Huawei Atlas 500 Service Repository

Technical White Paper

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Huawei Technologies Co., Ltd.

Address: Huawei Industrial Base
Bantian, Longgang
Shenzhen 518129
People's Republic of China

Website: http://www.huawei.com

Email: support@huawei.com

About This Document

Purpose

This document describes the architecture and implementation technologies of Huawei Atlas 500 Service Repository.

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
DANGER	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.
NOTICE	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.
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	Release Date	Description
V1.0	2019-04-28	Completed the draft.

Contents

1 Overview

1.1 Introduction

The Huawei Atlas 500 Service Repository (service repository for short) is the basic service of the Atlas 500. Huawei releases the service repository for third-party independent software vendors (ISVs) to develop and use. This helps ISVs accelerate the construction of their solution products.

The service repository includes the media gateway service (MGS), media storage service (MSS), media center service (MCS), log management service (LMS), media transfer service (MTS), and demo vehicle detection service (VDS).

The use of the service repository is based on the management of the edge support platform (ESP). This document describes the architecture and implementation technologies of the service repository.

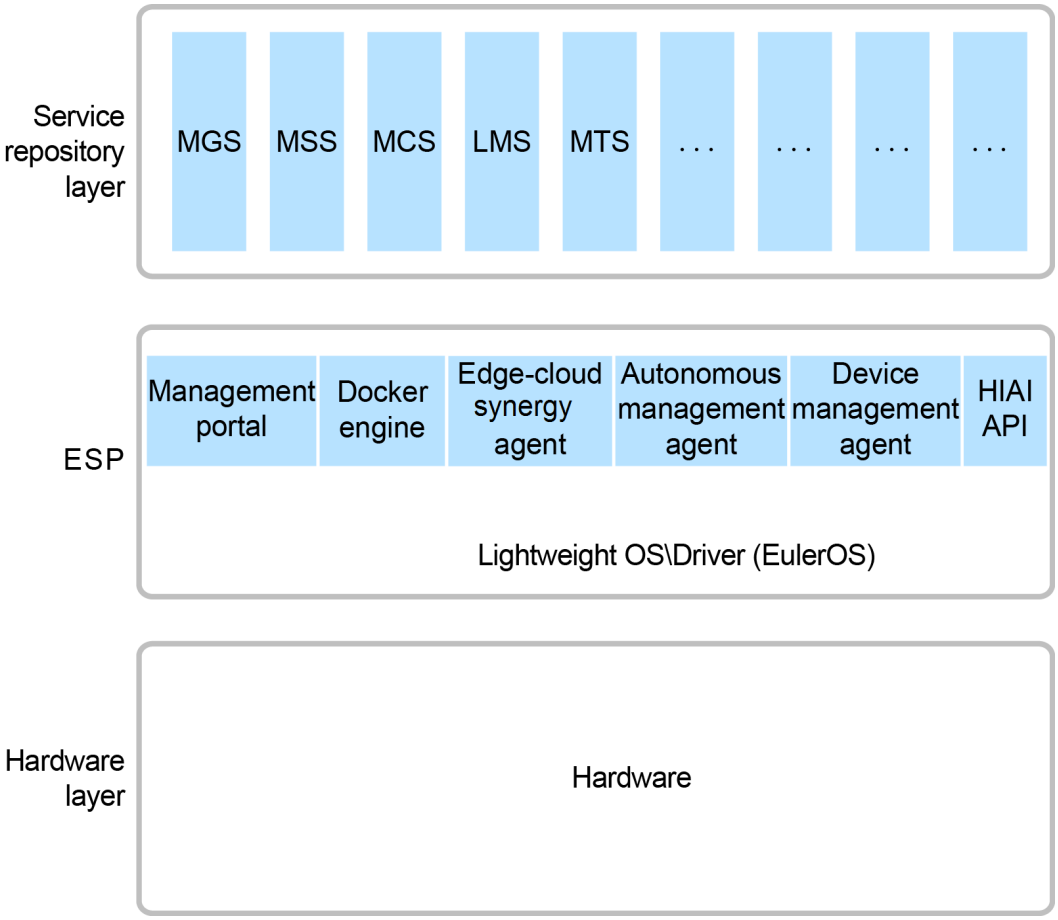
NOTE

To use the service repository, see the interface description document and related solution development guide of the service repository.

