



Verizon 5G Mobile Edge Compute (MEC)

Edge Discovery Service Software Development Kit (EDS SDK) for ARM64

User Manual

Important — Please Read

Verizon Confidential & Proprietary.

© 2021 Verizon. All rights reserved.

Restricted and Controlled Distribution. Not to be used, copied, reproduced in whole or in part, nor its contents revealed in any manner to others without the express written permission of Verizon.

All information herein is subject to change without notice. The information provided was considered accurate at the time the document(s) were developed, and Verizon disclaims and makes no guaranty or warranty, express or implied, as to the accuracy or completeness of any information contained or referenced herein.

VERIZON DISCLAIMS ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.

Verizon does not guarantee or warrant the availability of the network nor the compatibility of a network with any device, service or product. Verizon disclaims liability for any damages or losses of any nature whatsoever whether direct, indirect, special or consequential resulting from the use of or reliance on any information contained or referenced herein.

Technical data contained in this document may be subject to U.S. and international export, re-export, or transfer ("export") laws. Diversion contrary to U.S. and international law is strictly prohibited.

Verizon and Verizon logos are trademarks of Verizon. Other product and brand names may be trademarks or registered trademarks of their respective owners.

Contents

Introduction.....	3
Purpose.....	3
Package contents	3
New features, fixes and known Issues	3
EDS SDK RELEASE PACKAGE	4
Folder Structure	4
The EDS SDK Client	5
EDS Client Binary	5
EDS Client Service.....	5
EDS Client Install Script.....	5
EDS Client Configuration File	6
EDS Client Log	6
EDS Client APIs	7
EDS Client Supported Features	8
MEC Development Portal	9
MDP Account Creation.....	9
MDP Application Creation	10
How to Use the EDS SDK Client	12
System Requirements.....	13
Hardware	13
Software and tools.....	13
Hardware Setup	13
Configuration settings.....	14
EDS Client configurations.....	14
Device Onboarding	14
Installation of the EDS SDK Client	14
References	15
Acronyms and terms	15
EDS Client Reference Logs.....	15

Introduction

Purpose

The EDS SDK Client provides optimal MEC endpoint to the application to reduce latency and brings real-time performance to high-bandwidth applications.

This user manual provides details about the contents of EDS SDK release package, how to use EDS SDK Client APIs. This user manual also explains the steps to bring up the EDS SDK setup on a Raspberry pi (or similar ARM64) device.

Note: Any user (VZ customer and non-VZ customer) can use the EDS SDK client binary and APIs to integrate with their edge application. However, only VZ customers can get the optimal endpoints for edge application deployed on Verizon platform.

Package contents

- Release Notes
- EDS Client Binary
- EDS Client configuration files
- EDS Client APIs

New features, fixes and known Issues

- Refer to ***Release_Notes.pdf***

EDS SDK RELEASE PACKAGE

The EDS SDK Release package is named as “**EDSSDK_V<version>-arm64**”.zip file.

Folder Structure

The screenshot shows a file explorer window titled "EDSSDK_V1.0.0-arm64". The main pane displays a list of files and folders. The "EDS-SDK-Client" folder is selected and expanded, showing its contents. The file explorer interface includes a search bar at the top right and a sidebar on the left showing the directory structure.

Name	Kind	Date Modified	Size
COPYRIGHT.txt	Plain Text Document	Nov 11, 2021 at 3:04 PM	215 bytes
EDS_SDK_User_Manual.docx	Microsoft Word document (.docx)	Sep 30, 2021 at 11:20 AM	8.3 MB
EDS-SDK-Client	Folder	Today at 4:10 PM	--
config.txt	Plain Text Document	Nov 13, 2021 at 11:25 AM	177 bytes
edsclient	Unix Executable File	Nov 13, 2021 at 11:44 AM	6 MB
edsclient_install.sh	Shell Script	Nov 13, 2021 at 11:36 AM	256 bytes
edsclient.service	Document	Nov 13, 2021 at 11:30 AM	299 bytes
readme.txt	Plain Text Document	Yesterday at 8:40 PM	281 bytes
thingspace.pem	printable encoded archive	Nov 13, 2021 at 8:57 AM	1 KB
EDS-SDK-Client_APIS	Folder	Nov 11, 2021 at 3:52 PM	--
LICENSE.pdf	PDF Document	Aug 12, 2021 at 3:29 PM	243 KB
Release_Notes.docx	Microsoft Word document (.docx)	Sep 22, 2021 at 4:17 PM	27 KB

