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OF ITU

**H.741.4**

**Amendment 1**  
(04/2015)

SERIES H: AUDIOVISUAL AND MULTIMEDIA SYSTEMS

IPTV multimedia services and applications for IPTV –  
IPTV application event handling

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IPTV application event handling: Transport  
mechanisms for audience measurement

**Amendment 1: XML schema on the data  
structures for message delivery**

Recommendation ITU-T H.741.4 (2012) –  
Amendment 1

ITU-T



ITU-T H-SERIES RECOMMENDATIONS  
AUDIOVISUAL AND MULTIMEDIA SYSTEMS

CHARACTERISTICS OF VISUAL TELEPHONE SYSTEMS	H.100–H.199
INFRASTRUCTURE OF AUDIOVISUAL SERVICES	
General	H.200–H.219
Transmission multiplexing and synchronization	H.220–H.229
Systems aspects	H.230–H.239
Communication procedures	H.240–H.259
Coding of moving video	H.260–H.279
Related systems aspects	H.280–H.299
Systems and terminal equipment for audiovisual services	H.300–H.349
Directory services architecture for audiovisual and multimedia services	H.350–H.359
Quality of service architecture for audiovisual and multimedia services	H.360–H.369
Telepresence	H.420–H.429
Supplementary services for multimedia	H.450–H.499
MOBILITY AND COLLABORATION PROCEDURES	
Overview of Mobility and Collaboration, definitions, protocols and procedures	H.500–H.509
Mobility for H-Series multimedia systems and services	H.510–H.519
Mobile multimedia collaboration applications and services	H.520–H.529
Security for mobile multimedia systems and services	H.530–H.539
Security for mobile multimedia collaboration applications and services	H.540–H.549
Mobility interworking procedures	H.550–H.559
Mobile multimedia collaboration inter-working procedures	H.560–H.569
BROADBAND, TRIPLE-PLAY AND ADVANCED MULTIMEDIA SERVICES	
Broadband multimedia services over VDSL	H.610–H.619
Advanced multimedia services and applications	H.620–H.629
Ubiquitous sensor network applications and Internet of Things	H.640–H.649
IPTV MULTIMEDIA SERVICES AND APPLICATIONS FOR IPTV	
General aspects	H.700–H.719
IPTV terminal devices	H.720–H.729
IPTV middleware	H.730–H.739
<b>IPTV application event handling</b>	<b>H.740–H.749</b>
IPTV metadata	H.750–H.759
IPTV multimedia application frameworks	H.760–H.769
IPTV service discovery up to consumption	H.770–H.779
Digital Signage	H.780–H.789
E-HEALTH MULTIMEDIA SERVICES AND APPLICATIONS	
Interoperability compliance testing of personal health systems (HRN, PAN, LAN, TAN and WAN)	H.820–H.859
Multimedia e-health data exchange services	H.860–H.869

*For further details, please refer to the list of ITU-T Recommendations.*

# Recommendation ITU-T H.741.4

## IPTV application event handling: Transport mechanisms for audience measurement

### Amendment 1

#### XML schema on the data structures for message delivery

##### Summary

The ITU-T H.741.x series of Recommendations defines a foundational platform for audience measurement (AM) of IPTV services. They focus on the interface between terminal devices and an audience measurement aggregation function.

The AM platform integrates a method for end users to report personal information, and is designed to easily add time-shifted and interactive services, and non-terminal device measurement points. While the ITU-T H.741.x series allows the implementation of audience measurement for IPTV services, its mechanism may be equally applicable to non-IPTV services.

The design philosophy in the ITU-T H.741.x series is focused on scalability, minimizing the use of resources, security, flexibility to support a variety of service-provider deployments, and rich privacy support to meet emerging regulations and legislation.

Recommendation ITU-T H.741.4 specifies the data elements and structures of the transport delivery-dependent XML and binary headers, used in audience measurement messages. Appendix I provides an analysis of AM to understand its transport protocol requirements.

Amendment 1 to Recommendation ITU-T H.741.4 includes XML schema on the data structures for message delivery in Annex A.

##### History

Edition	Recommendation	Approval	Study Group	Unique ID*
1.0	ITU-T H.741.4	2012-06-29	16	<a href="http://handle.itu.int/11.1002/1000/11663">11.1002/1000/11663</a>
1.1	ITU-T H.741.4 (2012) Amd. 1	2015-04-29	16	<a href="http://handle.itu.int/11.1002/1000/12463">11.1002/1000/12463</a>

##### Keywords

Audience measurement, audience rating service, audience viewership, contents rating, data structures, distributed content service, elements, engagement metrics, end-user permission, interactive services, IPTV application event handling, linear TV, metadata, monitoring, personalized service, transport [protocol](#), [XML Schema](#).

