Alibaba Cloud
物联网边缘计算

Product Introduction

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Document conventions

Style	Description	Example
	A danger notice indicates a situation that will cause major system changes, faults, physical injuries, and other adverse results.	 **Danger:** Resetting will result in the loss of user configuration data.
	A warning notice indicates a situation that may cause major system changes, faults, physical injuries, and other adverse results.	 **Warning:** Restarting will cause business interruption. About 10 minutes are required to restart an instance.
	A caution notice indicates warning information, supplementary instructions, and other content that the user must understand.	 **Notice:** If the weight is set to 0, the server no longer receives new requests.
	A note indicates supplemental instructions, best practices, tips, and other content.	 **Note:** You can use Ctrl + A to select all files.
>	Closing angle brackets are used to indicate a multi-level menu cascade.	Click **Settings** > **Network** > **Set network type**.
Bold	Bold formatting is used for buttons, menus, page names, and other UI elements.	Click **OK**.
`Courier font`	Courier font is used for commands.	Run the `cd /d C:/window` command to enter the Windows system folder.
Italic	Italic formatting is used for parameters and variables.	`bae log list --instanceid` *Instance_ID*
[] or [a|b]	This format is used for an optional value, where only one item can be selected.	`ipconfig [-all|-t]`

Style	Description	Example
{} or {a|b}	This format is used for a required value, where only one item can be selected.	switch {active|stand}

Contents

1 What is Link IoT Edge?

Link IoT Edge allows you to use TSL to convert devices of various protocols and data formats into standard TSL models. Link IoT Edge provides secure reliable low-latency cost-effective scalable weak-dependency local computing services. Link IoT Edge adopts Alibaba Cloud capabilities in several areas including security, storage, compute, and artificial intelligence (AI). You can deploy Link IoT Edge on intelligent devices and compute nodes at different levels of computing power. Link IoT Edge extends the boundary of Alibaba Cloud capability at the edge of your network.

With the integration of Alibaba Cloud capabilities, such as big data processing, AI-powered machine learning, audio process, Link IoT Edge allows you to build a system that integrates the cloud, edges, and devices.

Link IoT Edge supports the following features:

Edge instance

Edge instances allow you to manage edge resources in a similar method you manage folders. All edge resources are treated as instances. These edge resources include gateways and sub-devices. You can also use the same method to manage scene rules , Function Compute-based edge applications, and message routes. By creating edge instances, you can consolidate resources that are attached to gateways into edge instances for central management.

Device access

Link IoT Edge provides multi-language device SDKs. These SDKs allow you to easily connect devices to edge nodes.

Scene orchestration

Scene orchestration allows you to use scene rules to develop automaticapplications in a visualized manner. These scene rules define how devices interact with each other. You can enable scene rules in the IoT Platform console or apply these scene rules to edge nodes.

To manage local devices and implement interactions and access control, you can drag and drop visualized controls. This makes everyone a device-oriented developer without writing code.

For example, you can combine two actions into one scene and make the scene happen at any point in time within a specified time range. The two actions can be "opening a door" and "turning on a bulb". The time range can be from 18:00 to 19:00.

Edge application

Link IoT Edge allows you to manage the versions and configurations edge applications.

Available edge applications include:

- Function Compute-based edge applications: Function Computer is a runtime framework . You can use Function Compute-based edge applications to connect devices to gateways and manage devices based on device data and events. You can use Function Compute to create applications and upload local applications.
- Container image-based edge applications: refer to edge applications that are based on Docker. You can use images that are retrieved directly from an image repository as edge applications.

Message routing

Link IoT Edge supports message routing. To circulate local data between edge nodes, you can configure message routes. This ensures data security.

Available message routes are as follows:

- From devices to IoT Hub
- From devices to Function Compute
- Between Function Compute-based edge applications
- From Function Compute to IoT Hub
- From IoT Hub to Function Compute

