China Unicom 5G MEC Commercial Practice in Industry for Digital Transformation

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New network demands for 5G industry application

- Differentiate, Synergy and Centralized Operation

**Business Demand**

- **Video surveillance**
  - Bandwidth: 4M~12M
  - Latency: <10ms
  - Local Traffic Redirection
  - AI

- **Industrial control**
  - Bandwidth: 4M~12M
  - Local Traffic Redirection
  - LBS(< 1meter)
  - L2 Network

- **Industrial vision**
  - Bandwidth: 80Mbps~500Mbps
  - Lossless compression
  - Encryption protection

**Network Requirement**

- **Wide Area**
  - Ultra low latency
  - Wide Converge
  - Cloud/Edge Orchestration
  - Unify Operation
  - Cross region connection
  - Cross-region self-service

- **Industrial vision**
  - Local Traffic Redirection
  - LBS(< 1meter)
  - L2 Network

- **Video surveillance**
  - Bandwidth: 4M~12M
  - Lossless compression
  - Encryption protection

**Operator Capability**

- **Differentiation MEC & 5G Private Network**
  - Customized private network section under public network
  - Low latency, High security
  - Edge Computing
  - End-to-end

- **Cloud, Edge and Network Synergy**
  - Central Cloud, Edge and network Synergy
  - Multi-region support
  - 5G ecosystem

- **Differentiation SLA**
  - Isolation: Local traffic routing & dedicate network space
  - Function: LBS/Video/AI

- **Determinative experience**
  - Latency: 5-15ms
  - Availability: 99.9%~99.9999%

- **Business Iteration**
  - Network Slicing
  - Deployment: <24 hr
  - MEC: On-premise

- **Self-service**
  - Self-service portal for users
  - Monitoring, Management

- **Centralized Operation**
  - Centralized support
  - Automated operation
  - Self-service entry for clients
China Unicom 5G MEC
- Low-latency network and high-quality edge computing

5G MEC = (Edge Network + Edge Computing) x Edge Ecosystem x Integrated Service
A 5G-based platform over mobile edge network with edge computing capability, providing end-to-end ICT services which are integrated, open, synergy and elastic. It help users to deploy service close to business with better performance and better cost-effective.

Product Definition

01. On-Site: Dedicated Model

- For 2B customers, to provide “plug and play integrated” dedicated services to meet intact user data for high security requirements. Self-service services is also provided to clients (self-monitoring, self-deployment, self-operation and etc.)
- Typical scenario: Large factories, mines, hospitals, ports

02. Aggregate/Access DC: Shared Model

- 2B or 2B2C customers who need to, share edge infrastructure in a “multi-tenant” way, typically deployed in Aggregate/Access DCs
- Typical scenario: campus, cloud gaming/XR and other wide-area services

Customer Local Site

Aggregated/Access DC

Tenant A
- Edge services1
- Edge services2
- Edge services3

Tenant B
- Edge services1
- Edge services2
- Edge services3

Tenant C
- Edge services1
- Edge services2
- Edge services3
China Unicom 5G Private Network

- Three Models: Virtual, Hybrid, and Dedicated.

There are three models for China Unicom 5G private network according to the level of customization: **Virtual**, **Hybrid**, and **Dedicated**. They are designed to different types of clients to provide 5G network for **specific area coverage**, **specific network transfer**, **specific security level**, and **user end device management** to fit different business scenarios.

**Virtual & Isolated Private Network** (Shared UPF + Shared 5GC)

- **Scenarios:** non-specific customers, wide-area mobility, and stable bandwidth for specific venues such as stadiums and media users.

**Hybrid + MEC**

- **Isolated Data with Customized network** (Dedicated UPF + Shared 5GC)
- High-end customization for digital factory/shop floor, industrial park and other data latency requirements, data local unloading, relatively capital-sensitive demand scenarios.

**Dedicated + MEC**

- **Dedicated network** (Dedicated UPF + 5GC Lite)
- Data privacy, high security requirements, and insensitive demand scenarios for coal, steel, energy and electricity.