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\* To access the Recommendation, type the URL <http://handle.itu.int/> in the address field of your web browser, followed by the Recommendation's unique ID. For example, <http://handle.itu.int/11.1002/1000/11830-en>.

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## Table of Contents

	<b>Page</b>
1) Clause 6 .....	1
2) Clause 6.2 .....	1
3) Clause 6.6 .....	2
4) Annex A – XML schema on the data structures for message delivery .....	3
5) Appendix II – XML schema instances for TD-AMF configurations .....	8
6) Appendix III –XML schema instances for audience measurement report .....	10



## Recommendation ITU-T H.741.4

### IPTV application event handling: Transport mechanisms for audience measurement

#### Amendment 1

#### XML schema on the data structures for message delivery

##### 1) Clause 6

*Modify clause 6 as follows:*

##### 6 Messages for data structure delivery

...

Unicast and multicast delivery elements include:

- A message type identifier to distinguish among AM messages.
- A message expiration time after which the message is not accepted.
- AM protocol version numbers to indicate interoperability and incompatibility.
- A message identifier to support correlation among messages.

In addition, multicast delivery elements include:

- A message integrity check and signature for authentication.
- An element to control acknowledge or error responses, so that problem AM messages may be reported.
- Sub-addressing elements to qualify the intended target sub-set of TD-AMFs.

The delivery elements of the uncompressed binary header may be used to determine if the XML payload is to be uncompressed and parsed.

See clause 7.1.1 of [ITU-T H.741.1] for descriptions of the capabilities provided by these elements.

[The XML schema that can be exchanged over different transport protocols is specified in Annex A.](#)

##### 2) Clause 6.2

*Modify clause 6.2 as follows:*

##### 6.2 Delivery of the data structure "configuration package request"

A unicast transport delivery mechanism is used by TD-AMFs during a pull sequence to deliver the configuration package request data structure.

The data structure of the "configuration request message" is as indicated in Table 3.

**Table 3 – Data structure for the "configuration request message"**

Element	Description	Support/ type	Notes or value domain
MessageType	Indicates configuration package request message.	1	Defined in Table 2.
Expiration Time	Security element indicating the message expiration time.	1	Defined in Table 2.
Protocol Version MajorID	Indicates the major protocol version of this message. Differences in major protocol versions indicate incompatibility where mandatory functions have changed so that an older version receiver would not be able to interoperate with a newer version source if it simply ignored the elements and attributes it did not understand and took the actions defined in the older recommendation.	1	Defined in Table 2.
Protocol Version MinorID	Indicates the minor protocol version of this message, generated by the source of the message. Differences in minor protocol versions indicate compatibility. The minor version number is incremented only if significant new capabilities have been added to the AM protocol (e.g., new message).	1	Defined in Table 2.
MessageID	Element of ConfigRequestMsg Message identifier.	1	Defined in Table 2. Generated by TD-AMF.
Compression	Indicates the compression/decompression algorithm used for the XML payload.	0-1	Defined in Table 2.
Config Package Request	Element of ConfigRequestMsg Container for a configuration package request data structure.	1	Defined in [ITU-T H.741.2].

[XML schema instances for examples of TD-AMF configurations can be found in Appendix II.](#)

### 3) Clause 6.6

*Modify clause 6.6 as follows:*

#### 6.6 Delivery of the data structure "AM report package"

A unicast transport delivery mechanism may be used by a TD-AMF during a pull or push sequence to deliver the data structure of a set of measurement reports. See Table 10.



**Table 10 – Data structure for the "measurement report message"**

Element	Description	Support/type	Notes or value domain
MessageType	Indicates a measurement report message.	1	Defined in Table 2.
Expiration Time	Security element indicating the message expiration time.	1	Defined in Table 2.
Signature	Security element indication of authentication.	1	Defined in Table 2.
Protocol Version MajorID	Indicates the major protocol version of this message.	1	Defined in Table 2.
Protocol Version MinorID	Indicates the minor protocol version of this message.	1	Defined in Table 2.
MessageID	Message identifier.	1	Defined in Table 2. Generated by TD-AMF if push delivery. Generated by aggregation function in measurement report request if pull delivery.
Compression	Indicates the compression/decompression algorithm used for the XML payload.	0-1	Defined in Table 2.
AMReport Package	Container for data structure of a set of measurement reports.	1	Defined in [ITU-T H.741.2].

