



Activating intelligence with IoT cloud and AI

According to GIV2025, Huawei's Global Industry Vision, the number of connected devices will reach 100 billion by 2025. Many high-value connections will arise in industry applications, with each industry fully utilizing data from an everything-connected, everything-sensing scenario. This will propel industrial IoT (IIoT) and greatly improve the efficiency of all industry verticals. However, three major challenges face IIoT: technology integration and innovation; standards and the industrial environment; and building a collaborative ecosystem. To tackle these challenges, Huawei must cooperate with its industry partners.

Building the IoT ecosystem

Huawei's IoT strategy is to supply IoT infrastructure and build an ecosystem through expanded connections, cloud services, and AI, which will in turn support rapid service rollout, global reachability through cloud services, and monetizable IoT applications. Huawei can realize this with the communications technology it has developed over the past 30 years.

Expanding connections

Currently, 200 million devices from across the globe are connected to the Huawei IoT platform, 90 million of which are connected to China Telecom's e-Surfing Cloud, while a further 1 million are smart



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city infrastructure devices.

Connections are the foundation of IoT. As well as increasing the number of connections, Huawei also plans to make all connections manageable and controllable and achieve continuous coverage, smooth evolution, security, and reliability.

Huawei's NB-IoT solution, for example, is characterized by its low power consumption, wide coverage, large capacity, and 5G evolution capabilities. Huawei's mature and open ecosystem provides E2E security solutions for chipsets and OS, data transmission, and the overall IoT platform.

Enhancing cloud services

In the future, the need for IoT connections will be so abundant that they'll rely on IoT cloud services that are available anytime, anywhere. Collaboration between the OceanConnect IoT Platform and OceanConnect Edge enables full coverage, elastic services, unified management, service collaboration, and data collaboration by extending IoT cloud services from the network center to the edge.

An intelligent traffic warning system is an example of a service collaboration scenario. In this system, surveillance cameras transmit footage of pedestrians to the edge cloud for rapid analysis, with a real-time warning sent to the nearest vehicles. Then the warning is sent to the central cloud, and nearby vehicles are alerted to the presence of pedestrians. By adopting central cloud-edge cloud service collaboration, operators can offer services

for more scenarios using IoT cloud services.

Advancing AI capabilities

Strong ROI from connections only in the IIoT scenario is impossible without killer applications. The large amount of data obtained through connections requires intelligent analysis to generate value.

Monetizing IoT

Intelligence – the algorithms at the network center and edge combined with the perception of devices – is the key to monetizing IoT. Devices are to an intelligent system what the sensory organs are to a human being – in particular the eyes. As the eyes of a fully connected, intelligent world, smart cameras will therefore become a valuable tool for obtaining information for IIoT, driving the industry to generate greater value.

Huawei has invested heavily in AI chipsets, software-defined intelligent cameras, edge video analysis, and OceanConnect AI. By advancing AI capabilities, Huawei helps its industry partners monetize their IoT applications.

Huawei IoT cloud service 2.0

To help its industry customers use Huawei's IoT infrastructure capabilities of connectivity, cloud, and intelligence, Huawei developed its IoT Cloud Service 2.0, with three main improvements over its first iteration:

One, for industries undergoing digital

transformation, Huawei provides pre-integrated industry suites and platform cloud services, such as Connected Vehicle, Intelligent Transportation, Smart City, and Smart Campus. Industry partners can develop applications more quickly and flexibly, and explore various scenarios in which to embed AI and create new high-value solutions.

Two, to expand connections across more industries, Huawei has released its lightweight cloud service, IoT Hub, a secure and reliable lightweight device management service that enables IoT devices to connect to the network in a simple, secure, and cost-effective way.

Three, to enable its ecosystem partners, Huawei's OceanConnect Market provides an array of services, including product innovation, display, and trading with integrated development, rollout, and O&M tools.

Internet of Vehicles platform

As automotive companies transform from auto manufacturers to transportation services, they're stepping up investment in new energy, autonomous driving, and connected vehicles. The IoV is an enabling platform for all three areas, and forms the basis for transforming into a data-driven company.

Huawei's enterprise-class vehicle networking platform offers global service coverage, providing a complete solution for automotive companies, in collaboration with traditional telematics service providers, and helping them complete digital transformation.

Intelligent transportation platform

In the transportation industry, we're seeing transformation from transportation management involving single scenarios, like the timing of traffic lights, to transportation services involving converged scenarios such as autonomous driving based on vehicle-road coordination. Road digitalization and vehicle-road-network synergy are the keys to successfully realizing this transformation.

Road digitalization involves IoT and converged video sensing technology. It enables real-time sensing of the whole road, such as data on road traffic, road conditions and traffic lights, and forms the foundation of intelligent transportation.

Vehicle-road-network synergy builds on road digitalization, incorporating Vehicle-to-Everything (V2X) technology. This enables assisted driving and fully self-driving technology, helping to reduce accidents and congestion.

Huawei's Intelligent Transportation solution offers unique competitive strengths in many areas to support road digitalization and vehicle-road synergy. The smart transportation platform integrates more than 30 algorithms, including multi-source converged sensing and algorithms for predicting collisions.

