**3GPP TSG-WG SA4 Meeting #118e *S4-220472r02***

 **Electronic Meeting, 6 - 14 April 2022**

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| *CR-Form-v12.2* |
| **Psuedo CHANGE REQUEST** |
|  |
|  | **26.517** | **CR** |  | **rev** | **-** | **Current version:** | **1.0.0** |  |
|  |
| *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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|  |
| ***Title:***  | [5MBP3]: Stage 3 Proposal for Clause 5 (Service Announcement) |
|  |  |
| ***Source to WG:*** | Ericsson LM |
| ***Source to TSG:*** | S4 |
|  |  |
| ***Work item code:*** | 5MBP3 |  | ***Date:*** | 31.3.2022 |
|  |  |  |  |  |
| ***Category:*** | B |  | ***Release:*** | Rel-17 |
|  | *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 canbe 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-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)* |
|  |  |
| ***Reason for change:*** |  |
|  |  |
| ***Summary of change:*** | This pCR starts proposing Stage 3 text for MBS Service Announcement, based on existing text in TS 26.346.  |
|  |  |
| ***Consequences if not approved:*** |  |
|  |  |
| ***Clauses affected:*** |  |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  |  |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  |  |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  |  |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

\*\*\*\* First Change \*\*\*\*

# 5 User Service Announcement

Editor’s Note:

* Specify the stage 3 format and protocol for User Service Announcement (between MBSF and MBS Client).
* Agreements per S4-220023
	+ Reuse the MBMS User Service Announcement Semantics as is (as shown in the diagram below), but
		- Only use the relevant functions identified and required from TS 26.502. At this stage this is:
			* userServiceDescription
			* session Description
			* appService
			* schedule

Metrics reporting should be rel 18



* Provide a modern Restful APIs and JSON approach.
* Provide a legacy mode reusing and XML-based description

## 5.1 Data model

### 5.1.1 General

MBS User Service Discovery/Announcement is needed in order to advertise MBS User Services in advance of, and potentially during, the MBS User Service Sessions described. The MBS User Service Sessions are described by information blocks delivered via an MBS Distribution Session or application-private means, as described in clause 4.3.2 of TS 23.502 [3].

MBS User Service Discovery/Announcement involves the delivery of *metadata units* to many receivers in a suitable manner. The metadata itself describes details of services. A metadata unit is a single uniquely identifiable block of metadata. Metadata units are always embedded in a document. An obvious example of a metadata unit would be a single SDP document [13].

The metadata consists of:

- *MBS User Service Bundle Description.* A metadata unit describing a bundle of one or more MBS User Services, and containing one or more:

- *MBS User Service Description.* A metadata unit describing an MBS User Service Session that includes:

- *MBS Distribution Session Description.* A metadata unit that references a Session Description document [13] that may be packaged with the MBS User Service Bundle Description, and which optionally includes a metadata unit describing the object repair parameters for the MBS Distribtuion Session.

- *MBS Application Service Description.* A metadata unit that references an Application Service Entry Point document that may be packaged with the MBS User Service Bundle Description. Additional resources referenced by the entry point document may also be packaged with the MBS User Service Bundle Description.

- *MBS Schedule Description.* A metadata unit advertisting the schedule for the MBS User Service Session.

Figure 5.1‑1 illustrates the relationships between these metadata units using UML for a single MBS User Service Bundle.



NOTE: "N" means any number in each instance.

Figure 5.1-1: User Service Data Model simple description

An MBS User Service Bundle Description document shall contain one or more instances of the MBS User Service Description metadata unit, each of which describes a single MBS User Service Session within the MBS User Service Bundle.

Each instance of the MBS User Service Description metadata unitshall include at least one distributionMethod metadata unitdescribing one MBS Distribution Session currently associated with the MBS User Service Session.

- The MBS Distribution Session Description metadata unitshall refer to one Session Description document.

- Each MBS Distribution Session Description metadata unitmay contain a reference to an Object Repair Parameters document.

Each instance of the MBS User Service Description metadata unitmay include an *MBS Application Service Description* metadata unit referencing a Application Service Entry Point document (e.g. a DASH MPD or HTML document) which describes the root of the Application Service associated with this MBS User Service.

Each instance of the MBS User Service Description metadata unitmay include a MBS Schedule Description metadata unit. If included, the MBS Dchedule Description shall refer to a Schedule Description document, and the UE can expect to receive MBS User Service data during the time periods described in the Schedule Description document.

In the case of the Object Distribution Method, the Schedule Description document may include an object transmission schedule for objects associated with the MBS User Service Session. The UE may select which objects to receive based on the object transmission schedule information published in the Schedule Description document.

### 5.1.2 Service types

Editor’s Note: What the service types should be defined here?

- MBS multicast service /MBS Broadcast service.

- Packet distribution method / Object distribution method.

- Live streaming service, Object download service, Group Communication service.

### 5.1.3 Capabilities

Editor’s Note: Should this Clause contain UE capabilities?

## 5.2 Semantics

### 5.2.1 User Service Description metadata unit

The root element of the MBS User Service Bundle Description metadata unit is the bundleDescription element. The element is of the type *bundleDescriptionType*. The bundleDescription element contains one or several userServiceDescription child elements.

NOTE: The following description in this clause presumes XML-encoding of the MBS User Service Announcement/Description.

