Huawei Atlas 500

Technical White Paper

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About This Document

Purpose

This document describes the Atlas 500 AI Edge Station (Atlas 500 for short) in terms of its appearance, features, and specifications.

Intended Audience

This document is intended for:

- Huawei presales engineers
- Channel partner presales engineers
- Enterprise presales engineers

Symbol Conventions

The symbols that may be found in this document are defined as follows.

Symbol	Description
	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.
	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.
	Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance deterioration, or unanticipated results. NOTICE is used to address practices not related to personal injury.

Symbol	Description
NOTE	Calls attention to important information, best practices, and tips. NOTE is used to address information not related to personal injury, equipment damage, and environment deterioration.

Change History

Issue	Date	Description
03	2019-08-05	This issue is the third official release.
02	2019-07-27	This issue is the second official release.
01	2019-07-04	This issue is the first official release.

Contents

1 Introduction

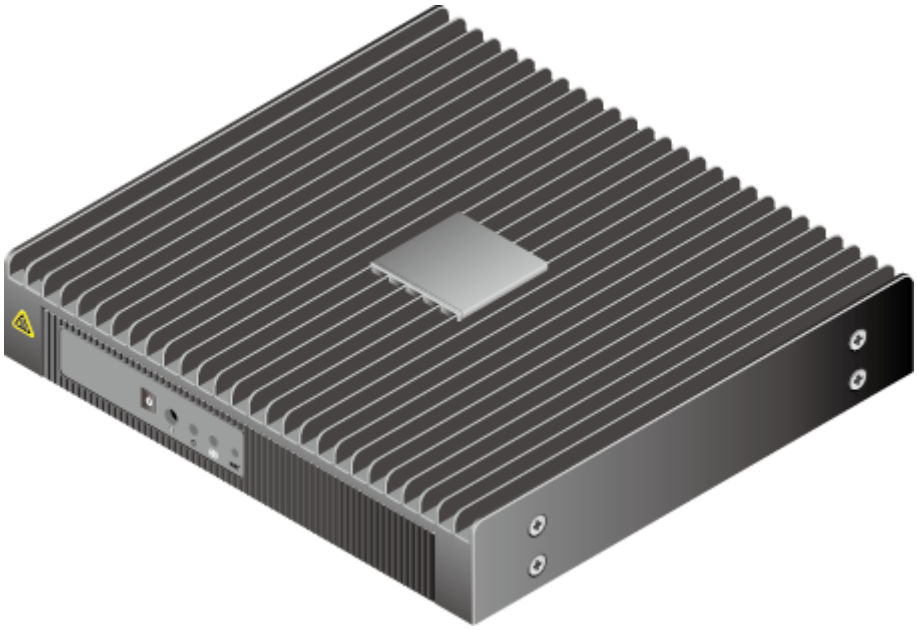
1.1 Product Overview

The Atlas 500 is a lightweight edge device designed for a wide range of edge applications. It features powerful computing performance, large-capacity storage, flexible configuration, small form factor, wide temperature range, strong environment adaptability, and easy maintenance and management. It is ideal for intelligent video surveillance, analysis, and data storage application scenarios, and can be deployed in various edge and central equipment rooms, meeting application requirements in complex environments, such as public security departments, communities, campuses, shopping malls, and supermarkets.

The Atlas 500 has two models with different drive configurations:

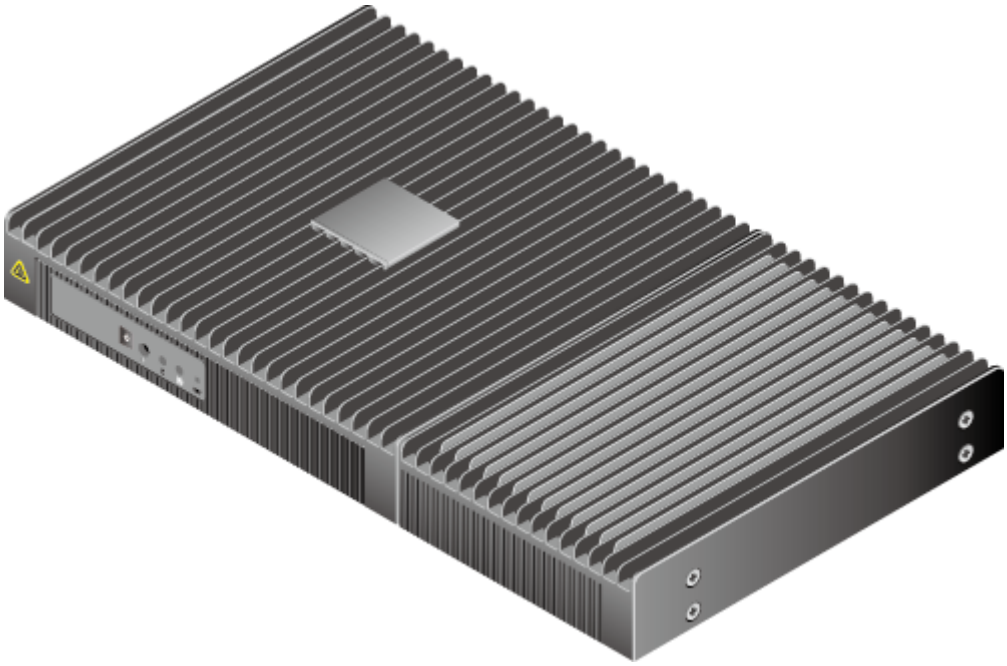
- **Figure 1-1** shows an Atlas 500 without a drive.

