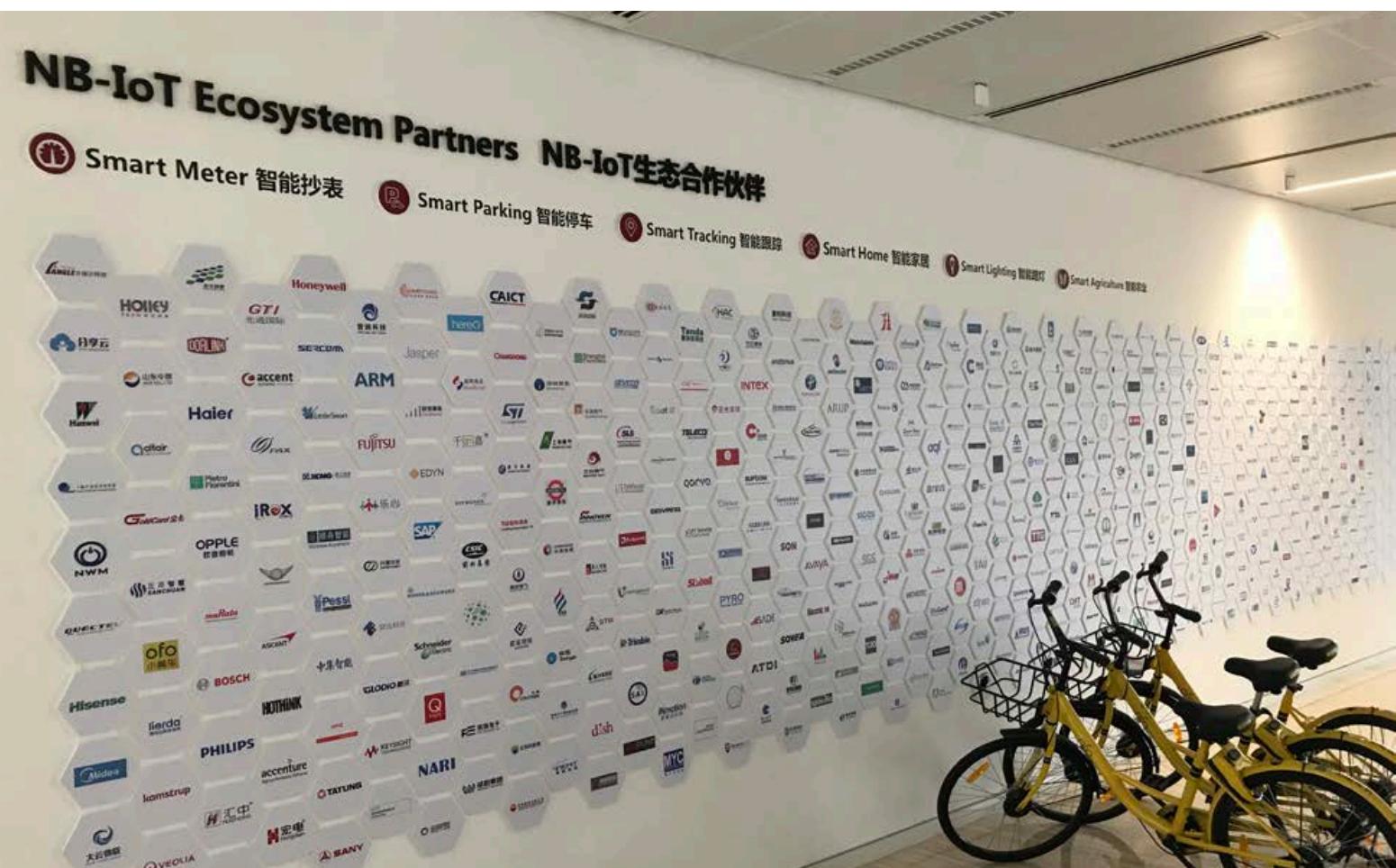


How OpenLabs can boost global IoT success

With 22 OpenLabs around the globe, including 8 jointly developed with telcos, Huawei is committed to open partnerships and success for all in the IoT domain. So, what can OpenLabs do for customers and partners?

By Wu Xiaodong & Wang Weiqiang



Based on the ideas of openness, collaboration, and shared success, Huawei's IoT OpenLabs help partners create E2E IoT solutions based on Huawei's open IoT capabilities. Partners can use the services at the labs to develop solutions in domains such as public utilities, smart homes, Internet of Vehicles, manufacturing, and consumer products. Huawei has established 14 of its own OpenLabs and 8 with telcos, which are dotted around the globe, and has plans to build more.