The root element of the MBS User Servive Description metadata unit is the userServiceDescription element. Each userServiceDescription element shall signal a unique identifier in its @serviceIdattribute and this shall be of URI format.

The userServiceDescription element may contain one or more name child elements. The purpose of a nameelement is to communicate a human-readable title of the MBS User Service. For each name element, the language shall be specified according to XML datatypes (XML Schema Part 2 [9]).

The userServiceDescription element may contain one or more serviceLanguage child elements. Each serviceLanguageelement represents the available languages of the user services. The language shall be specified according to XML datatypes (XML Schema Part 2 [9]) using the xml:lang attribute.

Each MBS User Service Description metadata unit shall contain at least one MBS Distribution Session Description. The element shall contain a reference to a Session Description document. The element may also contain a reference to an Object Repair Parameters Description document.

ThedistributionSessionDescription element may contain a @DataNetworkNameattribute indicating a Data Network Name (DNN) as defined in TS 23.003 [7]. When this attribute is present, the MBS Client shall use the given DNN for interactions with the MBSF at reference point MBS‑5 and with the MBS AS at reference point MBS‑4‑UC. If this attribute is not present, the MBS UE shall use a default PDU Session for these network interactions.

The userServiceDescription element may include an availabilityInfo child element providing additional information pertaining to the availability of the MBS User Service Session within the 5G Network. If present, the availabilityInfo element shall include one or more infoBinding child elements. The infoBinding element shall contain the child elements serviceArea and radiofrequency:

- The serviceArea element declares the one or more service areas in which this MBS User Service Session is currently available.

- The radioFrequencyelement indicates the one or more radio frequencies in the NG-RAN downlink which transmit this MBS User Service in the service area(s) identified by the serviceArea element.

### 5.2.2 Session Description metadata unit

The sessionDescriptionURI element of the MBS User Service Bundle Description references a Session Description document that may be packaged in the same MBS User Service Bundle.

One or more session description instances are contained in a Session Description document. The session description instance shall be formatted according to RFC 8866 [14]. Each session description instance shall describe one MBS Distribution Session.

A session description for an MBS Distribution Session using the Packet Distribution Method may include multiple media descriptions for RTP sessions, or one/multiple component sessions.

Editor’s Note: Details of the Session Descriptions should be moved to the according section.

- The session description for the MBS Object Distribution Method is specified in clause 6.2.3

- The session description for the MBS Packet Distribution Method is specified in clause 7.2.3.

### 5.2.3 MBS Application Service Description metadata unit

In order to support application services in MBS, the MBS User Service Bundle Description metadata unit shall contain an appService element referencing a Application Service Entry Point document which contains the descriptive information of the resources delivered via MBS and/or unicast distribution. That Application Service Entry Point document shall be formatted according to the value of the mimeType attribute.

If the MBS User Service Description contains a reference to an Application Service Entry Point document, then:

1) The MBS Distribution Session shall use the Object Distribution Method, i.e. it shall include at least one distributionSessionDescription element referencing an SDP that describes an Object Distribution Method as define in clause 7.

2) The MBS Distribution Session shall deliver objects that are directly or indirectly referenced by the Application Service Entry Point document.

3) If an object is delivered as a FLUTE object with an availability time defined by service is delivered then all of the following shall hold:

a) The MBS Distribution Session shall deliver the objects such that the last packet of the delivered object is available to the MBS Client by no later than its availability time as announced in the Application Service Entry Point document.

b) The Content-Location element in the FLUTE File Delivery Table for the delivered object shall match the URL in the Application Service Entry Point document.

Editor’s Note: Bullet 3 should be moved to Clause 7.

4) If an update to the Application Service Entry Point document is delivered as a FLUTE transmission object then the Content-Location element in the FLUTE File Delivery Table for the delivered object shall match the URL of the referenced Application Service Entry Point document.

In the case of 3GP-DASH formatted content, the appService element may refer to a unified media manifest document which describes Representations available for both MBS reception and unicast retrieval, and this shall be used by MBS Clients compliant with this specification. In practical deployments, different subsets of the Representations described by the unified manifest document and referenced by such appService may be specified for:

- Availability via MBS distribution only.

- Availability via both unicast and MBS distribution,

- Availability via unicast only, and the Representation is redundant in MBS area coverage, i.e. the usage of these resources does not provide an improved user experience. As an example, this may be a lower bitrate Representation of a media component for which a higher bitrate is available over MBS distribution, and

- Availability always via unicast, and the Representation is supplementary in MBS area coverage, i.e. even in MBS area coverage these resources provide an improved user experience. As an example, this may be a secondary language that is only accessible over unicast.

If the userServiceDescription contains an Application Service Description metadata unit, then all resources that are directly or indirectly referenced in the Application Service Entry Point document of this metadata unit, and are expected to be retrieved by HTTP GET, shall be delivered by at least one of the MBS Distribution Sessions associated with the MBS User Service Description.

### 5.2.4 Schedule Description metadata unit

Availability of the Schedule Description metadata unit is indicated by the presence of the schedule element in the MBS User Service Bundle Description metadata unit. The URI of the Schedule Description instance document is provided by the scheduleDescriptionURI child element in the schedule element.

