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Multi-Access Edge Computing (MEC); Traffic Management APIs

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Reference

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Foreword

This Group Specification (GS) has been produced by ETSI Industry Specification Group (ISG) Multi-access Edge Computing (MEC).

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

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1 Scope

The present document focuses on the Traffic Management multi-access edge service. It describes the related application policy information including authorization and access control, information flows, required information and service aggregation patterns. The present document specifies the necessary API with the data model and data format.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at https://docbox.etsi.org/Reference.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are necessary for the application of the present document.

[1] ETSI GS MEC 001: "Multi-access Edge Computing (MEC); Terminology".

[2] IETF RFC 2818: "HTTP Over TLS".

NOTE: Available at https://tools.ietf.org/html/rfc2818.

[3] IETF RFC 5246: "The Transport Layer Security (TLS) Protocol Version 1.2".

NOTE: Available at https://tools.ietf.org/html/rfc5246.

[4] IETF RFC 6749: "The OAuth 2.0 Authorization Framework".

NOTE: Available at https://tools.ietf.org/html/rfc6749.

[5] IETF RFC 6750: "The OAuth 2.0 Authorization Framework: Bearer Token Usage".

NOTE: Available at https://tools.ietf.org/html/rfc6750.

[6] ETSI GS MEC 009: "Multi-access Edge Computing (MEC); General principles for MEC Service APIs".

[7] IETF RFC 7396: "JSON Merge Patch".

NOTE: Available at https://tools.ietf.org/html/rfc7396.

[8] IEEE 802.11™: "802.11-2016 - IEEE Standard for Information technology-Telecommunications and information exchange between systems Local and metropolitan area networks-Specific requirements - Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications".

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] ETSI GS MEC 002: "Mobile Edge Computing (MEC); Technical Requirements".

[i.2] OpenAPI™ Specification.

NOTE 1: Available at https://github.com/OAI/OpenAPI-Specification.

NOTE 2: OpenAPI Specification and OpenAPI Initiative and their respective logos, are trademarks of the Linux Foundation.

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in ETSI GS MEC 001 [1] apply.

3.2 Symbols

Void.

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in ETSI GS MEC 001 [1] and the following apply:

API	Application Programming Interface
BW	BandWidth
BWM	BandWidth Management
BWMS	BandWidth Management Service
CDN	Content Delivery Network
DSCP	Differentiated Services Code Point
HTTP	Hypertext Transfer Protocol
HTTPS	Hypertext Transfer Protocol Secure
IETF	Internet Engineering Task Force
JSON	Javascript Object Notation
MEC	Multi-access Edge Computing
MTS	Multi-access Traffic Steering
NR	New Radio
OAI	Open API Initiative
RAN	Radio Access Network
REST	REpresentational State Transfer
RFC	REquest For Comments
RTT	Round Trip Time
TLS	Transport Layer Security
TM	Traffic Management
TMS	Traffic Management Service
URI	Uniform Resource Indicator
UTC	Coordinated Universal Time
UTRA	Universal Terrestrial Radio Access
WLAN	Wireless Local Area Network

4 Void

5 Overview

The present document specifies the Traffic Management (TM) APIs to support the requirements defined for Multi-Access Edge Computing in ETSI GS MEC 002 [i.1]. There are two TM services: BandWidth Management (BWM) service and Multi-access Traffic Steering (MTS) service. Clause 6 introduces how TM services can be used by the multi-access edge applications and by the multi-access edge platform. It describes the information flows used for TM services.

The information that can be exchanged over the TM APIs is described in clause 7 which provides detailed description on all information elements that are used for TM services.

Clause 8 and 9 describe the actual TM APIs (BWM API and MTS API) providing detailed information how information elements are mapped into a RESTful API design.

Figure 5-1 illustrates the mission of the TM services, which may optionally run as part of the platform or as an application. Different applications, whether managing a single instance or several sessions (for example CDN), may request specific Bandwidth Management (BWM) or/and Multi-access Traffic Steering (MTS) requirements for the whole application instance or different requirements per session. The TM services can aggregate all the requests and act in a manner that will help optimize the BW usage and improve Quality of user Experience for applications.