[XML schema instances for examples of audience measurement report can be found in Appendix III.](#)

#### 4) Annex A

Add the following annex after clause 6.8:

### Annex A

#### XML schema on the data structures for message delivery

(This annex forms an integral part of this Recommendation.)

The following XML schema can be exchanged over different transport protocols.

```
<?xml version="1.0" encoding="UTF-8"?>
<schema xmlns:am4=" http://www.itu.int/xml-namespace/itu-
t/h.741.4/messagedelivery" xmlns:am3=" http://www.itu.int/xml-namespace/itu-
t/h.741.3/lineartv" xmlns:am2=" http://www.itu.int/xml-namespace/itu-
t/h.741.2/datastructure" xmlns:ds="http://www.w3.org/2000/09/xmlsig#"
xmlns="http://www.w3.org/2001/XMLSchema" targetNamespace="
http://www.itu.int/xml-namespace/itu-t/h.741.4/messagedelivery"
elementFormDefault="qualified" attributeFormDefault="unqualified">
  <annotation>
    <documentation xml:lang="en"><![CDATA[
```

This schema (H.741.4-v1.xsd) is the ITU-T H.741 Part.4 Metadata, Version 1.

The namespace of the schema is "http://www.itu.int/xml-namespace/itu-t/h.741.4/messagedelivery", and its preferred namespace prefix is "am4".]]</documentation>

```
</annotation>
<import namespace="http://www.itu.int/xml-namespace/itu-t/h.741.3/lineartv"
schemaLocation="http://www.itu.int/xml-namespace/itu-t/h.741.3/H.741.3-v1.xsd"/>
<import namespace="http://www.itu.int/xml-namespace/itu-
t/h.741.2/datastructure" schemaLocation="http://www.itu.int/xml-namespace/itu-
t/h.741.2/H.741.2-v1.xsd"/>
<import namespace="http://www.w3.org/2000/09/xmlsig#"
schemaLocation="xmlsig-core-schema.xsd"/>
<import namespace="http://www.w3.org/XML/1998/namespace"
schemaLocation="http://www.w3.org/2001/03/xml.xsd"/>
<!-- ===== -->
<!-- ===== -->
<!-- Primitive Data Types for H.741 Part.4 -->
<!-- ===== -->
<!-- ===== -->
<simpleType name="HexBinary1">
  <restriction base="hexBinary">
    <length value="1"/>
  </restriction>
</simpleType>
<simpleType name="HexBinaryMax2">
  <restriction base="hexBinary">
    <maxLength value="2"/>
  </restriction>
</simpleType>
<simpleType name="HexBinaryMax4">
  <restriction base="hexBinary">
    <maxLength value="4"/>
  </restriction>
</simpleType>
<simpleType name="HexBinary16">
  <restriction base="hexBinary">
    <length value="16"/>
  </restriction>
</simpleType>
<!-- ===== -->
<simpleType name="ProtocolVersionIDType">
  <restriction base="am4:HexBinary1"/>
</simpleType>
<simpleType name="MessageIDType">
  <restriction base="am2:HexBinary8"/>
</simpleType>
<!-- ===== -->
<!-- Data Types (Table 2) -->
<!-- ===== -->
<simpleType name="MessageTypeType">
  <restriction base="HexBinary1">
    <enumeration value="00"/>
    <enumeration value="01"/>
    <enumeration value="02"/>
    <enumeration value="03"/>
    <enumeration value="04"/>
    <enumeration value="05"/>
    <enumeration value="06"/>
    <enumeration value="07"/>
    <enumeration value="08"/>
    <enumeration value="09"/>
  </restriction>
</simpleType>
```

```

<simpleType name="ResponseQualifierType">
  <restriction base="HexBinary1">
    <enumeration value="00"/>
    <enumeration value="01"/>
    <enumeration value="02"/>
    <enumeration value="03"/>
  </restriction>
</simpleType>
<!-- ===== -->
<!-- Data Elements for H.741 Part.4 (Table 2) -->
<!-- ===== -->
<complexType name="AMMsgBaseType">
  <sequence>
    <element name="MessageType" type="am4:MessageTypeType"/>
    <element name="Compression" type="am2:CompressionType"
minOccurs="0"/>
  </sequence>
  <attribute name="expirationTime" type="dateTime" use="required"/>
  <attribute name="protocolVersionMajorId"
type="am4:ProtocolVersionIDType" use="required"/>
  <attribute name="protocolVersionMinorId"
type="am4:ProtocolVersionIDType" use="required"/>
  <attribute name="messageId" type="am4:MessageIDType" use="required"/>
</complexType>
<complexType name="AMMulticastMsgBaseType">
  <complexContent>
    <extension base="am4:AMMsgBaseType">
      <sequence>
        <element name="Digest" type=" ds:ReferenceType"/>
        <element name="Signature" type=" ds:SignatureType"/>
        <element name="ResponseQualifier"
type="am4:ResponseQualifierType"/>
        <element name="TerminalDeviceTarget"
type="am4:TerminalDeviceTargetListType" minOccurs="0"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
<complexType name="TerminalDeviceTargetListType">
  <sequence>
    <element name="TerminalDeviceTarget" type="am4:HexBinary16"
minOccurs="0" maxOccurs="unbounded"/>
  </sequence>
  <attribute name="size" type="am4:HexBinaryMax4"/>
</complexType>

  <complexType name="ThresholdRangeType">
    <attribute name="lower" type="am4:HexBinaryMax2" use="optional"
default="00"/>
    <attribute name="upper" type="am4:HexBinaryMax2" use="optional"
default="FFFF"/>
  </complexType>
  <!-- group name="ThresholdRange">
    <sequence>
      <element name="LowerThreshold" type="am4:HexBinary2" default="00"
minOccurs="0"/>
      <element name="UpperThreshold" type="am4:HexBinary2"
default="FFFF" minOccurs="0"/>
    </sequence>
  </group -->
<!-- ===== -->
<!-- ===== -->
<!-- AM Messages for H.741 Part.4-->
<!-- ===== -->

