International Telecommunication Union

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

F.746.2

(02/2014)

SERIES F: NON-TELEPHONE TELECOMMUNICATION SERVICES

Audiovisual services

Service description for user data exchange between functional components in network entities and terminals

Recommendation ITU-T F.746.2

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Recommendation ITU-T F.746.2

Service description for user data exchange between functional components in network entities and terminals

Summary

Recommendation ITU-T F.746.2 describes user data exchange scenarios and a basic approach of exchanging user data between terminals or between terminals and network entities by using data packages encapsulating formatted user data. The functionality of the components which implement the data exchange and general guidance of generating and parsing such data package are given as well. This Recommendation also describes the preferred extensible markup language (XML) representations used when encapsulating corresponding user data, including, but not limited to, contacts, messages and other user data categories.

History

Edition	Recommendation	Approval	Study Group	Unique ID*
1.0	ITU-T F.746.2	2014-02-13	16	11.1002/1000/12050

Keywords

Data exchanging agent (DXA), user data exchange, XML.

* 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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1 Scope

The general purpose of this Recommendation is to describe user data exchange scenarios and a basic approach to exchange user data between terminals or between terminals and network entities by using data packages encapsulating formatted user data. The functionality of the components which implement the data exchange and general guidance of generating and parsing such data packages are given as well. This Recommendation also describes the preferred extensible markup language (XML) representations used when encapsulating corresponding user data, including, but not limited, to contacts, messages and other user data categories.

This Recommendation applies to terminals and network entities which choose to implement user data exchanging functions as described in this Recommendation.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

[ETSI TS 123 140] ETSI TS 123 140 V6.16.0 (2009), *Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Multimedia Messaging Service (MMS); Functional description; Stage 2* (3GPP TS 23.140 version 6.16.0 Release 6).

[ETSI TS 126 140] ETSI TS 126 140 V7.1.0 (2007), *Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Multimedia Messaging Service (MMS); Media formats and codes* (3GPP TS 26.140 version 7.1.0 Release 7).

[ETSI TS 127 005] ETSI TS 127 005 V3.2.0 (2002), *Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS);Use of Data Terminal Equipment – Data Circuit terminating Equipment (DTE – DCE) interface for Short Message Service (SMS) and Cell Broadcast Service (CBS)* (3GPP TS 27.005 version 3.2.0 Release 1999).

[IETF RFC 5545] IETF RFC 5545 (2009), *Internet Calendaring and Scheduling Core Object Specification (iCalendar)*.

[IETF RFC 6321] IETF RFC 6321 (2011), *xCal: The XML Format for iCalendar*.

[IETF RFC 6350] IETF RFC 6350 (2011), *vCard Format Specification*.

[IETF RFC 6351] IETF RFC 6351 (2011), *xCard: vCard XML Representation*.

[W3C XML] W3C XML 1.0 (2008), *Extensible Markup Language (XML) 1.0 (Fifth Edition)*.

[W3C XMLEnc] W3C XML Encryption (2002), *XML Encryption Syntax and Processing*.

[W3C XSD] W3C XML Schema Part 1 (2004), *XML Schema Part 1: Structures Second Edition.*

3 Definitions

3.1 Terms defined elsewhere

None.

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

3.2.1 data exchanging agent: Logic in terminals or entities where the main function is to put data into or extract data from the data package described in this Recommendation. Furthermore, it monitors the data exchange process and takes actions when specific user data is encountered after the data exchange process. A typical form of the functional component is an extensible markup language (XML) parser combined with application-dependent logic.

3.2.2 depository: A depository is a location where the user data could be stored or kept so that it could be accessed later. It can take various forms such as internal or external memory of terminals, network storage servers and other storage devices.

3.2.3 user data: "User data" is the data that is created or stored in terminals or network entities by the users, and is related to the private information, historical operations performed by the user, personal tendencies or favourite user settings. It is independent of whether this data is transported by terminal or network entities, and has no correlation with the counterpart of "Control data".

