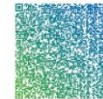




上海无线通信研究中心
SHANGHAI RESEARCH CENTER FOR WIRELESS COMMUNICATIONS



Massive IoT Monitoring System for the South-to-North Water Diversion Project in China

Professor Yang Yang

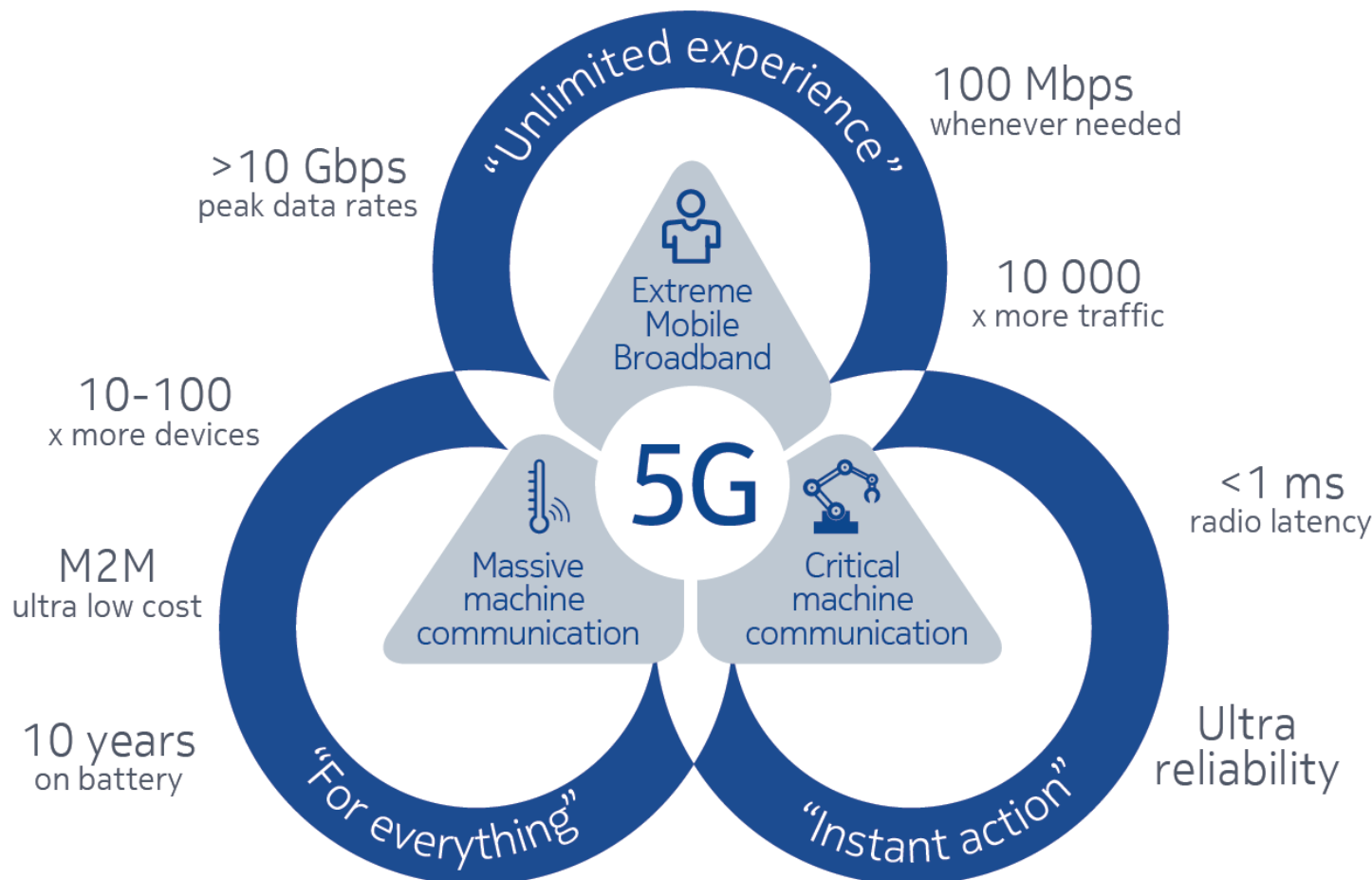
WiCO and SIMIT, Chinese Academy of Sciences
IoT Week, Bilbao, Spain, 4-7 June 2018

www.wico.sh

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IoT Plays the Key Role in 5G Services



