**3GPP TSG- Meeting #**

**, , - revision of S4-251511**

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  |  | **CR** |  | **rev** |  | **Current version:** |  |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network | **X** |

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| ***Source to WG:*** |  | | | | | | | | | |
| ***Source to TSG:*** |  | | | | | | | | | |
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| ***Work item code:*** |  | | | | |  | ***Date:*** | | |  |
|  |  | | | |  | |  | | |  |
| ***Category:*** |  |  | | | | | ***Release:*** | | |  |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)  Rel-20 (Release 20)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Stage-3 work has been recommended in clause 8.4.3 of TR 26.802:  2. For *Key Issue #10: Selected MBMS Functionalities not supported in MBS* as introduced in clause 5.11 and based on the conclusions in clause 5.11.4 of TR26.802.  Adapt time synchronization as defined in clause 4.6 of TS 26.346 to MBS User Services. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Adds time synchronization to MBS Distribution session | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Feature not supported | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 2, 5.1.1, 5.2.1, 5.2.4, 5.2.11, A.2.1, C.3 (new) | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | | **Special comment:** changes to the OpenAPI YAML schema for MBS User Service Announcement impact CT3's TS 29.580. (This is because TS 29.580 references our data type so that the MBS User Service Announcement generated by the MBSF can be handed back to the MBS Application Provider via reference point Nmb10 for subsequent private advertisement at reference point MBS-8.)  NOTE: This special comment on the cover page of our CR will cause CT3 to raise their own administrative CR against TS 29.580 to "bump" the version number of their *Nmbsf* provisioning API. | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

## ===== CHANGE =====

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 23.501: "System architecture for the 5G System (5GS)".

[3] 3GPP TS 23.502: "Procedures for the 5G System (5GS)".

[4] 3GPP TS 23.503: "Policy and charging control framework for the 5G System (5GS); Stage 2".

[5] 3GPP TS 23.247: "Architectural enhancements for 5G multicast-broadcast services; Stage 2".

[6] 3GPP TS 26.502: "5G multicast–broadcast services; User Service architecture".

[7] 3GPP TS 26.346: “MBMS; Protocols and Codecs".

[8] IETF RFC 8866: "Session Description Protocol".

[9] Void.

[10] 3GPP TS 23.003: "Numbering, addressing and identification".

[11] 3GPP TS 24.008: "Mobile radio interface Layer 3 specification; Core network protocols; Stage 3".

[12] IETF RFC 3926: "FLUTE - File Delivery over Unidirectional Transport".

[13] Void.

[14] OpenAPI: "OpenAPI 3.0.0 Specification", <https://github.com/OAI/OpenAPI-Specification/blob/master/versions/3.0.0.md>.

[15] 3GPP TS 29.500: "5G System; Technical Realization of Service Based Architecture; Stage 3".

[16] 3GPP TS 29.501: "5G System: Principles and Guidelines for Services Definition; Stage 3".

[17] 3GPP TS 29.580: "5G System; Multicast/Broadcast Service Function services; Stage 3".

[18] 3GPP TS 29.581: "5G System; Multicast/Broadcast Service transport services; Stage 3".

[19] IETF RFC 9110: "HTTP Semantics", June 2022.

[20] IETF RFC 9111: "HTTP Caching", June 2022.

[21] IETF RFC 9112: "HTTP/1.1", June 2022.

[22] IETF RFC 9113: "HTTP/2", June 2022.

[23] Reserved for future use.

[24] IETF RFC 8446: "The Transport Layer Security (TLS) Protocol Version 1.3", August 2018.

[25] Open Mobile Alliance: "OMNA BCAST Service Class Registry", https://technical.openmobilealliance.org/OMNA/bcast/bcast-service-class-registry.html.

[26] IETF RFC 3629: "UTF-8, a transformation format of ISO 10646".

[27] IETF RFC 8141: "Uniform Resource Names (URNs)".

[28] ISO 639-2: "Codes for the representation of names of languages - Part 2: Alpha-3 code".

[29] IETF RFC 6381: "The 'Codecs' and 'Profiles' Parameters for "Bucket" Media Types".

[30] 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces; Stage 3".

[31] 3GPP TS 26.512: "5G Media Streaming (5GMS); Protocols".

[32] 3GPP TS 33.501: "Security architecture and procedures for 5G system".

[33] 3GPP TS 33.246: "3G Security; Security of Multimedia Broadcast/Multicast Service (MBMS)".