A Schedule Description instance document describes the distribution schedule of the MBS Distribution Session and the availability of content via unicast delivery for an MBS User Service in terms of:

- start/stop lists,

- recurrence information,

- The service ID or service class to which the schedule may apply,

- nominal monitoring interval and indication of delivery mode for a Datacasting service.

An MBS User Service containing multiple content components may be carried on a single MBS Distribution Session, or on multiple MBS Distribution Sessions. The MBS Client can expect to receive MBS data during the described time period(s) when at least one of the MBS Distribution Sessions for the MBS User Service is active.

A Schedule Description instance document may also include a schedule of when the objects intended to be transmitted as part of an MBS Distribution Session using the Object Distribution Method. The object schedule information is defined in terms of:

- The service ID or service class to which the object schedule applies,

- An object transmission schedule listing for each object:

- Object URI,

- A list of start and end times for distribution of the object via MBS,

A Schedule Description instance document may be delivered to the MBS Client:

- prior to the MBS Distribution Session as part of the MBS User Service Announcement along with the Session Description metadata unit (out-of-band of that session); or

- in-band within an MBS Distribution Session; or

- via an MBS Distribution Session dedicated to the transport of Schedule Description instance documents.

The most recently delivered Schedule Description instance document shall take priority, such that schedule parameters received prior to – and out-of-band of – the MBS Distribution Session they apply to are regarded as "initial defaults", and schedule parameters received in-band with the MBS Distribution Session overwrite the earlier received schedule parameters.

The Shedule Description instance document is clearly identified using a URI, to enable cross-referencing by the MBS Client of instance documents delivered in band and out of band.

The session schedule and object transmission schedule are described in the Schedule Description instance document respectively by the sessionSchedule and objectSchedule elements.

- The start and stop time of a single sessionSchedule is specified by the start and stop elements.

- The start and stop time of a single objectSchedule is specified by the start and endattributes.

In both cases the time is specified as the absolute date and UTC time. The duration may be determined by subtracting the start time from the stop time.

The MBS Distribution Session shall be available to the MBS Client during the time interval(s) announced by the session schedule (i.e. scheduleDescription/serviceSchedule/sessionSchedule element of the Schedule Description instance document), for either unicast or MBS reception. In particular, for unicast reception, the Schedule Description is indicative of the time availability for unicast access of an MBS User Service while the TMGI for the MBS Distribution Session is not activated, as well as for unicast fallback reception when the MBS Client is not located in the MBS coverage area for the service.

The MBS Client may activate reception of that MBS Distribution Session only within the sessionSchedule (and the objectSchedule if present) time window.

When an objectSchedule element is present in a serviceSchedule element, then:

- The MBS Client should not expect that an object described by an objectSchedule will be updated during a time window instance, defined by start and end attributes, within a deliveryInfo element of that objectSchedule.

- There shall be only one object version (as defined in the File-ETag attribute in the FLUTE File Delivery Table) transmitted in a time window defined by the start and end attributes within a deliveryInfo element for a given objectSchedule element.

- If objectETag attribute is not present, the objects transmitted in the time windows from different deliveryInfo elements in an objectSchedule should not be expected to be the same object version.

- If objectETag attribute is present, there shall be only one object version transmitted in all of the time windows delimited by the start and end attributes of each of the one or more deliveryInfo elements.

- In-band Schedule Description instance document updates can be used to provide a dynamic schedule update to override the existing delivery schedule, such as using the cancelled attribute mechanism specified in this clause.

- A sessionSchedule element in the same serviceSchedule element shall be present, and its start and stop elements shall specify a time window that completely overlaps the time windows specified in each of the objectSchedule elements of the same serviceSchedule.

When a sessionSchedule is present and there are no objectSchedule child elements in a serviceSchedule, then the MBS Client should download each new object, independently of whether the MBS Distribution Session uses the MBS Object Distribution Method or the MBS Packet Distribution Method.

The objectSchedule element specifies details about the objects to be delivered during an MBS Distribution Session. The sessionId attribute, if present, identifies the MBS Distribution Session for each object. If not present, an MBS Client shall determine the MBS session by examining the Session Description metadata unit for the MBS Distribution Session. The objectETag attribute is the version identifier of the object. If present, the purpose of this entity tag is to enable an MBS Client to determine if an object has changed since a prior reception without having to download the object.

The scheduleUpdate element specifies a time after which MBS Client shall seek to update its schedule information by acquiring the latest available Schedule Description instance document.

An index attribute is included as a child of the sessionSchedule element. If the sessionSchedule does not describe any session reoccurrence, then the index corresponds to the single session occurrence. If the sessionSchedule describes one or more reoccurrences the index is the starting index of the first session occurrence with the index value increased by one for each session reoccurrence.

A cancelled attribute is defined as a child of the objectSchedule/objectURI element.

- If cancelled is set to "true" or "1", then the transmission of the object identified by the objectURI element is cancelled, and the MBS Client shall cancel any applicable repair and/or reception reporting procedures for that object.

If this object schedule-level cancellation indication in the updated schedule description is received after the associated object has already been delivered, then any related repair or reception reporting for that object (associated with its parent service), either in progress or yet to occur, shall be aborted.

- If cancelled is set to "false" or "0" or is absent, then normal object transmission and associated delivery procedures, if applicable, shall occur.

