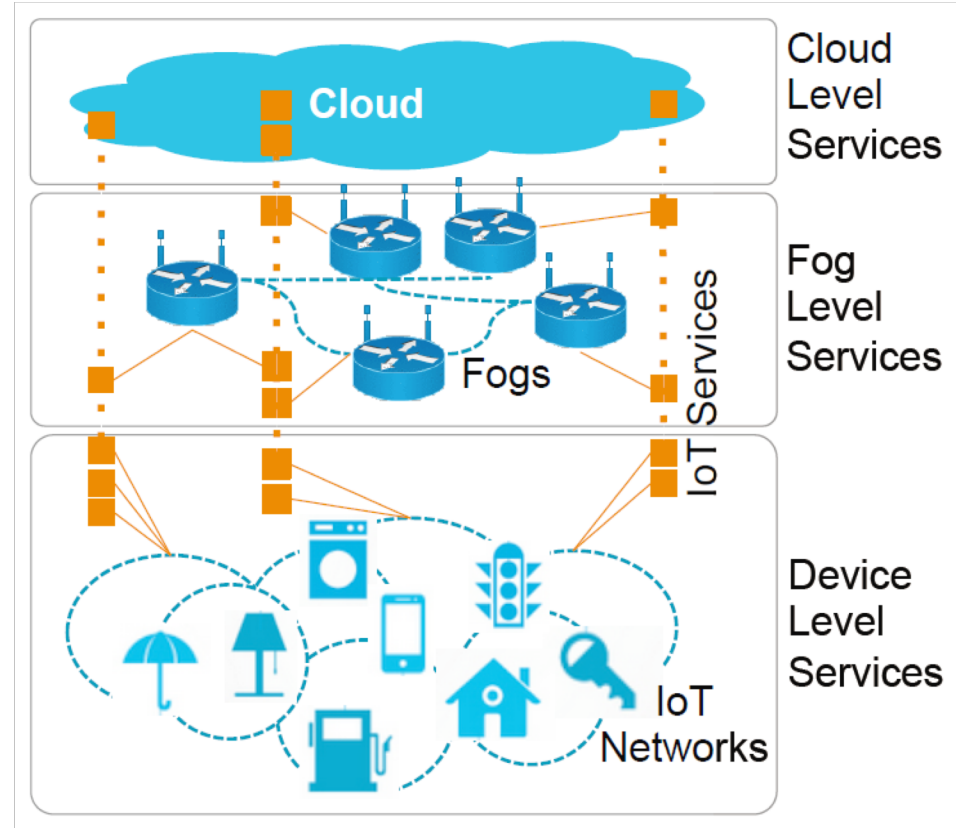# OctoFog: Distributed Intelligent Migration of Fog Services in Smart Cities

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Fog computing

- A key technology of future communication networks (e.g. 5G)
- Enable computation-intensive and delay-sensitive applications in smart cities

Mobility issue

- Mobility of end users in smart city systems result in considerable network performance and QoS degration
- Service migration is considered an effective solution to avoid service interruption and ensure service continuity

Service migration of Fog Service

OctoFog System Architecture

- An intelligent and efficient migration solution for proactive and reactive fog services migration

- Distribute the intelligence to both the Cloud and towards the network edge through a continuum of fog nodes