The scope of services provided by Huawei's

IoT OpenLabs includes:

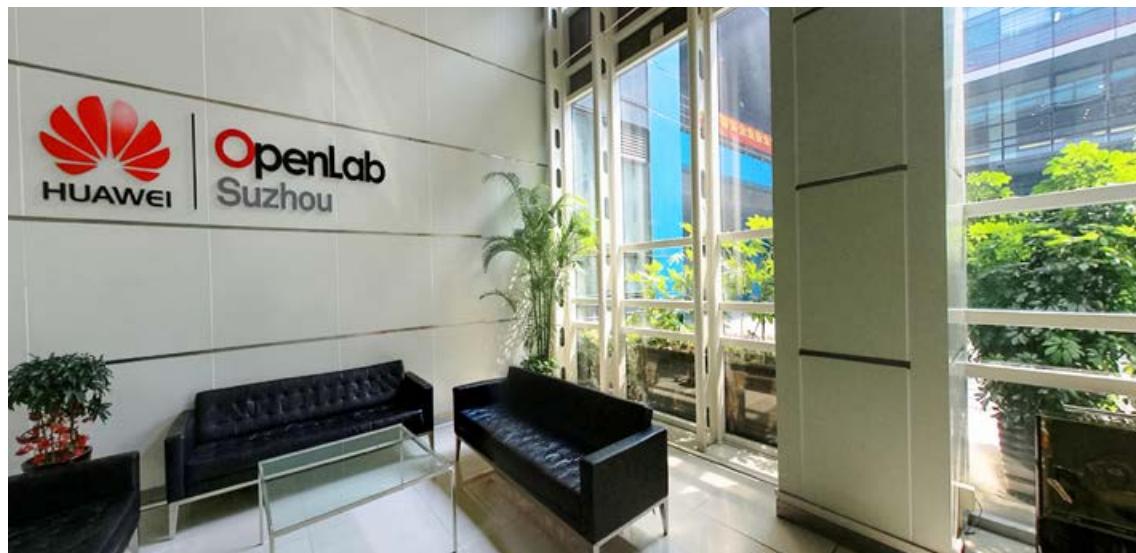
Joint solution design: working with partners to design IoT solutions.

Joint solution integration: guiding partners on developing solutions and integration testing.

Technology certification: certifying partner products and issuing Huawei certification.

OpenLabs provide four types of services for different technology scenarios: NB-IoT, EC-IoT, home gateway, and the IoT platform

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In addition to an NB-IoT network, Huawei also provides the OceanConnect IoT platform, CloudEPC, and the IoT operating system LiteOS.

OceanConnect. To apply for them, partners can join Huawei's IoT Solutions Partner Program.

NB-IoT

In addition to an NB-IoT network, Huawei also provides the OceanConnect IoT platform, CloudEPC, and the IoT operating system LiteOS. The partner supplies a service software system and device for a particular vertical industry scenario and connects them to Huawei's OceanConnect platform.

Technical support and integration documentation for developers

Huawei provides E2E development support and assistance. For device development, guidance documentation is provided, including module design guides, application guides, and PCB design references. For applications, development documentation on APIs, profiles, and codec plug-ins is available.

The SoftRadio tool

Partners can use the SoftRadio PC software to access the IoT platform and applications through the Internet at any time, without the need for chips, modules, NB-IoT base stations, or core networks. They can perform basic E2E function commissioning between NB-IoT terminals and application servers, greatly increasing commissioning efficiency. During early device development, partners complete basic functions verification locally using SoftRadio. They can then apply to Huawei OpenLab to carry out testing and verification after terminal module integration.

The complete wireless testing environments

of 700M, 800M, 850M, 900M, and 1800M frequency bands are all supported, as well as Standalone, Guardband, and Inband testing scenarios, meeting a variety of testing requirements.

OpenLabs also provide a comprehensive set of wireless testing equipment, including spectrum analyzers, DC power analyzers, VAM/adjustable attenuators, shielded boxes, welding machines, multimeters, and general toolboxes.

Device testing and analysis tools

UE log analysis tools are available to help partners quickly analyze KPI information on devices and improve testing efficiency. NB-IoT codec plug-in detection tools enable partners to check their own code for errors, improving development efficiency.

Scenario-based testing cases

E2E testing cases covering testing scenarios such as device access, basic services, performance, stability, reliability, power consumption, and maintainability are provided. Scenario-based testing cases for different service scenarios are provided to help partners carry out verification.