[34] IETF RFC 3986: "Uniform Resource Identifier (URI): Generic Syntax".

[35] 3GPP TR 26.946: "Multimedia Broadcast/Multicast Service (MBMS) user service guidelines".

[36] 3GPP TS 26.247: "Transparent end-to-end Packet-switched Streaming Service (PSS); Progressive Download and Dynamic Adaptive Streaming over HTTP (3GP-DASH)".

[37] IETF RFC 2046, "Multipurpose Internet Mail Extensions (MIME) Part Two: Media Types".

[38] IETF RFC 2387: "The MIME Multipart/Related Content-type".

[39] IETF RFC 2557: "MIME Encapsulation of Aggregate Documents, such as HTML (MHTML)".

[40] IETF RFC 2017: "Definition of the URL MIME External-Body Access-Type".

[41] IETF RFC 1952: "GZIP file format specification version 4.3".

[42] 3GPP TS 38.331: "NR; Radio Resource Control (RRC) protocol specification".

[23009-1] ISO/IEC 23009-1: " Information technology — Dynamic adaptive streaming over HTTP (DASH) — Part 1: Media presentation description and segment formats".

[RFC5905] IETF RFC 5905: "Network Time Protocol Version 4: Protocol and Algorithms Specification".

## ===== CHANGE =====

### 5.1.1 General

An MBS User Service Description is described by a set of metadata documents that are delivered as described in clause 4.3.2 of TS 26.502 [3]. The data model defined in this clause subdivides the parameters defined in [3] and groups them into a set of *metadata documents*.

The metadata consists of:

- A *User Service Descriptions* document (see clause 5.2.2) describing a set of one or more MBS User Services, and containing:

- One of more *User Service Description* objects (see clause 5.2.3), each describing an MBS User Service Session that is associated with:

- One or more *Distribution Session Description* objects (see clause 5.2.4), each of which references a Session Description document [8] (see clause 5.2.5) that may be packaged with the User Service Descriptions document for delivery to the MBS Client in the same User Service Bundle (see clause 5.3.4). Each may optionally reference a *Time Synchronization Parameters* object (see clause 5.2.11), and each may optionally reference an *Object Repair Parameters* object (see clause 5.2.7) describing the object repair parameters for the MBS Distribution Session in question.

- Zero or more alternative *Application Service Description* objects (see clause 5.2.5), each of which references an Application Service Entry Point document (see clause 5.2.6) that may be packaged with the User Service Description document for delivery to the MBS Client in the same User Service Bundle (see clause 5.3.4). Additional resources referenced by the Application Service Entry Point document may also be packaged into the User Service Bundle.

- Zero or more *Service Schedule Description* objects (see clause 5.2.7) advertising the delivery schedule for the MBS User Service Session.

Figure 5.1 1 illustrates the relationships between these metadata entities using UML for a User Service Descriptions document.



NOTE: “N” means any number in each instance.

Figure 5.1-1: User Service Data Model simple description

A *User Service Description* document shall contain one or more *User Service Description* objects, each of which describes a single MBS User Service Session.

Each User Service Description object shall include at least one *Distribution Service Description* object describing the set of MBS Distribution Sessions currently associated with the MBS User Service Session.

- The Distribution Session Description object shall refer to one *Session Description document*.

- Each Distribution Session Description object may include an *Object Repair Parameters* object.

- Each Distribution Session Description object may include zero or more alternative *Application Service Description* object, optionally referencing an Application Service Entry Point document (e.g. a DASH MPD, HLS Master Playlist or HTML document) which describes the root of the Application Service associated with this MBS Distribution Session. When multiple Application Service Entry Point documents are referenced by the same Distribution Session Description (not permitted in this release), an MBS Client shall select only one on the basis of a distinct MIME content type indicated in the Application Service Description object.

Each User Service Description object may include *Service Schedule Description* objects. If included, the UE can expect to receive MBS User Service data during the time periods described in the Service Schedule Description object.

## ===== CHANGE =====

### 5.2.1 General

The following description in this clause presumes a JSON encoding of the information comprising the MBS User Service Announcement as specified in clause 5.1A.

The data types in table 5.2.1-1 from other 3GPP specifications are reused in the remainder of the present document.