**Product Portfolio**

- **5GC**
  - Operator Public 5G + Enterprise Slicing

  - **Virtual**
    - Shared UPF

  - **Hybrid**
    - Operator Public 5G
    - Operator + Enterprise
    - Dedicated UPF/MEC

  - **Dedicated**
    - Operator Public 5G
    - Dedicated UPF/MEC
    - Dedicated + MEC

**Features**

- **Ultra-low latency**
- **Customization on demand**
- **Security**
- **Professional Service**
- **Centralized Ops**
- **Self-Service**
- **Open**
- **Higher bandwidth**
Industry Digital Transformation Acceleration by 5G MEC

- CNEEB “5 in 1” : Cloud, Network, Edge, End-Device & Business

① Cloud
✓ Public and Private cloud. Multi-cloud orchestration

② Network
✓ Network orchestration with Cloud; Agile, Open, Elastic and efficiency network

③ Edge
✓ Lower-down computing to edge to provide new computing model with ecosystem capability

④ End-Device
✓ Diversification, customization, pan-device, intelligent device,

⑤ Business
✓ 2B, 2C, 2H Applications and Ecosystem
China Unicom Intelligence 5G Operation Platform:
- The centralized ops platform to support 5G MEC business scaling and replication

### Product Gap-Filling

- Integrated with Business Middle Platform for seamlessly produce go-live and provisioning process
- Integrated with IOT management Gateway for SIM card configuration

### Network Gap-filling

- Integrated with OMC for network service provisioning automation
- NSMF+ integrated with wireless, access, aggregate and core for overall network management

### Product Portfolio Definition

- Define 2B business model and identify the service components (Network, computing or value-added PaaS) and price model
- Define unit product and enable ordering and provisioning automation

### Network Capability

- Beyond standards, innovation-friendly, enhance network capacity, 2B2C synergy, rich industry applications

### Automated Provisioning

- Build-in UPF with Pre-integrated to support plug-and-play

### Reliable Network

- Differentiated SLA, High-reliable 5G; High-Available UPF
China Unicom Intelligence 5G Operation Platform:
- The platform to support internal operation and external self-service

Country-wide 5G centralized platform for 5G MEC/Private Network in **unified operation, centralized support and client self-service**

**Support internal operation**: Seamlessly integrated with Business Middle Platform and OSS2.0 with the capability to provide end-to-end support

**Support external self-service**: Dedicated for client with the capability for on-site support
Shanxi China Unicom & PangPangTa Coal mine

Intelligent Coal Mine Project

PangPangTa Coal mine introduction:
- Capacity>10,000,000 tons/year
- First China Coal Mining Standard Pilot project
- More than 100 kilometers, combined mining face >300 Meters, 4 combined mining face

Intelligent Coal Mine Ecosystem Architecture
- 5G is one of the core infrastructures

Reliability Requirement: 5G system for coal mining should be able to network independently and run independently in case of the external network failure or disconnection.

Coal Mining Ecosystem
- MEC
- 5G+ Industrial networks

Communication applications (Call, Internet, video, AR, VR, etc)
- Driverless/AGV/Remote Control (Ground included)
- Environmental monitoring applications (Sensor data is transmitted wirelessly)

Data: mine equipment connection and management, industrial network data analysis
- Machine intelligence: AI+Security monitoring, AI+People positioning, AI+Production monitoring, AI+Control

Mine equipment connection and management
- Cloud-Edge-End Device Orchestration Platform

Underground 5G network
- Wireless-LampSite to cover tunnel and combined mining face
- Transmission-Industrial convergency network, 3 points-in-a-circle DR

Industrial Identification
- Industrial safety
- Explosion Avoidance

Source: China Unicom Shanxi Province

Typical business scenarios for the coal industry:

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Description</th>
<th>Availability requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underground fixed video surveillance</td>
<td>Underground roadways, transport car park distribution video</td>
<td>In case of the external network failure or disconnection, surveillance should keep running independently over 24 hours</td>
</tr>
<tr>
<td>Underground remote control</td>
<td>Remote control and video transmission of coal mining surface shearsers and diggers</td>
<td>In case of the external network failure or disconnection, end device should keep running over 24 hours</td>
</tr>
<tr>
<td>Underground automatic inspection</td>
<td>Automatic inspection of the robot underground electromechanical chamber</td>
<td>In case of the external network failure or disconnection, robot should keep running over 24 hours</td>
</tr>
</tbody>
</table>

June 17th, 2020, China Security Standard Center released Coal mining 5G Communication system safety technical requirements (Pilot). 5G system for coal mining should be able to network independently and run independently in case of the external network failure or disconnection. The system should be able to operate safely, independently and steadily, to ensure reliable and stable wireless communication and data transmission. It is to meet the relevant provisions of safety isolation on the well;
### PangPangTa Coal Mining Scenarios:
**High reliability, Low latency and broad bandwidth**

<table>
<thead>
<tr>
<th>Application</th>
<th>Scenario</th>
<th>Network Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control system</td>
<td>The coal mining surface coal machine is controlled remotely and centrally</td>
<td>Latency&lt;50ms, Reliability&gt;99.999%</td>
</tr>
<tr>
<td>coal mining Sensor</td>
<td>Underground environment and machine operation monitoring</td>
<td>&gt;5000+ Devices</td>
</tr>
<tr>
<td>HD video streaming</td>
<td>Work surface, digging surface, transport reprint point, distribution video</td>
<td>Upstream bandwidth&gt;1.6Gbps</td>
</tr>
</tbody>
</table>

- **Dedicated wireless + Dedicated MEC**
- **MEC local traffic redirection**
- **Edge MEP + Vertical applications**
- **Network Slicing for isolation**

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**Reliable Network**

**Intact Data**

**Low latency**

**Board bandwidth for video**

**Business isolation**
## China Unicom: Leading 5G MEC/Private Network Commercial Practice

In 2020, Over 100 MEC/Private 5G network project had been deployed to support client in digital transformation.

### Virtual 5G Private Network + MEC for Smart Grid

- **5G SA** with network slicing and end-to-end orchestration for grid scheduling
- ◇ 5G Slicing for reliable private network
- ◇ Support data analysis for business
- **Hybrid 5G Private Cloud for Smart Manufacturing**
- ◇ Machine vision for quality control

### Dedicated 5G Private Network + MEC for Smart Coal Mining

- China first 5G+ Smart Coal mining
- ◇ Dedicated 5G private network + MEC
- ◇ MEP + Coal mining apps