```

```

<!-- ===== -->
<!-- ===== -->
<!-- 1. Configuration Package Request Message (Table 3) -->
<!-- ===== -->
<element name="ConfigRequestMsg" type="am4:ConfigRequestMsgType"/>
<complexType name="ConfigRequestMsgType">
  <complexContent>
    <extension base="am4:AMMsgBaseType">
      <sequence>
        <element name="ConfigPackageRequest"
type="am2:ConfigPackageRequestType"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
<!-- ===== -->
<!-- 2. Configuration Package Request Response Messages (Tables 4,5) -->
<!-- ===== -->
<element name="UnicastConfigRequestResponseMsg"
type="am4:UnicastConfigRequestResponseMsgType"/>
<complexType name="UnicastConfigRequestResponseMsgType">
  <complexContent>
    <extension base="am4:AMMsgBaseType">
      <sequence>
        <element name="ConfigPackageRequestResponse"
type="am2:ConfigPackageRequestResponseType"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
<!-- ===== -->
<element name="MulticastConfigRequestResponseMsg"
type="am4:MulticastConfigRequestResponseMsgType"/>
<complexType name="MulticastConfigRequestResponseMsgType">
  <complexContent>
    <extension base="am4:AMMulticastMsgBaseType">
      <sequence>
        <element name="UserInfoTargetString"
type="am2:UserInfoTargetStringType" minOccurs="0" maxOccurs="unbounded"/>
        <element name="ConfigPackageRequestResponse"
type="am2:ConfigPackageRequestResponseType"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
<!-- ===== -->
<!-- 3. AMF Configuration Messages (Tables 6,7) -->
<!-- ===== -->
<element name="UnicastConfigMsg" type="am4:UnicastConfigMsgType"/>
<complexType name="UnicastConfigMsgType">
  <complexContent>
    <extension base="am4:AMMsgBaseType">
      <sequence>
        <element name="ImmediateAndFutureConfiguration"
type="am2:ConfigPackageRequestResponseType"/>
      </sequence>
    </extension>
    <!-- extension base="am4:UnicastConfigRequestResponseMsgType" -->
  </complexContent>
</complexType>
<!-- ===== -->
<element name="MulticastConfigMsg" type="am4:MulticastConfigMsgType"/>
<complexType name="MulticastConfigMsgType">
  <complexContent>