A sessionScheduleOverride element is defined as a child of the serviceSchedule element. If present, the sessionScheduleOverride element indicates either the cancellation of the session occurrence, or schedule override, as follows:

- If the cancelled attribute (a child of sessionScheduleOverrideelement) is set to "true" or "1", then the transmission of the MBS Distribution Session identified by the index attribute (a child of sessionScheduleOverrideelement) is cancelled, and the MBS Client shall cancel any applicable repair and/or reception reporting for all objects belonging to that MBS Distribution Session.

If this session schedule-level cancellation indication in the updated schedule description is received after any of the associated objects have already been delivered, then any related repair or reception reporting for those objects (associated with their parent service(s)), either in progress or yet to occur, shall be aborted.

- If the cancelled attribute (a child of sessionScheduleOverrideelement) is set to "false" or "0" or is absent, then the start and stop time elements (children of sessionScheduleOverrideelement) shall override the nominal start and stop time of the transmission schedule of the session as identified by the index attribute (a child of sessionScheduleOverrideelement).

The value of the index attribute in the sessionScheduleOverride element corresponds to any of the value of the index element in the reoccurenceStartStopType in the sessionSchedule element.

Schedule information received in the Schedule Description metadata unit shall take precedence over timing information that may have been received in the Session Description metadata unit (t and/or r lines in the SDP).

### 5.2.5 Object Repair Parameters metadata unit

An Object Rapair Parameters document for the object repair procedures may be delivered to MBS Clients:

- Prior to the MBS Distribution Session becoming active, along with the Session Description (out-of-band of that session); or

- in-band within an MBS Distribution Session.

The most recently delivered Associated Procedure instance document (i.e. the one with the highest version number – as signalled in the envelope, see clause 5.2.5) shall take priority, such that configuration parameters received prior to – and out-of-band of – the MBS Distribution Session they apply to are regarded as "initial defaults", and configuration parameters received during – and in-band with – the MBS Distribution Session, override the earlier received parameters. Thus, a method to update parameters dynamically on a short timescale is provided but, as would be desirable where dynamics are minimal, is not mandatory.

During the User Service Discovery / Announcement Procedure, the Associated Procedure Description instance document is clearly identified using a URI, to enable UE cross-referencing by the MBS Client of instance documents delivered in band and out of band.

## 3 of Service Announcement

\*\*\*\* Next Change \*\*\*\*

Annex X Syntax for Service Announcement

# X.1 XML-based representation

### X.1.1 MBS User Service Description schema

<?xml version="1.0" encoding="UTF-8"?>

<xs:schema xmlns="urn:3GPP:metadata:2022:MBS:userServiceDescription" xmlns:xs="http://www.w3.org/2001/XMLSchema" targetNamespace="urn:3GPP:metadata:2022:MBS:userServiceDescription" elementFormDefault="qualified">

 <xs:element name="bundleDescription" type="bundleDescriptionType"/>

 <xs:complexType name="bundleDescriptionType">

 <xs:sequence>

 <xs:element name="userServiceDescription" type="userServiceDescriptionType" maxOccurs="unbounded"/>

 <xs:any namespace="##other" minOccurs="0" maxOccurs="unbounded" processContents="lax"/>

 </xs:sequence>

 <xs:anyAttribute processContents="skip"/>

 </xs:complexType>

 <xs:complexType name="userServiceDescriptionType">

 <xs:sequence>

 <xs:element name="name" type="nameType" minOccurs="0" maxOccurs="unbounded"/>

 <xs:element name="serviceLanguage" type="xs:language" minOccurs="0" maxOccurs="unbounded"/>

 <xs:element name="distributionSessionDescription" type="distributionSessionDescriptionType" maxOccurs="unbounded"/>

 <xs:element ref="appService" minOccurs="0" maxOccurs="unbounded"/>

 <xs:element ref="availabilityInfo" minOccurs="0"/>

 <xs:any namespace="##other" minOccurs="0" maxOccurs="unbounded" processContents="lax"/>

 </xs:sequence>

 <xs:attribute name="serviceId" type="xs:anyURI" use="required"/>

 <xs:anyAttribute processContents="skip"/>

 </xs:complexType>

 <xs:complexType name="distributionSessionDescriptionType">

 <xs:sequence>

 <xs:element ref="mbsAppService" minOccurs="0" maxOccurs="unbounded"/>

 <xs:element ref="unicastAppService" minOccurs="0"/>

 <xs:any namespace="##other" minOccurs="0" maxOccurs="unbounded" processContents="lax"/>

 </xs:sequence>

 <xs:attribute name="associatedProcedureDescriptionURI" type="xs:anyURI" use="optional"/>

 <xs:attribute name="sessionDescriptionURI" type="xs:anyURI" use="required"/>

 <xs:attribute name="dataNetworkName" type="xs:anyURI" use="optional" />

 <xs:anyAttribute processContents="skip"/>

 </xs:complexType>

 <xs:complexType name="nameType">

 <xs:simpleContent>

 <xs:extension base="xs:string">

 <xs:attribute name="lang" type="xs:language" use="optional"/>

 </xs:extension>

 </xs:simpleContent>

 </xs:complexType>

 <xs:element name="appService" type="appServiceType"/>

 <xs:complexType name="appServiceType">

 <xs:sequence>

 <xs:element name="identicalContent" minOccurs="0" maxOccurs="unbounded">

 <xs:complexType>

 <xs:sequence>

 <xs:element name="basePattern" type="xs:anyURI" minOccurs="2" maxOccurs="unbounded"/>