The EDS SDK Client

EDS Client Binary

edsclient is an executable file. This binary is placed at this path of release package:

EDSSDK_V<version>-arm64/EDS-SDK-Client/edsclient

EDS Client Service

This is service program to runs **edsclient** as a service on ARM64 architecture. This is at this path of release package:

EDSSDK_V<version>-arm64/EDS-SDK-Client/edsclient.service

EDS Client Install Script

edsclient_install.sh is a script to install EDS SDK client on the device. This script is placed at below path of release package:

EDSSDK_V<version>-arm64/EDS-SDK-Client/edsclient_install.sh

EDS Client Configuration File

config.txt is the configuration file for EDS SDK Client. It contains below parameters. This file is placed at below path of release package:

EDSSDK_V<version>-arm64/EDS-SDK-Client/config.txt

Parameter	Default value	Description
AppName	cvonvif	
Key	ffffffff-ffff-ffff-ffff-ffffffffffff	Application key
Secret	ffffffff-ffff-ffff-ffff-ffffffffffff	Application secret
DeviceId	NULL	IMEI/MACID of the device
EdsProxyUrl	simplm-staging.thingspace.verizon.com	EDS Proxy url Note: This is a Staging environment
Logging	ERROR	ERROR/DEBUG to enable the eds client logging
ReqInterval	900	How often the EDS SDK Client connects with the EDS Proxy to get new optimal MEC Endpoints. Default value is 900 seconds.

EDS Client Log

EDS Client logs are collected in the **edsclient.log** file according the value of the “Logging Parameter” set in the **config.txt** file. This file will be created at this path:

/opt/verizon/eds/edsclient.log

For a log example, please see the [reference section](#) at the end of this document.

EDS Client APIs

To get the optimal endpoints, Edge applications need to call the EDS SDK REST APIs.

API signature and example are explained in this section and placed in the release package too for the user convenience at this path:

EDSSDK_V<version>-arm64/EDS_Client_APIs/

Request

Url Base Path	API Resource Path	Request Method	Request Protocol
<edssdkinterface:81>	/edssdk/	POST	HTTP

HTTP-Headers

Parameter	Description
content-type	application/json

Request Body

Parameter	Type	Description
deviceid serviceid	string string	Application Device Id Application Service Id
clientkey clientSecret	string string	Application Client Key Id Application Secret Key Id

Response

Type	Description
Array { serviceid string servicetype string serviceaccesspoint: { fqdn string url string ipv4addr string ipv6addr string protocol string port string } }	serviceid: identifies the service serviceaccesspoint: edge connection details one from the below list shall be available <ul style="list-style-type: none">• fqdn (if available)• url (if available)• ipv4address (if available)• ipv6 (if available)• protocol ((if available))• port (available if IP/Url/Fqdn is available)

Example Curl Request

```
curl --header "Content-Type: application/json" --request POST --data  
'{"deviceid":"<11:22:33:00:0A:66>","serviceid":"app1","clientkey":"<12345>","clientsecret":"<123456>"}'  
http://127.0.0.2:4443/edsclient
```

Example Curl Response

```
{"serviceid": "app1", "servicetype": "computervision", "serviceaccesspoint": [{"url": "127.0.0.4", "protocol": "wss", "port": "443"}, {"url":  
"127.0.0.5", "protocol": "rtsp", "port": "556"}]}
```