Source: Nokia

1

Background

2

Key Challenges

3

Main Contributions

4

Collaboration Opportunities

IoT Monitoring System for a 1400KM Water Diversion Project



**IEEE
SPECTRUM**

100,000 IoT Sensors Monitor a 1,400-Kilometer Canal in China

Sensors installed along China's South-to-North Water Diversion Project track water quality, watch for intruders, and detect structural damage

By **Tracy Staedter**



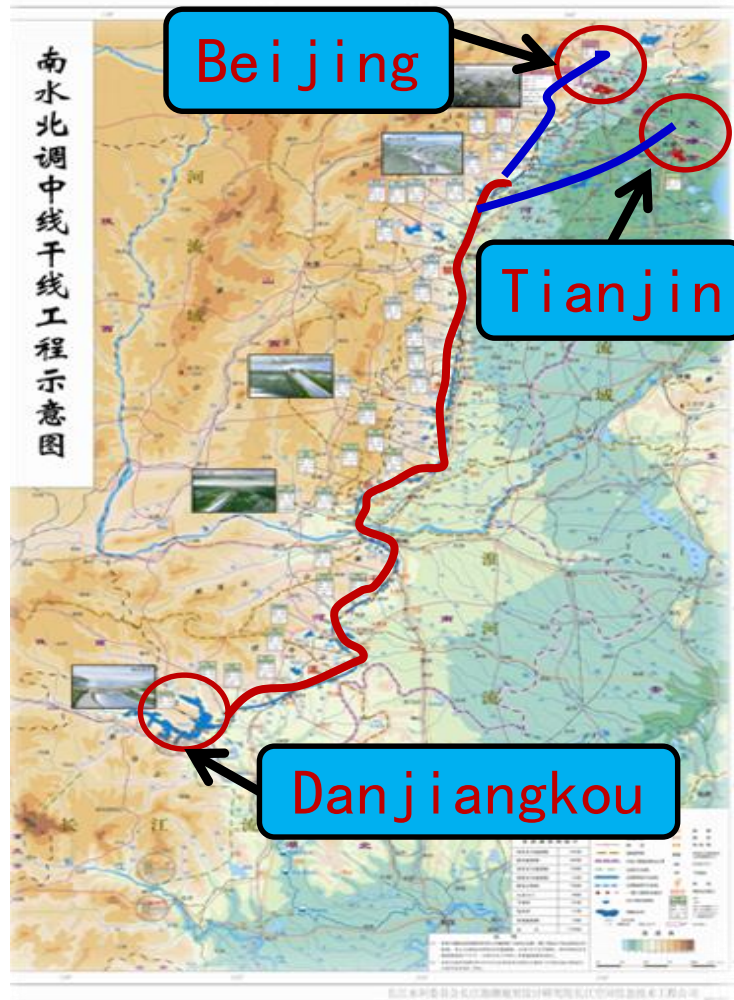
Photo: Construction and Administration Bureau of South-to-North Water Diversion Middle Route Project

As an engineering feat, China's massive South-to-North Water Diversion Project is a stunner. Three artificial canals, each more than 1000 kilometers long, are in various stages of completion and designed to reroute water from the country's rainy south to its parched north.

The massive internet-of-things (IoT) network that has been quietly overseeing the middle route is impressive in its own right. More than 100,000 individual sensors

Source: IEEE Spectrum, 11 Jan 2018

About South-to-North Water Diversion Middle Route Project (SNWD)



- Artificial canal across Henan and Hebei provinces to Beijing and Tianjing
- Total length is 1432km
- Total Investment is RMB 200 billion
- Accomplished in 2014. Currently, more than 70% of residential water supply in Beijing is from SNWD project



Challenges for Canal Safety Monitoring



Numerous Engineering Entities

- Dam: 1277 Km
- Floodgates: 318
- Bridges: 1256
- Drainage culverts: 469
- ...

Numerous Impacting Factors

- Leakage for dam
- Seepage for drainage culverts
- Settling for dam, floodgate
- ...



Challenges for Water Safety Monitoring



High Quality Requirements

- Goal: the for water received in Beijing, the quality should be above grade II.
- Canal is too long crossing main industry areas in Hebei.
- Accidents may cause pollution.



High Quantity Requirements

- No reservoirs along the canal.
- Water level should be kept stable.



