IPv6-based IoT Deployment in China

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Agenda

• National Guideline to the development of information industry

• IPv6 updates in China

• IoT activities in China

• An example of LSP - Bicycle-Sharing service
The 13th five-year National Plan: Guild to the development of information industry

- Jointly released by the MIIT and the NDRC, the IoT industry and services is among the 9 key areas to develop

- For IoT, the guild pointed out: Enhancing modern information infrastructure, advancing BigData and application of IoT, encouraging integration of IoT with Mobile Internet for smart-cities, industry, agriculture and other sectors
  - strengthening the use of IoT technology in various areas
  - improving the ability of urban operation monitoring management, facilitating the formation of a unified sensing equipment management platform, enhancing urban operation data collection and information sharing, meeting the inherent requirements of rapid response to urban management for scientific decision-making
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IPv6 Updates in China

- The number of Internet netizens in China has reached 0.731 billion, occupying 53.2% of whole population.
- Mobile Internet users are 0.695 billion, occupying 95.1% of whole netizens.
- IPv4 addresses: 338,100,000, no changes since year 2011.
- IPv6 addresses: 21188 /32, rise 2.9% than 2015

Source: CNNIC, 2017.1
CNGI Project – Government Framework

- Demo backbone networks setup in 2007
  - 6 core networks, China Telecom, China Netcom/CAS, China Mobile, China Unicom, CERNET, China Railcom
  - IPv6 Exchange Points set in Beijing and Shanghai
  - 300 CPNs
- Massive and trial commercial deployment
  - Terminal and network equipment
  - Applications
CERNET2 is one of the CNGI backbones
  • The largest network sponsored by CNGI

CERNET2 backbone
  • Pure IPv6 backbone / IPv4 and IPv6 dual-stack campus network
  • Provide multiple applications

CERNET2 / IX6 International exchange center
  • links to GEANT2/Internet2/TIEN3

25 CERNET2 Gigapops scattered in 20 major cities

More than 700 organizations connected, serving more than 6 million users

Provide various IPv6 information, teaching and research resources
CERNET2 traffic monitoring  September, 2016

Total traffic

Distribution of ingress traffic

Total egress traffic

Distribution of egress traffic
“Internet+” Mega Project

- “Education area oriented IPv6 demonstration network” is selected as one of the project
  - Bandwidth of backbone network will be up to 100Gbps
  - Construction of more than 40 network Giga pops
  - More than 10 million IPv6 users connected
  - Internet+ experiment and application demonstration
- The network aims to build the experimental platform for the “Internet +” plan
- Important infrastructure to promote the NGI research

http://www.sdpc.gov.cn/gzdt/201604/t20160413_798079.html
http://www.media.edu.cn/zyyy/szxy/201610/t20161012_1457214.shtml
NGI Innovation Projects Organized by CERNET

• Proved by MOE and in charged by CERNET network and information center and the advisor group of CERNET

• Started from year 2015
  • Support 108 projects
  • Support 84 universities
  • Invest more than 10 million yuan

• Support IPv6 education and innovation

• IPv6 network, IPv6 smart campus, IPv6 cloud, IPv6 mobile Healthcare, IPv6 IoT, IPv6 security, IPv6 intelligent manufacturing, IPv6 Internet Finance, IPv6 IoV
China Telecom

• Backbone network, i.e. 163 and cn2, IPv6 enabled
• 96% of BRAS/MSE supported IPv6, and more than 220 metropolitan area networks supported dual stack
• Import IPv6 to LTE network from year 2014, which was deploy in Jiangsu, Hunan and Zhejiang
• Most of the big IDC supports IPv6 connectivity
• IPv6 supported broadband users are more than 90 million, and active users are up to 4.4 million.
China Mobile

• Import IPv6 by taking advantage of LTE/Volte
  • Always on-line for LTE, big requirements

• IPv6 will be the important requirement for TD-LTE
  • All of the PCE will be IPv6 enable
  • Already built 146 4G base stations

• VoLTE is the future communication service. Each user will connect using pure IP, which needs a lot of IP addresses.
  • Apple promote new carrier update configuration in year 2016. From iOS9.2.1, all the apple phones will supprt VoLTE.
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IoT development

IPv4 / IPv6 powered
Internet as a Platform

RFID

{ RFID/ Barcode/ 2D Barcode } with networks

Sensor

Network and AdHoc Network

Sensor Network

Cloud computing

Visualization

Various kinds of Applications

Energy control

Artificial Intelligence

Big Data

Security and privacy protection

Standadization

Standadization
MIIT issues new numbering plan for comment

- Ministry of Industry and Information Technology released the "Telecommunication network numbering plan, 2017" for comment
- 140~144 was designated for IoT network
- It is estimated that
  - manufacturing, network transmission, intelligent information service, the overall industrial market scale will exceed 1.5 trillion RMB, the number of M2M connections count to 1.7 billion.
IoT practice in ChinaTelecom