 <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>

 </xs:sequence>

 <xs:anyAttribute processContents="skip"/>

 </xs:complexType>

 </xs:element>

 <xs:element name="alternativeContent" minOccurs="0" maxOccurs="unbounded">

 <xs:complexType>

 <xs:sequence>

 <xs:element name="basePattern" type="xs:anyURI" minOccurs="2" maxOccurs="unbounded"/>

 <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>

 </xs:sequence>

 <xs:anyAttribute processContents="skip"/>

 </xs:complexType>

 </xs:element>

 <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>

 </xs:sequence>

 <xs:attribute name="mediaManifestDescriptionURI" type="xs:anyURI" use="required"/>

 <xs:attribute name="mimeType" type="xs:string" use="required"/>

 <xs:anyAttribute processContents="skip"/>

 </xs:complexType>

 <xs:element name="mbsAppService">

 <xs:complexType>

 <xs:sequence>

 <xs:element name="basePattern" type="xs:anyURI" maxOccurs="unbounded"/>

 <xs:element name="serviceArea" type="xs:unsignedShort" minOccurs="0" maxOccurs="unbounded"/>

 <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>

 </xs:sequence>

 <xs:anyAttribute processContents="skip"/>

 </xs:complexType>

 </xs:element>

 <xs:element name="unicastAppService">

 <xs:complexType>

 <xs:sequence>

 <xs:element name="basePattern" type="xs:anyURI" maxOccurs="unbounded"/>

 <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>

 </xs:sequence>

 <xs:anyAttribute processContents="skip"/>

 </xs:complexType>

 </xs:element>

 <xs:element name="availabilityInfo">

 <xs:complexType>

 <xs:sequence>

 <xs:element name="infoBinding" maxOccurs="unbounded">

 <xs:complexType>

 <xs:sequence>

 <xs:element ref="mbsServiceArea" minOccurs="0" maxOccurs="unbounded"/>

 <xs:element name="radioFrequency" type="xs:unsignedInt" maxOccurs="unbounded"/>

 </xs:sequence>

 </xs:complexType>

 </xs:element>

 </xs:sequence>

 </xs:complexType>

 <xs:element name="mbsServiceArea">

 <xs:complexType>

 <xs:sequence>

 <xs:element name="taiList" minOccurs="0" maxOccurs="unbounded">

 <xs:complexType>

 <xs:sequence>

 <xs:element ref="tai" maxOccurs="unbounded"/>

 </xs:sequence>

 </xs:complexType>

 </xs:element>

 <xs:element name="ncgiList" minOccurs="0" maxOccurs="unbounded">

 <xs:complexType>

 <xs:sequence>

 <xs:element ref="ncgiTai" maxOccurs="unbounded">

 </xs:sequence>

 </xs:complexType>

 </xs:element>

 </xs:sequence>

 </xs:complexType>

 <xs:element name="tai">

 <xs:complexType>

 <xs:sequence>

 <xs:element name="plmnId">

 <xs:complexType>

 <xs:sequence>

 <xs:element name="mcc" type="xs:string"/>

 <xs:element name="mnc" type="xs:string"/>

 </xs:sequence>

 </xs:complexType>

 </xs:element>

 <xs:element name="tac" type="xs:string"/>

 <xs:element name="nid" type="xs:string" minOccurs="0"/>

 </xs:sequence>

 </xs:complexType>

 <xs:element name="ncgiTai">

 <xs:complexType>

 <xs:sequence>

 <xs:element ref="tai"/>

 <xs:element ref="ncgi"/>

 </xs:sequence>

 </xs:complexType>

 <xs:element name="ncgi">

 <xs:complexType>

 <xs:sequence>

 <xs:element name="plmnId">

 <xs:complexType>

 <xs:sequence>

 <xs:element name="mcc" type="xs:string"/>

 <xs:element name="mnc" type="xs:string"/>

 </xs:sequence>

 </xs:complexType>

 </xs:element>

 <xs:element name="nrCellId" type="xs:string"/>

 <xs:element name="nid" type="xs:string" minOccurs="0"/>

 </xs:sequence>

 </xs:complexType>

</xs:schema>

### X.1.2 Associated Distribution Procedure Description schema

Below is the formal XML syntax of associated distribution procedure description instances. Documents following this schema can be identified with the MIME type "application/mbms‑associated-procedure-description+xml". The schema filename of distribution procedure description is associatedprocedure.xsd.