The network provides a key safeguard for intelligent transportation systems with millisecond-level, ultra-low latency capabilities. At a speed of 100 km/h, a

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latency of 100 ms produces a reaction distance of 2.8 meters, the difference between life and death. Huawei achieved latency of 10 ms in the Wuxi V2X intelligent transportation national demonstration project, the world's largest city-level LTE-V2X intelligent transportation project, which covered 240 intersections and 170 square kilometers, and generated more than 40 types of transport management information and 30 use cases.

Smart city platform

The goal of a smart city is to enable good governance, benefit people, and promote industry. Smart cities have evolved from Internet-based Smart City 1.0 to mobile-based 2.0 to today's IoT-based 3.0. The core aspect of Smart City 3.0 is the use of IoT technology to digitalize municipal infrastructure such as street lights, manhole covers, smoke detectors, fire hydrants, trash cans, in-ground magnetic parking sensors, and environmental monitoring equipment.

Realizing Smart City 3.0 first requires a city-level sensor network to provide ubiquitous access for municipal infrastructure throughout a city or town. NB-IoT is the go-to solution, given its advantages of wide coverage, low-power consumption, and cost-effectiveness.

Second, a city-level IoT platform is required to enable data sharing across government departments and to aggregate the industry ecosystem. Huawei's IoT platform supports over 30 smart city projects, including in Yingtan in Jiangxi, Weifang in Shandong,

Fuzhou in Fujian, and Lanzhou in Gansu. It has enabled more than 30 innovative applications, such as smart greenhouses, smart smoke detectors, and river monitoring, and helped the government formulate urban IoT construction specifications.

Smart campus platform

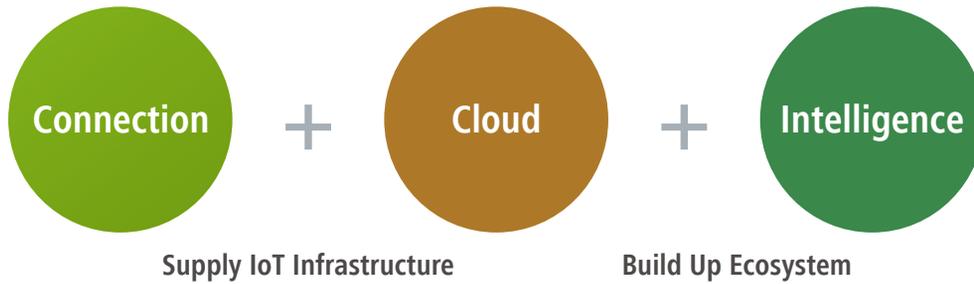
As a miniature version of a smart city, a smart campus includes complex use cases, including buildings, security, and vehicle management. Digitalization requirements are high, but current smart campuses aren't smart enough. Data on the environment, logistics, vehicles, and crowd flow are mutually isolated into data silos, which means overall analysis is impossible. Moreover, campus management still depends on manual operations as automation is low.

Huawei's Smart Campus solution enables coordination between IoT, video surveillance, and convergent command systems, facilitating data sharing, comprehensive analysis, and converged command and dispatch. The solution enlarges the campus security area and increases the automation of campus management.

IoT Hub

To support large-scale development and lower the barriers of entry to the IoT industry, Huawei's simple, secure, and cost-effective device access management service IoT Hub can help enterprise customers flexibly design and develop services. It offers the following benefits:

Simple and fast device access in just



OceanConnect AI enables vertical industrial services
 IoT Hub provides safe and secure device access
 OceanConnect Market facilitates partner "bidding" and product innovation



three steps: device provisioning, configuration, and access.

Support for all mainstream protocols, including HTTP, MQTT, and CoAP.

Safe and reliable access for hundreds of millions of devices, including flexible expansion and multi-site disaster recovery to guarantee reliable connections.

OceanConnect Market

OceanConnect Market is an IoT cloud market for partners that can help with partner bidding and product innovation.

Project requirements can be published on the platform to attract partners in joint projects. Huawei has over 1,000 industry

opportunities in smart cities, smart campuses, and IoV to share with its partners. Weifang Smart City, for example, needs a collaborative ecosystem to construct smart sanitation, smart street lighting, smart fire protection, smart buildings, and other solutions.

OceanConnect Market provides developers with an integrated platform to support product development, deployment and operations, and accelerate product innovation. China Telecom, for instance, used the development center to complete the development and integration of 1,000 partner applications in three months for its eCloud project.

Huawei is committed to supplying IoT infrastructure, expanding

connections, enhancing cloud services, and advancing AI capabilities. IoT Hub provides simple and fast device management capabilities and secure and reliable ubiquitous access capabilities for all industries. It enables IoV, smart transportation, smart city, and smart campus based on AI capabilities.

Huawei is working with its partners to activate intelligence in the IIoT and increase the ecosystem for the benefit of all.

(Based on the keynote speech "Activate Intelligence: IoT Cloud Services Enable Vertical Industrial IoT" at HUAWEI CONNECT 2018 by Michael Ma, President of Huawei Cloud Core Network Product Line)