Challenges for Intrusion Monitoring



High Loss for Intrusions

- Many crossings with roads, railways, and rivers, through which it is easy to get in.
- People will get drought with high probability if fallen into the canal.



Limited Protection Methods

- Unattended and less on duty.
- Physic isolation fence is weak.



Key Challenges for the Safety Monitoring System



Challenges

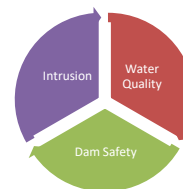
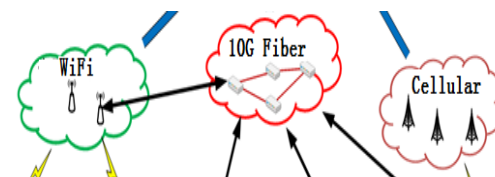
Varying Monitoring Environments

Enormous Types of Sensors

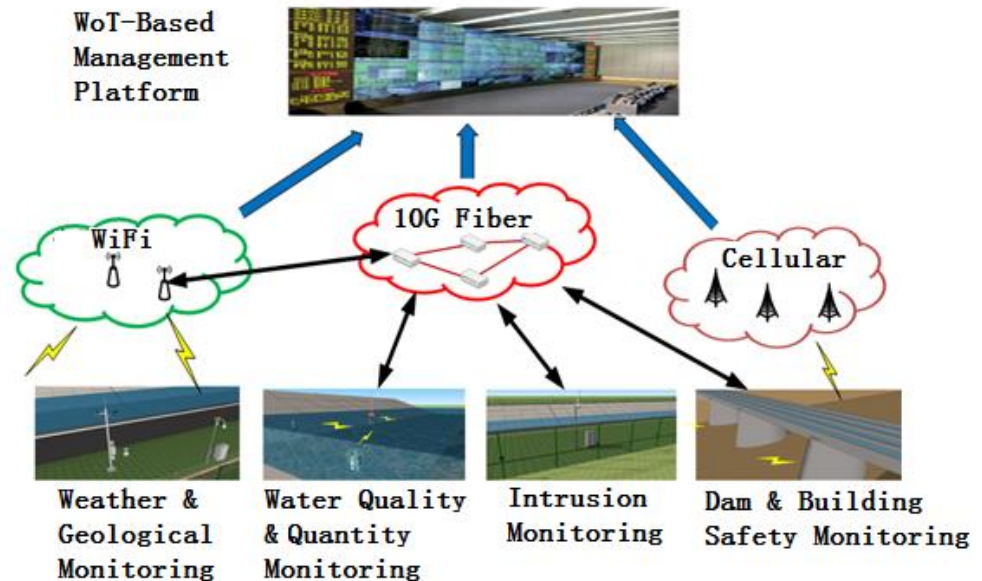
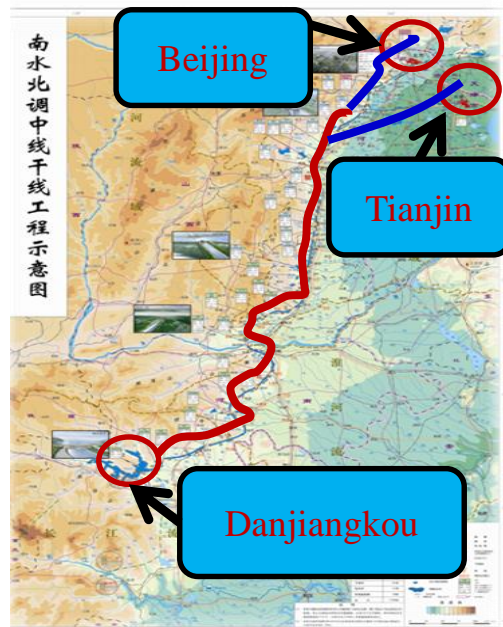
Enormous Types of Data

Complicate HetNet Architecture

Complicate Integrated Platform



Safety Monitoring System for South-to-North Water Diversion (SNWD) Middle Route Project



- Design of a sensor network for the monitoring of South-to-North Water Diversion Middle Route project.
- Development of an integrated information platform for the management of the water diversion project.