EDS Client Supported Features

To get the list of supported features and known issues refer Release_Notes.docx

MEC Development Portal

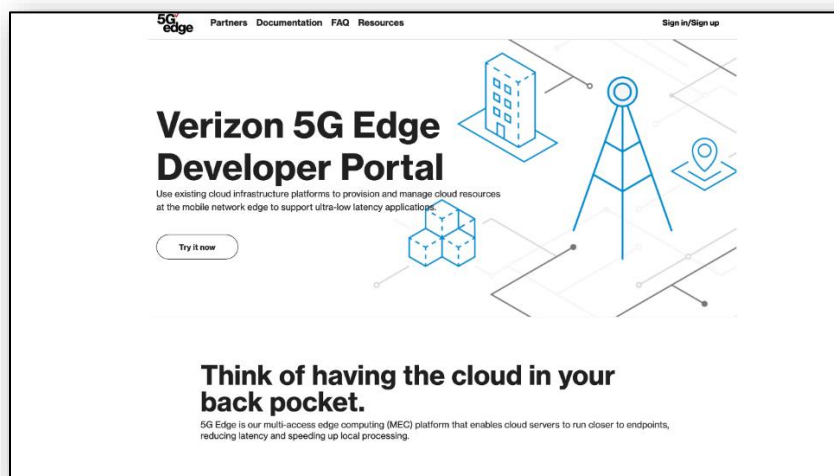
To get the optimal endpoint for their edge application user need to create the account on MEC portal and obtain the application credentials.

MDP Account Creation

To create an account on MEC portal (Staging) follow these steps:

1. Access <https://www98.verizon.com/business/5g-edge-portal> and click on “Sign in / Sign up” in the upper right corner

Note: For first-time users, click on “Sign up”. Existing users can just sign in.



2. Enter your details and click on the “sign up” button

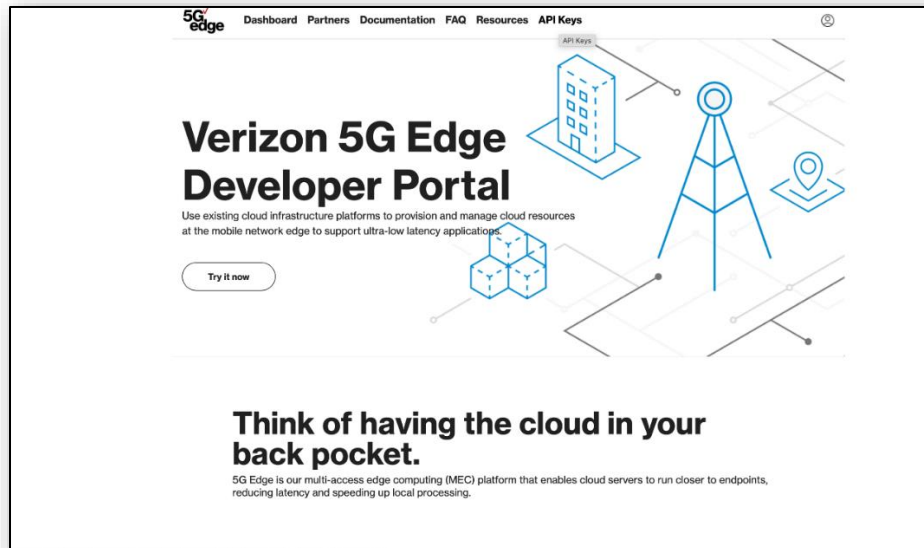
The screenshot shows the "Sign up" form on the Verizon 5G Edge Developer Portal. The form includes fields for First name, Last name, Username, Email, Password, and Confirm password. There are also dropdown menus for Country and Company. A checkbox at the bottom indicates agreement to the Terms of Service and Privacy Policy. A "Sign up" button is at the bottom, and a link for "Have account? Sign in" is below it.

3. The user will receive the account activation link at the registered email id. Click on the activation link to activate your account.

