Region Formation

$\mathcal{R}_1, U_1$

$\mathcal{R}_4, U_4$

Intersection Agents

R1

R3

R4

R6

R5

R2

SEMI-CTDE

Region$_k$

regional agent u_k

Q-Network

Regional Policy

Regional Policy

Query

Composite Reward weights (ρ^{loc}_k, ρ^{reg}_k)

Query

Sample

Region-Level Shared Replay Memory DR_k

Intersection agent 1

Intersection agent i

Experience

Experience

A_1

ρ^{loc}_k

$Topology_1$ & $Location_1$

$Topology_i$ & $Location_i$

ρ^{loc}_k

A_i

ρ^{reg}_k

ρ^{reg}_k

AMM_1

TLE_1

TLE_i

AMM_i

Regional Reward

Action

Local Reward

Local State

Regional State

Local State

Local Reward

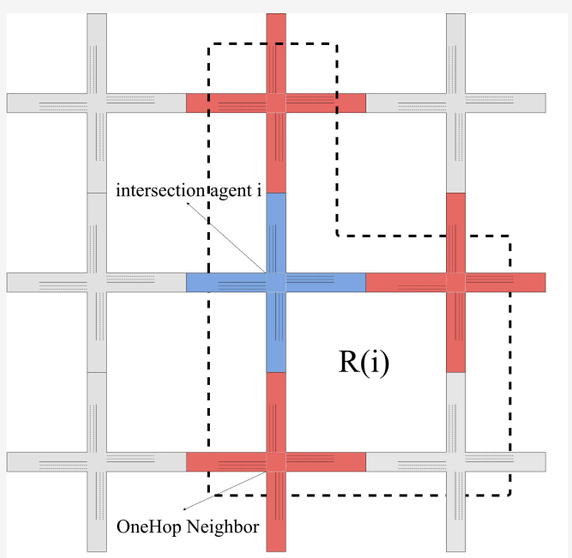
Action

Regional Reward

Intersection 1

Intersection i

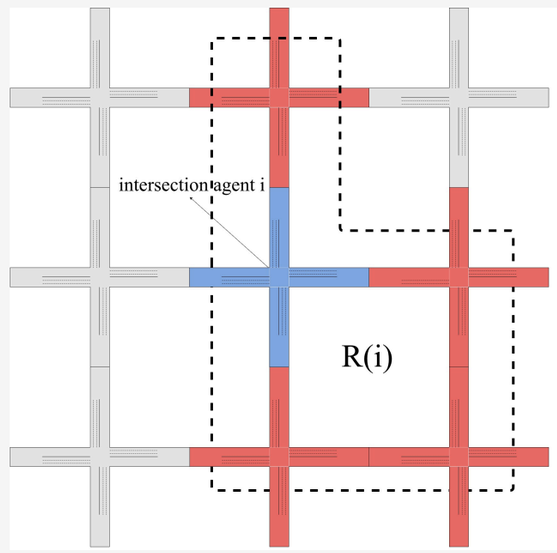
OneHop



$$s_i = \left[s_i^{\text{local}} \,\|\, s_i^{\text{regional}} \right]$$

Local Information

Regional Information

$$r_i = \rho^{loc}_{\mathcal{R}(i)}\, r_i^{\text{local}} + \rho^{reg}_{\mathcal{R}(i)}\, r_i^{\text{regional}}$$

RegionWide