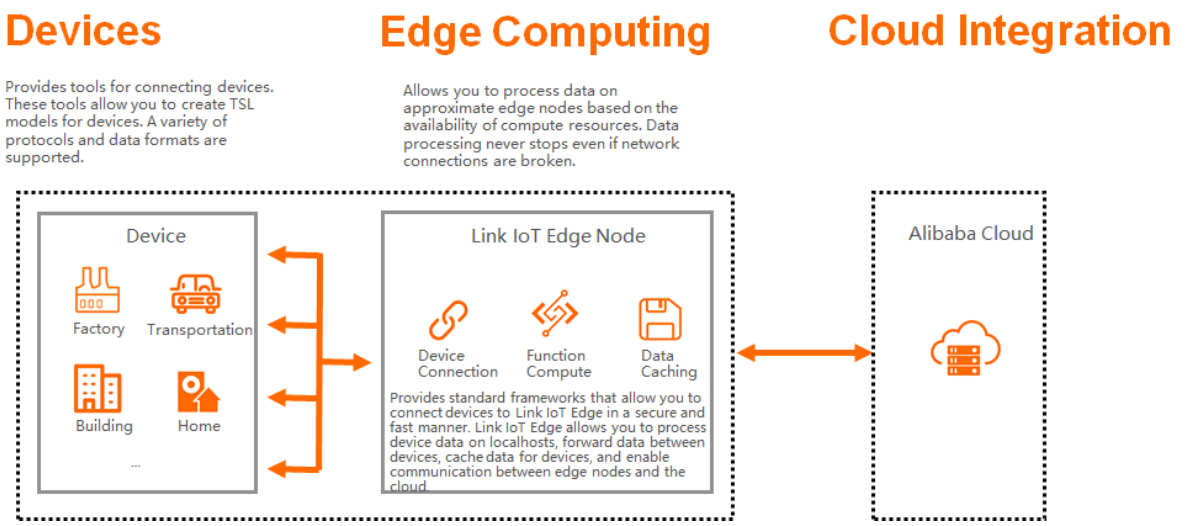
Resumable download

Link IoT Edge offers data restoration in the event of network breakdown or intermittent connectivity. Link IoT Edge allows you to add Quality of Service (QoS) policies when you configure message routing. By doing so, you can store device data on local storage in cases of network breakdown. After the network recovers, Link IoT Edge synchronizes cached data to the cloud.

2 Architecture

This topic describes the architecture of Link IoT Edge.

The following figure shows the architecture.



Link IoT Edge consists of the following components:

- Device

  You can use device SDKs to convert non-standard devices into standard Thing Specification Language (TSL) models. After the conversion is complete, you can connect these devices to the nearest gateway. The gateway allows you to manage and control these devices.

- Link IoT Edge

  After devices are connected to a gateway, the gateway helps collect, circulate, store, and analyze device data. Then, the gateway uploads device data to IoT Platform. By working with rule engines and Function Compute, the gateway allows you to easily orchestrate scenes and expand the business scale.

- IoT Platform

  IoT Platform supports the standard API and can work with multiple Alibaba Cloud services, such as big data processing and AI-powered machine learning. Based on these features, IoT Platform allows you to manage uploaded device data with ease.

3 Specifications

This topic describes the differences between Link IoT Edge Pro, Link IoT Edge Standard, and Link IoT Edge Lite. It also lists the software and hardware requirements for Link IoT Edge editions.

- You can install Link IoT Edge Pro from Docker-based packages. Link IoT Edge Pro includes all features that are supported by Link IoT Edge.
- You can install Link IoT Edge Standard from self-contained executable packages. You can select an installation package based on your software or hardware environment.
- You can install Link IoT Edge Lite from an open-source package. You can use official self-contained packages or build packages from source code. Link IoT Edge Lite supports remote operations and maintenance.

Features

Feature	Pro	Standard	Lite
Remote SSH service	Supported	Supported	Supported
Remote file service	Supported	Supported	Supported
Remote web tunnel	Supported	Supported	Supported
MQTT migration to the cloud	Supported	Supported	Supported
Sub-device management	Supported	Supported	Not supported
Driver	Supports C, Node.js, and Python	Supports C and Node.js	Not supported
Function Compute business applet	Supports C, Node.js, and Python	Supports C and Node.js	Not supported
Visualized scene orchestration	Supported	Supported	Not supported
Streaming data analysis	Supported	Not supported	Not supported
AI-powered model running framework	Supported	Not supported	Not supported
Message routing	Supported	Supported	Not supported

Feature	Pro	Standard	Lite
Cloud service integration	Supported	Supported	Not supported
Application isolation	Container isolation	Process isolation	Not supported

Hardware requirements

The following table lists hardware requirements for Link IoT Edge editions.

Parameter	Pro	Standard	Lite
CPU architecture	x86-64	• x86-64 • ARMv8 64-bit • ARMv7 VFPv3 hard-float • ARMv7 soft-float	• x86-64 • ARMv8 64-bit • ARMv7 VFPv3 hard-float • ARMv7 soft-float
CPU clock speed	Minimum of 2 GHZ	Minimum of 1 GHZ	No limit
RAM	Minimum of 2 GB	Minimum of 128 MB	Minimum of 1 MB
Disk	Minimum of 2 GB	Minimum of 128 MB	Minimum of 1 MB

The following table lists software requirements for Link IoT Edge editions.

