ResilNet-FL: System Architecture

Layer 3: Federated Learning (FedProx)

Cloud Aggregation Server

FedProx Weighted Averaging

$$w_{t+1} = \frac{\sum \alpha_k w_k}{\sum \alpha_k}$$

$$\mathcal{L} = \mathcal{L}_{task} + \frac{\mu}{2}\|w - w_g\|^2$$

w_k Model 1

w_k Model 2

w_k Model 3

Model 4

Layer 2: Edge Computing (CloudSim) + NS-3 Network

NS-3: IEEE 802.11p DSRC Channel

Local Training — **Edge Server 1**

Local Training — **Edge Server 2**

Local Training — **Edge Server 3**

Local Training — **Edge Server 4**

Layer 1: Traffic Infrastructure

Sensors — **Intersection 1**

Sensors — **Intersection 2**

Sensors — **Intersection 3**

Sensors — **Intersection 4**

Upload Gradients

Download Global Model

Data Flow