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

DRM Digital Rights Management

DXA Data exchanging Agent

FTP File Transfer Protocol

HTTP Hypertext Transfer Protocol

IM Instant Message

MMS Multimedia Message Service

RAM Random Access Memory

ROM Read Only Memory

SD Secure Digital

SIM Subscriber Identity Module

SMS Short Message Service

URL Uniform Resource Locator

USB Universal Serial Bus

USIM User Services Identity Module

W3C World Wide Web Consortium

XML Extensible Markup Language

5 Conventions

None.

6 General

Under many circumstances there is a need to exchange user data between terminals or network entities and another data depository. For example, a user may want to replace a terminal with a new terminal without losing personal data, such as contacts and received messages, stored in the original one. The data exchange process might be initiated by the user manually or by a network application automatically, and multiple categories of data might be involved in an exchange process. However, the terminals or entities acting as the source and destination in the exchange process may use different operating systems or different internal data expressions for the same kind of data. Without a consistent approach, accurate exchange of the user data is difficult to realize.

To facilitate the exchange process and make it as simple as possible for the users, this Recommendation describes an exchange approach by using a data package as a container to encapsulate user data and specifies the recommended data syntax for parsing or generating the data package.

7 Scenarios of user data exchange

7.1 User data grouping

The user data includes the user's personal data, device configuration parameters and personalized application data, and can be stored in terminals or other entities, no matter the device type. User data may take various forms such as binary, text or multimedia files depending on the corresponding data category. It could be stored in different locations such as internal memory (RAM, ROM, etc.) and external memory (SIM/USIM, SD card, hard disk, etc.).

7.1.1 Private user data

Private user data is created by the user for a special purpose or generated by the users operations and contains important information about the user. Examples of private user data include:

– Contact information (including phonebook)
– Messages (including SMS, MMS, IM and e-mail)
– Calendar information
– Favourite uniform resource locator (URL) lists and bookmarks
– Call and browsing history

7.1.2 Device configuration data

Device configuration data is the data that a terminal allows users to access and modify, so as to personalize what the terminal displays and the way it behaves. Examples of device configuration data include:

– Terminal theme, fonts, wallpaper and screensaver
– Language settings
– Date/Time and location settings
– Energy saving settings
– Accessibility settings

7.1.3 Personalized application data

Personalized application data is the data that applications allow users to access and modify, so as to personalize the way an application operates or behaves, including:

– Service dependent settings or parameters

– Application settings or application files

7.2 Scenario description

A basic user data exchange scenario is that a terminal or an entity wants to receive discrete sets of user data from another terminal or to send data to another terminal. For example, a mobile phone desires to retrieve all the contacts and calendar data stored in another terminal. Another example would be that an entity in the network needs to receive a status report or needs to retrieve the browsing history of the streaming media player on the terminal to use for later statistical purposes.

In those cases, typically user data is of small size and may be stored in different formats in the two terminals because of different operating platforms or different data management applications. To exchange data, normally the data providing party will generate a data package which contains multiple categories of data, and the other party receives the data package and performs data analysis, followed by certain operations according to the original purpose of this data acquisition process.

8 User data exchange method

8.1 General procedure

For a typical user data exchange scenario, the data exchange process can be summarized into several steps: Export, transfer and analyse.

– Export: Export selected user data from party A as an accessible data package.

– Transfer: Party A transfers the selected package to party B by any approach. This step does not need to be in real time.

– Analyse: Party B opens the package and performs the analysis. It retrieves all the needed data or supported data according to the pre-defined data format or expression. This is followed by certain operations based on the retrieved data.

The data package which contains all the user data forms the basis of data exchange. To ensure compatibility, the data package is defined in an extensible markup language (XML) format as specified in [W3C XML] so that it may be supported and applied in various applications across different operating systems and terminals. Furthermore, the data package is able to encapsulate multiple categories of data and is also extendable to new data categories. This Recommendation uses XML for the user data in the data package as it is designed to describe structured data, is naturally extendable and widely supported by many applications and operating systems.