Operating system	Pro	Standard	Lite
Linux	Docker (later than v17.03)	• Kernel version (2.6.32 or later for x86-64) • Kernel version (2.6.32 or later for ARMv7 soft-float and hard-float) • Kernel version (3.7.0 or later for ARMv8 64-bit)	• Kernel version (2.6.32 or later for x86-64) • Kernel version (2.6.32 or later for ARMv7 soft-float and hard-float) • Kernel version (3.7.0 or later for ARMv8 64-bit)
Windows	• Bash (such as Git Bash) • Docker (later than v17.03)	Not supported	Not supported
macOS	Docker (later than v17.03)	Not supported	Not supported

Operating system	Pro	Standard	Lite
Cloud Shell	Not supported	Available only for Link IoT Edge v1.8.2 or later	Not supported

4 Terms

This topic describes common terms that are used in Link IoT Edge.

Term	Description
Link IoT Edge	Link IoT Edge serves as a function module that is included in IoT Platform. Link IoT Edge provides reliable data processing for on-premises devices. This reduces cloud migration costs.
Link IoT Edge package	You can use Link IoT Edge packages to install Link IoT Edge Lite, Link IoT Edge Standard, and Link IoT Edge Pro.
Link IoT Edge Lite	You can install Link IoT Edge Lite by using an executable tar.gz package.
Link IoT Edge Standard	You can install Link IoT Edge Standard by using an executable .tar.gz package.
Link IoT Edge Pro	You can install Link IoT Edge Pro by using a Docker image.
Gateway	Compute nodes that run Link IoT Edge are referred to as edge gateways.
Sub-device	Sub-devices refer to any devices that connect to Link IoT Edge gateways. These devices use different protocols and interfaces for communication. A gateway serves as a proxy that enables the communication between a sub-device and Link IoT Edge.
Driver	You can use drivers to manage and control devices that are attached to Link IoT Edge. Before a device can access Link IoT Edge , you must specify a driver for the device.
Edge instance	You can delegate gateways to associate your devices with edge instances. These devices are consolidated to IoT Platform through edge instances for management. You can use edge instances to manage multiple resources of your devices. These resources include drivers, Function Compute applications, and scene rules.
Fun	Fun is a tool that allows you to develop serverless applications . Fun allows you to define, develop, test, and debug serverless applications in a local environment and deploy these serverless applications in the cloud.

Term	Description
Resumable upload	Link IoT Edge provides the resumable upload feature in cases of network breakdown or intermittent connectivity. Link IoT Edge allows you to add Quality of Service (QoS) policies when you configure message routing. By doing so, you can store device data on local storage in cases of network breakdown. After the network recovers, Link IoT Edge synchronizes the cached data to the cloud.
Message routing	You can use routing rules to implement message routing. Messages that meet the specified conditions will be routed from the source node to the destination node.
Device simulator	Device simulators refer to applications that simulate physical devices. Each device simulator includes a driver and a management tool.

5 Benefits

Link IoT Edge provides the following benefits:

Quick device connection

Link IoT Edge allows you to quickly connect edge nodes to devices that use varied data formats and communications protocols. You can use languages that you are familiar with to connect the devices.

Low latency

In the local networks where your devices reside, you can collect the device data and implement control policies. For example, you can perform data cleansing, computing, and analysis locally. This improves the timeliness and reliability of data processing.

Low cost

After you perform data cleansing, computing, and filtering locally, only high-quality data is uploaded to the cloud for storage. This reduces the costs in terms of computing, storage, and bandwidth.

High security

Link IoT Edge provides secure connections between the cloud and edge. It also offers data encryption and secure storage services.

High tolerance in network conditions

In offline and intermittent connectivity scenarios, Link IoT Edge allows you to perform computing over data, store data, and analyze data locally.

High AI capabilities

You can integrate AI learning, speech recognition, video recognition, and cloud services with Link IoT Edge to enhance local AI capabilities.