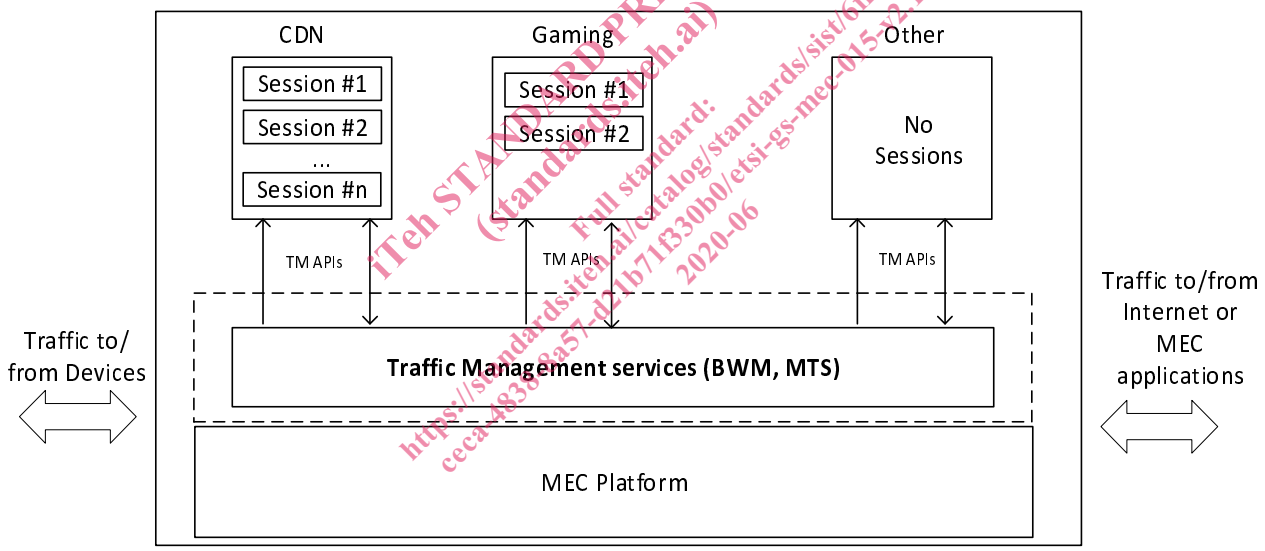

Figure 5-1: Traffic Management services description

6 Description of the service (informative)

6.1 Introduction

Different MEC applications running in parallel on the same MEC host may require specific static/dynamic up/down bandwidth resources, including bandwidth size and bandwidth priority. In some cases different sessions running in parallel on the same application may each have specific bandwidth requirements. In addition, sessions driven by applications running from closer to end user (shorter RTT) may receive unfair advantage over session driven by application running from distant locations (outside the RAN). To resolve potential resource conflicts between such competing applications, the following optional traffic management services may be used:

- BandWidth Management (BWM) service; and
- Multi-access Traffic Steering (MTS) service.

The BWM service is for allocating/adjusting bandwidth resources, including bandwidth size and bandwidth priority, for MEC applications, and allows MEC applications to provide bandwidth requirements.

The MTS service is for seamlessly steering/splitting/duplicating application data traffic across multiple access network connections. The MTS allows:

1) MEC applications to get informed of various MTS capabilities and multi-access network connection info.

2) MEC applications to provide requirements, e.g. delay, throughput, loss, for influencing traffic management operations.

The specific session or MEC application will be identified using a set of filters within the resource request.

6.2 Sequence diagrams

6.2.1 General

The following clauses describe how multi-access edge applications can use TMS to update/receive Bandwidth Management (BWM) or/and Multi-access Traffic Steering (MTS) information to/from the MEC platform. The sequence diagrams that are relevant for TMS are presented.

The TM APIs enable the MEC applications to register or unregister for specific bandwidth allocation or/and multi-access traffic steering requirement. The "Registration" flow is used to create a bandwidthAllocation as shown in clause 6.2.2 or a mtsSession as shown in clause 6.2.7. It is operated on per-allocation/session basis, and can be used multiple times by the application to create multiple bandwidthAllocations or mtsSessions. The "Unregistration" flow is used to delete a bandwidthAllocation as shown in clause 6.2.3 or a mtsSession as shown in clause 6.2.8.

The present document of TM APIs contains the HTTP protocol bindings for traffic management functionality using the REST architectural style.

6.2.2 Register to Bandwidth Management Service

Figure 6.2.2-1 shows a scenario where a MEC Application instance registers to BWMS.