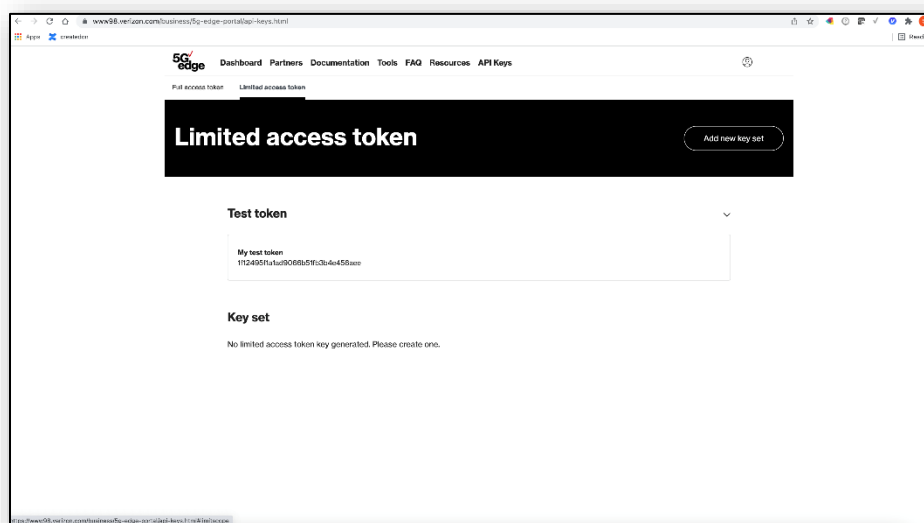
MDP Application Creation

To create the application and key/secret pair follow the below steps.