Project & Partner

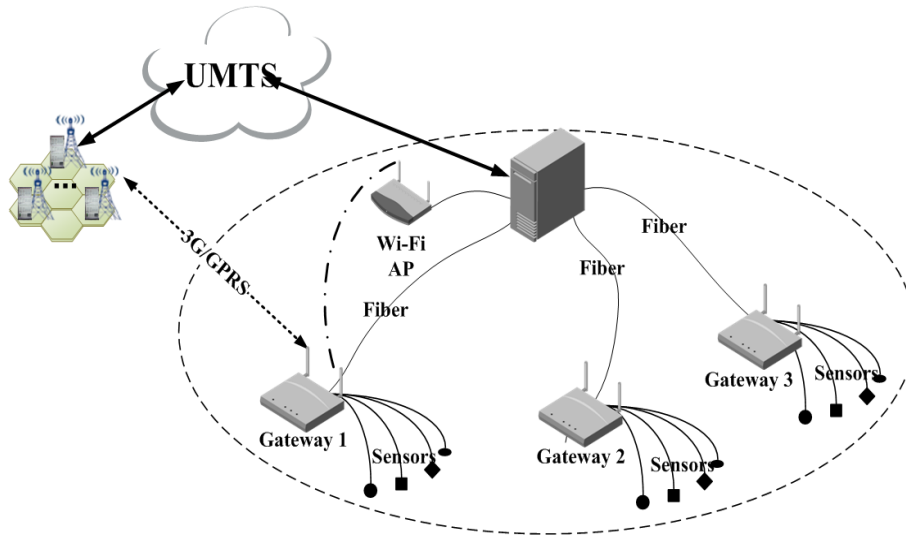


Key Technologies: R&D on Smart Transmission Gateways



Configurations

- Wireless Communication Tech. 2G/3G/4G/WiFi/Zigbee/BLT/470
- Seamless Handover
- Remote Control and Configure
- DVI+HDMI+DisplayPort
- Interfaces for Sensors CAN/RS232/RS485/Wireless Tech.
- High Compression Rate for Data Preprocessing



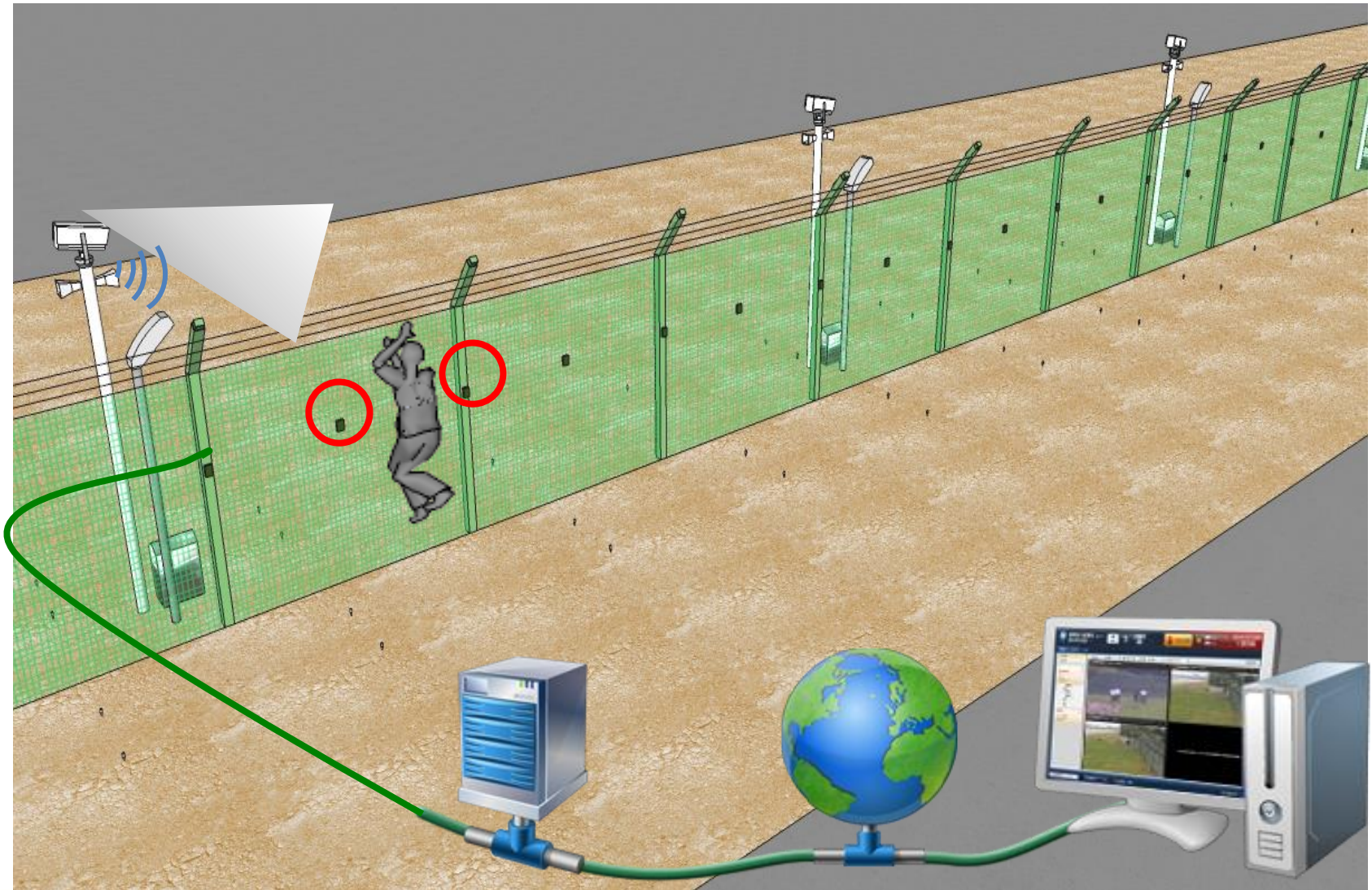
Key Technologies: R&D on Integrated Web-and-GIS based Control and Display Platform