<?xml version="1.0" encoding="UTF-8"?>

<xs:schema

 xmlns="urn:3gpp:metadata:2020:MBS:associatedProcedure"

 xmlns:xs="http://www.w3.org/2001/XMLSchema"

 targetNamespace="urn:3gpp:metadata:2022:MBS:associatedProcedure"

 elementFormDefault="qualified"

 version="1">

 <xs:element name="associatedProcedureDescription" type="associatedProcedureType"/>

 <xs:complexType name="associatedProcedureType">

 <xs:sequence>

 <xs:element name="postFileRepair" type="basicProcedureType" minOccurs="0"/>

 <xs:element name="mbsFileRepair" type="mbsFileRepairType" minOccurs="0"/>

 <xs:any namespace="##other" processContents="skip" minOccurs="0" maxOccurs="unbounded"/>

 </xs:sequence>

 </xs:complexType>

 <xs:complexType name="basicProcedureType">

 <xs:sequence>

 <xs:element name="serviceURI" type="xs:anyURI" maxOccurs="unbounded"/>

 </xs:sequence>

 <xs:attribute name="offsetTime" type="xs:unsignedLong" use="optional"/>

 <xs:attribute name="randomTimePeriod" type="xs:unsignedLong" use="required"/>

 </xs:complexType>

 <xs:complexType name="mbsFileRepairType">

 <xs:attribute name="sessionDescriptionURI" type="xs:anyURI" use="required"/>

 </xs:complexType>

</xs:schema>

## X.1.3 Schedule Description schema

Below is the formal XML syntax of schedule information procedure. Documents following this schema can be identified with the MIME type "application/mbms‑schedule+xml". The file name of XML schema for schedule description is Schedule-Description.xsd.

<?xml version="1.0" encoding="UTF-8"?>

<xs:schema xmlns="urn:3gpp:metadata:2022:MBS:scheduleDescription" xmlns:xs="http://www.w3.org/2001/XMLSchema" targetNamespace="urn:3gpp:metadata:2022:MBS:scheduleDescription" elementFormDefault="qualified" version="1">

 <xs:complexType name="scheduleDescriptionType">

 <xs:sequence>

<xs:element name="serviceSchedule" maxOccurs="unbounded">

 <xs:complexType>

 <xs:sequence>

 <xs:element name="sessionSchedule" type="reoccurenceStartStopType" minOccurs="0" maxOccurs="unbounded"/>

 <xs:element name="sessionScheduleOverride" minOccurs="0" maxOccurs="unbounded">

 <xs:complexType>

 <xs:sequence minOccurs="0">

 <xs:element name="start" type="xs:dateTime"/>

 <xs:element name="stop" type="xs:dateTime"/>

 </xs:sequence>

 <xs:attribute name="index" type="xs:unsignedInt" use="required"/>

 <xs:attribute name="cancelled" type="xs:boolean"/>

 </xs:complexType>

 </xs:element>

 <xs:element name="objectSchedule" minOccurs="0" maxOccurs="unbounded">

 <xs:complexType>

 <xs:sequence>

 <xs:element name="objectURI">

 <xs:complexType>

 <xs:simpleContent>

 <xs:extension base="xs:anyURI">

 <xs:attribute name="cancelled" type="xs:boolean"/> </xs:extension>

 </xs:simpleContent>

 </xs:complexType>

 </xs:element>

 <xs:element name="deliveryInfo" minOccurs="0" maxOccurs="unbounded">

 <xs:complexType>

 <xs:attribute name="start" type="xs:dateTime"/>

 <xs:attribute name="end" type="xs:dateTime"/>

 <xs:anyAttribute processContents="skip"/>

 </xs:complexType>

 </xs:element>

 <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>

 </xs:sequence>

 <xs:attribute name="sessionId" type="xs:string" use="optional"/>

 <xs:attribute name="objectEtag" type="xs:string" use="optional"/>

 <xs:attribute name="unicastOnly" type="xs:boolean" use="optional" default="false"/>

 <xs:anyAttribute processContents="skip"/>

 </xs:complexType>

 </xs:element>

 <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>

 </xs:sequence>

 <xs:attribute name="serviceId" type="xs:anyURI"/>

 <xs:attribute name="serviceClass" type="xs:string" use="optional"/>

 <xs:anyAttribute processContents="skip"/>

 </xs:complexType>

 </xs:element>

 <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>

 </xs:sequence>

 <xs:attribute name="scheduleUpdate" type="xs:dateTime"/>

 <xs:anyAttribute processContents="skip"/>

 </xs:complexType>

 <xs:complexType name="reoccurenceStartStopType">

 <xs:sequence>

 <xs:element name="start" type="xs:dateTime"/>

 <xs:element name="stop" type="xs:dateTime"/>

 <xs:element name="reoccurencePattern" type="xs:string" minOccurs="0"/>

 <xs:element name="numberOfTimes" type="xs:unsignedInt" minOccurs="0"/>

 <xs:element name="reoccurenceStopTime" type="xs:dateTime" minOccurs="0"/>

 <xs:element name="index" type="xs:unsignedInt" minOccurs="0"/>

 <xs:element name="FDTInstanceURI" type="xs:anyURI" minOccurs="0"/>

 <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>

 </xs:sequence>

 <xs:attribute name="sessionDescriptionURI" type="xs:anyURI" use="optional"/>

 <xs:anyAttribute processContents="skip"/>

 </xs:complexType>

 <xs:element name="scheduleDescription" type="scheduleDescriptionType"/>

</xs:schema>

## X.2 JSON-based representation

### X.2.1 MBS User Service Bundle Description schema

openapi: 3.0.0

info:

 title: 'MBS User Service Announcement Element units’ definition'

 version: 1.0.0

 description: |

 MBS User Service Announcement Element units.