1. Access <https://www98.verizon.com/business/5g-edge-portal>
2. Click on sign in button.
3. Click on API Keys link

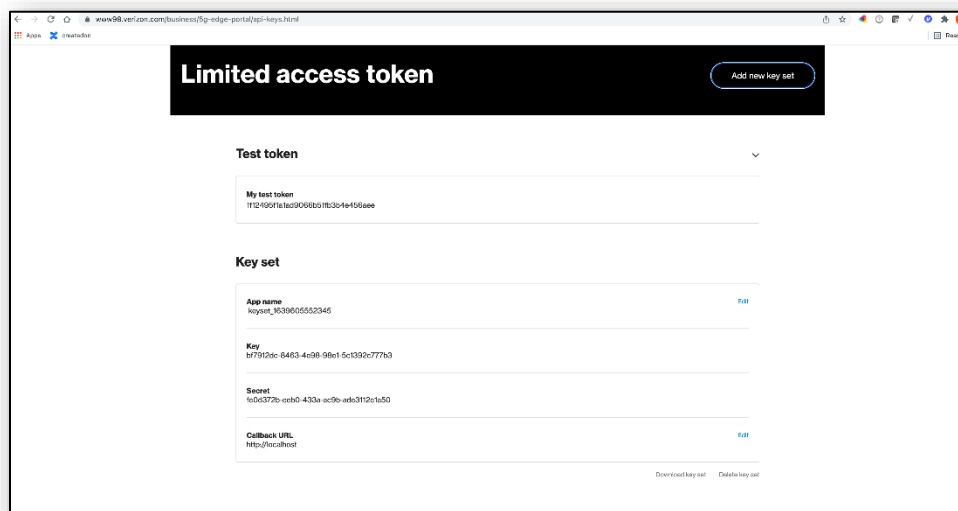


4. Go to the Limited Access token tab and then click Add new key set button:

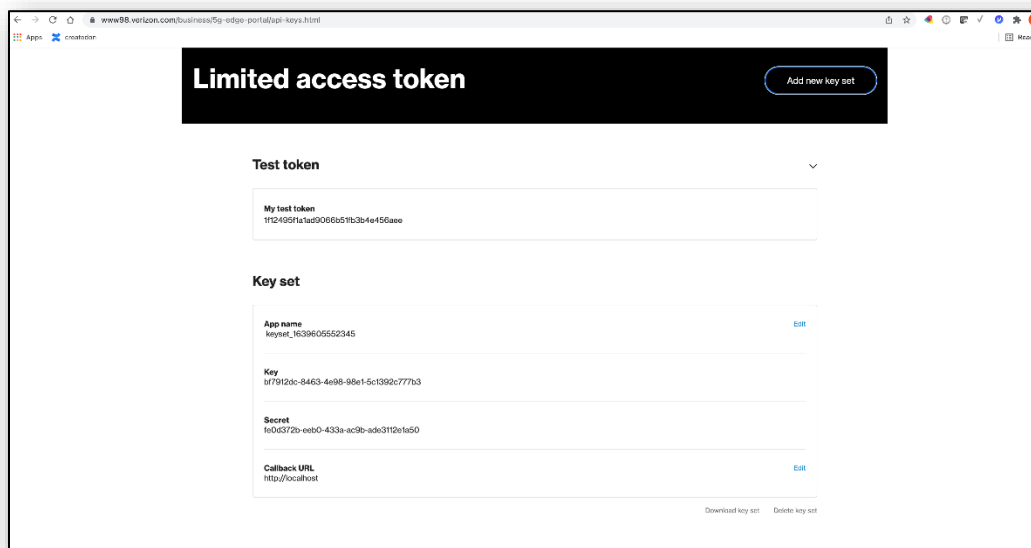


5. Application and limited access keyset gets generated:

NOTE: This is very important that user should use limited access token tab to get key/secret for EDS SDK Client otherwise full access keyset can be compromised on device by unauthorized user access.



6. User can rename the application by editing the "App name" option.
7. Click on the "Download key set" button to download the client key and secret.

