

## Abstract

- We discuss an area restriction technology based on tracking area code (TAC) control policy for 5G private network.
- We focus on proposing the related 5G private network area restriction technology.
- A typical application scenario is presented to demonstrate the effectiveness and safety of the proposed scheme.

## Introduction

- Industry users have urgent needs for network coverage quality, latency and stability in the process of accelerating transformation to digitalization and intelligence.
- 5G terminals are free from time and space constraints and can flexibly access enterprise intranet and Internet resources.
- 5G private network should realize smooth connection and interconnection of data within, outside and between parks.

## Aims

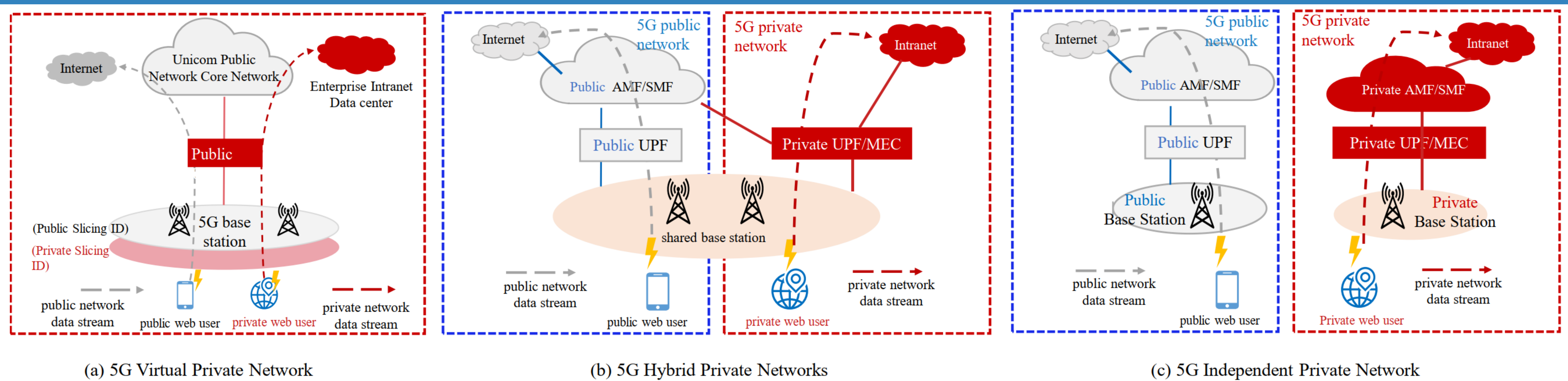


Fig. 1. The schematic diagram of 5G private network deployment mode

- China's three major operators publicly released 5G private network white papers in 2020, and all of them adopted similar private network architectures.
- 5G private networks are basically categorized into three types: virtual private network, hybrid private network, and independent private network.