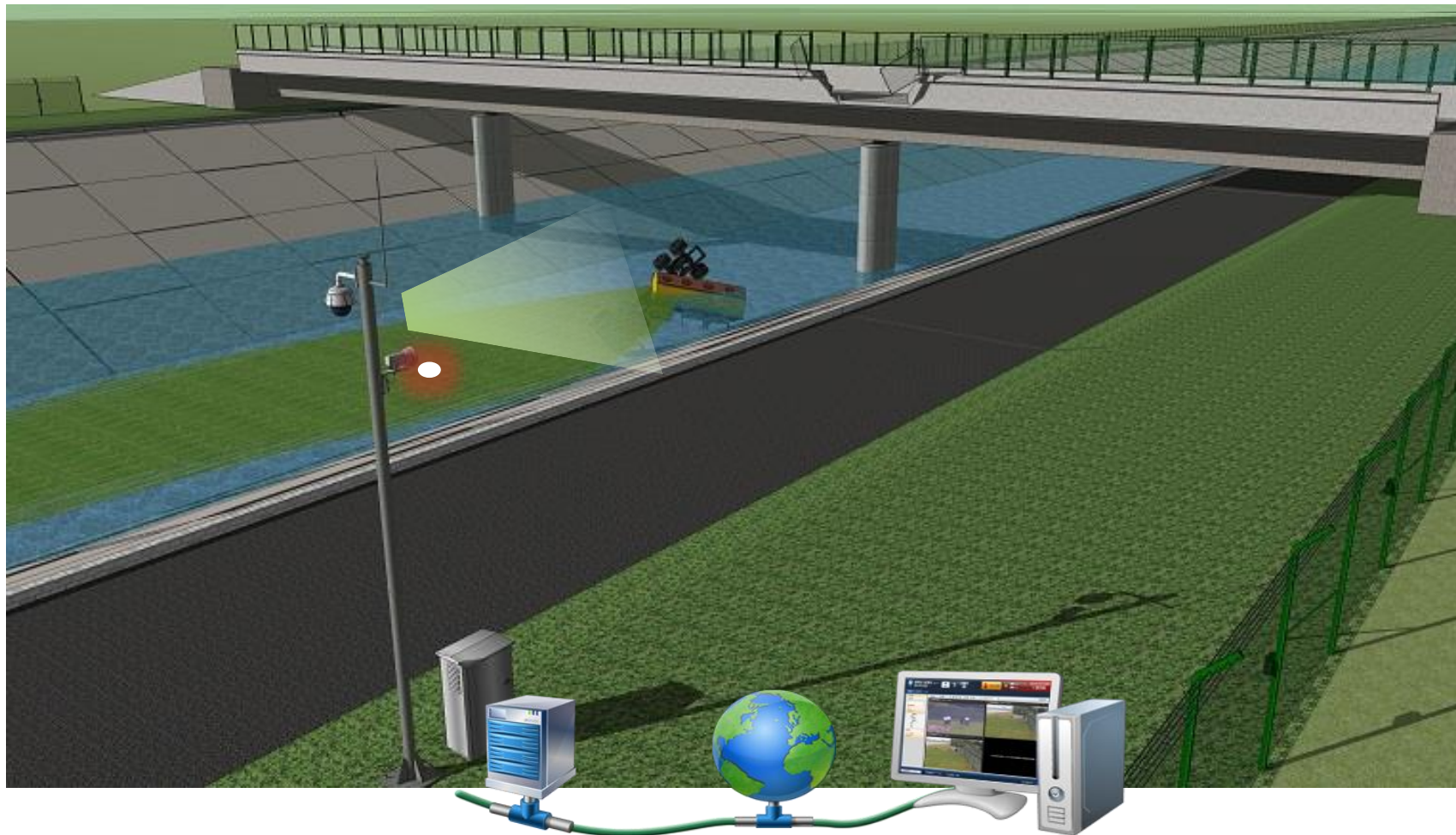
Browser-Server based architecture, with Water Quality & Quantity Monitoring, Dam Safety Monitoring, Intrusion Monitoring, Weather Monitoring.