```

```

        <extension base="am4:AMMulticastMsgBaseType">
            <sequence>
                <element name="ThresholdRange"
type="am4:ThresholdRangeType" minOccurs="0"/>
                <!-- group ref="am4:ThresholdRange"/ -->
                <element name="TerminalDeviceTypeTarget"
type="am2:TerminalDeviceTypeType" minOccurs="0" maxOccurs="unbounded"/>
                <element name="UserInfoTargetString"
type="am2:UserInfoTargetStringType" minOccurs="0" maxOccurs="unbounded"/>
                <element name="ImmediateAndFutureConfiguration"
type="am2:ConfigPackageRequestResponseType"/>
            </sequence>
        </extension>
    </complexContent>
</complexType>
<!-- ===== -->
<!-- 4. Measurement Report Request Messages (Tables 8,9) -->
<!-- ===== -->
    <element name="UnicastMeasReportRequestMsg"
type="am4:UnicastMeasReportRequestMsgType"/>
    <complexType name="UnicastMeasReportRequestMsgType">
        <complexContent>
            <extension base="am4:AMMsgBaseType">
                <sequence>
                    <element name="MeasurementReportRequest"
type="am2:MeasurementReportRequestType"/>
                </sequence>
            </extension>
        </complexContent>
    </complexType>
<!-- ===== -->
    <element name="MulticastMeasReportRequestMsg"
type="am4:MulticastMeasReportRequestMsgType"/>
    <complexType name="MulticastMeasReportRequestMsgType">
        <complexContent>
            <extension base="am4:AMMulticastMsgBaseType">
                <sequence>
                    <element name="ThresholdRange"
type="am4:ThresholdRangeType" minOccurs="0"/>
                    <!-- group ref="am4:ThresholdRange"/ -->
                    <element name="MeasurementReportRequest"
type="am2:MeasurementReportRequestType"/>
                </sequence>
            </extension>
        </complexContent>
    </complexType>
<!-- ===== -->
<!-- 5. Measurement Report Message (Tables 10) -->
<!-- ===== -->
    <element name="MeasurementReportMsg" type="am4:MeasurementReportMsgType"/>
    <complexType name="MeasurementReportMsgType">
        <complexContent>
            <extension base="am4:AMMsgBaseType">
                <sequence>
                    <element name="Signature" type="ds:SignatureType"/>
                    <element name="AMReportPackage"
type="am2:AMReportPackageType"/>
                </sequence>
            </extension>
        </complexContent>
    </complexType>
<!-- ===== -->
<!-- 6. Acknowledge Message (Table 11) -->
<!-- ===== -->

```

```

<element name="ConfigurationAckMsg" type="am4:ConfigurationAckMsgType"/>
<complexType name="ConfigurationAckMsgType">
  <complexContent>
    <extension base="am4:AMMsgBaseType">
      <sequence>
        <element name="Ack" type="am2:AckType"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
<!-- ===== -->
<!-- 7. Error Message (Table 12) -->
<!-- ===== -->
<element name="ErrorMsg" type="am4:ErrorkMsgType"/>
<complexType name="ErrorkMsgType">
  <complexContent>
    <extension base="am4:AMMsgBaseType">
      <sequence>
        <element name="Error" type="am2:ErrorType"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
</schema>

```

## 5) Appendix II

Add the following appendix after Appendix I:

### Appendix II

#### XML schema instances for TD-AMF configurations

(This appendix does not form an integral part of this Recommendation.)

This is the XML schema instances for TD-AMF configurations.

```

<?xml version="1.0" encoding="UTF-8"?>
<ConfigRequestMsg expirationTime="2013-05-30T09:00:00"
protocolVersionMajorId="00" protocolVersionMinorId="01" messageId="1234ABCD"
xsi:schemaLocation=" http://www.itu.int/xml-namespace/itu-t/h.741.4/H.741.4-
v1.xsd" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:am2="
http://www.itu.int/xml-namespace/itu-t/h.741.2/datastructure" xmlns:am3="
http://www.itu.int/xml-namespace/itu-t/h.741.3/lineartv" xmlns="
http://www.itu.int/xml-namespace/itu-t/h.741.4/messagedelivery">
  <MessageType>00</MessageType>
  <Compression>BiM</Compression>
  <ConfigPackageRequest terminalDeviceIdref="0123AABB"
subscriberIdref="user1">
    <am2:TerminalDeviceType>STB</am2:TerminalDeviceType>
    <!-- Only one TerminalDeviceType is allowed -->
    <am2:UserPermitInfo lastUpdateDateAndTime=" 2013-05-30T09:00:00">
      <am2:UserPermit expirationDate="2013-05-30">

        <am2:DefaultPermissionLevel>Distinguishability_And_GenericUserInfo</am2:Def
aultPermissionLevel>
          <am2:DefaultAllContentClassExceptList>
            <am2:ContentClass domain="politics">presidential
debate</am2:ContentClass>