1.2 Overall Architecture

Figure 1-1 shows the position of the service repository in the overall architecture. For other technologies related to hardware and ESP, see the technical white paper.

Figure 1-1 Overall architecture

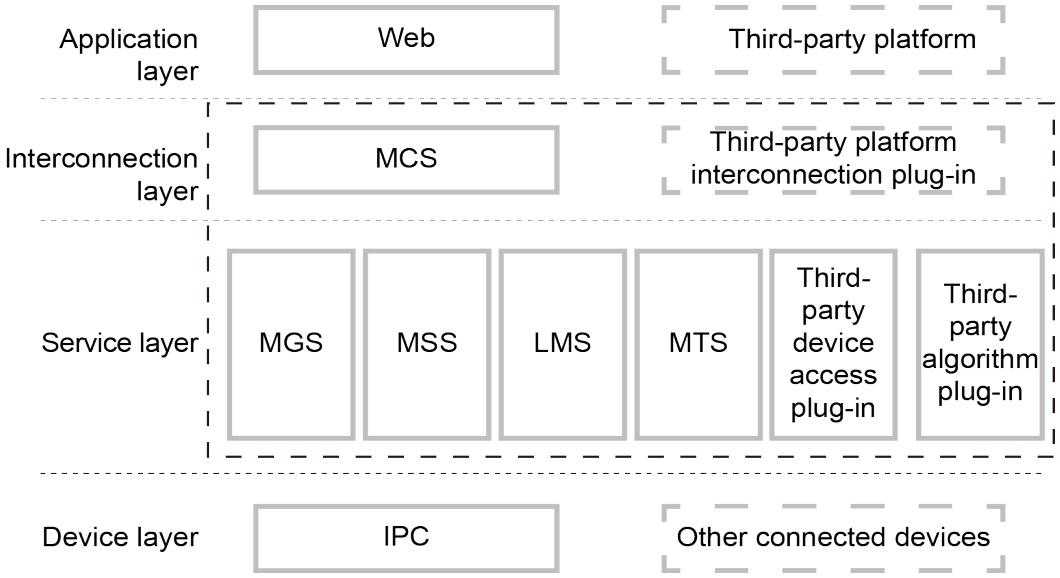


1. Hardware layer: This layer is designed based on the ARM+AI accelerator chip solution and can be customized based on customer requirements.
2. ESP layer (provided by Huawei): This layer incorporates the lightweight OS, edge-cloud synergy agent, device autonomy management agent, management portal, and AI APIs (based on the Mini D Matrix interface). This layer is decoupled from user services. In addition to the lightweight OS and driver, some functions are provided by the Intelligent Edge System (IES). For details, see the IES technical white paper.
3. Service repository layer: This layer provides common functions for service implementation and presents the services to external systems in RESTful API mode. Other services (such as the MGS, MSS, and LMS) can be added based on user requirements.

2 Service Repository Design

2.1 Architecture

Figure 2-1 Architecture



The description of **Figure 2-1** is as follows:

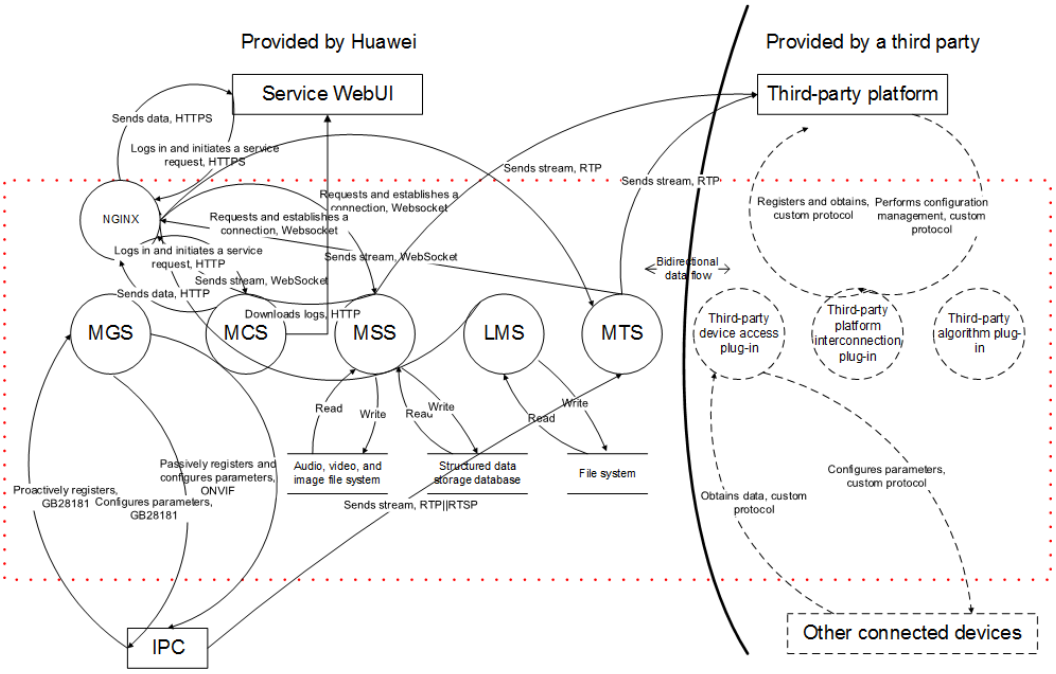
1. There are four layers. The interconnection layer and service layer are deployed in the Atlas 500, and the device layer is deployed in the connected peripheral devices.
2. In the service layer and interconnection layer, the services in solid-line boxes are provided by the Huawei Atlas 500; the plug-ins in dotted-line boxes are developed by third-party vendors based on specific service requirements.
3. The service layer implements the functions of services and connected devices. The interconnection layer is connected to the external web or third-party platforms.

   NOTE

   Authentication requirements must be considered for unified interconnection egress. However, authentication is not required for interfaces provided by the service layer for internal use in Atlas 500 deployment.

2.2 General Data Process

Figure 2-2 Data process



As shown in **Figure 2-2**, the service repository provides the basic services, including the MGS, MCS, MSS, LMS, and MTS. The details are as follows:

1. MGS <--->IP camera (IPC): The MGS interconnects with IPCs. Only one IPC is displayed in the figure. The MGS can interconnects with multiple IPCs in the actual situation by using ONVIF or GB28181.
2. MTS <--->IPC: After IPCs are managed by the MGS, the MGS can apply to the IPCs for media streams (audio and video streams). The IPCs then send media streams (through RTP or RTSP) to the MTS.
3. MSS <---> Audio, video, and image file system\Structured data storage database: The audio, video, and image file system and structured data storage database are deployed on a storage medium (drive on the Atlas 500). The MSS obtains data and stores the data to the storage medium.

4. LMS <---> file system: Related log files can be written to and queried on the storage medium (Atlas 500 uses flash).
5. NGNIX <---> MCS: The used external management protocols are transparently transmitted by the NGNIX to the MCS for processing.
6. NGNIX <---> MSS: When the protocol negotiation is passed, the media stream data is sent to the NGNIX for forwarding to the WebUI for presentation. The main data is the data replay or download function.
7. NGNIX <---> MGS: When the protocol negotiation is successful, the media stream data is sent to the NGNIX for forwarding to the WebUI live video display. The main function is the live video playback of the media.
8. NGNIX <---> LMS: When the protocol negotiation is successful, the LMS provides the log download function. The log management service forwards the logs to the WebUI through the NGNIX to implement the log downloading function.
9. NGNIX<--->WebUI: The service function protocol on the WebUI is forwarded by the NGNIX (based on HTTPS to ensure message transmission security).