- China Telecom is investing heavily into converged IoT infrastructure with Huawei and plans to have nationwide narrow-band IOT (NB-IoT) coverage using the 800MHz band by the end of the first half of 2017.
- Over 400 NB-IoT base-stations already installed and covers the whole Yingtan city in JiangXi province, which is the first of its kind among other 12 cities for LSP trial in China.
- China Telecom released enterprise standard “NB-IoT equipment v1.0”.
- ITS, logistics, security monitoring, public utilities, intelligent manufacturing, modern agriculture, financial and retail sectors, smart street lighting, video monitoring, intelligent financial POS information, waste management, smart manhole cover, Auto-parking and other LSP IoT services, following ChinaTelecom IoT enterprise standard v1.0.

http://stock.cfi.cn/p20170214000330.html
First global NB-IoT based smart street lighting
IoT practice in ChinaMobile

- ChinaMobile has launched OneNET as an open cloud platform
- This IoT platform offers PaaS and SaaS business service, providing a variety of network access protocols, easy to connect to a variety of networked devices, smart home, smart car, wearable devices and could generate user applications quickly.
- ChinaMobile already working with Huawei, providing Intelligent parking business, has realized the parking online query, online booking, reverse search and online payment, and other functions
- NB-IoT and eMTC trials in Hangzhou, Shanghai, Guangzhou and Fuzhou, now 5000 stations
- By the end of 2015, over 65million IoT terminals registered with ChinaMobile

http://iot.10086.cn
IoT practice in China Unicom

• China Unicom plans to start NB-IoT LSPs in more than six cities based on 900 MHz and 1800 MHz for field test and business model trials

• China Unicom plans to promote NB-IoT commercial deployment in key cities in 2017

• China Unicom already released its IoT service platform, deployment of NB-IoT private network will support Shanghai smart city construction, smart meters, smart parking, environmental monitoring, intelligent manufacturing

• Promote application of innovation, enhance the capacity and efficiency of urban operation management.

• More than 3000 base station will be built in 2017, covering the cities to meeting the requirement in the scale of hundreds of millions of "connectivity"
IPv6 based IoT demonstration in State Grid

• Supported by CNGI project

• IPv6 based sensor development
  • Support IEEE 802.15.4/WiFi
  • Transmission speed is no less than 250kbps

• Application scenarios investigation
  • Network construction technologies in power transmission status monitoring
  • Together with Mobile IP technology, IoT is used in power line monitoring, mobile meter reading
IPv6 based LBS service platform

• Supported by CNGI project
• IPv6 based LBS service platform
  • 800TB location service database
  • 20million POI information
• Various applications
  • Smart car parking
  • Meteorologic service
  • Logistics service
IPv6 based IoT platform in BUPT

• Android based gateway + Cloud
• Gateway
  • North: uniform access of various wireless technologies
  • South: IPv4/IPv6, CoAP
• Cloud
  • App push to support automatic function update and deployment
  • Big data analysis
• Support restful architecture
• Support heterogenous devices: IP, non IP
• Data representation: XML/JSON
• Open platform: easy to extend to different scenarios
One case: Smart classroom

• Easy monitor and control:
  • temperature, humidity, number of students, light, air conditioner, devices

• Easy update and deployment of functions
  • Intelligent sign in
  • Automatic information collection of classroom
  • Interactive discussion
  • Distance classroom

• Cloud based big data analysis
  • Intelligent teaching information for different dimension analysis
  • energy consumption, teaching quality, course recommendation etc.
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A LSP example - Bicycle-Sharing Service

over 30 APPs of Bicycle-Sharing service providers, 2017
According to the report, there are 18 million bicycles sharing users, there will be over 50 million users by the end of 2017.

- Mobike Co. provides their service in more than 20 cities.
- There are over 100,000 Bikes each in Beijing, Guangzhou, Shanghai ...
- WeChat user can use the service by scanning QR-Code via the Small-Program.
- The production capacity will reach 10 million in cooperation with Foxconn.

- Ofo Co. has offered 300 million services since Jun.2015
- Registered user over 20 million, 1 million Bikes put into service in over 33 cities in China, USA, UK and Singapore.
- 1st generation uses mechanical lock, 2nd generation uses smart lock.
Investment

• OFO story
  • Cooperate with ChinaTelecom and Huawei, NB-IoT solution will provide good coverage, ultra-low energy requirement, better QoE
  • In D rounds of investment, OFO received 450million US$ in March 2017

• Mobike story
  • Cooperate with ChinaMobile and Ericsson, by using CAT-M1 and NB-IoT
  • Over 300million US$ in D rounds of investment received in early 2017

http://sh.xinhuanet.com/2017-03/02/c_136096248.htm
How the Bicycle-Sharing system works

Scan the QR-Code by smart-phone

Unlock the Byke

Request to unlock

Charging information and the service result

Report the status and location

Bicycle-Sharing Service Cloud
Sensor embedded bicycle lock

- OFO, Mobike, XiaoMingBike, more than 20 service providers now in China
- With different business models, SIM card, GPS/BD chip, and other IoT chips installed on each bicycle

- Chips inside:
  - Battery
  - Motion
  - Geo location
  - Vibration
  - Accelerometer
  - Communication
  - Temperature
  - Light
  - ...

...
您周围车辆数量约为 48 辆。
Shared everything?

- Shared electronic bicycles
- Shared cars
- Shared umbrella
- Shared portable power bank
Let's work together for a better world!