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externalDocs:

 description: 3GPP TS 26.517 V0.1.0; 5G System; 5G MBSF; Stage 3.

 url: http://www.3gpp.org/ftp/Specs/archive/26\_series/26.517/

paths: {}

components:

 schemas:

 bundleDescription:

 type: array

 items:

 $ref: '#/components/schemas/userServiceDescription'

 minItems: 1

 userServiceDescription:

 type: object

 properties:

 name:

 type: array

 items:

 type: string

 serviceLanguage:

 type: array

 items:

 type: string

 serviceId:

 type: string

 distributionSessionDescription:

 $ref: '#/components/schemas/distributionMethod'

 appService:

 $ref: '#/components/schemas/mbsAppService'

 availabilityInfo:

 $ref: '#/components/schemas/availabilityInfo'

 required:

 - distributionMethod

 - serviceId

 distributionSessionDescription:

 type: object

 properties:

 sessionDescriptionURI:

 type: string

 associatedProcedureDescriptionURI:

 type: string

 dataNetworkName:

 type: string

 mbsAppService:

 type: array

 items:

 $ref: '#/components/schemas/appService'

 unicastAppServices:

 type: array

 items:

 unicastAppService:

 type: object

 properties:

 $ref: '#/components/schemas/appService'

 required:

 - sessionDescriptionURI

 mbsAppService:

 type: object

 properties:

 MediaManifestDescriptionURI:

 type: string

 mimeType:

 type: string

 identicalContents:

 type: array

 items:

 identicalContent:

 type: array

 items:

 $ref: '#/components/schemas/appService'

 alternativeContents:

 type: array

 items:

 alternativeContent:

 type: array

 items:

 $ref: '#/components/schemas/appService'

 appService:

 type: object

 properties:

 basePattern:

 type: string

 required:

 - basePattern

 MbsServiceArea:

 description: MBS Service Area

 type: object

 properties:

 ncgiList:

 type: array

 items:

 $ref: '#/components/schemas/NcgiTai'

 minItems: 1

 description: List of NR cell Ids

 taiList:

 type: array

 items:

 $ref: '#/components/schemas/Tai'

 minItems: 1

 description: List of tracking area Ids

 NcgiTai:

 description: List of NR cell ids, with their pertaining TAIs

 type: object

 properties:

 tai:

 $ref: '#/components/schemas/Tai'

 cellList:

 type: array

 items:

 $ref: '#/components/schemas/Ncgi'

 minItems: 1

 description: List of List of NR cell ids

 required:

 - tai

 - cellList

 Tai:

 description: Contains the tracking area identity as described in 3GPP 23.003

 type: object

 properties:

 plmnId:

 $ref: '#/components/schemas/PlmnId'

 tac:

 $ref: '#/components/schemas/Tac'

 nid:

 $ref: '#/components/schemas/Nid'

 required:

 - plmnId

 - tac

 Ncgi:

 description: Contains the NCGI (NR Cell Global Identity), as described in 3GPP 23.003

 type: object

 properties:

 plmnId:

 $ref: '#/components/schemas/PlmnId'

 nrCellId:

 $ref: '#/components/schemas/NrCellId'

 nid:

 $ref: '#/components/schemas/Nid'

 required:

 - plmnId

 - nrCellId

 PlmnId:

 type: object

 properties:

 mcc:

 $ref: '#/components/schemas/Mcc'

 mnc:

 $ref: '#/components/schemas/Mnc'

 description: When PlmnId needs to be converted to string (e.g. when used in maps as key), the string shall be composed of three digits "mcc" followed by "-" and two or three digits "mnc".

 required:

 - mcc

 - mnc

 Mcc:

 type: string

 pattern: '^\d{3}$'

 description: Mobile Country Code part of the PLMN, comprising 3 digits, as defined in clause 9.3.3.5 of 3GPP TS 38.413.

 Mnc:

 type: string

 pattern: '^\d{2,3}$'

 description: Mobile Network Code part of the PLMN, comprising 2 or 3 digits, as defined in clause 9.3.3.5 of 3GPP TS 38.413.

 Tac:

 type: string

 pattern: '(^[A-Fa-f0-9]{4}$)|(^[A-Fa-f0-9]{6}$)'

 description: 2 or 3-octet string identifying a tracking area code as specified in clause 9.3.3.10 of 3GPP TS 38.413, in hexadecimal representation. Each character in the string shall take a value of "0" to "9", "a" to "f" or "A" to "F" and shall represent 4 bits. The most significant character representing the 4 most significant bits of the TAC shall appear first in the string, and the character representing the 4 least significant bit of the TAC shall appear last in the string.

 Nid:

 type: string

 pattern: '^[A-Fa-f0-9]{11}$'

 description: This represents the Network Identifier, which together with a PLMN ID is used to identify an SNPN (see 3GPP TS 23.003 and 3GPP TS 23.501 clause 5.30.2.1).

