



## Project Status report

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Community & UN SDG(s): **SaskTel network engineers and architects**

**UN SDG(s):**

- SDG#7: Affordable and clean energy
- SDG#11: Sustainable cities and communities
- SDG#12: Responsible consumption and production
- SDG#13: Climate action

MVP # **1**

Sprint cycle dates: **February 10th, 2025 - February 24th, 2025**

Project Name	Eco-Resilient Networks: Smart Deployment for the Future
Blurb	We are developing a simulation framework to optimize the deployment of Service Function Chains (SFCs) in edge-cloud environments, with a focus on jointly maximizing network availability and minimizing the carbon footprint. This project directly addresses UN Sustainable Development Goals 7, 9, 11, 12, and 13 by promoting affordable and clean energy, resilient infrastructure, sustainable communities, responsible consumption, and climate action. Our primary focus is on providing network engineers and architects (specifically at SaskTel) with tools to make data-driven decisions about VNF placement, leading to more efficient and sustainable network operations. The initial focus is on optimizing video streaming over 5G networks.
For Week Ending	February 24, 2025
Project Status	Green
Status Description	The project is currently on track and progressing according to the planned schedule. We have successfully completed the initial setup of the development environment, implemented the core simulation framework, and made significant progress on data input/output and visualization. The basic network topology and SFC request generation are functional. The team is prepared for the first scrum check-in.

### Activities—During the past sprint cycle

During the past sprint cycle we achieved the following:

- **Completed Work Package 1.1: Development Environment Setup.**
  - Installed Python, and required libraries (NetworkX, NumPy, Pandas, DEAP).
  - Set up a GitHub repository for version control and collaboration.
  - Created the project directory structure and initial project files.
- **Completed Work Package 1.2: Core Simulation Framework Implementation.**
  - Defined classes for Node, Link, VNF, and SFC.
  - Implemented basic network topology creation (fat-tree).
  - Implemented SFC request generation.
  - Implemented basic (random) VNF placement for initial testing.
- **Completed Work Package 1.3: Data Input/Output Modules.**
  - Created a JSON schema for input files (network topology and SFC definitions).
  - Implemented functions to read network topology and SFC definitions from JSON files.
  - Implemented functions to write simulation results to CSV files.
- **Completed Work Package 1.4: Visualization Module**



- Implemented basic network topology visualization using Matplotlib.
- Implemented basic VNF placement visualization.
- Began initial draft of research paper (Introduction and Related Work sections).
- Prepared presentation materials for Scrum #1.
- **Code/Demo Todos:**
  - Show the input JSON files defining the network topology and SFC.
  - Show the output CSV file with basic simulation information.
  - Show the visualizations of the network topology and VNF placement.
  - Show the code structure in the GitHub repository.

## Project Issues

All identified minor issues have been successfully addressed and resolved. We maintain a proactive approach to issue management, ensuring no roadblocks impede our progress.

## Project Changes

No project changes were required during this sprint cycle. The project scope and requirements remain well-defined and aligned with our initial plan.

## Activities—Planned for Next Week

Following is the list of all activities that the team members will work on during the next week of the project:

- **Begin Work Package 2.1:** Embedding Policy Implementation (focus on Tradeoff-Aware Embedding).
- **Begin Work Package 2.2:** Redundancy Optimization Algorithm Implementation (focus on PSO).
- **Begin Work Package 2.3:** Performance Metric Calculation (availability, carbon footprint, latency).
- Continue work on the research paper draft.

## Reflection

### **Do you feel "on track"?**

Yes, the project is currently on track according to the planned schedule.

### **What progress do you particularly feel good (great) about?**

We are particularly pleased with the successful setup of the development environment and the rapid progress on the core simulation framework. The ability to visualize the network topology and VNF placement early on is also very encouraging. The clear definition of input and output formats will facilitate future development.

### **What barriers (if any) do you feel is/are a current impediment to success?**

No significant barriers have been encountered so far.

### **What help (if any) do you require to move positively forward?**

No specific help is required at this time, but we welcome feedback from the instructor and peers during the scrum check-in.

### **What questions or concerns do you have (if any)?**

We are currently prioritizing the Tradeoff-Aware embedding policy and the PSO algorithm. We would appreciate feedback on whether this is the most appropriate approach for the initial MVP.