Figure 1-1 Atlas 500 (without a drive)



- Figure 1-2 shows an Atlas 500 with a 3.5-inch drive in the drive module on the right.

Figure 1-2 Atlas 500 (with a drive)



1.2 Product Features

Ease of Use in Edge Scenarios

- Real time: Data is processed locally and response is returned in real time.
- Low bandwidth: Only necessary data is transmitted to the cloud.

- Privacy protection: Customers can determine the data to be transmitted to the cloud and stored locally. All data transmitted to the cloud can be encrypted.
- Standard container engines and fast deployment of third-party algorithms and applications are supported.

16-Channel Video Analysis and Storage Capability

- 16-channel video analysis (up to 16-channel 1080p video decoding and 16 TOPS compute power on INT8 data).
- 12 TB storage capacity, supporting storage of 16-channel 1080p 4 Mbit/s videos for 7 days and 8-channel 1080p 4 Mbit/s videos for 30 days.

Strong Environment Adaptability

- Industrial protection level: IP40.
- Zero-fan design, supporting a wide operating temperature range of -40°C to +70°C (-40°F to +158°F).

Flexible Configuration and Wireless Transmission

Support for 3G or 4G modules and wireless transmission.

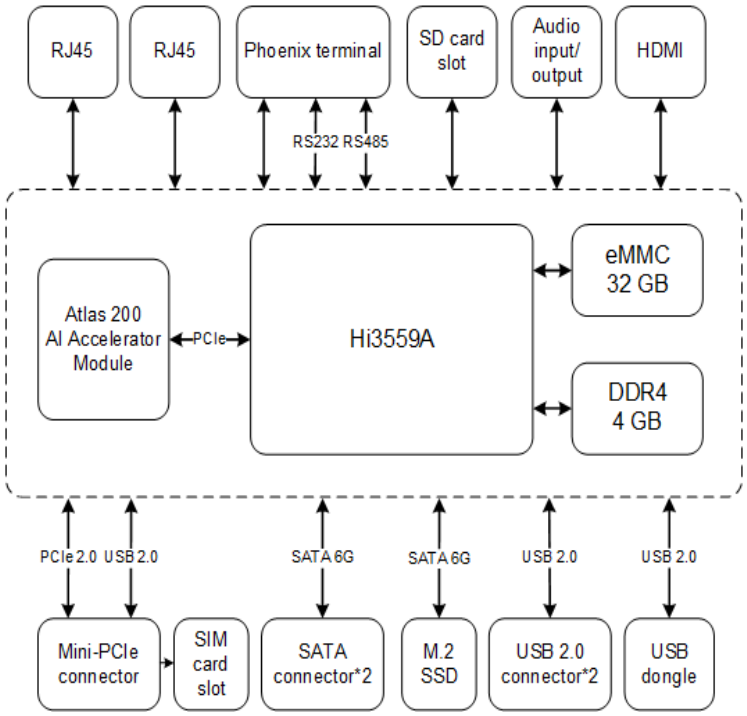
High Reliability

- All the firmware in the system has dual-image backup. If a fault occurs, automatic active/standby failover will occur.
- The system detects software and hardware faults and generates alarms.
- The system provides the HA solution with built-in HA backup software. Two Atlas 500 edge stations can form an HA system. If one Atlas 500 is faulty, a failover is automatically triggered.

1.3 Logical Architecture

Figure 1-3 shows the system architecture of the Atlas 500. The processor uses the Huawei-developed HiSilicon Hi3559A chip, and works with the Atlas 200 AI accelerator module (optional) to provide 16 TOPS compute power on INT8 data.

Figure 1-3 Atlas 500 system architecture

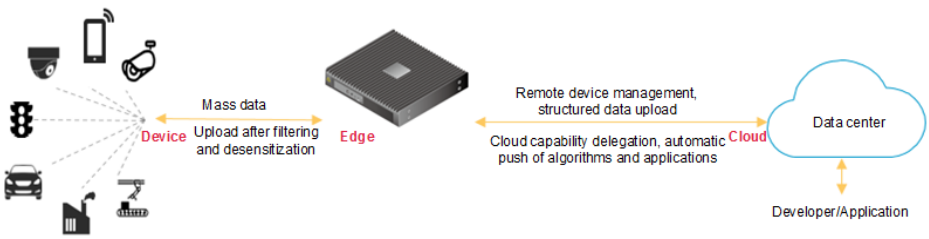


1.4 Typical Application Scenarios

The Atlas 500 can be used in many scenarios, including Safe City, Smart Security Supervision, Smart Transportation, Smart Manufacturing, Smart Retail, and Smart Care. In these application scenarios, the typical architecture is as follows:

- Device: IP cameras or other front-end devices are connected in a wireless or wired way.
- Edge: The edge implements the extraction, storage, and upload of valuable information.
- Cloud: Data centers implement model and application push, management, and development.