6 Scenarios

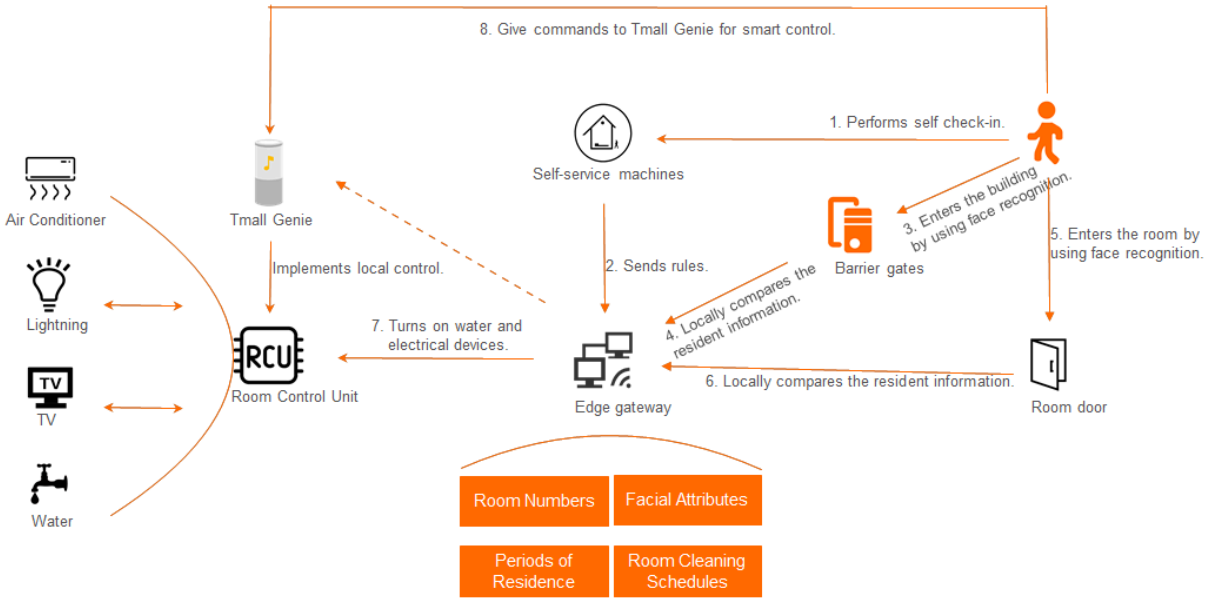
This topic introduces the typical application scenarios of Link IoT Edge, such as smart hotels, industrial production, and wind power industries. Link IoT Edge can be used to improve the efficiency of businesses that can take advantage of data collection and processing services, such as wind power systems.

Smart hotels

Edge gateways can quickly connect to on-premises devices and function as nodes that quickly respond to local events. Edge gateways make it possible to achieve machine to machine (M2M) communication in the on-premises environment and unlock the full potential of voice intelligence. Voice intelligence allows you to control and manage services inside and outside hotel rooms.

Features:

- Device connection: The system connects hotel barrier gates, room doors, air conditione rs, lighting devices, and water and electricity devices.
- Edge computing: Edge gateways performs computing over data such as face informatio n, room numbers, room cleaning schedules, and periods of residence.
- Voice intelligence: Tmall Genie works as a private assistant for hotel residents who have checked in. Hotel residents can give commands to Tmall Genie that Tmall Genie can carry out on connected devices.



The entire procedure is described as follows:

1. Hotel residents check in by using self-service machines. The self-service machines send the rules that regulate check-in information to edge gateways.
2. Residents go to the barrier gates for face recognition. The barrier gates verify resident identities by communicating with the edge gateways.
3. After the resident identities are verified, the barrier gates allow the residents to enter the building.
4. Residents go to their rooms for face recognition. The devices that are installed on the room doors verify the resident identities by communicating with the edge gateways.
5. After the resident identities are verified, residents can enter their rooms.
6. When the room doors are opened, the devices in the rooms, such as water and electricit y devices, air conditioners, lightning devices, and TVs, are automatically started as specified.
7. Residents can give commands to Tmall Genie that Tmall Genie can carry out on connected devices.

Wind power

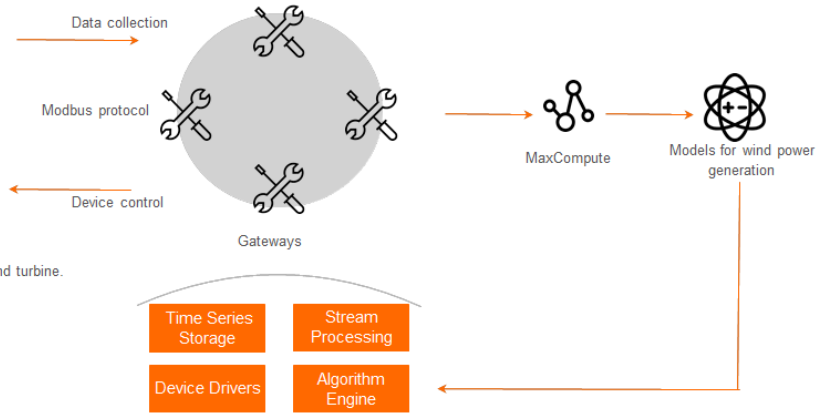
In the local networks for wind turbines, you can deploy edge gateways to collect wind turbine data in real time. After the collected data is processed locally, you can upload the processed data to Alibaba Cloud MaxCompute. Then, you can use big data models to adjust the wind turbine parameters, such as the wind direction sensitivity and start time delay. The procedure of automatic parameter adjustment is described as follows. Algorithms or rules are created based on the big data models and imported to the local edge nodes. The edge nodes can then automatically adjust the wind turbine parameters to improve efficiency.