The transfer step encompasses transferring a data package between a terminal and another entity. There are various techniques for transferring files (such as the XML data package files), including file transfer protocol (FTP), hypertext transfer protocol (HTTP), Bluetooth and infrared via short ranged wireless communication and universal serial bus (USB) storage via wired connections. The transfer may be real-time or may be a store and forward arrangement. There may be extra processing during the data package transfer. The data package may also be moved to another depository and accessed at a later time as necessary.

The export and analyse steps could be implemented by functional components. These components are deployed in the terminals or the entities acting as data exchange agents to manage the data exchange. The data exchange process is illustrated in Figure 1.

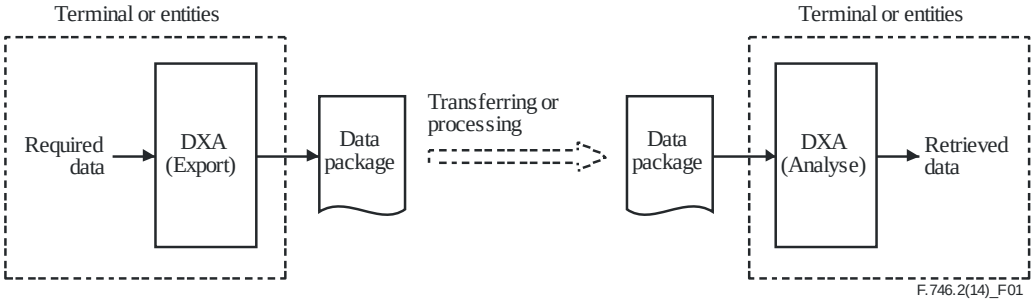

Figure 1 – Data exchange procedure

8.2 Data package

8.2.1 Example

The data package is an XML encoded structure. A simple example of a data package containing the contacts information, calendar records and instant message history, which is used for exchanging private user data between two terminals, is illustrated as follows:

```
<?xml version="1.0" encoding="UTF-8"?>
<DataExchangeInfo>
  <UdxVersion>1.0</UdxVersion>
  <Encryption>0</Encryption>
  <RecordInfo>
    <CreateTime>2010-08-10T14:30:00Z</CreateTime>
    <VendorInfo>MobilePhone_Vendor_X</VendorInfo>
    <DeviceInfo>TypeNumber_2321C</DeviceInfo>
    <UserAgent>Data_export_Manager</UserAgent>
  </RecordInfo>
  <DataSection>
    <vcards xmlns="urn:ietf:params:xml:ns:vcard-4.0">
    <!—XML structured data for contacts is stored here-->
    </vcards>
    <icalendar xmlns="urn:ietf:params:xml:ns:icalendar-2.0">
    <!—XML structured data for calendar is stored here-->
    </icalendar>
    <IM xmlns="http://IM.com/IM-xml/conversation-records">
    <!—XML structured data for IM message history is stored here-->
    </IM>
  </DataSection>
</DataExchangeInfo>
```

8.2.2 <DataExchangeInfo> element

The root element in this XML structure is <DataExchangeInfo> which is also the beginning of the XML structure. When packing data into the <DataExchangeInfo> element, the format should follow the XML schema 1.1 description of the <DataExchangeInfo> element, which follows [W3C XSD], as listed below:

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">
<xs:element name="DataExchangeInfo" type="DataExchangeInfoType"/>
<xs:complexType name="DataExchangeInfoType">
  <xs:sequence>
    <xs:element name="UdxVersion" type="xs:string" default="1.0"/>
    <xs:element name="Encryption" type="xs:boolean" default ="0"/>
    <xs:element name="RecordInfo" type="RecordInfoType"/>
    <xs:element name="DataSection" type="DataSectionType"/>
  </xs:sequence>
</xs:complexType>
```