Figure 1-4 Typical architecture of the Atlas 500



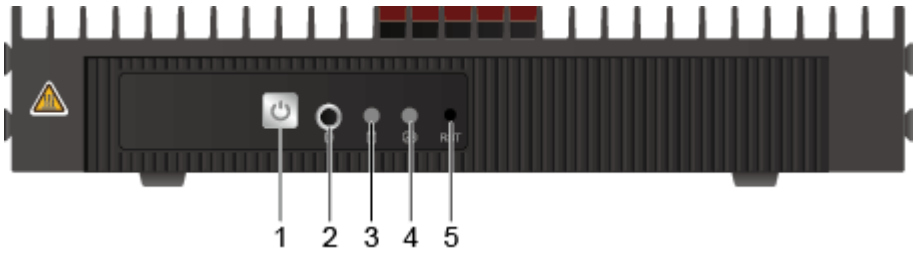
2 Hardware

2.1 Front Panel

2.1.1 Indicators and Buttons

Positions

Figure 2-1 Indicators and buttons on the front panel



1	Graceful power-off indicator/ button	2	Bluetooth indicator/button (reserved)
3	Drive indicator	4	Health indicator
5	Reset button	-	-

Description

Table 2-1 Description of indicators and buttons on the front panel

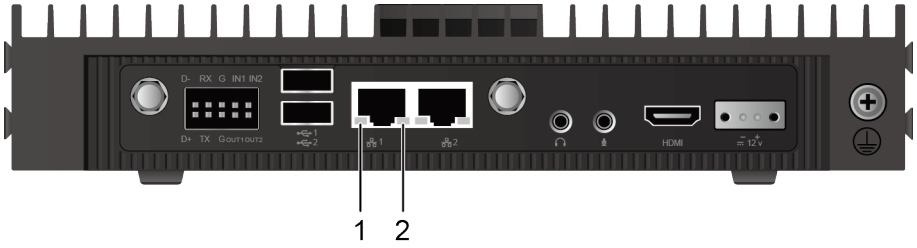
Indicator/Button	Description
Graceful power-off indicator/button	Graceful power-off indicator: ● Steady green: The device is operating properly. ● Blinking green: The device is being powered off. ● Off: The device is powered off. Graceful power-off button: ● If you press this button when the system is powered on, the system starts the graceful power-off process. ● If you hold down this button for 5 seconds when the system is powered on, the system starts the forcible power-off process. ● If you press this button when the system is powered off, the system starts the power-on process.
Bluetooth indicator/ button **NOTE** The Bluetooth indicator/ button is reserved and currently unavailable.	Bluetooth indicator: ● Steady blue: The Bluetooth function is enabled. ● Off: The Bluetooth function is disabled. Bluetooth button: You can press this button to enable the Bluetooth function.
Drive indicator	● Steady green: The drive is operating properly. ● Blinking green: Data is being read from or written to the drive.
Health indicator	● Steady green: The device is operating properly. ● Blinking red: An alarm has been generated for the system.
Reset button	You can press this button to reset the system.

2.2 Rear Panel

2.2.1 Indicators

Positions

Figure 2-2 Indicators on the rear panel



1	GE port connection status indicator	2	Data transmission status indicator for a GE port

Description

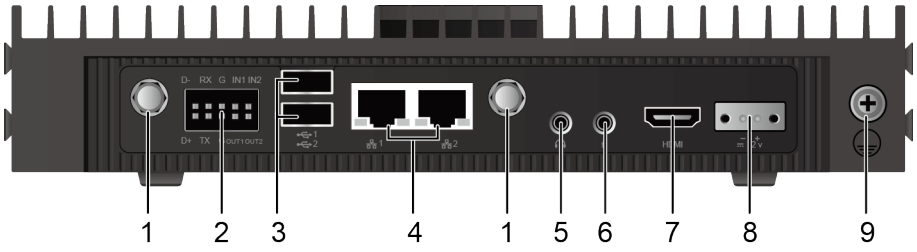
Table 2-2 Description of indicators on the rear panel

Indicator	Description
GE port connection status indicator	● Off: The network is disconnected. ● Steady green: The network is properly connected.
Data transmission status indicator for a GE port	● Off: No data is being transmitted. ● Blinking yellow: Data is being transmitted.

2.2.2 Ports

Positions

Figure 2-3 Ports on the rear panel



1	Antenna ports	2	Phoenix alarm terminal port

3	USB ports	4	GE network ports
5	Audio output port	6	Audio input port
7	HDMI port	8	Power socket
9	Ground terminal	-	-

Description

Table 2-3 Description of ports on the rear panel

Name	Type	Quantity	Description
Antenna port	SMA-K (screw threads outside and a hole inside)	2	Used to connect antennas to the Atlas 500.
Phoenix alarm terminal port	-	1	Used to connect an alarm input device such as a smoke detector, infrared detector, access controller, or an alarm output device such as an alarm bell. Ensure that the alarm input device and Atlas 500 are grounded. **NOTE** It is recommended that the length of an RS232 cable be less than or equal to 10 m.
USB port	USB 2.0 Type-A	2	Used to connect a mouse. The Atlas 500 provides two USB ports on the rear panel. You can connect a mouse to either of the ports.
GE network port	-	2	Used to connect to a switch through network cables.
Audio output port	-	1	Used to connect an audio output device such as a headset or speaker to the Atlas 500. **Figure 2-4** Audio output cable  **NOTE** The audio output cable and devices are not included in the accessory package, and need to be purchased by customers themselves.

