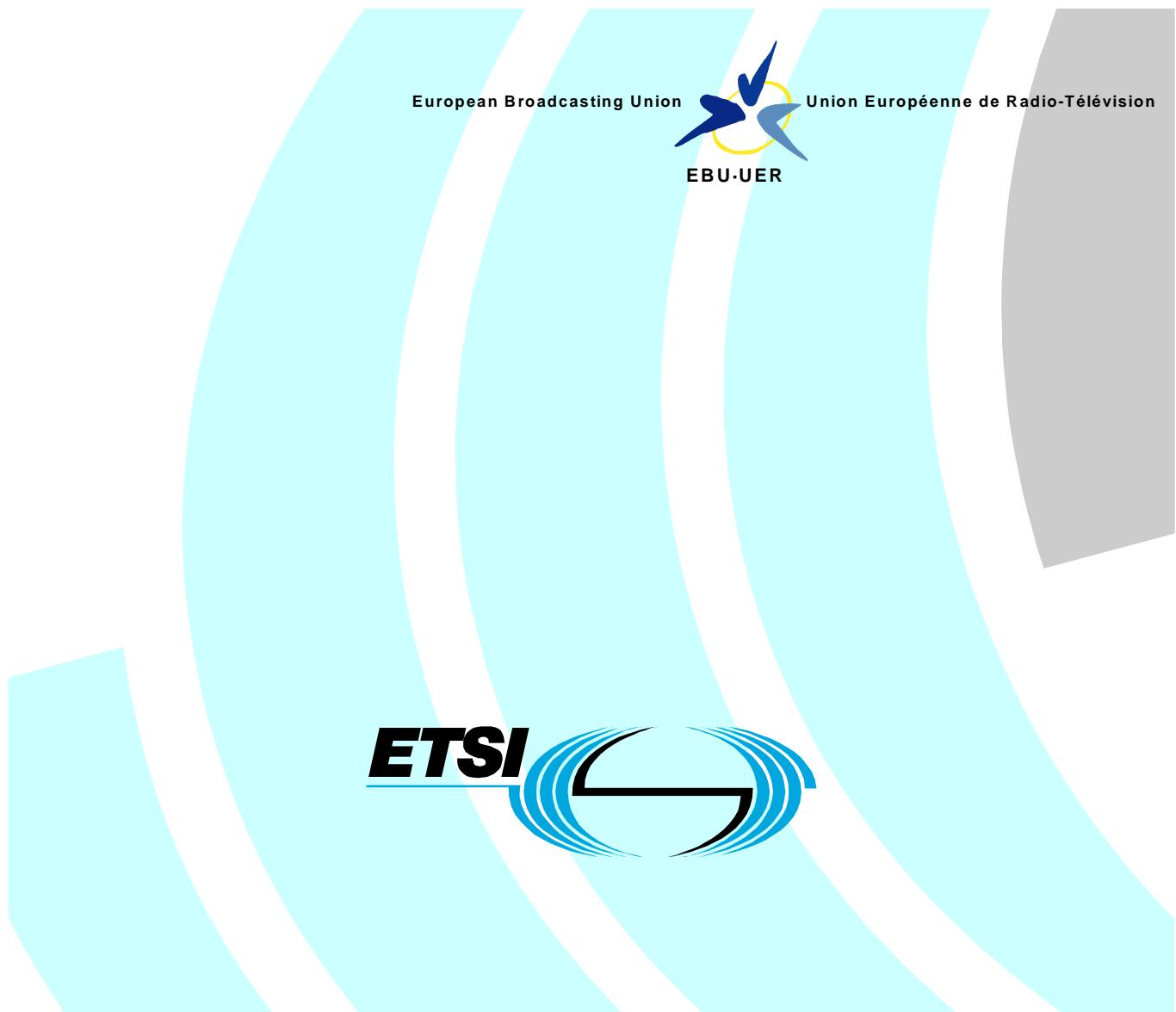


**Broadcast and On-line Services: Search, select, and
rightful use of content on personal storage systems
("TV-Anytime");**

**Part 6: Delivery of metadata over a bi-directional network;
Sub-part 2: Phase 1 - Service discovery**



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Keywords

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Foreword

This Technical Specification (TS) has been produced by Joint Technical Committee (JTC) Broadcast of the European Broadcasting Union (EBU), Comité Européen de Normalisation ELECtrotechnique (CENELEC) and the European Telecommunications Standards Institute (ETSI).