- Service WebUI (provided by the service repository): The WebUI displays basic web service pages. Web HTML static pages are provided during version release.

  NOTE

  - For details about how to operate pages, see related operation guides. Third-party vendors can modify the page styles or functions as required.
  - For details about how to develop services on the WebUI, see the related development guide.

- External components are development components provided by the IPCs, WebUI, and third-party systems.

  The components provided by the third-parties include the services deployed on the ESP (such as the third-party device access plug-in, third-party platform interconnection plug-in, and third-party algorithm plug-in in **Figure 2-2**) and third-party platforms (the services of the platforms are determined by third-party vendors). **Figure 2-2** shows the data process when third-party devices are connected.

2.3 Overall Design Technology

This section describes common technologies applicable to all services in the service repository.

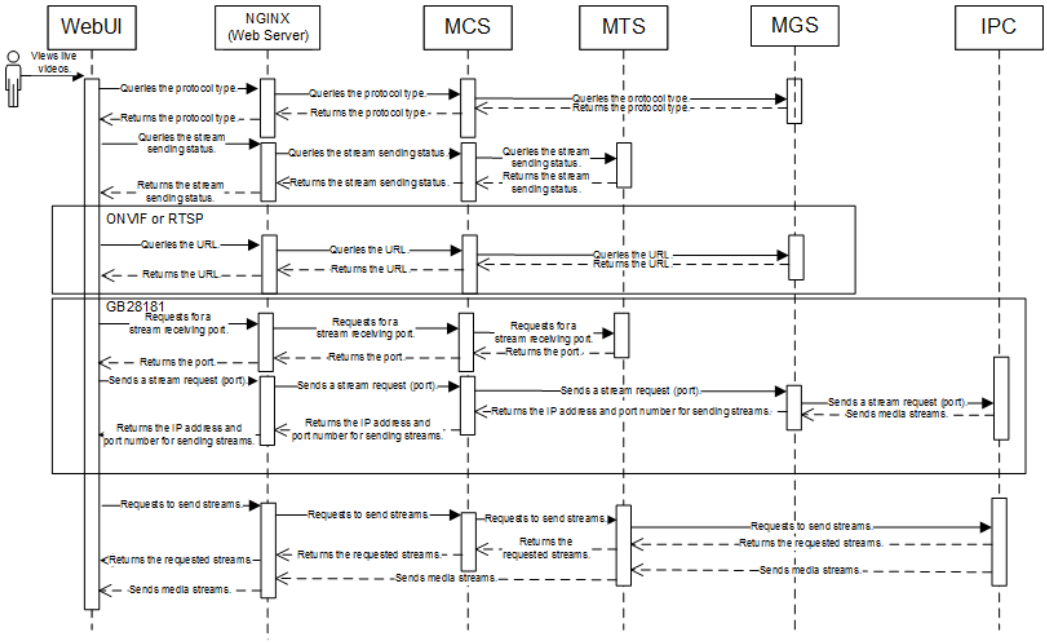
2.3.1 RESTful APIs

All services in the service repository provide service functions in the RESTful API mode. For details, see the *Atlas 500 Service Repository Interface Description*.

2.3.2 Live Video Preview

Live video preview: Users can preview video surveillance videos in real time through the service repository and view the video information on the WebUI. **Figure 2-3** shows the process.