Table 5.2.1 1: Externally defined data types used by User Service Description schema

|  |  |  |
| --- | --- | --- |
| Data type | Comments | Reference |
| Uri | A Uniform Resource Locator | TS 29.571 [30] |
| DateTime | A date–time value. |  |
| MbsServiceArea | An MBS Service Area. |  |
| MbsFsaId | An MBS Frequency Selection Area identifier. |  |
| DurationSec | A time duration expressed in seconds. |  |
| AbsoluteUrl | An absolute URL | TS 29 512 [31] |

The data types in table 5.2.1-2 are defined in the present document.

Table 5.2.1 2: User Service Description schema data types defined in the present document

|  |  |
| --- | --- |
| Data type | Clause |
| User‌Service‌Descriptions | 5.2.2 |
| User‌Service‌Description | 5.2.3 |
| Distribution‌Session‌Description | 5.2.4 |
| Application‌Service‌Description | 5.2.6 |
| Service‌Schedule‌Description | 5.2.7 |
| Object‌Repair‌Parameters | 5.2.8 |
| Availability‌Information | 5.2.9 |
| NrParameterSet | 5.2.9 |
| Security‌Description | 5.2.10 |
| Time‌Synchronization‌Parameters | 5.2.11 |
| Time‌Service‌Endpoint‌Parameters | 5.2.11 |

## ===== CHANGE =====

### 5.2.4 Distribution Session Description data type

The DistributionSessionDescription data type describes one *MBS Distribution Session* associated with an MBS User Service and carries the MBS Distribution Session Parameters as defined in clause 4.5.8 of TS 26.502 [6]. Table 5.2.4-1 provides the detailed semantics of this data type.

Table 5.2.4-1: Semantics of DistributionSessionDescription data type

| Property name | Data Type | P | Cardinality | Description |
| --- | --- | --- | --- | --- |
| distribution‌Method | Distribution‌Method | M | 1 | The distribution method used for this MBS Distribution Session.  For details, refer to table 5.2.4‑2. |
| conformance‌Profiles | array(Uri) | O | 1..N | A list of profiles indicating the set of features that this MBS Distribution Session conforms to and which the MBS Client needs to support in order to fully decode the MBS Distribution Session. For details refer to clause 12.  If not present, the MBS Distribution Session is assumed to conform to the "Baseline MBS Distribution Session Profile" specified in clause C.2. |
| session‌Description‌Locator | AbsoluteUrl | M | 1 | URL to a Session Description document carrying the *Session Description parameters* for this MBS Distribution Session as defined in table 4.5.8‑1 of TS 26.502 [6].  For details, refer to clause 5.2.5. |
| application‌Service‌Descriptions | array(Application‌Service‌Description) | O | 1..1 | If present, an array containing a set of one or more Application Service Descriptions for the MBS User Service (see clause 5.2.6 and text below this table). |
| post‌Session‌Object‌Repair‌Parameters | ObjectRepair‌Parameters | O | 0..1 | Parameters to be used by the MBSTF Client at reference point MBS‑4‑UC for post-session unicast object repair of this MBS Distribution Session, as defined in table 4.5.8‑2 of TS 26.502 [6].  For details, refer to clause 5.2.8. |
| availability‌Infos | array(Availability‌Information) | O | 1..N | Additional information pertaining to the availability of this MBS Distribution Session within the MBS System.  For details, refer to clause 5.2.9. |
| security‌Description | Security‌Description | O | 0..1 | The security parameters for this MBS Distribution Session, as defined in table 4.5.8-1 of TS 26.502 [6].  For details, refer to clause 5.2.10. |
| time‌Synchronization‌Parameters | Time‌Synchronization‌Parameters | O | 0..1 | Parameters to support synchronisation of the MBS Client with the MBSTF as defined in clause 4.2.7 of TS 26.502 [6].  If omitted, SIB9 presence and usage shall be signalled as defined in clause 4.2.7 of TS 26.502 [6] and shall be used by the MBS Client for time synchronization, if needed.  For details, refer to clause 5.2.11. |

## ===== CHANGE =====

### 5.2.11 Time Synchronization Parameters data type

The Time Synchronization Parameters object indicates how the MBS Client obtains for an MBS Distribution Session a wallclock that is synchronised with the MBSTF, and possibly the MBS AS.

Table 5.2.11-1 provides the detailed semantics for the TimeSynchronizationParameters data type.