Features:

- Real-time data collection: Source data is collected from wind turbines in varied locations in real time.
- Big data processing: After the source data is uploaded to Alibaba Cloud MaxCompute, big data models are used to boost wind power efficiency.
- Instant feedback: After the algorithms or rules are imported to local edge nodes, the edge nodes adjusts wind turbine parameters in real time to optimize wind power generation.

Wind turbines

Around 200 data records must be reported for each wind turbine.



7 Limits

This topic describes limits that apply to edge instances and scene rules when you use Link IoT Edge.

Limits on edge instances

Limit	Description
Maximum number of edge instances: 100,000	You can use an Alibaba Cloud account to create a maximum of 100,000 edge instances.
Maximum number of users that you can authorize to access an edge instance: 20	You can authorize a maximum number of 20 users to access each edge instance.
Number of gateways: 1	Each edge instance has only one gateway.
Maximum number of drivers: 30	You can add a maximum of 30 drivers to each edge instance.
Maximum number of sub-devices: 1,000	You can add a maximum of 1,000 sub-devices to each edge instance.
Maximum number of scene rules: 30	You can add a maximum of 30 scene rules to each edge instance.
Maximum number of Function Compute applications: 30	You can add a maximum of 30 Function Compute-based applications to each edge instance.
Maximum number of message routes: 30	You can add a maximum of 30 message routes to each edge instance.

Limits on drivers

Limit	Description
Maximum number of custom drivers: 50	You can use an Alibaba Cloud account to create a maximum of 50 custom drivers.
Maximum size of a custom driver package: 50 MB	The maximum size of a custom driver package is 50 MB.
Maximum number of driver versions: 10	Each driver can have a maximum of 10 versions.
Maximum number of key-value pairs: 100	You can add a maximum of 100 key-value pairs to the configurations of a driver.

Limit	Description
Maximum size of JSON data for a driver: 1 KB	Each driver contains up to 1 KB configurat ion data in the JSON format.
Maximum size of a configuration file for a driver: 1 MB.	The size of a configuration file that you can upload to configure a drive can be a maximum of 1 MB.
Maximum size of JSON data for a device: 1 KB	Each device contains a maximum of 1 KB configuration data in the JSON format.

Limits on scene orchestration

Limit	Description
Maximum number of scene rules: 100	You can create a maximum of 100 scene rules in the Scene Orchestration section.
Maximum number of triggers: 10	You can add a maximum of 10 triggers to each rule.
Maximum number of conditions: 5	You can add a maximum of 5 conditions to each rule.
Maximum number of actions: 10	You can add a maximum of 10 actions to each rule.

Note:

If you want to increase one of the preceding limits, we recommend that you submit a ticket in the console for further assistance.

8 Release notes

8.1 Download URLs

Link IoT Edge Standard and Lite Edition provide software packages for multiple environments.

Standard Edition

X86-64

Download URL	Release date	Package size
link-iot-edge-x86-64-v2.7.0.tar.gz	April 29, 2020	59.587 MB

ARMv7-hf

Download URL	Release date	Package size
link-iot-edge-armv7-hf-v2.7.0.tar.gz	April 29, 2020	53.508 MB

ARMv8 (AArch64)

Download URL	Release date	Package size
link-iot-edge-aarch64-v2.7.0.tar.gz	April 29, 2020	55.780 MB

Lite Edition

X86-64

Download URL	Release date	Package size
link-iot-edge-lite-x86-64-v2.7.0.tar.gz	April 29, 2020	10.939 MB

ARMv7-hf

Download URL	Release date	Package size
link-iot-edge-lite-armv7-hf-v2.7.0.tar.gz	April 29, 2020	8.007 MB

ARMv8 (AArch64)

Download URL	Release date	Package size
link-iot-edge-lite-aarch64-v2.7.0.tar.gz	April 29, 2020	8.458 MB