```

```

        <am2:ContentClass domain="religion">Sunday
Mass</am2:ContentClass>
        </am2:DefaultAllContentClassExceptList>
        <am2:UserPermissionSet>

<am2:PermissionLevel>OnlyDistinguishabilityInfo</am2:PermissionLevel>
        <am2:UserPermission>
            <am2:TerminalDeviceSet>

<am2:TerminalDeviceType>STB</am2:TerminalDeviceType>

<am2:TerminalDeviceType>TV</am2:TerminalDeviceType>

<am2:TerminalDeviceType>Mobile</am2:TerminalDeviceType>
            </am2:TerminalDeviceSet>
            <am2:AllContentClassExceptList>
                <am2:ContentClass
domain="politics">presidential debate</am2:ContentClass>
                </am2:AllContentClassExceptList>
            </am2:UserPermission>
        </am2:UserPermissionSet>
    </am2:UserPermit>
</am2:UserPermitInfo>
<am2:AMFCapabilityProfile>
    <am2:TransportCapabilitiesList>
        <am2:TransportProtocolMode>HTTP</am2:TransportProtocolMode>
        <am2:TransportProtocolMode>IGMP</am2:TransportProtocolMode>
    </am2:TransportCapabilitiesList>
    <am2:SecurityCapabilities>
        <am2:CryptographicProtocol>TLS</am2:CryptographicProtocol>
    </am2:SecurityCapabilities>
    <am2:PermissionOperationModes>
        <am2:PermissionMode>Internal</am2:PermissionMode>
        <am2:PermissionMode>External</am2:PermissionMode>
        <am2:PermissionMode>Hybrid</am2:PermissionMode>
    </am2:PermissionOperationModes>
    <am2:ConfigurationPackageDelivery>
        <am2:ConfigurationMode>Push</am2:ConfigurationMode>
        <am2:ConfigurationMode>Pull</am2:ConfigurationMode>
        <am2:ConfigurationMode>Hybrid</am2:ConfigurationMode>
    </am2:ConfigurationPackageDelivery>
    <am2:MeasurementTriggerMethod>
        <am2:EventTrigger eventName="AudioVolume"/>
        <am2:TimeTrigger sampleSetName="EventCount"/>
        <am2:ServiceStartTrigger sampleSetName="TDLocation"/>
    </am2:MeasurementTriggerMethod>
    <am2:ReportDeliveryModes>
        <am2:DeliveryMode>ImmediatePush</am2:DeliveryMode>
        <am2:DeliveryMode>Pull</am2:DeliveryMode>
    </am2:ReportDeliveryModes>
    <am2:OperationalManagementCapabilities>

<am2:OperationalManagement>Acknowledgements</am2:OperationalManagement>

<am2:OperationalManagement>ChannelChangeFilter</am2:OperationalManagement>
        <am2:OperationalManagement>ChannelsMeasured
</am2:OperationalManagement>
    </am2:OperationalManagementCapabilities>
    <am2:Compression>BiM</am2:Compression>
</am2:AMFCapabilityProfile>
    <am2:CurrentMeasurement packageId="000001" packageVersion="001"/>
    <am2:FutureMeasurement packageId="000002" packageVersion="002"/>
</ConfigPackageRequest>
</ConfigRequestMsg>

```





```
        </am3:LinearTVReport>
      </am2:MeasurementReport>
    </am4:AMReportPackage>
  </am4:MeasurementReportMsg>
```





## SERIES OF ITU-T RECOMMENDATIONS

Series A	Organization of the work of ITU-T
Series D	General tariff principles
Series E	Overall network operation, telephone service, service operation and human factors
Series F	Non-telephone telecommunication services
Series G	Transmission systems and media, digital systems and networks
<b>Series H</b>	<b>Audiovisual and multimedia systems</b>
Series I	Integrated services digital network
Series J	Cable networks and transmission of television, sound programme and other multimedia signals
Series K	Protection against interference
Series L	Environment and ICTs, climate change, e-waste, energy efficiency; construction, installation and protection of cables and other elements of outside plant
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Series N	Maintenance: international sound programme and television transmission circuits
Series O	Specifications of measuring equipment
Series P	Terminals and subjective and objective assessment methods
Series Q	Switching and signalling
Series R	Telegraph transmission
Series S	Telegraph services terminal equipment
Series T	Terminals for telematic services
Series U	Telegraph switching
Series V	Data communication over the telephone network
Series X	Data networks, open system communications and security
Series Y	Global information infrastructure, Internet protocol aspects and next-generation networks
Series Z	Languages and general software aspects for telecommunication systems