Name	Type	Quantity	Description
Audio input port	-	1	Used to connect an audio input device such as a microphone to the Atlas 500. **Figure 2-5** Audio input cable  **NOTE** The audio input cable and devices are not included in the accessory package, and need to be purchased by customers themselves.
HDMI port	-	1	Used to connect to a monitor through an HDMI cable for video output. **NOTE** The HDMI cable is not included in the accessory package, and needs to be purchased by customers themselves.
Power socket	-	1	Used to connect to the power supply system through a 2-pin DC power cable. One end of the cable is a 2-pin DC input terminal, and the other end is open. Users can prepare cables based on site requirements. The 2-pin DC input terminal adopts a foolproof design. If the positive and negative poles are reversely connected, the device cannot be powered on. The Atlas 500 installation accessory package provides a 2-pin power cable terminal. The DC power cable specifications must be 1.5 mm^2 or 16 AWG (recommended) or smaller. **Figure 2-6** Atlas 500 power cable 
Ground terminal	-	1	Used to connect one end of the PGND cable to the ground terminal on the device and the other end to the ground point on the cabinet or workbench. A Phillips screwdriver and M4 screws are required. The PGND cable needs to be prepared by the customer, and a 16 AWG to 18 AWG yellow and green cable is required.

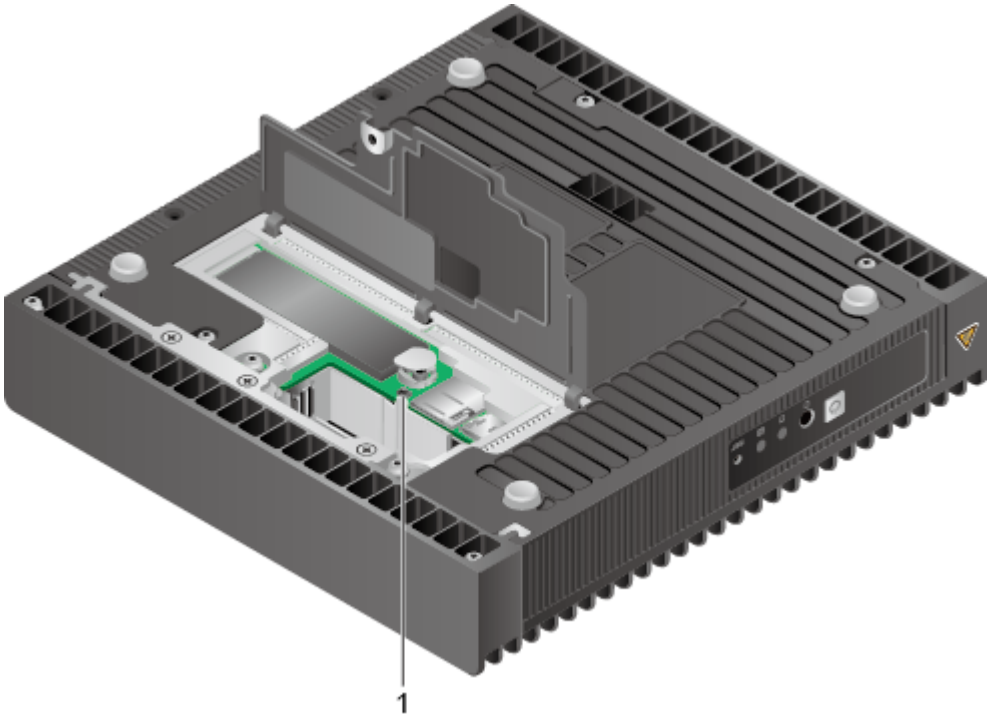
2.3 Bottom Cover

The cover at the bottom of the device can be removed to connect more user peripherals, such as an M.2 SSD, microSD card, SIM card, and USB dongle. In addition, a button is provided to restore the device to its default settings.