Table 5.2.11‑1: Semantics of TimeSynchronizationParameters data type

| Property name | Data Type | P | Cardinality | Description |
| --- | --- | --- | --- | --- |
| ranTimeTransmitted | boolean | O | 0..1 | Indicates that NR SIB9 is transmitted as defined in clause 4.2.7 of TS 26.502 [6], to be used for time synchronization.  If not present, the value is assumed to be false. |
| timeServiceEndpoints | array(TimeServiceEndpointParameters) | C | 1..N | A set of endpoints provided by the MBS AS and used by the MBS Client to synchronise its clock with the needed precision.  Shall be present if ran‌Time‌Transmitted is false or absent. May be present if ran‌Time‌Transmitted is true.  For details refer to table 5.2.11-2. |

The semantics of the above parameters are specified as follows:

- If ranTimeTransmitted is set true, then NR SIB9 as specified in TS 38.331 [42] is carried in the radio frequency carrying the MBS Distribution Session and the relevant MBS functions are time-synchronized to the same UTC wallclock as the NR SIB9 information to a tolerance of ±100 ms or better.

NOTE: NR SIB9 as specified in TS 38.331 [42] conveys information in its timeInfo parameter related to a Coordinated Universal Time (UTC) wallclock to an accuracy of 10 ms.

- If ranTimeTransmitted is set false or absent, the NR SIB9 is either not present, or it does not fulfil the above requirements. In this case, the timeServiceEndpoints attribute shall be present and shall contain at least one entry.

- Each entry in timeServiceEndpoints describes a time service hosted by the MBS AS using the parameters in table 5.2.11-2 below. If multiple time service endpoints are specified, their order indicates their relative precedence, the first having the highest priority, and the last having the lowest. The MBS Client may choose any endpoint, potentially having to deal with reduced accuracy.

If both options (i.e., SIB9 as well as the MBS AS time service in the MBS AS) are offered by the 5G System, the MBS Client should preferably use the information in NR SIB9.

Table 5.2.11-2 provides the detailed semantics for the TimeServiceEndpointParameters data type. The data type follows the syntax and semantics of the UTC Timing Descriptor specified in ISO/IEC 23009-1 [23009-1].

Table 5.2.11‑2: Semantics of TimeServiceEndpointParameters data type

| Property name | Data Type | P | Cardinality | Description |
| --- | --- | --- | --- | --- |
| protocolScheme | Uri | M | 1 | The scheme identifier for the time service drawn from the controlled vocabulary specified in clause C.3.  The vocabulary of scheme identifiers shall be restricted to the DASH UTC timing method, whereby instead of the Media Presentation it refers to the MBS Distribution Session. |
| endpoint | string | M | 1 | The endpoint address of the time service, formatted according to the protocol scheme indicated in protocolScheme and based on the definition in ISO/IEC 23009-1 [23009-1]. |
| accuracy | integer | O | 0..1 | The accuracy of the timing source in relation to the wallclock of the MBS Distribution Session, expressed in a positive number of milliseconds.  Indicates that the relevant MBS functions are time-synchronised to the same UTC wallclock as the information provided by this timing source to a tolerance of ±*n* ms or better, where *n* is the value of this parameter.  If absent, the default accuracy is assumed to be a tolerance of ±1000 ms. |

## ===== CHANGE =====

## A.2.1 MBS User Service Announcement schema

Below is the schema specifying the format of User Service Descriptions instance documents using a JSON-based representation. The schema filename is "TS26517\_MBSUserServiceAnnouncement.yaml".

Documents following this schema shall be identified with the MIME media type application/3gpp-mbs-user-service-descriptions+json as registered in clause E.2.1 including the following parameters:

- The profiles parameter (see clause E.2.2) shall include a fully-qualified term identifier from the controlled vocabulary specified in clause C.2.

- The version parameter (see clause E.2.3) shall contain the value "Rel19" to indicate conformance with this version of the present document.