```
<xs:complexType name="RecordInfoType">
  <xs:sequence>
    <xs:element name="CreateTime" type="xs:dateTime" minOccurs="0"/>
    <xs:element name="VendorInfo" type="xs:string" minOccurs="0"/>
    <xs:element name="DeviceInfo" type="xs:string" minOccurs="0"/>
    <xs:element name="UserAgent" type="xs:string" minOccurs="0"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="DataSectionType">
  <xs:sequence>
    <xs:any minOccurs="0" maxOccurs="unbounded" processContents="lax"/>
  </xs:sequence>
</xs:complexType>
</xs:schema>
```

In the <DataExchangeInfo> element, there are several child elements:

– <UdxVersion>: this element indicates the version of this XML file.

– <Encryption>: this element indicates the encryption status of this XML file.

– <RecordInfo>: this element contains the following descriptive information about the data package:

  • <CreateTime>: Contains a string indicating the creation time of this package according to the format

  • <VendorInfo>: Contains a string indicating information about the terminal vendor.

  • <DeviceInfo>: Contains a string indicating information about the terminal itself.

  • <UserAgent>: Contains a string indicating information about the application generating the data package.

– <DataSection>: this element contains the main body of the data to be exchanged.

8.2.3 <DataSection> element

The <DataSection> is the main element which contains the data to be exchanged. Any XML formulated user data that follows the corresponding XML representations defined in the existing specifications or defined by applications itself may be stored in this element.

9 Functionality of data exchange functional components

9.1 Basic functionality

The data exchanging agent (DXA) should be able to generate and parse the XML data package. When parsing the XML data package, the DXA should ignore unsupported data in the data package without interrupting the data exchange process or generating an unexpected exception error.

The DXA should be capable of supporting the updating of the data set definition. This functionality may be realized by updating the corresponding XML definition of the supported data.

The DXA should, when appropriate, avoid data collision when storing the retrieved data from the exchange process, possibly by noting the existing user data records. When data collision might occur, actions such as prompts to user or user data merging according to predefined rules should be taken.

9.2 Security consideration

The decision to take action to ensure the security of user data exchange depends on the application implementation and the data sensitivity. For some real-time implementations of user data exchange, security issues could be addressed in the transport layer by secure file transfer. For other non-real-

time implementations, for example where the generated data package would be temporarily stored in public websites, simple password protection or XML encryption according to [W3C XMLEnc] may be applied on the data package to prevent unauthorized access of the user data.

When XML encryption is used to create the data package, the DXA should be capable of encrypting the user data and decrypting the XML encrypted data according to the [W3C XMLEnc].

10 Preferred XML user data syntax

10.1 General

Whether the data retrieved from the data package can be successfully understood will depend on the XML user data syntax. If the XML user data syntax in the data package perfectly matches the internal storage format used by the terminal or the entities which receive the data package, then the user data exchange can be performed without any compatibility problem, otherwise the exchange process may suffer data loss.

User data typically has its own distinctive format, which may be different between multiple terminals and/or operating systems. Moreover some kinds of user data do not use popular or globally-accepted formats. This Recommendation defines XML syntax for several common forms of user data in order to improve interoperability between the entities.

10.2 Contacts data syntax

For representing and exchanging contact and relevant information about individuals and other entities, IETF has specified vCard data format in [IETF RFC 6350], which is a text-based format.

The XML representation for vCard is defined by [IETF RFC 6351]. The underlying data structure is exactly the same as the original vCard text format, which supplies the one-to-one mapping between the original vCard format and the XML representation.

The contacts XML representation should follow the vCard XML format, which is specified in [IETF RFC 6351].

10.3 Calendar data syntax

For the calendaring and scheduling data, IETF has defined the iCalendar data format in [IETF RFC 5545]. The iCalendar data format is a widely deployed interchange format. While many applications and services on the Internet support and generate calendar data, similar to the vCard format, an iCalendar XML representation has been defined. This supplies a one-to-one mapping between the original iCalendar format and the XML representation.

The calendaring XML representation should follow the iCalendar XML formats, which is specified in [IETF RFC 6321].

10.4 Messaging data syntax

10.4.1 SMS syntax

For exchanging the SMS data stored in mobile terminals or other storages, the recommended XML schema representation following XML schema 1.1 is shown as below:

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">
<xs:element name="RecordOfSMS" type="RecordOfSMSType"/>
<xs:complexType name="RecordOfSMSType">
  <xs:sequence>
    <xs:element name="SMSField" type="SMSFieldType" minOccurs="0"
    maxOccurs="unbounded"/>
  </xs:sequence>
```

```
</xs:complexType>
<xs:complexType name="SMSFieldType">
  <xs:sequence>
    <xs:element name="Origination_Address" type="xs:string" minOccurs="0"/>
    <xs:element name="Destination_Address" type="xs:string" minOccurs="0"
    maxOccurs="unbounded"/>
    <xs:element name="Data" type="xs:string" minOccurs="0"/>
    <xs:element name="TimeStamp" type="xs:string" minOccurs="0"/>
    <xs:element name="MessageInfo" type="MessageInfoType" minOccurs="0"/>
    <xs:element name="EXTENSION" type="xs:string" minOccurs="0"
    maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="MessageInfoType">
  <xs:choice>
    <xs:element name="MT_SMS" type="xs:boolean" default="1"/>
    <xs:element name="MO_SMS" type="xs:boolean" default="0"/>
    <xs:element name="Draft_SMS" type="xs:boolean" default="0"/>
    <xs:element name="Delivery_Report" type="xs:boolean" default="0"/>
  </xs:choice>
</xs:complexType>
</xs:schema>
```