2.3.1 Button

Position

Figure 2-7 Button at the bottom



1	Button for restoring factory settings	-	-

Description

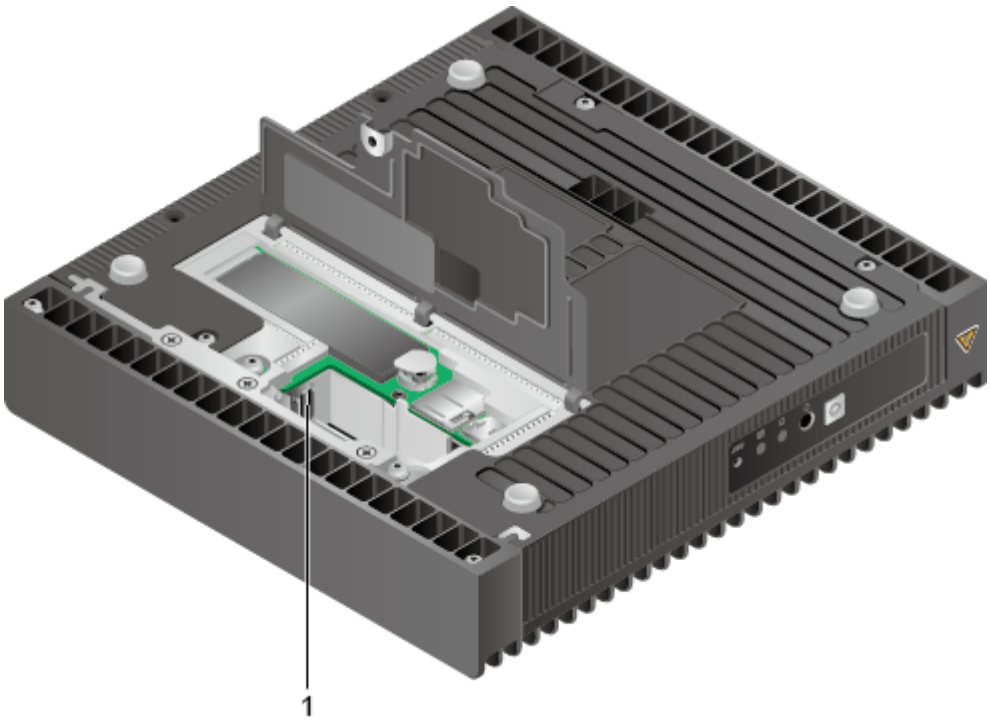
Table 2-4 Description of the button at the bottom

Name	Type	Description
Button for restoring factory settings	-	When the device is powered on, you can press and hold the button for 10 seconds or longer to reset the device and restore it to its factory settings. **NOTICE** Exercise caution when using this button. Restoring factory settings will interrupt services.

2.3.2 Port

Position

Figure 2-8 Port at the bottom



1	USB port	-	-

Description

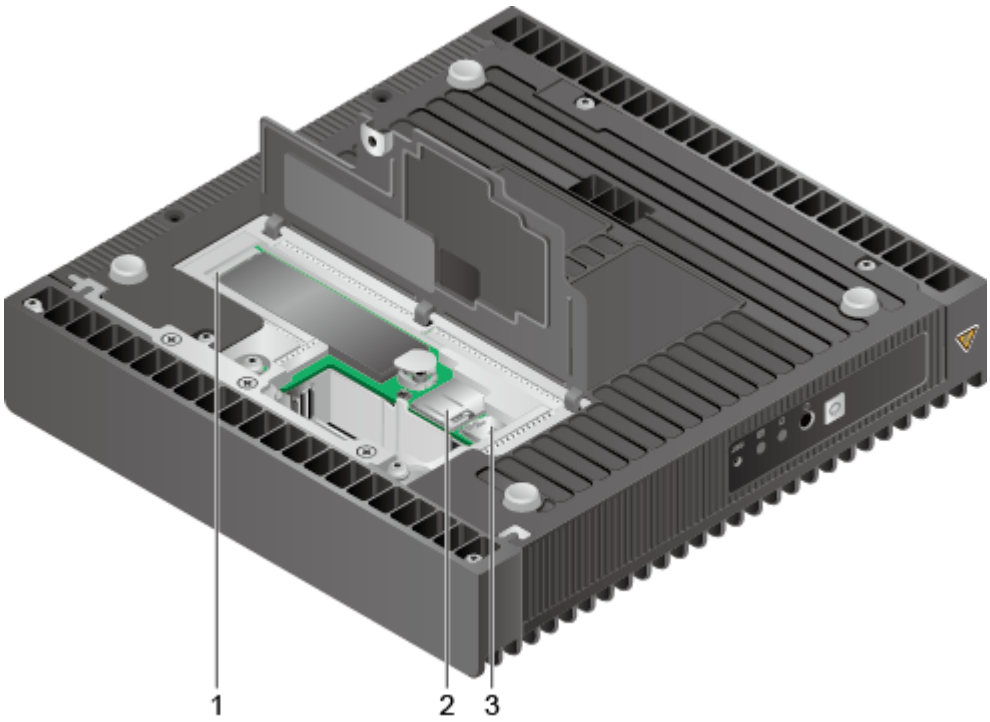
Table 2-5 Description of the port at the bottom

Name	Type	Description
USB port	USB 2.0	Connects a USB dongle.

2.3.3 Slots

Positions

Figure 2-9 Slots at the bottom



1	M.2 SSD slot	2	SIM card slot
3	microSD card slot	-	-

Description

Table 2-6 Description of the slots at the bottom

Name	Type	Description
M.2 SSD slot	SATA 3.0	Houses a 2280 SATA M.2 SSD. **NOTE** An industrial M.2 SSD must be used to meet ambient temperature requirements.
SIM card slot	-	Houses a SIM card, which must be used together with an LTE module. **NOTE** ● The SIM card is not hot swappable. ● An industrial SIM card must be used to meet ambient temperature requirements.
microSD card slot	SDIO	Houses a microSD card, with a maximum rate of SDR50 and a maximum capacity of 2 TB. **NOTE** An industrial microSD card must be used to meet ambient temperature requirements.