<table>
<thead>
<tr>
<th>#</th>
<th>Province</th>
<th>Client Name</th>
<th>Industry</th>
<th>运作模式</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GuangDong</td>
<td>Gree electrical</td>
<td>Manufacturing</td>
<td>MEC + 5G Slicing + Value-Added Service</td>
</tr>
<tr>
<td>2</td>
<td>ShanXi</td>
<td>Jinnan Steel</td>
<td>Manufacturing</td>
<td>MEC + Ecosystem App</td>
</tr>
<tr>
<td>3</td>
<td>GuangDong</td>
<td>Wei de Wen</td>
<td>Internet of Vehicle</td>
<td>MEC + Ecosystem App</td>
</tr>
<tr>
<td>4</td>
<td>GuangDong</td>
<td>MingMing Electronics</td>
<td>Manufacturing</td>
<td>MEC + Ecosystem App</td>
</tr>
<tr>
<td>5</td>
<td>Gansu</td>
<td>Baolang carbon</td>
<td>Manufacturing</td>
<td>MEC + Value-Added Service</td>
</tr>
<tr>
<td>6</td>
<td>Jiling</td>
<td>FAW Red Flag—汽红旗</td>
<td>Manufacturing</td>
<td>MEC + 5G Slicing + Value-Added Service</td>
</tr>
<tr>
<td>7</td>
<td>Zhejiang</td>
<td>State Grid</td>
<td>Power</td>
<td>MEC + Value-Added Service</td>
</tr>
<tr>
<td>8</td>
<td>HeiLongJiang</td>
<td>Yichun West Steel</td>
<td>Manufacturing</td>
<td>MEC + Value-Added Service</td>
</tr>
<tr>
<td>9</td>
<td>GuangDong</td>
<td>Toyota (Guangzhou)</td>
<td>Manufacturing</td>
<td>MEC + Ecosystem App</td>
</tr>
<tr>
<td>10</td>
<td>GuangDong</td>
<td>Honda (Guangzhou)</td>
<td>Manufacturing</td>
<td>MEC + Ecosystem App</td>
</tr>
<tr>
<td>11</td>
<td>Xinjiang</td>
<td>State Grid</td>
<td>Power</td>
<td>MEC + Ecosystem App</td>
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<tr>
<td>12</td>
<td>AnHui</td>
<td>Changhong Meling</td>
<td>Manufacturing</td>
<td>MEC + Value-Added Service</td>
</tr>
<tr>
<td>13</td>
<td>Jiangsu</td>
<td>China University of Mining and Technology</td>
<td>Education</td>
<td>MEC</td>
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<tr>
<td>14</td>
<td>Jiangsu</td>
<td>Bosch (Suzhou)</td>
<td>Manufacturing</td>
<td>MEC</td>
</tr>
<tr>
<td>15</td>
<td>QingHai</td>
<td>Scenic spot</td>
<td>Tourism</td>
<td>MEC + Value-Added Service + Ecosystem App</td>
</tr>
<tr>
<td>16</td>
<td>Jiling</td>
<td>SiPing City Public Security Bureau</td>
<td>Smart city</td>
<td>MEC + Value-Added Service + Ecosystem App</td>
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<tr>
<td>17</td>
<td>AnHui</td>
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<td>MEC</td>
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<td>18</td>
<td>GuangDong</td>
<td>BaoWu Steel</td>
<td>Manufacturing</td>
<td>5G Dedicated Network + MEC + Value-Added Service</td>
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<tr>
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<td>Manufacturing</td>
<td>MEC + Value-Added Service</td>
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<td>ChongQing</td>
<td>Chuanyi Automation Co., Ltd</td>
<td>Manufacturing</td>
<td>MEC</td>
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<td>Sunwoda</td>
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<td>22</td>
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<td>EVOC</td>
<td>Manufacturing</td>
<td>MEC</td>
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<tr>
<td>23</td>
<td>GuangDong</td>
<td>Zhuhai City Emergency Management Agency</td>
<td>Government</td>
<td>MEC</td>
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<tr>
<td>24</td>
<td>GuangDong</td>
<td>TianHong Digital Mall</td>
<td>Building</td>
<td>MEC</td>
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<tr>
<td>25</td>
<td>GuangDong</td>
<td>HuCais</td>
<td>Manufacturing</td>
<td>MEC + Ecosystem App</td>
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<tr>
<td>26</td>
<td>ShangHai</td>
<td>ZhangJiang</td>
<td>Building/Campus</td>
<td>5G + MEC + Ecosystem App</td>
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<tr>
<td>27</td>
<td>ShangHai</td>
<td>COMAC</td>
<td>Manufacturing</td>
<td>5G + MEC + Ecosystem App</td>
</tr>
<tr>
<td>28</td>
<td>HeBei</td>
<td>State Grid</td>
<td>Power</td>
<td>5G + MEC + Ecosystem App</td>
</tr>
<tr>
<td>29</td>
<td>ShanXi</td>
<td>Zhang Jiaxuan Coal Mine</td>
<td>Manufacturing</td>
<td>5G + MEC + Ecosystem App</td>
</tr>
<tr>
<td>30</td>
<td>ShangHai</td>
<td>SWS</td>
<td>Manufacturing</td>
<td>5G + MEC + Smart shipbuilding applications</td>
</tr>
</tbody>
</table>
Thank you.