





CEVA TECHNOLOGY SYMPOSIUM SERIES

# NB-IoT protocol stack project status and future evolution

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# **About Huachang**

Established in 1997, Huachang Technology keep providing high quality & low-cost software products & solutions, software customizing, outsourcing services to all customers with our advanced technologies.



### **Development Course**



## Intellectual Property Rights and Qualifications



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## **NB-IoT networks deploying situation**

As of May 2018, 50 NB-IoT commercial networks were deployed worldwide, more than 500,000 base stations have been built.



They are mainly distributed in the APAC, Europe, North America, Australia and South Africa.

## Chinese three major operators deploying situation



## **NB-IoT Industries application**





### Protocol version evolution R13~R15



### Protocol version evolution R13~R15



### Protocol version evolution R13~R15





## **NB-IoT Protocol Stack Architecture**



- Easy to port to different platforms
- Advanced logging and debugging tools



## **Protocol Stack Test environment**



Call-box test

- R&S CMW500

- Keysight UMX

- Starpoint 8315

- Anritsu 8430

• Our PS has been tested with the following Call-box

#### • Stand-alone test on Board

- $\odot~$  Run the PS code on the board for script testing before L1 is ready
- Full stack is running in the real working environment and check the software and hardware cooperation
- Communication between PC and board uses UART or others(such as Socket or USB if the board supports it)
- O Now we have supported four platforms as shown

## Maturity of Protocol Stack

### GCF certification

- PS has passed almost half of the GCF test cases, other test cases are on going.
- PS will pass GCF certification in December 2018.

### Field test

- Data throughput with CHINA TELECOMM.
- Communication with Ali cloud platform.
- More than 8 cities in China.







Satellite communications products

**GSM for Railway products** 

### Support team overview

We have been focusing on the development of protocol stack for almost 20 years. Our protocol stack products are available from 2G to 4G.

There are **5** teams in our management structure. Each team has experts who have been in his

field for more than 10 years experiences.

### Testing Team

Responsible for each module testing and the whole protocol stack integration testing

### **Environment Team**

Responsible for the development and maintenance of testing tools. (RTSS, ITE, ScriptTool, APIdecoder, ASN.1)

### **RRC** Team

Responsible for the development and maintenance of RRC module.

L2 Team

Responsible for the development and maintenance of L2 module. (MAC, RLC, PDCP, RoHC)

### NAS Team

Responsible for the development and maintenance of NAS module. (EMM, ESM, SMS, AT, USIM, NVM, NAScodec)

### Support Experiences



### Roadmap





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