|  |
| --- |
| openapi: 3.0.0  info:  title: 'MBS User Service Announcement'  version: 2.1.1  description: |  MBS User Service Announcement Element units.  © 2024, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).  All rights reserved.  externalDocs:  description: 3GPP TS 26.517 V19.0.0; 5G Multicast-Broadcast User Services; Protocols and Formats  url: http://www.3gpp.org/ftp/Specs/archive/26\_series/26.517/  paths:  /user-service-descriptions:  get:  operationId: discoverUserServiceDescriptions  summary: 'Discover User Service Descriptions'  description: 'Discover User Service Descriptions that match the supplied query filter(s). At least one filter query parameter must be included in the request URL.'  parameters:  - in: query  name: service-class  schema:  $ref: 'TS29571\_CommonData.yaml#/components/schemas/Uri'  required: true  description: 'Filter for User Service Descriptions tagged with the supplied service class term identifier expressed as a fully-qualified URI string from a controlled vocabulary'  responses:  '200':  # OK  description: "Success"  content:  multipart/related:  schema:  type: string  '204':  # No Content (no matching User Service Descriptions)  description: "No Matches Found"  '500':  # Internal Server Error  $ref: 'TS29571\_CommonData.yaml#/components/responses/500'  '503':  # Service Unavailable  $ref: 'TS29571\_CommonData.yaml#/components/responses/503'  default:  $ref: 'TS29571\_CommonData.yaml#/components/responses/default'  /user-service-descriptions/{externalServiceId}:  get:  operationId: retrieveUserServiceDescription  summary: 'Retrieve User Service Description'  description: 'Retrieve the User Service Description of a single service by supplying its external service identifier.'  parameters:  - name: externalServiceId  in: path  required: true  schema:  type: string  description: 'The external service identifier of a User Service provisioned in the MBSF.'  responses:  '200':  # OK  description: "Success"  content:  multipart/related:  schema:  type: string  '404':  # Not Found  $ref: 'TS29571\_CommonData.yaml#/components/responses/404'  '500':  # Internal Server Error  $ref: 'TS29571\_CommonData.yaml#/components/responses/500'  '503':  # Service Unavailable  $ref: 'TS29571\_CommonData.yaml#/components/responses/503'  default:  $ref: 'TS29571\_CommonData.yaml#/components/responses/default'  components:  schemas:  UserServiceDescriptions:  description: 'A document announcing one or more MBS User Services.'  type: object  properties:  version:  type: integer  minimum: 1  userServiceDescriptions:  type: array  items:  $ref: '#/components/schemas/UserServiceDescription'  minItems: 1  required:  - userServiceDescriptions  UserServiceDescription:  description: 'A description of a single MBS User Service.'  type: object  properties:  serviceIds:  type: array  items:  $ref: 'TS29571\_CommonData.yaml#/components/schemas/Uri'  minItems: 1  class:  $ref: 'TS29571\_CommonData.yaml#/components/schemas/Uri'  names:  type: array  items:  type: object  properties:  name:  type: string  lang:  type: string  pattern: '^[a-zA-Z]{3}$'  example: 'eng'  required:  - name  - lang  minItems: 1  descriptions:  type: array  items:  type: object  properties:  description:  type: string  lang:  type: string  pattern: '^[a-zA-Z]{3}$'  example: 'eng'  required:  - description  - lang  minItems: 1  serviceLanguage:  type: string  pattern: '^[a-zA-Z]{3}$'  example: 'eng'  distributionSessionDescriptions:  type: array  items:  $ref: '#/components/schemas/DistributionSessionDescription'  minItems: 1  serviceScheduleDescriptions:  type: array  items:  $ref: '#/components/schemas/ServiceScheduleDescription'  minItems: 1  required:  - serviceIds  - class  - distributionSessionDescriptions  DistributionSessionDescription:  type: object  properties:  distributionMethod:  $ref: '#/components/schemas/DistributionMethod'  conformanceProfiles:  type: array  items:  $ref: 'TS29571\_CommonData.yaml#/components/schemas/Uri'  minItems: 1  sessionDescriptionLocator:  $ref: 'TS29571\_CommonData.yaml#/components/schemas/Uri'  applicationServiceDescriptions:  type: array  items:  $ref: '#/components/schemas/ApplicationServiceDescription'  minItems: 1  postSessionObjectRepairParameters:  $ref: '#/components/schemas/ObjectRepairParameters'  availabilityInfos:  type: array  items:  $ref: '#/components/schemas/AvailabilityInformation'  minItems: 1  securityDescription:  $ref: '#/components/schemas/SecurityDescription'  timeSynchronizationParameters:  $ref: '#/components/schemas/TimeSynchronizationParameters'  required:  - distributionMethod  - sessionDescriptionLocator  DistributionMethod:  anyOf:  - type: string  enum:  - OBJECT  - PACKET  - type: string  description: >  This string provides forward-compatibility with future  extensions to the enumeration but is not used to encode  content defined in the present version of this API.  