NOTE: The EBU/ETSI JTC Broadcast was established in 1990 to co-ordinate the drafting of standards in the specific field of broadcasting and related fields. Since 1995 the JTC Broadcast became a tripartite body by including in the Memorandum of Understanding also CENELEC, which is responsible for the standardization of radio and television receivers. The EBU is a professional association of broadcasting organizations whose work includes the co-ordination of its members' activities in the technical, legal, programme-making and programme-exchange domains. The EBU has active members in about 60 countries in the European broadcasting area; its headquarters is in Geneva.

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The present document is part 6 sub-part 2, of a multi-part deliverable covering Broadcast and On-line Services: Search, select and rightful use of content on personal storage systems ("TV-Anytime"), as identified below:

- Part 1: "Benchmark Features";
- Part 2: "System description";
- Part 3: "Metadata";
- Part 4: "Content referencing";
- Part 5: "Rights Management and Protection (RMP)";
- Part 6: "Delivery of metadata over a bi-directional network";**

Sub-part 1: "Service and transport";

Sub-part 2: "Phase 1 - Service discovery";

Sub-part 3: "Phase 2 - Exchange of Personal Profile";

- Part 7: "Bi-directional metadata delivery protection";
- Part 8: "Phase 2 - Interchange Data Format";
- Part 9: "Phase 2 - Remote Programming".

Introduction

"TV-*Anytime*" (TVA) is a synchronized set of specifications established by the *TV-Anytime* Forum. TVA features enable the search, selection, acquisition and rightful use of content on local and/or remote personal storage systems from both broadcast and online services.

TS 102 822-1 [2] and TS 102 822-2 [3] set the context and system architecture in which the standards for Metadata, Content referencing, Bi-directional metadata and Metadata protection are to be implemented in the *TV-Anytime* environment. TS 102 822-1 [2] provides benchmark business models against which the *TV-Anytime* system architecture is evaluated to ensure that the specification enable key business applications. TS 102 822-2 [3] presents the *TV-Anytime* System Architecture. These two documents are placed ahead of the others for their obvious introductory value. Note that these first two documents are largely informative, while the remainder of the series is normative.

The features are supported and enabled by the specifications for Metadata (TS 102 822-3 sub-parts 1 [4], 2 [5], 3 [6] and 4 [7]), Content Referencing (TS 102 822-4 [8]), Rights Management (TS 102 822-5 sub-parts 1 [9] and 2 [10]), Bi-directional Metadata Delivery (TS 102 822-6 sub-parts 1 [11], 2 (the present document) and 3 [12]) and Protection (TS 102 822-7 [13]), Interchange Data Format (TS 102 822-8 [14]) and Remote Programming (TS 102 822-9 [15]). This list of features is to be used as guidance to manufacturers, service providers and content providers regarding the implementation of the Phase 1 and Phase 2 *TV-Anytime* specifications.

1 Scope

The present document is the sixth in a series of specification documents produced by the *TV-Anytime* Forum. These documents establish the fundamental specifications for the services, systems and devices that will conform to the *TV-Anytime* standard, to a level of detail that is implementable for compliant products and services.

Congruent with the structure initially defined by *TV-Anytime*, these specifications are parsed into three major areas: Metadata, Content Referencing, and Rights Management and Protection. Within these general areas, the following specifications have been developed : TS 102 822-3-1 [4], TS 102 822-3-2 [5], TS 102 822-3-3 [6], TS 102 822-3-4 [7] TS 102 822-4 [8], TS 102 822-5-1 [9], TS 102 822-5-2 [10], TS 102 822-6-1 [11], TS 102 822-6-2 (the present document), TS 102 822-6-3 [12], TS 102 822-7 [13], TS 102 822-8 [14] and TS 102 822-9 [15].