3 Product Specifications

3.1 Technical Specifications

Table 3-1 Atlas 500 technical specifications

Item	Specifications
Processor	HiSilicon Hi3559A processors ● Dual-core ARM Cortex A73 @1.8 GHz, 32 KB I-Cache, 64 KB D-Cache/512 KB L2 cache ● Dual-core ARM Cortex A53 @1.2 GHz, 32 KB I-Cache, 32 KB D-Cache/256 KB L2 cache ● Dual-core ARM Mali G71 @900 MHz, 256 KB cache
Processor memory	DDR4 4 GB, 64-bit, 2400 Mbit/s

Item	Specifications
Processor encoding capability	● H.264 BP/MP/HP ● H.265 Main Profile/Main 10 Profile ● I/P/B frames supported in H.264/H.265 encoding mode ● MJPEG/JPEG Baseline encoding ● A maximum resolution of 8192 x 8640 for H.264 encoding ● A maximum resolution of 16384 x 8640 for H.265 encoding ● H.264/H.265 multi-stream real-time encoding capabilities: 7680 x 4320@30 FPS + 1080p@30 FPS + 7680 x 4320@2 FPS ● CBR, VBR, AVBR, FixQp, and QpMap bit rate control modes ● Maximum output bit rate of 200 Mbit/s
Processor decoding capability	● H.264 BP/MP/HP ● H.265 Main Profile/Main 10 Profile ● JPEG/MJPEG decoding ● Up to H264/H.265 7680 x 4320@30 FPS or H.264/H.265 3840 x 2160@120 FPS ● Up to 7680 x 4320@15 FPS JPEG decoding
Processor security engine	● Hardware-based encryption and decryption algorithms: AES, DES, and 3DES ● Hardware-based signature verification algorithms: RSA-1024, RSA-2048, RSA-3072, and RSA-4096 ● Hardware-based HASH anti-tamper algorithms: SHA-1, SHA-224, SHA-256, SHA-384, and SHA-512; HMAC-SHA-1, HMAC-SHA-224, HMAC-SHA-256, HMAC-SHA-384, and HMAC-SHA-512 ● Integrated 32-kbit OTP storage space and hardware random number generator
Atlas 200 AI accelerator module (optional)	● Two Da Vinci AI cores ● Processor: 8-core ARM Cortex-A55, max. 1.6 GHz ● Multiplication and addition computing performance: 8 TFLOPS/FP16, 16 TOPS/INT8 ● Memory specifications: LPDDR4X, 128-bit, 8 GB/4 GB, 3200 Mbit/s

Item	Specifications
Atlas 200 encoding/ decoding capability	● H.264 hardware decoding, 16-channel 1080p 30 FPS (2-channel 3840 x 2160 60 FPS), YUV420 ● H.265 hardware decoding, 16-channel 1080p 30 FPS (2-channel 3840 x 2160 60 FPS), YUV420 ● H.264 hardware encoding, 1-channel 1080p 30 FPS, YUV420 ● H.265 hardware encoding, 1-channel 1080p 30 FPS, YUV420 ● JPEG decoding capability at 1080p 256 FPS and encoding capability at 1080p 64 FPS, up to 8192 x 8192 resolution ● PNG decoding at 1080p 48 FPS, up to 4096 x 4096 resolution
Storage	● Onboard 32 GB eMMC (used for storing OS and application software) ● One 6 TB or 12 TB 3.5-inch drive ● One slot for a microSD card, with a maximum rate of SDR50 and a maximum capacity of 2 TB ● One slot for a 2280 SATA M.2 SSD **NOTE** ● The Atlas 500 supports a wide temperature range. If a microSD card or M.2 SSD is required, it must meet temperature requirements. ● M.2 SSDs and microSD cards are flash-based storage devices, and M.2 SSDs use SATA interfaces. Currently, NAND flash memory is mostly used in the industry. NAND flash memory stores electrons on the floating gate to store data. However, electrons frequently passing through the floating gate will weaken the gate's ability to store electrons and eventually make the gate unable to store electrons. This problem is common to NAND flash memory. To prevent failures of NAND flash memory, accurately assess the amount of service data to be written. ● For details about the application scenarios of M.2 SSDs, see the *M.2 SSD Technical White Paper*. ● For details about the application scenarios of SD cards, see the *SD Card Technical White Paper*.
System management	● One-click upgrade ● Automatic hardware fault detection ● Autonomous management ● Edge-cloud synergy ● Login using a web browser ● Interconnection with the Intelligent EdgeFabric (IEF) platform ● Interconnection with the Huawei FusionDirector management platform

