Telecommunication 4.0

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China Mobile
China Mobile Overview

- Part of the Dow Jones Sustainability Indices for 10 consecutive years
- 53rd in Fortune 500
- 21st in BrandZ Top 100

- Total connections 1.633B
- Mobile subscribers 925M
- Personal mobile market share 60%
- Household market share 41.5%
- Corporate market share 38.5%
4G Transforms Our Life

**World’s Largest 4G Network**
- 2.41M 4G base stations
- ≥ 99% population coverage

**World’s Largest Fixed Network**
- 157M broadband connections
- ≥100 Mbps

**World’s Largest IoT Network**
- 551M connections
- 0.2M NB-IoT base stations

**Lifestyle Transformation**
- Mobile payment
- Video call
- Fixed network
- Smart parking
- Video Website
- Intelligent lamp
- Smart bike
China Mobile’s Effort in 5G

5G Requirements

Proposed 5G flower
8 KPIs accepted by ITU

5G Key Technologies & Standardization

1000+ patents
1500+ standard contributions
SBA, 3D-MIMO, CU-DU split, etc.

5G Ecosystem

O-RAN Alliance
17 5G Trial and Demonstration Cities
Xiong’an 5G Trial Network
“5G Device Forerunner Initiative”
“5G Network Pilot Plan”

5G + Verticals

5G Joint Innovation Center
22 Global Open Labs
500+ Partners
R&D Landscape of China Mobile

R&D Expenditure
- 3% of Revenue

R&D Staff
- 10,000 +

National Key Labs
- 5

Core
- Technology and Standard R&D
- 6 Research Institutions

Inner
- Product and Platform R&D
- 12 Subsidiaries

Outer
- Service and Application R&D
- 31 Provincial Operating Companies

Bottom up R&D

Top down R&D

Open Collaboration

- 31 Provincial Operating Companies

- 12 Subsidiaries

- 6 Research Institutions

- 5 National Key Labs
From Telecom 1.0 to 4.0
Dedicated to Revolutionary Evolution

Support our pursuit for better life
Promote social and economic development

Telecom 1.0
Analogue communication

Telecom 2.0
Digital communication

Telecom 3.0
IP Network

Telecom 4.0
ICT Integration

Vertical Industry

APP

Online Video

Gaming

8k High Definition
Maslow Model for Telecommunication

**Maslow's hierarchy of needs**

- **Survival**
  - Physiological needs (breath, water, food, sleep, sex)
  - Safety needs (security of body, resources, morality, health, property)
- **Belonging**
  - Social needs (love, belonging)
  - Esteem needs (confidence, achievement)
- **Growth**
  - Self-Fulfillment
  - Self-Liberation (Ubiquitous and Shared Intelligence)

**Model of telecom needs**

- **Telecom 1.0**
  - Essential Communication (Telegram and telephone, SMS, MMS)
- **Telecom 2.0**
  - Universal Communication (Picture, video call)
- **Telecom 3.0**
  - Information Consumption (Mobile Internet, rich media)
- **Telecom 4.0**
  - Sensing Extension (Ubiquitous and Shared Information)
  - Person - Information
  - Person - Thing
  - Thing - Thing
  - Person - Person
  - Intelligence - Intelligence
Pervasive Intelligent World

- Automated Traffic (Drone Taxi)
- Inter-Machine Collaboration (Autonomous Soccer Robot)
- Body Area Network (Personal/Safety Monitoring)
- Multisensory Mixed Reality (Smart Education)
- Virtual Assistant
- Empathic and Haptic Communications (Wireless Brain-Computer Interactions)
- Tactile Internet (Remote control)
- Hologram (Virtual Meeting Rooms)
- Communication at any where (Space phone)
- intelligence Exchange

Ubiquitous Intelligence

Person - Person

Person - Thing

Thing - Thing
Telecom 4.0, From 5G to 6G
Technical Features

Network as a Service (NaaS)
- Diverse capabilities
- On-demand fulfillment

Multi-band Co-existence
- Opportunistic sharing

Native AI
- ICDT convergence
- Smart node
- Smart connection

Native Security
- Smart consensus
- AI enabled defense

Lite Network
- Plug-and-play
- Biomimetic architecture

Soft & Self-evolving
- Zero touch network
Lite Network: Inspiration of an Anthill

- 3D topology
- Efficient
- Rapid deployment
- ...
Multi-band Co-existence

Spectrum sensing

- Sub 10GHz
- Microwave
- MMW
- THz
- Visible
- UV
- X-ray

Opportunistic sharing

On-demand activation

Energy Saving

- THz
- LiFi
- Sub 10GHz
Soft & Self-evolving Network

**Fully software-defined**
- Open air-interface & softwarized terminals
- Flexible, fast SW & HW extension
- Agile development iterations

**E2E forward-compatibility**
- Self-learning-based new features & functionalities enablement
- Auto upgrade of E2E NW

**Beyond “cellular”**
- User-centric network auto-configuration
- Meshed terminals with routing capability
Network as a Service (NaaS)

Embedded network intelligence, beyond simple connectivity

Diverse capabilities

- Peak Data Rate
- User Experienced Data Rate
- 3D Coverage
- Volume Spectrum Efficiency
- Super Accurate Positioning
- Mobility

On-demand fulfillment

- On-demand fulfillment
- Diverse capabilities
- Digital World

- Ultra Low Jitter
- Area Traffic Capacity
- Ultra High Security
- Network Energy Efficiency
- Connection Density
- Latency

- 20Gbps
- 0.1-1Gbps
- 30 bps/Hz
- 500Km/
- 10 Mbps/Km2
- 100 million/Km2
- 1ms
- 100
- 0
- 3D
- mMTC
- uRLLC
- eMBB

- Peak Data Rate
- User Experienced Data Rate
- 3D Coverage
- Volume Spectrum Efficiency
- Super Accurate Positioning
- Mobility

- Embeded network intelligence, beyond simple connectivity
Native Security

**Smart Consensus**
Safeguard data and information security based on consensus achieved by connected smart entities.

**Trust Enhancement**
Infrastructure with active immunity via trustworthy computing technology.

**AI enabled Defense**
Proactive in-depth defense, based on AI and Big Data technology.

**Ubiquitous Cooperation**
Collaborative security assessment and resolution across terminal, edge, network, and cloud.
Native AI

Pervasive network AI capabilities: AI embedded core, transport, access, etc.
Thanks!