TS 102 822-1 [2], TS 102 822-2 [3] define the context and system architecture in which these specification shall be implemented. TS 102 822-1 [2] provides benchmark business models against which the *TV-Anytime* system architecture is evaluated to ensure that the specification enable key business applications. TS 102 822-2 [3] presents the *TV-Anytime* System Architecture. These two documents are largely informative documents, while the others in the series are normative.

The scope of the present document comprises the delivery of *TV-Anytime* metadata and content referencing information via a bi-directional network using a PDR's return path.

The requirements for this technology are outlined in TS 102 822-1 [2]. The following is an overview of the return path's use:

- "The consumer can get more information about the programme from either the content provider or from a programme information service offered by a third party. This could include programme specifications (such as source, duration, format, storage location, etc.), programme schedules, commentary, critiques, liner notes from the provider or third parties, etc."
- "A Return Path is a data connection from a consumer's home digital storage system (e.g. PDR) to one or more service providers. The return path gives the consumer access to interactive content, such as the Internet and interactive television. It also allows service providers to access consumer profile/preference information in order to make business decisions regarding content that is provided to the consumer."

The present document describe the mechanism for describing and discovering IP-based web "metadata services" from which a client shall request metadata from, and submit user-centric data to. The present document does not address the unidirectional delivery of metadata over IP networks, or the delivery of content over IP networks.

2 References

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

- References are either specific (identified by date of publication and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

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

- [1] IETF RFC 1591: "Domain Name System Structure and Delegation".
- [2] ETSI TS 102 822-1: "Broadcast and On-line Services: Search, select, and rightful use of content on personal storage systems ("TV-Anytime"); Part 1: Benchmark Features".
- [3] ETSI TS 102 822-2: "Broadcast and On-line Services: Search, select, and rightful use of content on personal storage systems ("TV-Anytime"); Part 2: System description".

- [4] ETSI TS 102 822-3-1: "Broadcast and On-line Services: Search, select, and rightful use of content on personal storage systems ("TV-Anytime"); Part 3: Metadata; Sub-part 1: Phase 1 - Metadata schemas".
- [5] ETSI TS 102 822-3-2: "Broadcast and On-line Services: Search, select, and rightful use of content on personal storage systems ("TV-Anytime"); Part 3: Metadata; Sub-part 2: System aspects in a uni-directional environment".
- [6] ETSI TS 102 822-3-3: "Broadcast and On-line Services: Search, select, and rightful use of content on personal storage systems ("TV-Anytime"); Part 3: Metadata; Sub-part 3: Phase 2 - Extended Metadata Schema".
- [7] ETSI TS 102 822-3-4: "Broadcast and On-line Services: Search, select, and rightful use of content on personal storage systems ("TV-Anytime"); Part 3: Metadata; Sub-part 4: Phase 2 - Interstitial metadata".
- [8] ETSI TS 102 822-4: "Broadcast and On-line Services: Search, select, and rightful use of content on personal storage systems ("TV-Anytime"); Part 4: Content referencing".
- [9] ETSI TS 102 822-5-1: "Broadcast and On-line Services: Search, select, and rightful use of content on personal storage systems ("TV-Anytime"); Part 5: Rights Management and Protection (RMP) Sub-part 1: Information for Broadcast Applications".
- [10] ETSI TS 102 822-5-2: "Broadcast and On-line Services: Search, select, and rightful use of content on personal storage systems ("TV-Anytime"); Part 5: Rights Management and Protection (RMP) Sub-part 2: RMPI binding".
- [11] ETSI TS 102 822-6-1: "Broadcast and On-line Services: Search, select, and rightful use of content on personal storage systems ("TV-Anytime"); Part 6: Delivery of metadata over a bi-directional network; Sub-part 1: Service and transport".
- [12] ETSI TS 102 822-6-3: "Broadcast and On-line Services: Search, select, and rightful use of content on personal storage systems ("TV-Anytime"); Part 6: Delivery of metadata over a bi-directional network; Sub-part 3: Phase 2 - Exchange of Personal Profile".
- [13] ETSI TS 102 822-7: "Broadcast and On-line Services: Search, select, and rightful use of content on personal storage systems ("TV-Anytime Phase 1"); Part 7: Bi-directional metadata delivery protection".
- [14] ETSI TS 102 822-8: "Broadcast and On-line Services: Search, select, and rightful use of content on personal storage systems ("TV-Anytime"); Part 8: Phase 2 - Interchange Data Format".
- [15] ETSI TS 102 822-9: "Broadcast and On-line Services: Search, select, and rightful use of content on personal storage systems ("TV-Anytime"); Part 9: Phase 2 - Remote Programming".
- [16] Universal Description Discovery & Integration, Version 3.0, T. Bellwood, et. al.