ApplicationServiceDescription:  type: object  properties:  entryPointLocator:  $ref: 'TS29571\_CommonData.yaml#/components/schemas/Uri'  contentType:  type: string  pattern: '^[a-zA-Z]+\/[a-zA-Z]+$'  example: 'application/dash+xml'  required:  - entryPointLocator  - contentType  AvailabilityInformation:  type: object  properties:  mbsServiceAreas:  type: array  items:  $ref: 'TS29571\_CommonData.yaml#/components/schemas/MbsServiceArea'  minItems: 1  mbsFSAId:  $ref: 'TS29571\_CommonData.yaml#/components/schemas/MbsFsaId'  nrParameters:  type: array  items:  $ref: '#/components/schemas/NrParameterSet'  minItems: 1  nrRedCapUEInfo:  $ref: 'TS29571\_CommonData.yaml#/components/schemas/NrRedCapUeInfo'  NrParameterSet:  type: object  properties:  freqBandIndicator:  $ref: 'TS29571\_CommonData.yaml#/components/schemas/Uinteger'  aRFCNValue:  $ref: 'TS29571\_CommonData.yaml#/components/schemas/Uinteger'  required:  - freqBandIndicator  - aRFCNValue  ObjectRepairParameters:  type: object  properties:  backOffParameters:  $ref: '#/components/schemas/BackOffParameters'  objectDistributionBaseLocator:  $ref: 'TS29571\_CommonData.yaml#/components/schemas/Uri'  objectRepairBaseLocator:  $ref: 'TS26510\_CommonData.yaml#/components/schemas/AbsoluteUrl'  BackOffParameters:  type: object  properties:  offsetTime:  $ref: 'TS29571\_CommonData.yaml#/components/schemas/DurationSec'  randomTimePeriod:  $ref: 'TS29571\_CommonData.yaml#/components/schemas/DurationSec'  anyOf:  - required: [offsetTime]  - required: [randomTimePeriod]  ServiceScheduleDescription:  type: object  properties:  id:  type: string  version:  type: integer  minimum: 1  start:  $ref: 'TS29571\_CommonData.yaml#/components/schemas/DateTime'  stop:  $ref: 'TS29571\_CommonData.yaml#/components/schemas/DateTime'  repetitionRule:  $ref: '#/components/schemas/RepetitionRule'  required:  - id  - version  oneOf:  - required: [start, stop]  - required: [repetitionRule]  RepetitionRule:  type: object  properties:  startTime:  $ref: 'TS29571\_CommonData.yaml#/components/schemas/DateTime'  duration:  $ref: 'TS29571\_CommonData.yaml#/components/schemas/DurationSec'  repetitionInterval:  $ref: 'TS29571\_CommonData.yaml#/components/schemas/DurationSec'  required:  - startTime  - duration  - repetitionInterval  SecurityDescription:  type: object  properties:  mBSSFAddresses:  type: array  items:  $ref: 'TS26510\_CommonData.yaml#/components/schemas/AbsoluteUrl'  minItems: 1  mBSServiceKeyInfo:  type: object  properties:  mBSId:  type: string  mBSDomainId:  type: string  required:  - mBSId  - mBSDomainId  uICCKeyManagement:  type: boolean  2GGBAallowed:  type: boolean  backOffParameters:  $ref: '#/components/schemas/BackOffParameters'  required:  - mBSSFAddresses  - mBSSessionKeyInfo    TimeSynchronizationParameters:  type: object  properties:  ranTimeTransmitted:  type: boolean  timeServiceEndpoints:  type: array  items:  $ref: '#/components/schemas/TimeServiceEndpointParameters'  minItems: 1  TimeServiceEndpointParameters:  type: object  properties:  protocolScheme:  type: string  items:  $ref: 'TS26510\_CommonData.yaml#/components/schemas/AbsoluteUrl'  endpoint:  type: string  accuracy:  type: integer  minimum: 1  required:  - protocolScheme  - endpoint |

## ===== CHANGE =====

# C.3 Controlled vocabulary of timing schemes

The controlled vocabulary of timing schemes is a subset of the term identifiers for DASH UTC Timing Schemes specified in clause 5.8.5.7 of ISO/IEC 23009-1 [23009-1].

Table C.3-1: Controlled vocabulary of timing schemes

|  |  |  |  |
| --- | --- | --- | --- |
| URI | Description | Reference | Remarks |
| urn:mpeg:dash:utc:sntp:2014 | The time service endpoint indicates the host name or IP address of an SNTP server compliant with RFC 5905 [RFC5905]. | ISO/IEC 23009-1 [23009-1] clause 5.8.5.7 | None. |
| urn:mpeg:dash:utc:http-xsdate:2014 | The time service endpoint indicates an HTTP URL of a resource representation of the current date–time. | ISO/IEC 23009-1 [23009-1] clause 5.8.5.7 | None. |