Figure 2-3 Live video preview process



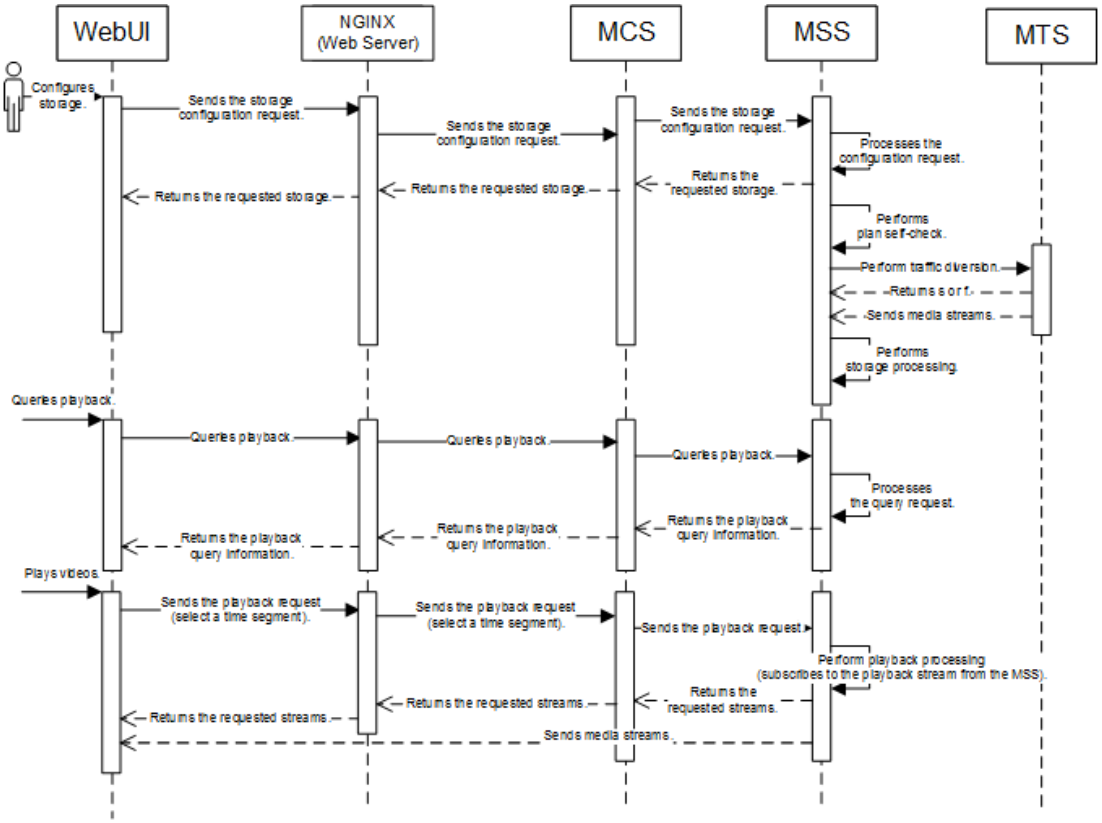
Process description:

1. During live video preview, a user can select a camera (the live video button is available on the page).
2. The media stream request processes vary according to protocol types, as shown in "ONVIF or RTSP" and "GB28181" in **Figure 2-3**.
3. The media stream requests are transferred by the MTS. For example, after the MTS has requested media streams from IPCs, the MTS transfers the media streams if the media streams are requested on the WebUI subsequently.

2.3.3 Video Playback

Video playback includes storage configuration and playback functions. Users can configure and play back media streams. For details about storage management, see **2.3.5 Storage Management**.