Item	Specifications
Wired network	2 x GE RJ45 ports
Wireless network	● 3G/4G wireless module ● Two SMA antenna ports ● One SIM card slot
Display port	One HDMI port
Audio port	One audio input port and one audio output port (3.5 mm stereo ports)
USB port	Two USB 2.0 ports on the panel and one USB 2.0 port inside (connecting a USB dongle). All ports are Type-A.
Alarm port	● One RS232 port and one RS485 port for connecting to a PTZ device or access control system ● One alarm output port for connecting to an external alarm output device, such as a smoke sensor ● Two alarm input ports for connecting to external alarm input devices, such as the access control system
Power supply	12 V DC, with an external power adapter

3.2 Environmental Specifications

Table 3-2 Atlas 500 environmental specifications

Item	Specifications
Operating temperature	● Without a drive: -40°C to +70°C (-40°F to +158°F) ● With a drive: -40°C to +60°C (-40°F to +140°F)
Storage temperature	-40°C to +85°C (-40°F to +185°F)
Altitude	● Without a drive: Operating altitude: ≤ 5000 m (16404 ft.) When the altitude is between 1800 m (5905.44 ft.) and 5000 m (16404 ft.), the maximum operating temperature decreases by 1°C (1.8°F) for every increase of 220 m (721.78 ft.) in altitude. ● With a drive: Operating altitude: ≤ 3000 m (9842.4 ft.) When the altitude is between 1800 m (5905.44 ft.) and 3000 m (9842.4 ft.), the maximum operating temperature decreases by 1°C (1.8°F) for every increase of 220 m (721.78 ft.) in altitude.

Item	Specifications
Operating humidity (RH, non-condensing)	5% to 95%
Operating humidity (RH, non-condensing)	5% to 95%
Surge protection	Built-in surge protection to best suit harsh outdoor environments
IP rating	IP40
Heat dissipation mode	Natural heat dissipation without fans

NOTE

- Low-temperature startup: To protect internal components and the drive, the system enters the heating mode after startup if the ambient temperature is lower than 0°C (32°F). The heating time varies depending on the ambient temperature but does not exceed 1 hour. In heating mode, the device is unavailable and the health indicator blinks. After the heating is complete, the system returns to normal and the health indicator is steady green.
- Temperature: If a 3.5-inch drive is installed, the refrigerating system starts working to keep the temperature at 60°C (140°F) or lower, and the air flow around the device must reach 0.7 m/s or higher.
- Surge protection: The surge protection level of the RS232 port for dual-live wire to the ground the level between the two wires are both ±4 kV (criterion C).

3.3 Physical Specifications

Table 3-3 Atlas 500 physical specifications

Item	Specifications
Dimensions (H x W x D)	● Without a drive: 45 mm x 235 mm x 220 mm (1.77 in. x 9.25 in. x 8.66 in.) ● With a drive: 45 mm x 355 mm x 220 mm (1.77 in. x 13.98 in. x 8.66 in.)
Weight	● Without a drive: 2.5 kg (5.51 lb) ● With a drive: 4.7 kg (10.36 lb)
Power consumption	● Typical power consumption – Without a drive: 25 W – With a drive: 40 W ● Maximum power consumption: – Without a drive: 50 W (including the heating module) – With a drive: 60 W (including the heating module)

3.4 PSU Specifications

Table 3-4 Atlas 500 PSU specifications

Item	Specifications
Input	● Rated power input range – AC: 100 V to 240 V, 50 Hz or 60 Hz, 2 A – DC: 110 V to 250 V, 2 A ● Maximum power input range – AC: 90 V to 264 V – DC: 88 V to 300 V
Output	● Rated output voltage: 12 V DC ● Rated output current: 5 A
Note: 60 W industrial AC PSUs are recommended. For details, see **B.1 60 W Industrial AC PSU**.	

4 System Management

This product integrates the Atlas Intelligent Edge System (Atlas IES for short). The Atlas IES is an edge management platform developed by Huawei. It provides basic functions such as hardware monitoring, system configuration, and routine O&M for edge devices. It also allows users to install third-party software on the Atlas 500 to meet various service deployment requirements.

The Atlas IES supports the edge-cloud synergy function and can connect to the HUAWEI CLOUD intelligent edge platform (IEF) and Huawei FusionDirector management platform.

Features

The Atlas IES supports the following features:

- Network configuration
- Time synchronization
- Drive partitioning
- Software installation
- Certificate management
- System maintenance, including firmware upgrade, system restart, and log collection
- Edge-cloud synergy
- HA solution: Two Atlas 500 edge stations can form an HA system. If one Atlas 500 is faulty, a failover is automatically triggered.

Functions

Table 4-1 Atlas IES functions

Function	Description
Quick start	The OS is started 30 seconds after the device is powered on at normal temperature when the hardware is normal.
Secure boot	The built-in security mechanism of the CPU chip verifies the signatures of uBoot and OS kernel files during startup.

Function	Description
System watchdog	uBoot and OS watchdog are supported. When the system is abnormal during startup or running, it automatically resets to recover services in time. 60 seconds is required for the system to reset after it is abnormal.
Fault detection	Various fault detection functions are support to accurately locate hardware faults, detect container service exceptions, and report hardware and software alarms.
Black box	The black box function is supported, and black box logs can be obtained remotely.
Software dual-image backup	If software fails, it starts again from a backup image.
Device asset management	Intelligent asset management supports unified management and stocktaking of assets in use.
One-click information collection	System logs are collected in one-click mode for analysis.
One-click upgrade	System firmware can be upgraded in one-click mode to ensure that the firmware version is the latest.
WebUI	A user-friendly graphical user interface (GUI) simplifies user configuration and query operations.