## Architecture

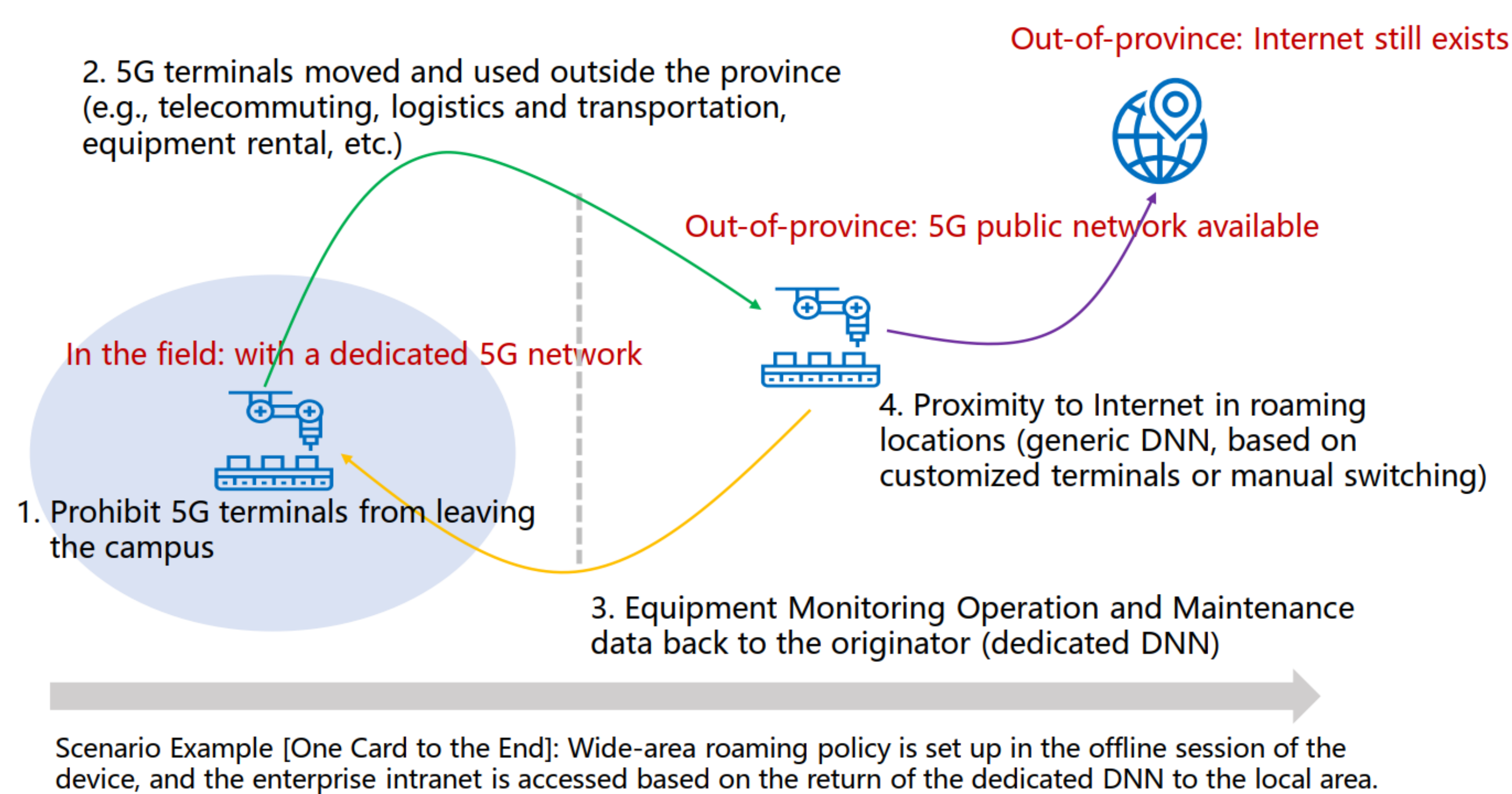


Fig. 2. Schematic diagram of the park exclusive card

- The campus exclusive card is a special 5G IoT card that can strictly control the 5G private network access area. The granularity of its area control can reach the TAC level.
- The new 5G network security quasi-control system includes a 5G access authorization gateway module, a 5G control policy module, and a forwarding system control module.

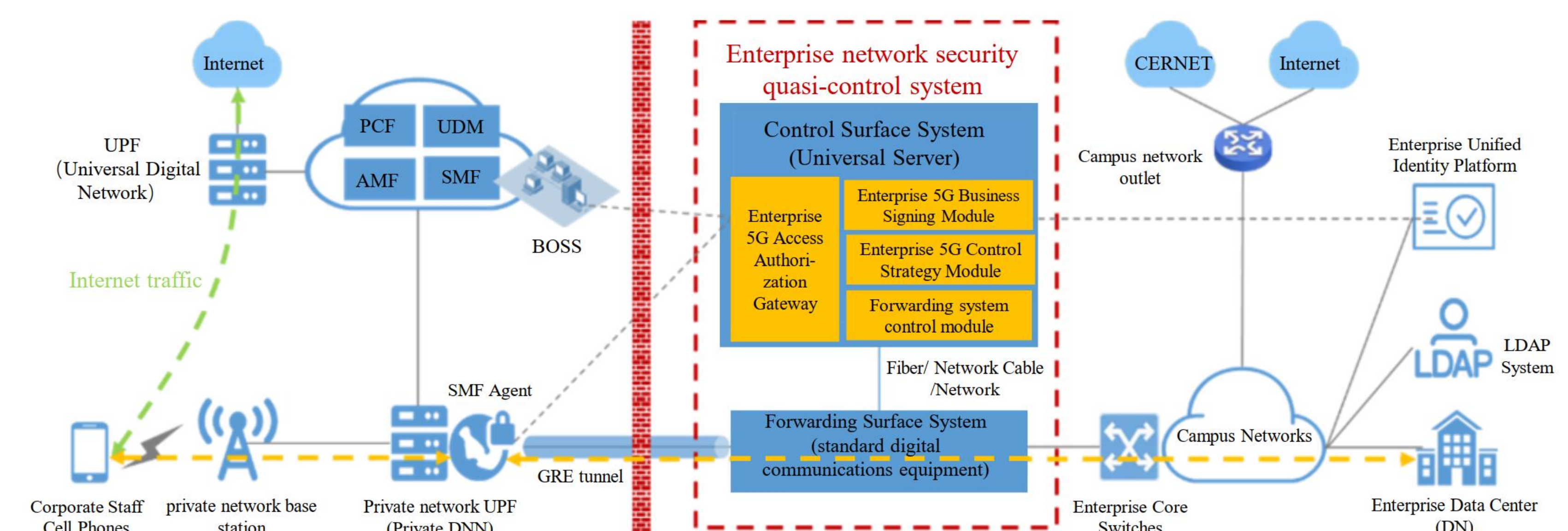


Fig. 3. Comparison of reward values corresponding to different learning rates of the two-level actor-critic algorithm.