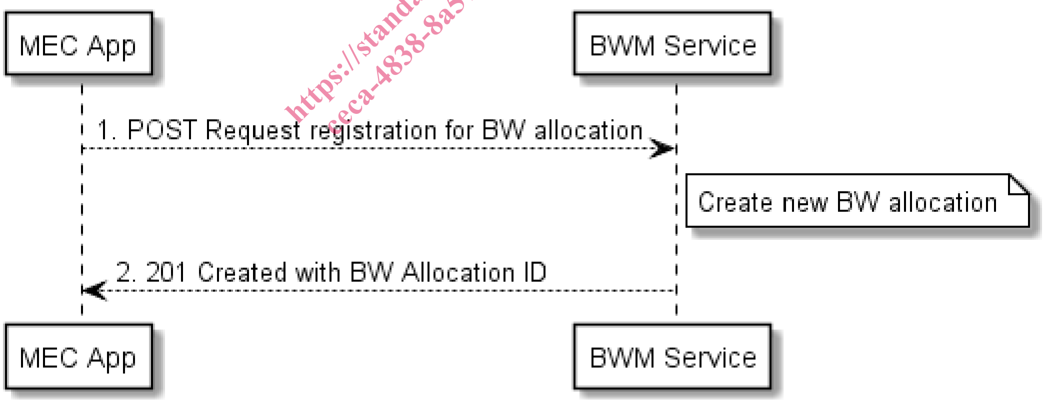

Figure 6.2.2-1: Flow of MEC Application registration to BWMS

MEC Application instance registration to BWMS, as illustrated in figure 6.2.2-1, consists of the following steps:

1) MEC application instance sends a request to register to the BWMS with the requested bandwidth requirements (bandwidth size/priority).

2) BWMS responds with a registration and initialization approval.

6.2.3 Unregister from Bandwidth Management Service

Figure 6.2.3-1 shows a scenario where a MEC Application Instance unregisters from BWMS.

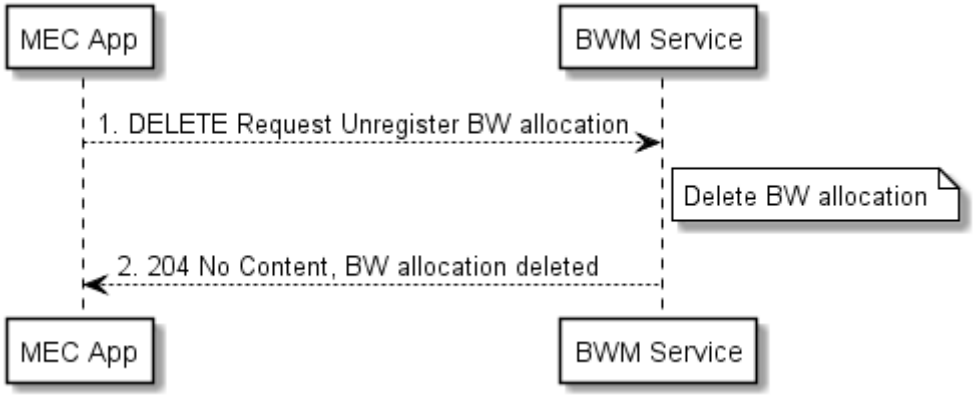

Figure 6.2.3-1: Flow of MEC Application unregistering BW allocation from BWMS

MEC Application Instance unregistering from BWMS , as illustrated in figure 6.2.3-1, consists of the following steps:

1) MEC Application instance sends an unregister request to BWMS.

2) BWMS responds with an unregistration approval.

6.2.4 Update requested bandwidth requirements on BWM Service

Figure 6.2.4-1 shows a scenario where a MEC Application instance updates its requested bandwidth requirements on the BWMS.

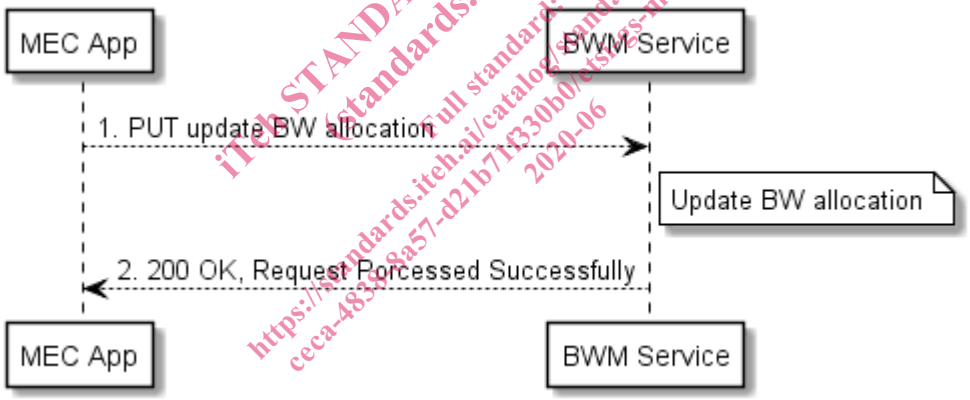

Figure 6.2.4-1: Flow of MEC application updating its requested bandwidth requirements on BWMS