5 Maintenance and Warranty

For details, see **Maintenance & Warranty**.

6 Certifications

Table 6-1 Certifications that the Atlas 500 has passed

No.	Country/Region	Certification
1	China	CCC
2	China	RoHS
3	Europe	WEEE
4	Europe	RoHS
5	Europe	REACH
6	Europe	CE
7	Japan	VCCI
8	Kuwait	KUCAS
9	Nigeria	SONCAP
10	Uganda	UNBS
11	Algeria	ACAP

A Acronyms

A.1 A-E

A

AI	Artificial Intelligence

B

BMC	Baseboard Management Controller

C

CFM	Cubic Feet Per Minute

D

DDR4	Double Date Rate 4

E

ECC	Error Checking and Correcting

A.2 F-J

G

GE	Gigabit Ethernet

H

HDD	Hard Disk Drive
HDMI	High Definition Multimedia Interface

A.3 K-O

M

MTBF	Mean Time Between Failures

O

OS	Operating System

A.4 P-T

P

PCB	Printed Circuit Board
PCIe	Peripheral Component Interconnect Express

R

RJ45	Registered Jack 45

S

SATA	Serial Advanced Technology Attachment
SMBus	System Management Bus
SSD	Solid-State Drive

A.5 U-Z

U

UBER	Uncorrectable Bit Error Rate
USB	Universal Serial Bus

V

VPD	Vital Product Data

B Appendix

B.1 60 W Industrial AC PSU

The Atlas 500 can use a 60 W industrial AC PSU, as shown in **Figure B-1**.

Figure B-1 60 W industrial AC PSU

Panel

Figure B-2 PSU panel

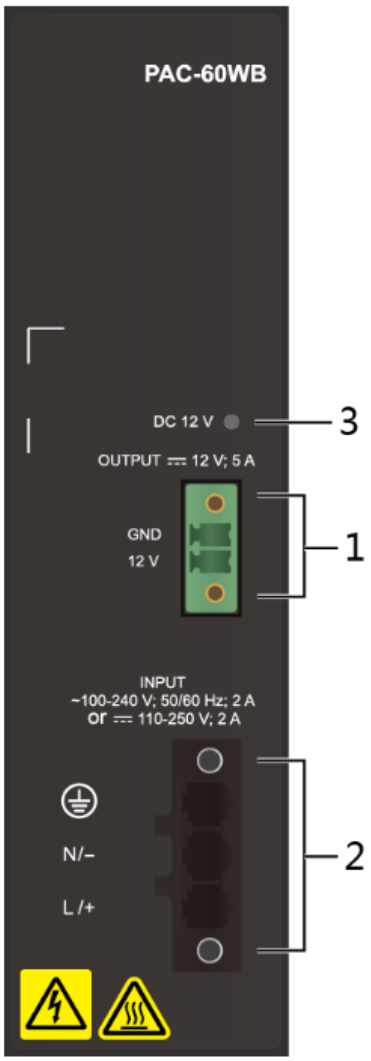


Table B-1 PSU panel description

No.	Name	Description
1	2-pin DC output port	Connects the PSU to the Atlas 500 through a 2-pin cable.
2	AC/DC input port	Connects the PSU to the external power supply system through a 3-pin cable.
3	12 V DC power indicator	● Steady green: The power output is normal. ● Off: The power output is abnormal. ● Blinking green: The PSU is in hiccup mode.

Specifications

Table B-2 Specifications of a 60 W industrial AC PSU

Item	Specifications
Physical specifications	● Dimensions (H x W x D): 150 mm x 40 mm x 133 mm (5.91 in. x 1.57 in. x 5.24 in.) ● Weight: 0.9 kg (1.98 lb)
Environmental specifications	● Storage temperature: -40ºC to 85ºC (-40ºF to +185ºF) ● Operating temperature: -40ºC to +70ºC (-40°F to +158°F) ● Operating humidity (RH, non-condensing): 5% to 95%
Input	Rated power input range ● AC: 100 V to 240 V, 50 Hz or 60 Hz, 2 A ● DC: 110 V to 250 V, 2 A Maximum power input range ● AC: 90 V to 264 V ● DC: 88 V to 300 V
Output	● Rated output voltage: 12 V DC ● Rated output current: 5 A

Functions

Table B-3 PSU functions

Item	Description
Input undervoltage protection	The power supply automatically resumes from this protection state.
Input overcurrent protection	The power supply does not automatically resume from this protection state.
Output overvoltage protection	The power supply automatically resumes from this protection state.
Output current limit protection	The power supply automatically resumes from this protection state.
Output short circuit protection	The power supply automatically resumes from this protection state.
Overtemperature protection	When the temperature of the PSU is higher than the preset value, the PSU stops supplying power. When the temperature falls into the normal range, the power supply automatically resumes.

Item	Description
Hot swap	Supported.