When converting SMS data to XML representation, the SMS information data fields should be mapped to XML elements correctly. The specific data format and meaning for each element is described as below:

<RecordofSMS> is the root element for storing SMS. It may contain multiple <SMSField> elements.

<SMSField> is the element containing data for one SMS record, it has several fields:

– <Origination_Address>: Contains a string with the address information of the terminals or the entities sending the SMS, the specific format shall follow the address definition of SMS in [ETSI TS 127 005].

– <Destination_Address>: Contains a string with the address information of the recipient of the SMS, the specific format shall follow the address definition of SMS in [ETSI TS 127 005].

– <Data>: Contains a string with the text content of the SMS, the format of the string shall follow the short message data format definition in [ETSI TS 127 005].

– <TimeStamp>: Contains a string indicating the creating time of this SMS record when it is received, sent out or generated within the terminal or the entities, the format of the time shall follow the time string format defined in [ETSI TS 127 005].

– <MessageInfo>: this is the elements indicating the status of the SMS:

  • <MT_SMS>: If the SMS is sent to the terminals or the entities by other terminals or entities, this field shall be set to 1; otherwise it shall be set to 0.

  • <MO_SMS>: If the SMS is sent out by the terminals or the entities to other terminals or entities, this field shall be set to 1; otherwise it shall be set to 0.

  • <Draft_SMS>: If the SMS is generated within the terminals or the entities and hasn't been sent out, this field shall be set to 1; otherwise it shall be set to 0.

  • <Delevery_Report>: If the SMS is a delivery report from the SMS service centre located in the network, this field shall be set to 1; otherwise it shall be set to 0.

– <EXTENSION>: Contains a string about any extra descriptive information of the SMS if supported by the terminals or the entities.

10.4.2 MMS Syntax

For exchanging the multimedia message service (MMS) data stored in the mobile terminals or other storages, the recommended XML schema representation following XML schema 1.1 is shown as below:

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">
<xs:element name="RecordOfMMS" type="RecordOfMMSType"/>
<xs:complexType name="RecordOfMMSType">
  <xs:sequence>
    <xs:element name="MMSField" type="MMSFieldType" minOccurs="0"
    maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="MMSFieldType">
  <xs:sequence>
    <xs:element name="MMSContent" type="MMSContentType" minOccurs="0"/>
    <xs:element name="ContentInMMS" type="ContentInMMSType" minOccurs="0"/>
    <xs:element name="Message_Type" type="xs:string" minOccurs="0"/>
    <xs:element name="MMS_Version" type="xs:string" minOccurs="0"/>
    <xs:element name="Message_ID" type="xs:string" minOccurs="0"/>
    <xs:element name="Sender_address" type="xs:string" minOccurs="0"/>
    <xs:element name="Recipient_address" type="xs:string" minOccurs="0"
    maxOccurs="unbounded"/>
    <xs:element name="Message_class" type="xs:string" minOccurs="0"/>
    <xs:element name="Date_and_time" type="xs:string" minOccurs="0"/>
    <xs:element name="Priority" type="xs:string" minOccurs="0"/>
    <xs:element name="Subject" type="xs:string" minOccurs="0"/>
    <xs:element name="MM_State" type="xs:string" minOccurs="0"/>
    <xs:element name="EXTENSION" type="xs:string" minOccurs="0"
    maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="MMSContentType">
  <xs:sequence>
    <xs:element name="Charset" type="xs:string" minOccurs="0"/>
    <xs:element name="Content-Transfer-Encoding" type="xs:string"
    minOccurs="0"/>
    <xs:element name="Content-Location" type="xs:string" minOccurs="0"/>
    <xs:element name="Data" type="xs:string" minOccurs="0"/>
    <xs:element name="Content-type" type="xs:string" minOccurs="0"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="ContentInMMSType">
  <xs:sequence>
    <xs:element name="ContentInfo" type="xs:string" minOccurs="0"/>
    <xs:element name="Type" type="xs:string" minOccurs="0"/>
    <xs:element name="Start" type="xs:string" minOccurs="0"/>
  </xs:sequence>
</xs:complexType>
</xs:schema>
```

When converting MMS data to XML representation, the MMS information data fields should be mapped to the XML elements correctly, the specific data format and the meaning for each MMS information field is described below:

<RecordofMMS> is the root element for storing MMS. It may contain multiple <MMSField> elements.

<MMSField> is the element containing data for one MMS record, it has several fields:

– <MMScontent>: Contains several fields holding the content of the MMS.

- <Charset>: Contains a string indicating the character encoding for text as specified in [ETSI TS 126 140].
- <Content-Transfer-Encoding>: Contains a string indicating the content encoding type as specified in [ETSI TS 123 140].
- <Content-Location>: Contains a string with the reference location of MMS content as specified in [ETSI TS 123 140].
- <Data>: Contains a string with the encoded data of the MMS.
- <Content-type>: Contains a string with the indicator of content type as defined in [ETSI TS 123 140].

– <ContentInMMS>: Contains several fields of more descriptive information.

- <ContentInfo>: Contains a string with the descriptive information of the nature of the content, such as indications of the classified contents of the MMS and the digital rights management (DRM) status, as defined in [ETSI TS 123 140].
- <Type>: Contains a string with the media type and formats of the classified content as defined in [ETSI TS 123 140].
- <Start>: Contains a string about the index of the MMS as defined in [ETSI TS 123 140].

– <Message_Type>: Contains a string with the message type of MMS, as defined in [ETSI TS 123 140].

– <MMS_Version>: Contains a string with the current version of the MMS.

– <Message_ID>: Contains a string with the message identification of the MMS as defined in [ETSI TS 123 140].

– <Sender_address>: Contains a string with the address information of the terminals or the entities sending the MMS, the specific format shall follow the address definition of MMS in [ETSI TS 123 140].

– <Recipient_address>: Contains a string with the address information of the terminals or the entities receiving the MMS, the specific format shall follow the address definition of MMS in [ETSI TS 123 140].

– <Message_class>: Contains a string with the class of the MMS, e.g., personal, advertisement, informational or auto as defined in [ETSI TS 123 140].

– <Date_and_time>: Contains a string with the date and time as the MMS is handled.

– <Priority>: Contains a string with the priority of the MMS when handled, which might be "low", "normal" or "high".

– <Subject>: Contains a string with the subject of the MMS.

– <MM_State>: Contains a string with the current status of the MMS, which might be "Draft", "Sent", "New", "Retrieved", "Forwarded" as defined in [ETSI TS 123 140].

– <EXTENSION>: Contains a string with any extra descriptive information of the MMS if supported by the terminals or the entities.

10.5 Other

XML syntax for additional user data is for further study.

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Printed in Switzerland
Geneva, 2014