MEC application instance updating its requested bandwidth requirements on BWMS, as illustrated in figure 6.2.4-1, consists of the following steps:

1) MEC Application instance sends a request to update a specific bandwidth allocation on the BWMS.

2) BWMS responds with an update approval.

6.2.5 Get configured bandwidth allocation from BWM Service

Figure 6.2.5-1 shows a scenario where a MEC Application instance gets its configured bandwidth allocation from the BWMS.

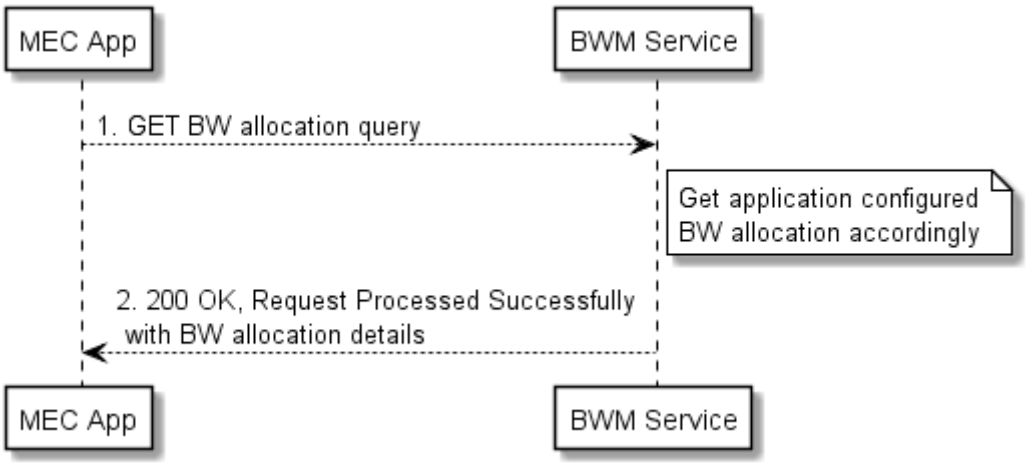

Figure 6.2.5-1: Flow of MEC Application getting its configured bandwidth allocation from BWMS

MEC Application instance gets its configured bandwidth from BWMS, as illustrated in figure 6.2.5-1, consists of the following steps:

1) MEC Application instance sends a request to get its configured bandwidth allocation on the BWMS.

2) BWMS responds with the BW allocation details.

6.2.6 Get MTS service Info from the MTS Service

Figure 6.2.6-1 shows a scenario where a MEC Application instance gets the available MTS service information from the MTS service.

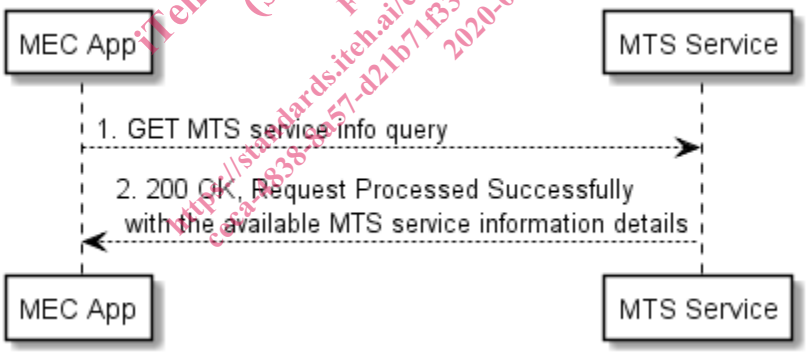

Figure 6.2.6-1: Flow of MEC Application getting the MTS service info

MEC Application instance gets the available MTS service info from the MTS service, as illustrated in figure 6.2.6-1, consists of the following steps:

1) MEC Application instance sends a request to get the available MTS service information.

2) The MTS service responds with the available MTS service information details.

6.2.7 Register to the MTS service

Figure 6.2.7-1 shows a scenario where a MEC Application instance registers to the MTS service.