NOTE: Available at: <http://uddi.org/pubs/uddi-v3.00-published-20020719.htm>.

[17] Web Services Inspection Language, Version 1.0, K.

NOTE: Available at: <http://www.ibm.com/developerworks/webservices/library/ws-wsilspec.html>.

[18] ISO/IEC 15938-1: "Information technology - Multimedia content description interface - Part 1: Systems".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

acquisition: retrieval of content

application: specific set of functions running on the PDR

NOTE: Some applications use metadata, either automatically or under *consumer* control.

authority: organization that creates CRIDs

bi-directional network: network that supports two way, point-to-point, one-to-many, and many-to-many data delivery

NOTE: The Internet is an example of such a network. A PDR may access a bi-directional network using its return path.

capture: storing the acquired content (e.g. to local storage)

content: anything the viewer would like to access (movies, games, TV programmes, radio programmes, etc.)

content creator: producers of the content

content provider: entity that acts as the agent for and is the prime exploiter of the content

content reference: pointer to a specific content item

location resolution: process of establishing the address (location and time) of a specific content instance from its CRID

locator: time and place where a content item can be acquired

metadata: generally, data about content, such as the title, genre, and summary of a television programme

NOTE: In the context of *TV-Anytime*, metadata also includes consumer profile and history data.

metadata service: service that provides *TV-Anytime* data using a server on a bi-directional network

NOTE: The formats of the data and the protocols used to deliver that data are defined by the present document.

programme: editorially coherent piece of content

NOTE: Typically, a programme is acquired by the PDR as a whole.

resolving authority: body which provides location resolution

Resolving Authority Record (RAR): information needed for retrieving the location resolution data for the given authority

return path: part of the bi-directional distribution system from the consumer to service provider

segment: continuous portion of a piece of content, for example a single news topic in a news programme

service provider: aggregator and supplier of content which may include gateway and management roles

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

ARIB Association of Radio Industries and Businesses

NOTE: A Japanese standards organization.

ATSC Advanced Television Systems Committee

NOTE: American based standards organization for establishing technical standards for advanced television systems, including digital high definition television.

BiM Binary format for Multimedia description streams

NOTE: Defined in ISO/IEC 15938-1 [18] (MPEG-7 Systems part).

DNS Domain Naming System

NOTE: System used on the Internet to register names that can then be mapped into IP addresses using a DNS server RFC 1591 [1].

DVB Digital Video Broadcasting

NOTE: Set of standards used for European digital TV broadcasting.

EPG Electronic Programme Guide

NOTE: Means of presenting available content to the consumer, allowing selection of desired content.

HTTP HyperText Transfer Protocol

IP Internet Protocol

NOTE: Generic name for the network protocols used on the Internet.

IPR Intellectual Property Rights

PDR Personal Digital Recorder

RAR Resolving Authority Record

SOAP Simple Object Access Protocol

TCP Transmission Control Protocol

UDDI Universal Description Discovery and Integration

URI Uniform Resource Identifier

URL Uniform Resource Locator

W3C World Wide Web Consortium

WSDL Web Services Description Language

WS-Inspection Web Services Inspection language

XML eXtensible Markup Language

4 Introduction

The *TV-Anytime* Forum has defined a number of data types that can be exchanged between *TV-Anytime* devices. These include programme metadata, content referencing information, and user-centric metadata. The present document is concerned with data exchange between *TV-Anytime* clients and metadata servers over a bi-directional network using the return path. A *TV-Anytime* client is typically a PDR, although in the present document the client can be any Internet connected device. These devices do not necessarily need to have the ability to display or store content, since many types of devices can exploit *TV-Anytime* metadata services (e.g. a mobile phone displaying an EPG).