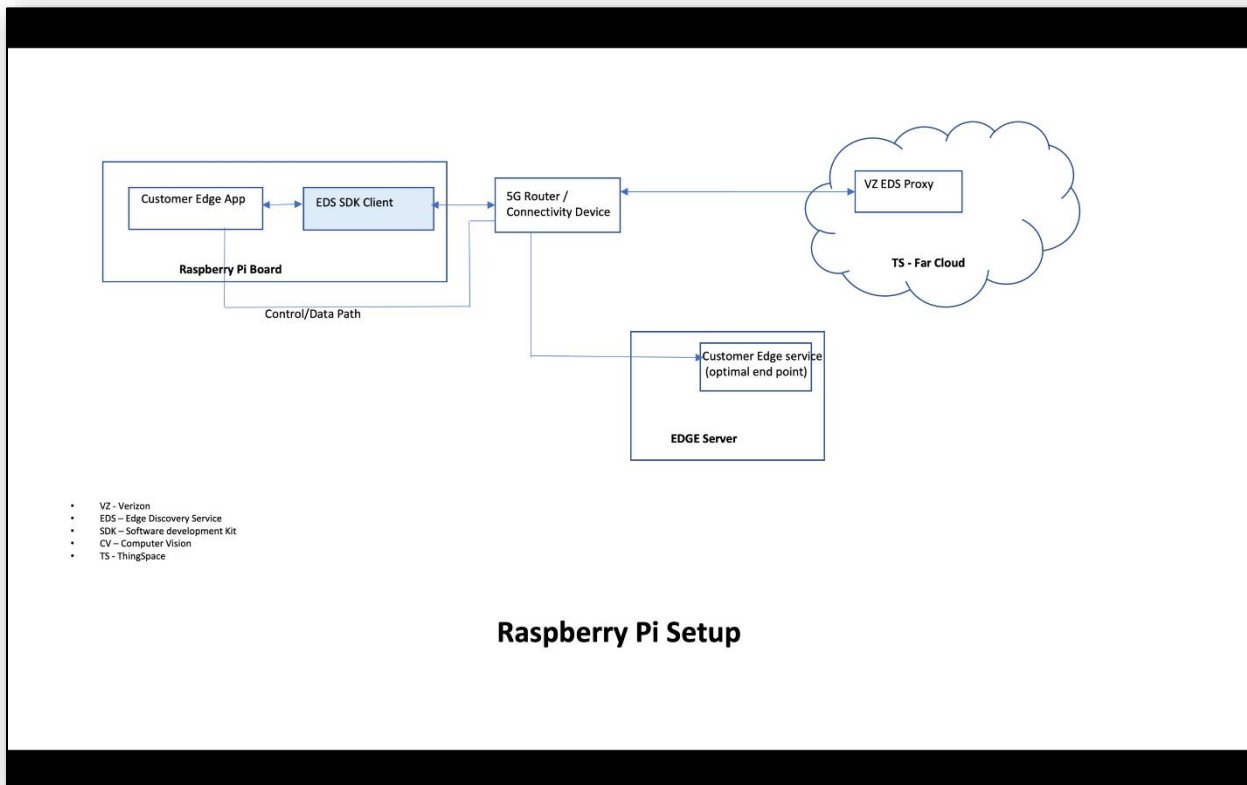


8. Save the downloaded file.

How to Use the EDS SDK Client

The user's edge application needs to call the EDS SDK Client REST API to get the optimal end point for the required service. After receiving the optimal endpoints, the Edge application needs to connect with the optimal endpoints to access the EDS service. The EDS client binary needs to be executed on ARM64 architecture.

This graphic shows how to execute the EDS SDK Client on a Raspberry pi board.



Note: The user can use any application to integrate with EDS SDK Client to get the optimal end point.

System Requirements

Hardware

- Raspberry pi (or equivalent ARM64 SBC)
- Verizon Connectivity Device
- Verizon Activated SIM card
- Power Over Ethernet (POE)
- Ethernet cable(s)

Software and tools

- EDS SDK Client

Hardware Setup

To set up the hardware, the user needs to follow these steps:

1. Insert an active Verizon SIM in the router/connectivity device to access the Verizon Wireless network.
2. Switch on the router/connectivity device and verify that it is able to connect with Verizon network successfully.
3. Connect the Raspberry pi's (or equivalent ARM64 device's) Ethernet port with Router's Ethernet port to get connectivity.
4. Disable Bluetooth and wifi on the board and verify the internet connectivity is via Ethernet link.
5. Copy the received EDS-SDK-Client folder into the device's home folder.

Configuration settings

EDS Client configurations

1. Get the MAC address of the ARM64 board and update the **Deviceld** parameter with that value in the **config.txt** file.
2. Update the value of the **Key** and **Secret** in **config.txt** file with values received in the downloaded file from the previous [section's step 8](#).
3. Update the value of the "Logging Parameter" according to the logging required in the **config.txt** file. The valid values are **DEBUG** and **ERROR**.

Device Onboarding

To Access Verizon MEC services securely the user needs to onboard their devices on the ThingSpace platform. Refer to <https://thingspace.verizon.com/documentation/apis/connectivity-management/getting-started.html> to onboard devices on ThingSpace.

Installation of the EDS SDK Client

To test the EDS SDK Client on a Raspberry pi board follow these steps:

1. Go to **/home/pi/EDS-SDK-Client** and execute **sudo ./edsclient_install.sh** to start the EDS client service.
2. EDS Client Logs will be created at **/opt/verizon/eds/edsclient.log**. Analyze the **edsclient.log** file to verify that client is able to make the connection with the EDS proxy or not and the EDS client should be able to receive the optimal endpoints from the EDS proxy. For the log references refer to [EDS Client Reference Logs](#)
3. To connect with the optimal endpoints and access MEC services the user needs to integrate the EDS SDK Client APIs with their edge application and then recompile their application code.