- Forecasting the movement of user and fog nodes

- Apply DRL algorithms to automatically perceive the complicated resources utilization and diverse requirements of emerging services
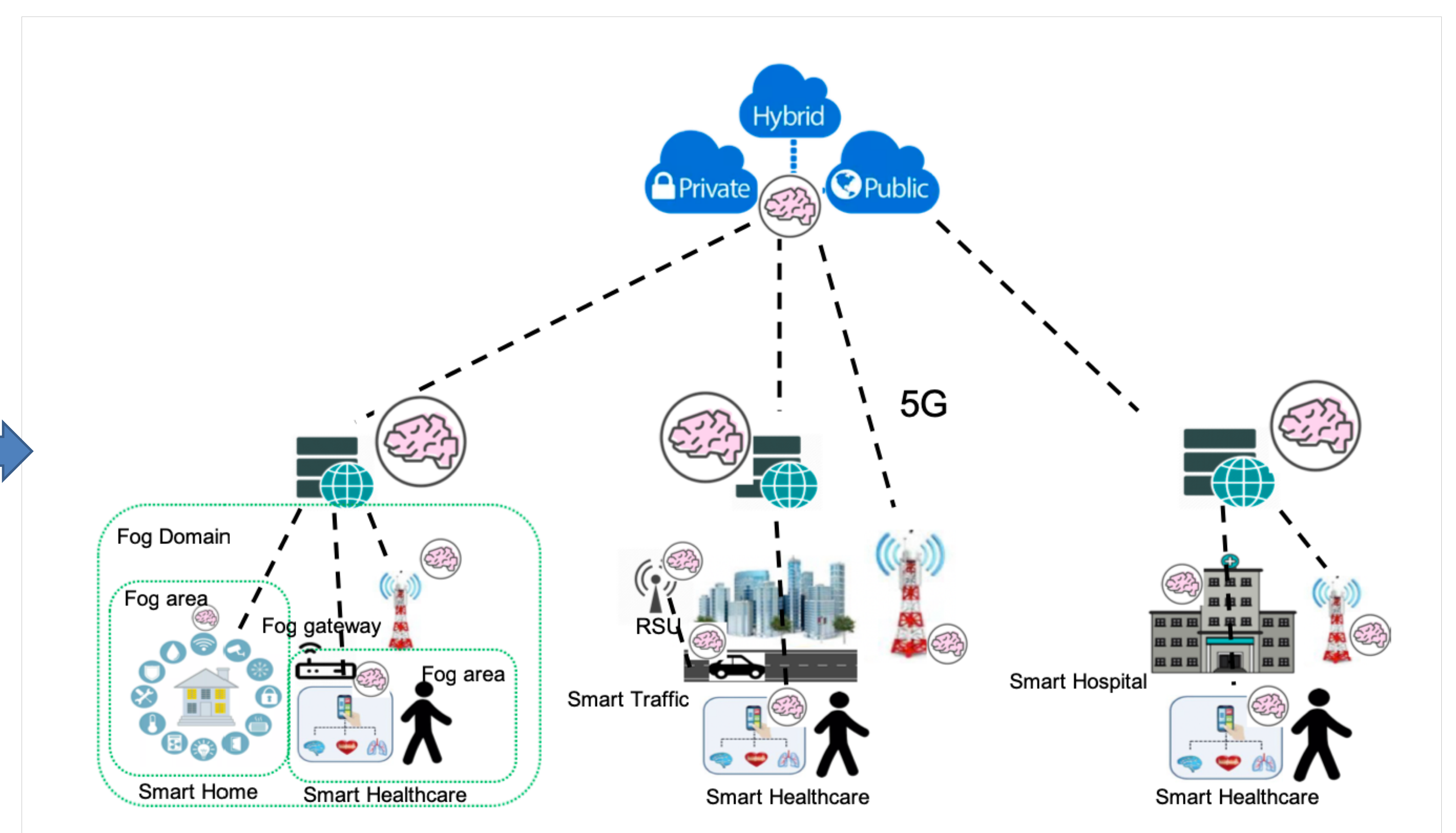
AI based Optimisation module