Programme metadata and content referencing information can be delivered unidirectionally (e.g. via traditional broadcast or IP multicast) or via a bi-directional network. The reasons a *TV-Anytime* provider might choose to deliver data via a bi-directional network are as follows:

- It allows a richer set of metadata to be delivered, since there are much lower bandwidth constraints.

- It allows *TV-Anytime* data providers without access to a broadcast system to deliver metadata to clients.
- It allows *TV-Anytime* data providers to personalize the metadata they offer according to the source of the request.
- It allows a range of client devices, which are not necessarily able to receive broadcast data, to access and exploit *TV-Anytime* data. For example, a mobile phone or personal organizer could use the metadata service to show the user an EPG.

User-centric metadata can only be delivered from a PDR to a *TV-Anytime* metadata service when a return path is available and the user authorizes it. The submission of such user data allows the metadata service to provide a variety of value adding services, which are more completely described in clause 6.5 of TS 102 822-3-1 [4].

The present document defines the protocols that allow these transactions to take place in an interoperable fashion. Note that, due to the widespread nature and mass penetration of the Internet, the *TV-Anytime* Forum has completely specified the transport and network layer protocols (TCP/IP) necessary for end-to-end interoperability. This is in contrast to unidirectional transport mechanisms, which are not completely specified by the *TV-Anytime* Forum, but instead defined individually by the bodies responsible for the various broadcast standards used around the world (e.g. ARIB, ATSC, DVB, etc.).

To use a *TV-Anytime* metadata service a client takes the steps illustrated in figure 1.

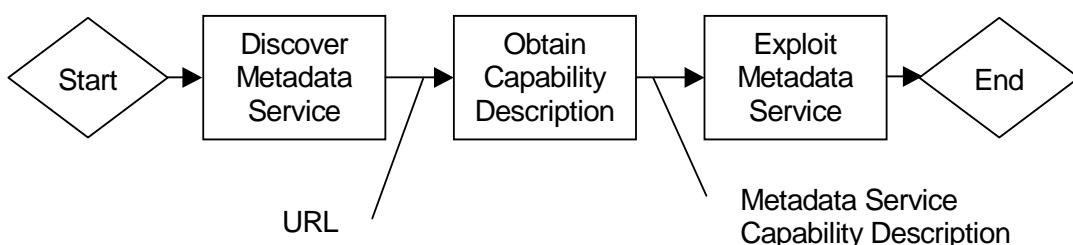


Figure 1: The steps in using a *TV-Anytime* metadata service

These steps are described in more detail in the following three clauses (in reverse order). Note that a metadata service must provide a description capability (see TS 102 822-6-1 [11]) but the support for metadata service discovery (the present document) is optional. The middle step typically will only occur when a metadata service is first discovered or updated, and not each time the metadata service is used.

4.1 Types and functionalities of Metadata services

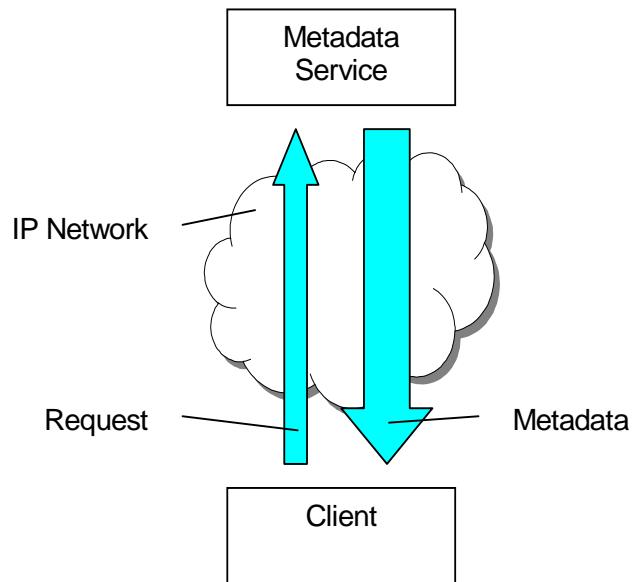
TV-Anytime metadata services can be broken into two basic types, which are shown in figures 2 and 3. The metadata services specified are all request-response based. This can be seen in the two figures - the network transaction is always point-to-point (client to server), and the transaction is always initiated by the client.