References

Acronyms and terms

Acronym	Definition
API	Application programming interface
EDS	EDGE Discovery Service
VZ	Verizon
SDK	Software development kit
RTSP	Real Time Streaming Protocol
DMP	Device Media Proxy

EDS Client Reference Logs

Example of **edsclient.log** file entries:

021-11-16 07:59:17,904 (MainThread) Current config

2021-11-16 07:59:17,904 (MainThread) {'AppName': 'cvonvif', 'DeviceId': '8c:dc:d4:56:04:f9', 'Key': 'aa22c77sscd-14e3-41f0-9202-a5a07fdd4a87', 'Secret': '4e85f54d-9b03-42f6-97b7-c337fbd84bd2', 'EdsPr

oxyUrl': 'aaa414dad4d16451089738254ddd5faaf4-437585706.us-east-1.elb.amazonaws.com', 'Logging': 'DEBUG'}

2021-11-16 07:59:17,904 (MainThread) Starting EDS Client

2021-11-16 07:59:17,905 (MainThread) DeviceId 8s:df:d4:56:04:f9

2021-11-16 07:59:17,905 (MainThread) Key aa22c676d-14e3-41f0-9202-a5a07fdd4a87

2021-11-16 07:59:17,905 (MainThread) Secret 4e897f54d-9b03-42f6-97b7-c337fbd84bd2

2021-11-16 07:59:17,905 (MainThread) EdsProxyUrl aaa414dad4d16451089738254b5faaf4-437585706.us-east-1.elb.amazonaws.com

2021-11-16 07:59:27,916 (EDSClientThread) Running.. EDSClientThread

2021-11-16 07:59:27,922 (EDSClientThread) REQUEST API1 aaa414dad4d16hwjb51089738254b5faaf4-437585706.us-east-1.elb.amazonaws.com/edsproxy/oauth2/session?grant_type=client_credentials

2021-11-16 07:59:27,923 (EDSClientThread) {'client_key': 'aa22ssbjsnwc77d-14e3-41f0-9202-a5a07fdd4a87', 'client_secret': '4e85fwbwnw54d-9b03-42f6-97b7-c337fbd84bd2'}

2021-11-16 07:59:28,301 (EDSClientThread) API1 RESULT

2021-11-16 07:59:28,302 (EDSClientThread) {'access_token': 'eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJleHAiOiJlZ6lnO.Rj4VyCukcAU4jxXQvpvsshX9MWzvbfdjt-U-281q-XU8Y-A', 'status': 'ap

proved', 'client_key': 'aa22c77hwuwbwd-14e3-41f0-9202-a5a07fdd4a87', 'expires_in': '300s', 'token_type': 'Bearer'}

2021-11-16 07:59:28,302 (EDSClientThread) REQUEST API2: aaa414dad4d16451089738254b5faaf4-437585706.us-east-1.elb.amazonaws.com/edsproxy/edgediscovery/8c:dc:d4:56:04:f9

2021-11-16 07:59:28,302 (EDSClientThread) {'Authorization': 'Bearer eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJleHAiOiJlZ6lnO.Rj4VyCukcAU4jxXQvpX9MWzvbfdjt-U-281q-XU8Y-A'}

2021-11-16 07:59:28,391 (EDSClientThread) API2 RESULT

2021-11-16 07:59:28,392 (EDSClientThread) b'{"edgelist":[{"mecid":"dev-int-aws-us-east-1-wl1-bos-wlz-1","edgeservices":[{"serviceid":"cvonvif","servicetype":"computervision","serviceaccesspoint":[

{"url":"simpmpoxy-wl1.devint-us-eastlingq-1.tscloudservice.com","ipv4addr":"155.146.0.234","protocol":"wss","port":"443"},{"url":"simpmpoxy-wl1.devint-us-east-lingq.tscloudservice.com","ipv4addr":"155.146.0.234","protocol":"rtsps","port":"554"}]]}]'

2021-11-16 07:59:28,393 (EDSClientThread) BUILD DBASE

2021-11-16 07:59:28,397 (EDSClientThread) entry found update current value