- Introduce DRL-based techniques to solve the optimization problem
- Define three elements in DRL, namely, specific state, action and reward
- Use the Q-learning algorithm and propose a DQN method to estimate the action-value function of Q-learning
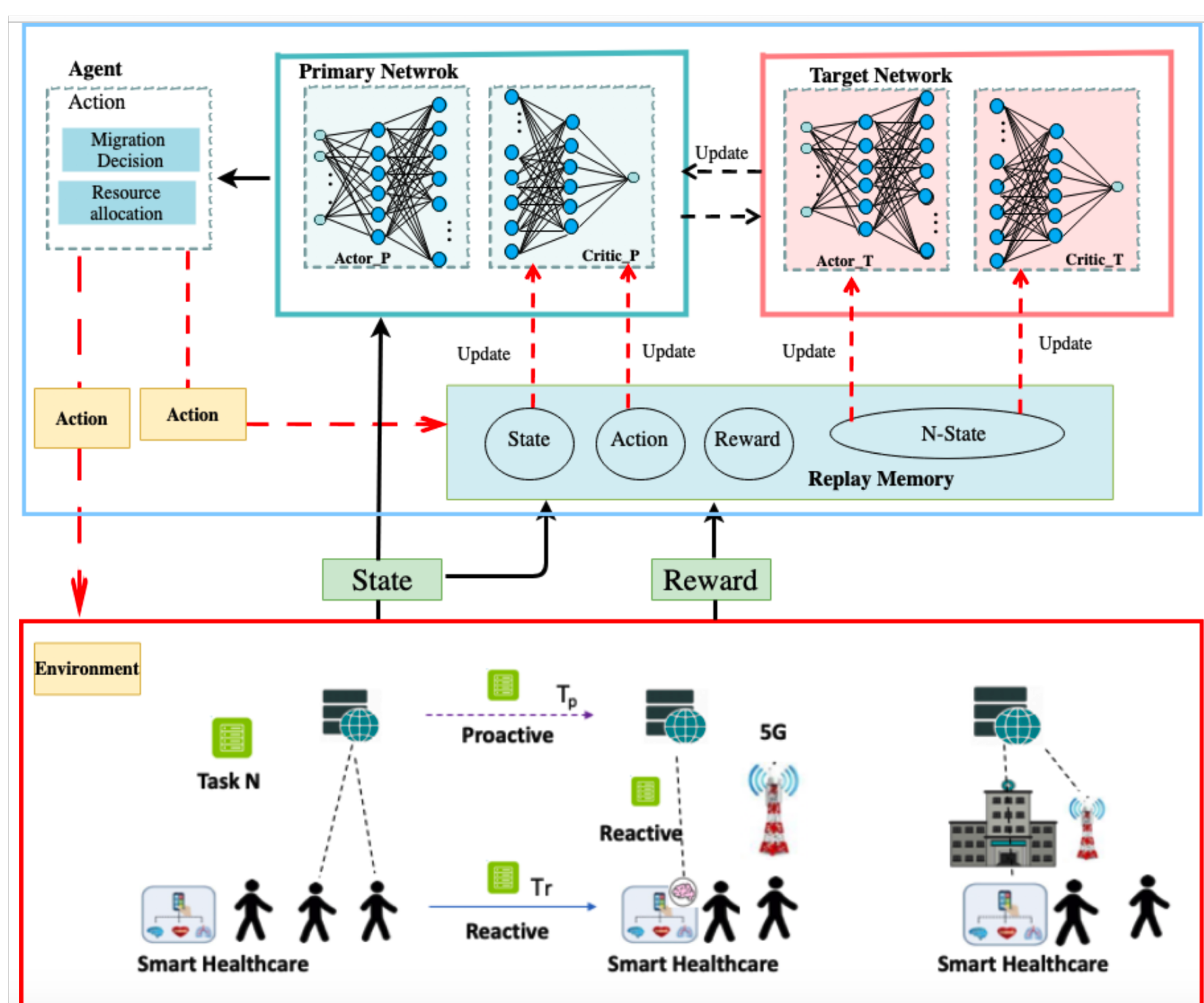
Evaluation and results

- Testbed includes three layers: the Cloud layer, the Fog layer and the mobile user layer
- Cloud layer runs on an UH-IaaS infrastructure based on OpenStack
- Two laptops to simulate the fog/edge nodes running with Ubuntu 18.04 LTS with Docker 18.09.2
- Mobile user device layer consists of RaspberryPi
- Using the DRL method achieves 34.5% and 16.3% better performance than sole reactive method and proactive migration methods