4.1.1 Metadata retrieval

Metadata retrieval occurs when a client wishes to obtain certain metadata from a metadata service that it has previously discovered and obtained a capability description for. The following list gives some examples of metadata retrieval:

- A client wishes to obtain programme reviews for a CRID. The client sends a request specifying the CRID and type of metadata required, and the metadata service responds with the appropriate ProgramReviewTable.
- A client wishes to obtain the schedule information for a particular channel over the next week. The client sends a request specifying the channel, date range, and type of metadata required. The metadata service returns a ProgramLocationTable and ProgramInformationTable corresponding to the programmes on that channel.

- A client wishes to search a metadata service that specializes in movie information. The client sends a request specifying the type of movie (e.g. the genre is "Western" and the star is "John Wayne") and the type of metadata required. The metadata service returns a number of matching movies, using a ProgramInformationTable and ProgramReviewTable.



NOTE 1: Any party capable of delivering compliant *TV-Anytime* data could provide a metadata service. Examples include: content creators, content providers, service providers, consumer electronics manufacturers and third parties aggregation services.

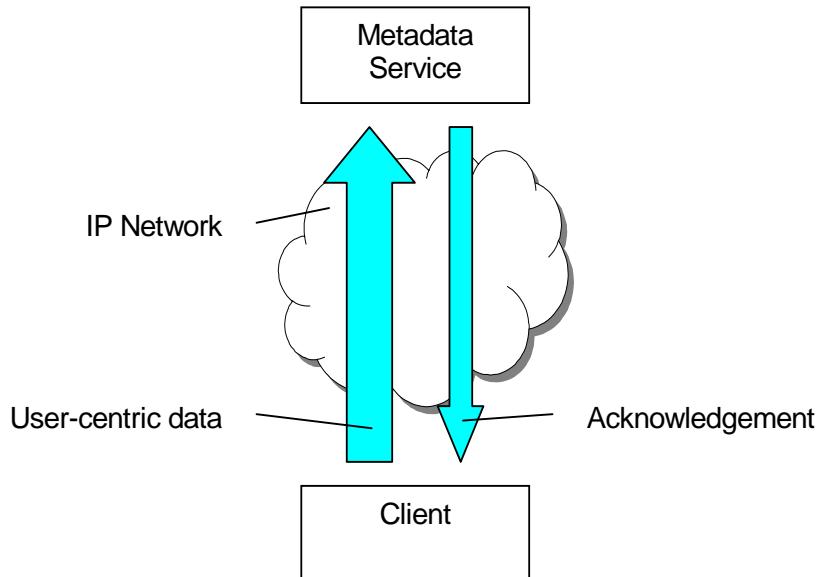
NOTE 2: The request contains parameters that specify the type of metadata required by the client.

NOTE 3: The types of metadata returned could be any of the non user-centric data specified in TS 102 822-3-1 [4] (i.e. the fragments defined in clause 4.3.1.1 of TS 102 822-3-2 [5]), along with content referencing information.

Figure 2: Client requesting metadata from a metadata service

4.1.2 Submission of user-centric metadata

Submission of user-centric metadata offers a number of possible benefits to both consumers and metadata service providers. These are described in clause 5 of TS 102 822-3-1 [4]. Ensuring the privacy of these transactions and that the metadata service provider is trustworthy is essential to the submission of user-centric metadata. The means by which this is ensured is not defined by the present document.



- NOTE 1: In this case, the metadata service is a user data aggregator. Any of the parties listed for figure 2, or any other party capable of usefully exploiting *TV-Anytime* usage information in a trustworthy fashion, could provide the metadata service.
- NOTE 2: In principle, the user-centric data may be any of the types defined in TS 102 822-3-1 [4] (e.g. *UserPreferences* and *UsageHistory*). For the purposes of the present document only a submission of carefully constrained, anonymous *UsageHistory* instances is allowed.

