage and lower energy consumption in data centers can result from effective network management.

**Societal Benefits:** Improving network performance and visibility helps maintain the general stability and effectiveness of the internet infrastructure, which is essential for both end users and companies.

**Approach and Methodology**

**Strategy**

Integration of Kafka and GoFlow2**:** Configure Kafka to handle flow data from OVS switches.

Kafka Consumer Agents**:** Implement Kafka consumer agents in Go for processing flow records and reconstructing network paths.

Testing and Validation**:** Deploy the system in a cloud environment to test and validate its performance in reconstructing network paths and handling high data volumes.

**Methodology**

Configuration**:** Set up Kafka brokers, ZooKeeper clusters, and topic queues for data streaming.

Development**:** Code the Kafka consumer agents and integrate them with GoFlow2.

Deployment: Use Mininet for network simulation and ONOS for SDN control to emulate the network environment.

Evaluation**:** Measure the system's performance in terms of path reconstruction accuracy and latency.

**Tools and Resources**

Software**:** Kafka, GoFlow2, Mininet, ONOS, Docker.

Hardware**:** Standard cloud resources for deployment and testing.