Application: Intrusion Monitoring System According to Web of Things Architecture



Application: Smart Video Monitoring System





FIOT-LAB
中国·福州物联网开放实验室

Collaboration Opportunities

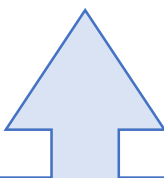
**An Open Platform for
IoT Industry**

China · Fuzhou Internet
of Things Open Lab

The Establishment



FIOT-LAB
中国·福州物联网开放实验室



Shanghai Institute of
Microsystem and
Information Technology,
Chinese Academy of
Sciences



Fuzhou Municipal
Government



Mawei District
Government



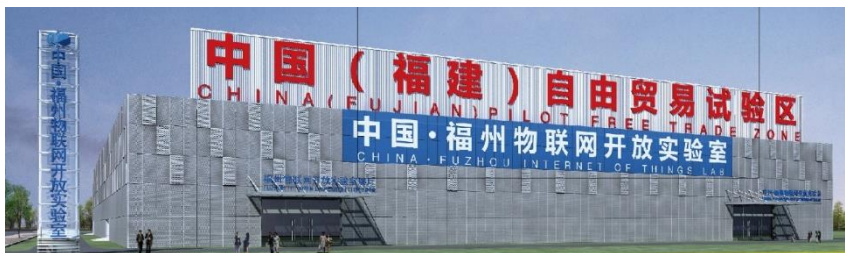
HUAWEI

Huawei



Construction of FIOT-LAB

- ◆ Equipped with the most advanced IoT testing equipment worldwide
- ◆ 600M RMB investment
- ◆ Total area : ~20,000 square meters



Management Team



Dr. WANG XI
Professor/Academician
FIOT-LAB Management
Committee



Dr. GAO TENG EMBA
National "Thousand People
Plan" Expert
FIOT-LAB President



Dr. YANG YANG Professor
Chinese academy of sciences
"Hundred People Plan"
FIOT-LAB CTO



8 doctors
18 masters
32.5% of total staffs



Oversea returnees
From Belgium,
Netherlands, France,
Singapore, USA, UK
etc.