Figure 2-4 Storage and playback processes



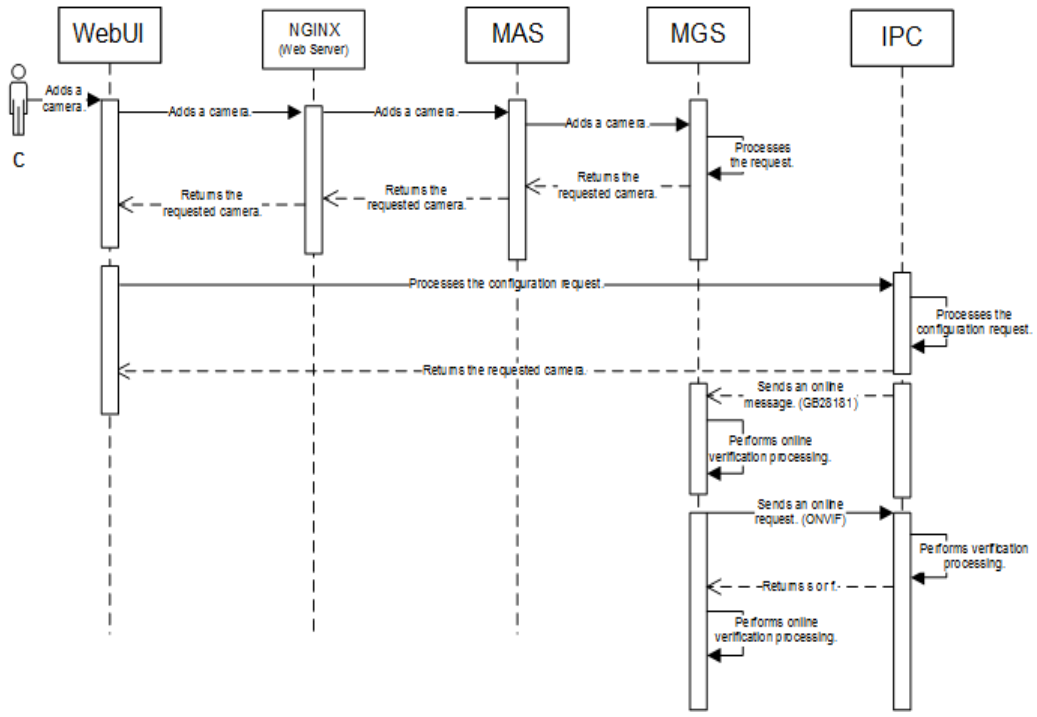
Process description:

1. The user configures the storage on the WebUI, and the MCS transparently transmits the configuration message to the MSS.
2. The media streams are sent from the MTS during the storage process.
3. Media streams are mainly provided by the MSS. Therefore, the storage playback is implemented in the MSS (including playback control functions, such as fast-forward and time-segment-based playback control).

2.3.4 Camera Management

Camera management allows users to add, delete, modify, and query IPCs on the WebUI. This section uses the operation for adding a camera as an example. The other operations are similar to the operation for adding a camera. The ONVIF and GB28181 protocols are supported for camera access.

Figure 2-5 Process of adding a camera



Process description:

1. A user adds a camera on the WebUI.

2. The WebUI sends a message to the MGS to help the user select the configured parameters.

3. After the addition processing is complete, a message is returned. If the operation fails, a failure message is returned.

The IPC configuration process is as follows: Configure the ONVIF verification username and password, GB28181 registration server IP address, port number, username, and password.

Online status, which is displayed on the live video page. The options are as follows:

1. For GB28181, the IPC registers and goes online, and the MGS records the status and keeps the status alive.

2. For ONVIF, the MGS processes the online request from the IPC. After the request is successfully processed, the MGS records the request and keeps the request alive.

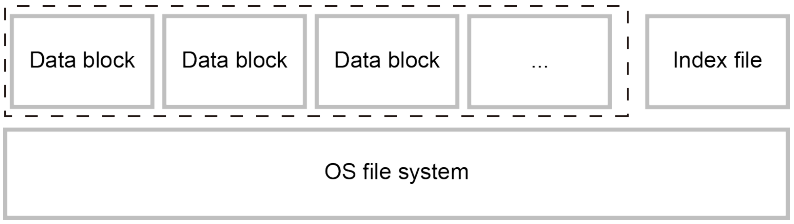
Device management description:

Camera management includes adding, deleting, and updating cameras. The other operation processes are the same as the process of adding a camera.

2.3.5 Storage Management

The MSS performs storage management of media streams, images, and structured data. Users can implement storage management operations through the MSS interface. **2.3.3 Video Playback** describes a media stream playback example, and this section describes the storage management technology implementation. For details about the external interfaces of the MSS, see the *Atlas 500 Service Repository Interface Description*.