## Typical Application

- As of the end of May this year, China has built a total of 2.844 million 5G base stations, with more than 2.05 billion mobile IoT end-users.
- 5G applications have been integrated into 60 of the 97 major categories of the national economy, and the number of application cases has accumulated more than 50,000.
- The core network of the project is based on the original 1 set of UPF, 2 firewalls, and 2 switches.
- A pair of firewall side-mounted docking service switches are configured.

## Conclusions

- This paper focuses on the field of 5G private network security.
- The technology supports wide-area mobility, and also real-time detection and judgment of whether the connected terminals are accessed within the TAC zone of the private network.

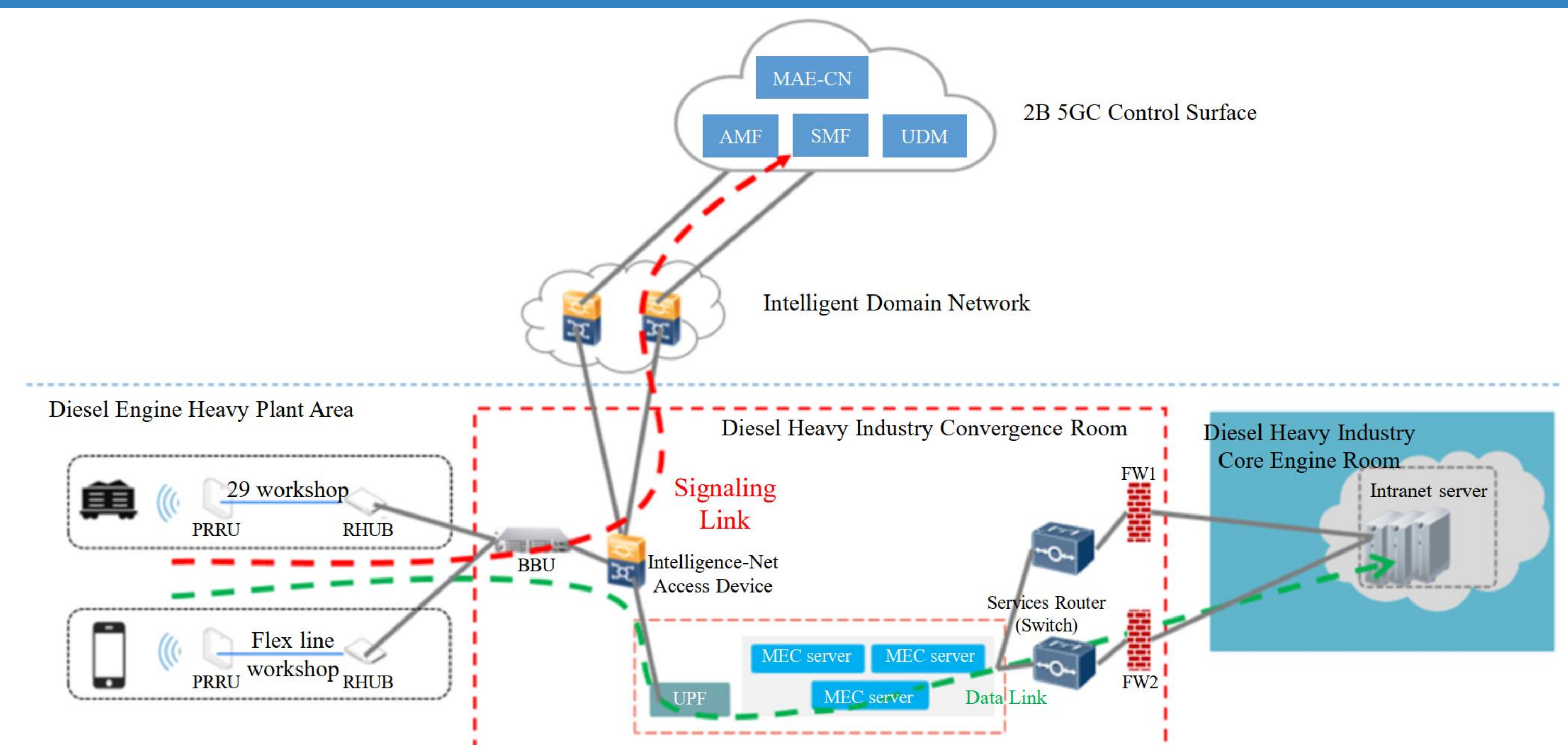


Fig. 4. Architecture of a typical 5G private network