EC-IoT

The Huawei EC-IoT solution consists of a device communication module, an edge computing gateway (AR500 series), and an agile controller. The device communication module supports smart interconnection for IoT sensor networks. The edge computing gateway provides deep and open edge computing capabilities, simplifying the

development of edge applications for customers. Based on cloud management architecture, the agile controller connects to different partners' industrial application systems through an open API, ensuring rapid adaptation to the smart edge data processing requirements of different industries. This provides support for various key smart services such as real-time services, smart decision-making, data optimization, and smart security.

Interoperability with various open interface protocols

For device-side agile gateways, open containers are available for third-party deep development or the dedicated use of network communications. Southbound standard protocol communication interfaces for IoT smart hardware allow partners to ensure compatibility with mainstream communication protocols. Bottom-layer sensors are connected via various wireless and wired interfaces to process and interoperate with different industrial protocols, providing local computing capabilities and facilitating local processing and the local survival of services.

The northbound RESTful interface is provided for application-side agile controllers so that industry applications can quickly integrate device management capabilities and access network metadata and other information.

Self-service testing

Partners can apply for agile gateways to realize sensor/agile gateway interoperation and develop industrial applications from their own premises.

The EC-IoT Remote Lab provides a free 24/7 cloud lab environment for developers. Developers can develop Huawei products on the self-service management platform using the Remote Lab without needing to buy any products, and complete testing certification for remote interconnection.

Home gateways

The home IoT gateway solution provides a smart gateway and smart home control center. These enable southbound exposure of device capabilities and support multi-protocol access and interchangeability for working with multiple vendors' devices. The open gateway platform exposes home capabilities and operator pipeline capabilities, ensuring service aggregation.

Complete software and hardware resource packages for development

The intelligent integration of hardware allows partners to obtain various types of Smart+ open plugins so that they can quickly and easily develop differentiated smart home products.

SDKs can be used to quickly integrate and develop the home user app for the management of home networks, users, and smart hardware and applications, and to grow smart home services through application innovation.

Hardware device and integrated testing environment on cloud

Partners can apply for the local development of home gateway devices and carry out commissioning on the cloud platform, which can be remotely accessed worldwide. Huawei also provides online and offline technical support for issues that arise during development.

OceanConnect IoT platform

The OceanConnect IoT Connection Management Platform is a unified, open ecosystem based on the core technologies of IoT, cloud computing, and big data. It provides data, device, and operations management, and enables unified, secure network access; flexible integration with various devices; and the collection and analysis of massive amounts of data.

The OceanConnect platform provides IoT Agents, which simplifies development for various device vendors and eliminates

Huawei's IoT solutions partner management system is a comprehensive process that helps partners to incubate their products.

complex equipment interfaces to ensure rapid access by different devices. The platform also provides powerful open capabilities for various industries, helping enterprises quickly roll out different IoT service applications and meet unique service requirements.

Development guidance

The OceanConnect IoT platform provides a comprehensive set of development resources and support, including basic introductory guides, API interface documentation, development samples for industry customers, and SDKs. It also contains a dedicated developers' portal with applications and devices for developers to quickly carry out online development and commissioning. The portal integrates various tools such as device management, profile development, plug-in self-service management, simulators, and API commissioning. Developers can use the device simulators with northbound applications to complete device commissioning without requiring actual devices.

Online and offline integrated testing services

Partners can use the online service environment deployed over the Internet. Developers can apply for a temporary OceanConnect account on the Huawei Developer Zone's Remote Lab for self-service IoT platform experience, integration, and commissioning.

For complex collaborative integration projects, Huawei provides offline support for joint commissioning and integration through

technical experts at OpenLabs. OpenLabs provide northbound application demos for quick device integration testing for partners that only develop devices or that haven't completed application development.

OpenLabs also provide E2E test cases for technical certification. Partners can quickly complete self-testing for *Huawei Enabled* certification based on test cases and test report templates.

IoT technical certification

Huawei provides technology certification for partners through the Huawei Certification service. The scheme enables Huawei and its partners to provide verified solutions for customers.

There are three categories of Huawei technology certification: **Huawei Validated**, **Huawei Compatible**, and **Huawei Enabled**.

Huawei provides IoT technical certification for partner products that pass testing as part of its technology certification system, giving Huawei's technical endorsement of IoT product pre-integration. Certification is valid for a given duration and partners can promote their products using the certification logo.

Huawei's partner management system for IoT solutions – Manage Alliance Relationship (MAR) – is a comprehensive process that helps partners to incubate their products. Partners can obtain IoT OpenLab resources to complete integration testing and technical certification through the MAR process. 