 NrCellId:

 type: string

 pattern: '^[A-Fa-f0-9]{9}$'

 description: 36-bit string identifying an NR Cell Id as specified in clause 9.3.1.7 of 3GPP TS 38.413, in hexadecimal representation. Each character in the string shall take a value of "0" to "9", "a" to "f" or "A" to "F" and shall represent 4 bits. The most significant character representing the 4 most significant bits of the Cell Id shall appear first in the string, and the character representing the 4 least significant bit of the Cell Id shall appear last in the string.

 availabilityInfo:

 type: array

 properties:

 $ref: '#/components/schemas/infoBinding'

 infoBinding:

 type: object

 properties:

 mbsServiceArea:

 type: array

 items:

 $ref: '#/components/schemas/MbsServiceArea'

 radioFrequency:

 type: array

 items:

 type: integer

 minimum: 0

 associatedProcedureDescription:

 type: object

 properties:

 postFileRepair:

 $ref: '#/components/schemas/postFileRepair'

 mbsFileRepair:

 $ref: '#/components/schemas/mbsFileRepair'

 postFileRepair:

 type: object

 items:

 serviceURI:

 type: array

 items:

 type: string

 offsetTime:

 type: integer

 randomTimePeriod:

 type: integer

 mbsFileRepair:

 type: object

 properties:

 "sessionDescriptionURI":

 type: string

 scheduleDescription:

 type: array

 items:

 $ref: '#/components/schemas/serviceSchedule'

 serviceSchedule:

 type: object

 properties:

 sessionSchedule:

 $ref: '#/components/schemas/sessionSchedule'

 sessionScheduleOverride:

 $ref: '#/components/schemas/sessionScheduleOverride'

 fileSchedule:

 $ref: '#/components/schemas/fileSchedule'

 serviceId:

 type: string

 serviceClass:

 type: string

 required:

 - serviceId

 - serviceClass

 - serviceSchedule

 sessionSchedule:

 type: array

 items:

 type: object

 properties:

 start:

 type: string

 stop:

 type: string

 reoccurencePattern:

 type: string

 numberOfTimes:

 type: integer

 reoccurenceStopTime:

 type: string

 index:

 type: integer

 FDTInstanceURI:

 type: string

 required:

 - start

 - stop

 sessionScheduleOverride:

 type: array

 items:

 type: object

 properties:

 start:

 type: string

 stop:

 type: string

 index:

 type: integer

 cancelled:

 type: boolean

 sessionDescriptionURI:

 type: string

 fileSchedule:

 type: array

 items:

 type:object

 properties:

 fileURI:

 type: string

 sessionId:

 type: string

 fileEtag:

 type: string

 unicastOnly:

 type: boolean

 deliveryInfo:

 type: array

 items:

 type: object

 properties:

 start:

 type: string

 stop:

 type: string

### X.2.2 Service announcement json example (part)

{

 "bundleDescription":[

 {

 "userServiceDescription":{

 "name":[

 "test1"

 ],

 "serviceLanguage":[

 "en-us"

 ],

 "serviceId":"urn:test:test:D4-Service:D4-SB:D4-US",

 "distributionSessionDescription":{

 "sessionDescriptionURI":"http://www.test.com/D4-Service/D4-SB/D4-US.sdp",

 "dataNetworkName":"media-dnn",

 "mbsAppService":[

 {"basePattern":"http://www.test.com/D4-Service/D4-SB/D4-US/video/2048/"},

 {"basePattern":"http://www.test.com/D4-Service/D4-SB/D4-US/audio/1/"}

 ],

 "unicastAppServices":[

 {"unicastAppService":[

 {"basePattern":"http://www.test.com/D4-Service/D4-SB/D4-US/video/1024/"},

 {"basePattern":"http://www.test.com/D4-Service/D4-SB/D4-US/audio/1/"}]

 },

 {"unicastAppService":[

 {"basePattern":"http://www.test.com/D4-Service/D4-SB/D4-US/video/2048/"},

 {"basePattern":"http://www.test.com/D4-Service/D4-SB/D4-US/audio/1/"}]

 }

 ]

 },

 "appService":{

 "MediaManifestDescriptionURI":"http://www.test.com/D4-Service/D4-SB/D4-US/adpd.xml",

 "mimeType":"application/dash+xml;profiles=urn:3GPP:PSS:profile:DASH10",

 "identicalContents":[

 {

 "identicalContent":[

 {"basePattern":"http://www.test.com/D4-Service/D4-SB/D4-US/video/1024/"},

 {"basePattern":"http://www.test.com/D4-Service/D4-SB/D4-US/video/2048/"}

 ],

 },{

 "identicalContent":[

 {"basePattern":"http://www.test.com/D4-Service/D4-SB/D4-US/audio/1/"}

 ]

 }]

 },

 "availabilityInfo":[

 {

 "infoBinding":{

 "mbsServiceArea":[

 {

 "ncgiList":[

 {

 "NcgiTai":{

 "tai":{

 "plmnId":{

 "mcc":"860",

 "mnc":"15"

 },

 "tac":"0fa0"

 },

 "cellList":[

 {

 "Ncgi":{

 "plmnId":{

 "mcc":"860",

 "mnc":"15"

 },

 "nrCellId":"999999999"

 }

 },

 {

 "Ncgi":{

 "plmnId":{

 "mcc":"860",

 "mnc":"15"

 },

 "nrCellId":"999999998"

 }

 }

 ]

 }

 }

 ],

 "taiList":[

 {

 "tai":{

 "plmnId":{

 "mcc":"860",

 "mnc":"15"

 },

 "tac":"0fa0"

 }

 },

 {

 "tai":{

 "plmnId":{

 "mcc":"860",

 "mnc":"15"

 },

 "tac":"0fa0"

 }

 }

 ]

 }

 ],

 "radioFrequency":[

 "9410"

 ]

 }

 }

 ]

 }

 }

 ]

}

##

\*\*\*\* Last Change \*\*\*\*