Media streams and images are stored in a file block system. The file block system consists of index files and data blocks. As shown in the following figure, the index file records information about data blocks and stored data, such as frame information in images or media streams. A data block is a specific data store, for example, an image or a media stream. To store data, the system creates large data blocks first, and then write media stream or image data to data block files when the data arrives. This reduces the file fragments of the OS file system and improves the data retrieval efficiency.



Structured data storage management provides elastic extensible interfaces. That is, users can define the number of structured data types and store the data in different structured data types instead of providing fixed storage interfaces. For example, the structured data in the face detection is generally classified into four data types, the start and end coordinates (x, y) and the face width and length (w, h). If there are other face attributes, for example, whether there are glasses, five structured data types can be dynamically created for storage.

2.3.6 Log Management

The LMS provides a unified log management interface. All service logs in the service repository are managed by the LMS. Other services can write and read logs through the interface provided by the LMS. The LMS manages how the logs are stored in storage media.

2.3.7 MTS

The MTS provides the media transfer function. After being connected to the media data of IPCs, the MTS can transfer the media data to other services. If the intelligent analysis algorithm is encapsulated into a service, the media stream input is required for intelligent analysis. In this case, the media stream output can be transferred from the MTS. If there are multiple intelligent analysis algorithms, the MTS copies and transfers them.

2.4 MGS

This service is deployed in container image mode to manages IPCs, including registering, deregistering, configuring, and controlling IPCs.

Table 2-1 MGS functions

Function	Description
IPC access	Supports the ONVIF, GB28181, and RTSP protocols.

NOTE

For details about the external interfaces, see the MGS description in the *Atlas 500 Service Repository Interface Description*.

2.5 MTS

This service is deployed in container image mode to transfer media streams, access IPC video streams, and transfer IPC video streams. It can be used a third-party algorithm plug-in for analysis and can also be used by other application services or third-party platforms.

Table 2-2 MTS functions

Function	Description
Stream transfer protocol	Supports the WebSocket and RTP protocols. The RTP supports only the RTP client mode. That is, after the negotiation with the receiver, the MTS actively connects to the receiver to recommend a media stream channel.
Media stream encryption transmission	This function is unavailable at present.

NOTE

For details about the external interfaces, see the MTS description in the *Atlas 500 Service Repository Interface Description*.

2.6 MSS

This service is deployed in container image mode to store, play back, and download original video streams, and store and query images and structured data.

Table 2-3 MSS functions

Function	Description
Storage type	Provides the functions of storing video streams, images, and metadata.
Data storage encryption	This function is unavailable at present.

NOTE

For details about the external interfaces, see the MSS description in the *Atlas 500 Service Repository Interface Description*.

2.7 MCS

This service is deployed in container image mode to provide external device interfaces for web management and performs internal service management and control. The Atlas 500

provides service policies for POC scenarios and provides configuration and log storage interfaces.

Table 2-4 MCS functions

Function	Description
User management	Implements user management, encrypts user names and passwords, and ensures the security of sensitive data.
Transparent transmission of messages	Transparently transmits service messages sent by authenticated login users to specific services for implementing specific service functions.

NOTE

For details about the external interfaces, see the MCS description in the *Atlas 500 Service Repository Interface Description*.

2.8 LMS

This service is deployed in container image mode to manage logs in a unified manner, including writing and querying logs.

Table 2-5 LMS functions

Function	Description
Unified log management	Manages internal service logs in a unified manner. Users can be unaware of log storage and query.
Encrypted storage of logs	This function is unavailable at present.

NOTE

For details about the external interfaces, see the LMS description in the *Atlas 500 Service Repository Interface Description*.

A Acronyms and Abbreviations

Acronyms and Abbreviations	Description
IPC	IP Camera
MGS	Media Gateway Service
MSS	Media Storage Service
VDS	Vehicle Detection Service
MCS	Media Center Service
LMS	Log Manager Service
MTS	Media Translate Service
ESP	Edge Support Platform
Ngnix	Open source web server
IES	Intelligent Edge System