Two Keys of IoT Industry



Vision and Mission

Take the opportunity of
NB-IoT

Prepare for
future IoT
technology

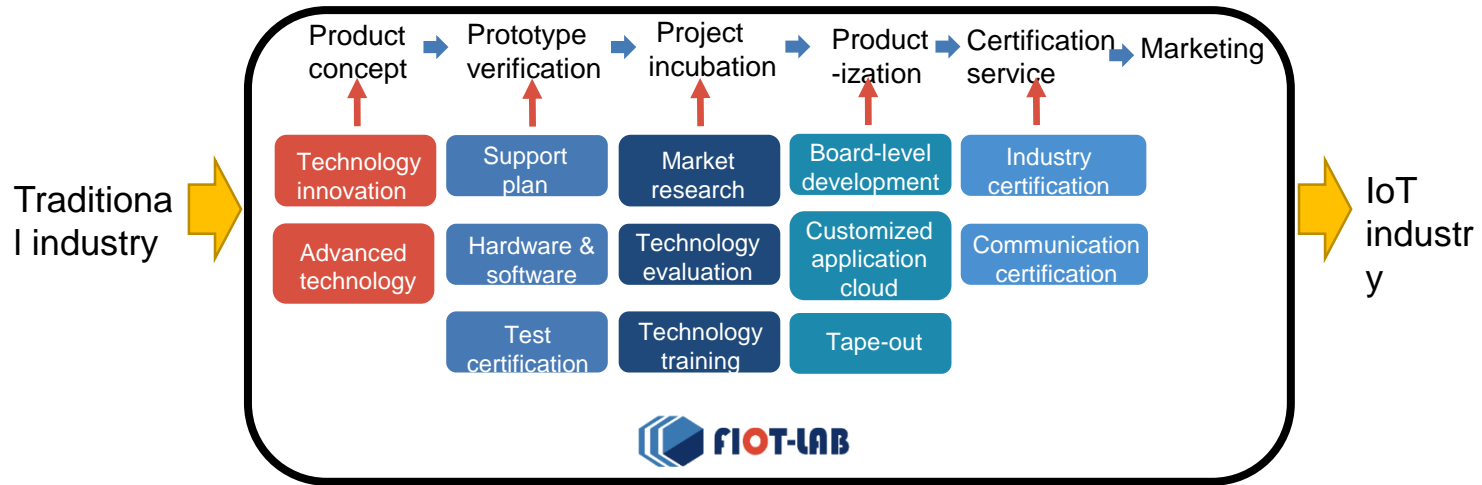


Three Major Sectors



Technology Services

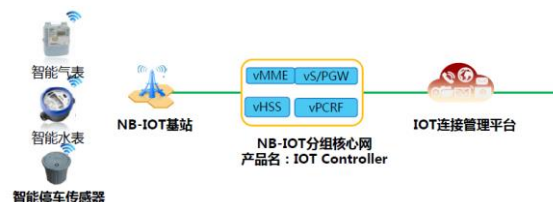
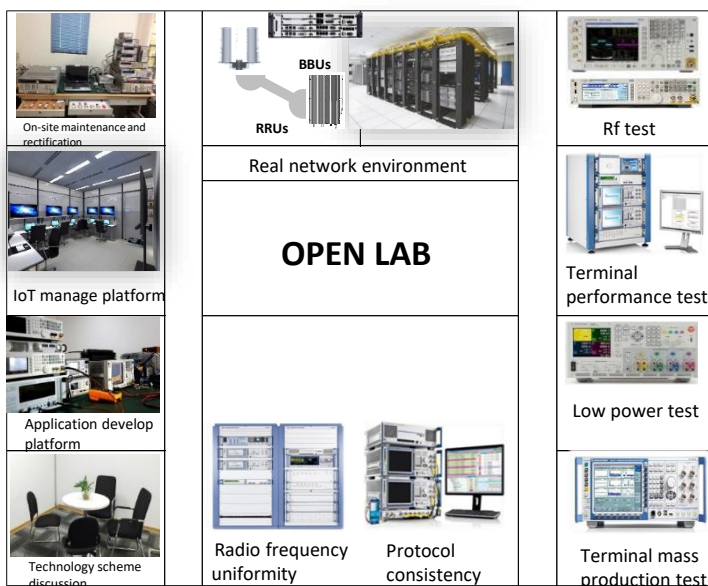
Help SMEs and traditional companies to reduce product development cost and risk.



Typical phase of PDDP (Project Development and Delivery Plan)

Technical Service

Improves product development efficiency in our OPEN LAB



- In the Open Lab, customers can achieve the whole process of terminal product development, debugging and rectification of real network environment, various performance tests and product consistency test.
- Open Lab will build the software and hardware platform of IoT terminal application product development with upstream operators, chip module suppliers and test equipment suppliers.

Standardization Services

- **Focus on IoT vertical industry applications**
- **Technical strength:** A team with sound technical background and industry experience.
- **Neutrality:** A third-party, non-for-profit platform, supported by the government.
- **In depth:** Broad cooperation with industry in test certification, technical support and training, with better understanding of the industry.

Fields we have participated in the development of standard related to NB-IoT



Smart water meter



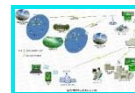
Smart gas meter



Smart street light



Smart fishery



Smart Agriculture



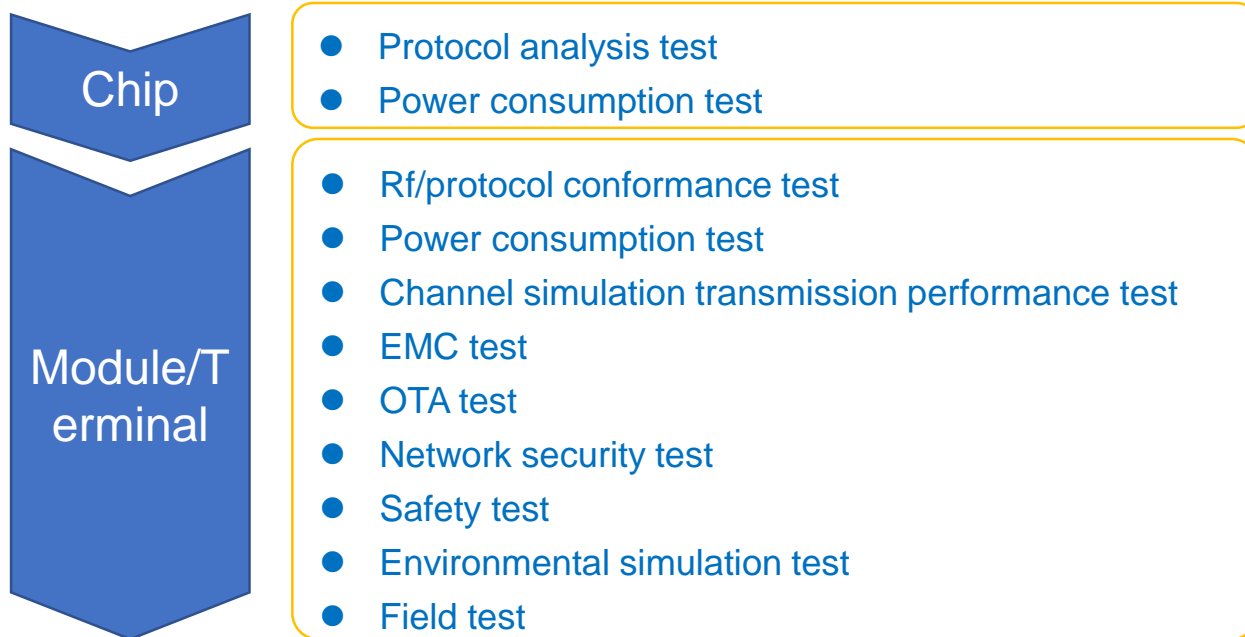
Smart scenic



Smart city etc.

Test and Certification

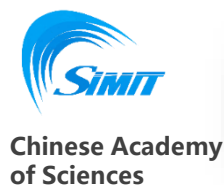
Fuzhou IoT open lab test certification abilities



- ❑ Ensure the reliability of iot chip, module, network, platform and application.

Training Service

National training center for IOT talent



Item	Content
Talent Training	The famous universities, institutions and industry leading enterprises cooperate to form the most perfect talent cultivation system
Industry Events	Convergence of the Internet of things innovation and entrepreneurship resources to create a first-class domestic Internet of things innovation and entrepreneurship competition brand.
Brain Gain	Relying on the talent base to promote high-end talents and teams
Build Think-tanks	Build a professional think tank for the international top Internet of things and build a team of leading experts
Career Fair	Develop Internet of things professional job fair brand, promote the employment rate of Internet of things professionals in Fuzhou
Entrepreneurs communication and forum activities	lot industry of international and domestic exchanges forum, work closely with China association of small and medium-sized commercial enterprises, combined with the IoT industry and the area along the national strategy, promote good cooperation for enterprises and institutions to Fuzhou market

Our Partners



HUAWEI



中国电信
CHINA TELECOM



中国移动
China Mobile



China
unicom 中国联通



福建计量
Fujian Measurement



同耀实验室
TA Test & Certification Laboratories Group



中国科学院 | 无线传感网与通信重点实验室
Key Lab of Wireless Sensor Network and Communication, Chinese Academy of Sciences



泰康人寿
TAIKANG LIFE



大唐联仪
DT Link Tester



中国硬件产业技术创新联盟
CHINA HARDWARE FEDERATION



福水智联
PRAJNA IOT TECH



英飞凌
Infineon

Flairmicro

冠林
AURINE



CAICT
中国信息通信研究院



GSM
GLOBAL NETWORK



CCIA IOT



csem



lierda
利尔达科技集团



昂欣科技
ICBright



三鑫隆
SANXINLONG



QUECTEL

移远通信-无线模块专家



溢资物联
YIZI INTERNET OF THINGS



新大陆
NEWLAND



Oviphone





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Thank you!

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