Figure 3: Client submitting user-centric data to a service provider

4.2 Metadata service capability descriptions

In order to exploit usefully the metadata services described in the previous clause, the client needs information about the nature of the metadata service being offered. This is because different metadata services will provide different types of metadata and can be queried in different ways. For example, some metadata services may offer just content referencing information, whilst others may provide programme metadata but no segmentation information. Similarly, whereas one server may only be able to accept simple requests for metadata based on a CRID, another server may offer much more sophisticated querying and sorting capabilities. Moreover, different types of queries are only useful if a client is able to establish sensible values with which to query. An example of this is a query for scheduling data (*ProgramLocationTable*). In order to query for scheduling information on a particular content delivery service, the client needs to know the content delivery services for which that metadata service has data.

To address this issue, each metadata service provides, on request from a client, a capability description. This capability description allows a client to flexibly query a metadata service, without making requests that will not be supported by that metadata service. Furthermore, it allows metadata service providers to flexibly implement the server in a way that is appropriate to the data that they have available.

4.3 Metadata service discovery

Metadata service discovery is the process by which a client establishes a URL where a *TV-Anytime* metadata service can be found. There are a number of ways this process can occur, but only the third method (see clause 4.3.3) is addressed by the present document.

4.3.1 Non-standardized discovery

A number of methods exist for discovering the URLs of metadata services that will not be standardized by the *TV-Anytime* Forum. The following list gives some examples:

- The client might be pre-programmed with a set of URLs that refer to one or more metadata services. This will typically be useful in a vertical market, or tightly controlled horizontal market.

- A user might manually enter a URL of a new metadata service he is interested in, using some means of text input.
- The software on a client may be updated using software updates delivered via a unidirectional broadcast, or over the return channel.

4.3.2 Unidirectional delivery of discovery information

The System Specification [13] and Content Referencing Specification [8] define ways or requirements on the underlying transport, in which the URL of a bi-directional metadata and/or content referencing service can be discovered from *TV-Anytime* information inserted in a unidirectional stream. The present document defines how a client can usefully exploit the discovered service using the resulting URL.

4.3.3 Client-Initiated discovery using the bi-directional network

This mode of metadata service discovery involves using the bi-directional network to access a "Yellow Pages" of *TV-Anytime* metadata services. The mechanism is based upon W3C standards for web service discovery (UDDI [16] and WS-Inspection [17]), the use of which is standardized by the *TV-Anytime* Forum, according to the rules given in clause 5. Support for these discovery techniques by clients and servers is optional.

5 Metadata service discovery

The present document describes how standard web service discovery techniques can be used to allow PDRs and other *TV-Anytime* clients to discover *TV-Anytime* metadata services. The relevant standards are UDDI [16] and WS-Inspection [17], which enable different, but complementary, modes of discovery. A provider can choose to enable neither, both, or just one of these mechanisms.

For a useful overview of these two standards please refer to: "The WS-Inspection [17] and UDDI Relationship [16]".

5.1 Discovering a get_Data operation that will provide metadata for a certain CRID authority

The content referencing specification describes the use of DNS SRV records to discover web services for location resolution, using only a CRID as the starting point. The present document defines an analogous method for use in discovering metadata delivery services. The form of the DNS query string is:

_gmet._tcp.<name_extension segment from CRID authority>.<DNS segment from CRID authority>,

where *gmet* is short for "get metadata".

Since a resolution authority will not necessarily provide (directly or indirectly) a metadata service for its CRIDs, the client should not assume that this DNS enquiry will succeed. The result of the DNS query is a machine name (*<hostname>*) and port (*<port>*) that locates the metadata server. A *get_Data* service capable of returning at least one type of metadata table is offered at this URL (*http://<hostname>:<port>/*).

5.2 Universal Description, Discovery and Integration (UDDI)

UDDI [16] allows PDRs, and other clients with Internet connectivity, to discover *TV-Anytime* metadata services without the client requiring any prior knowledge of the metadata service, nor any information from a unidirectional metadata service. Metadata service providers may publish details of their *TV-Anytime* metadata service(s) to the UDDI Business Registry. Any client can then use a node in the UDDI Business Registry (which have well-known addresses) to browse and locate *TV-Anytime* metadata services.

Note that version 3 of the UDDI specification is used. Clients wishing to discover *TV-Anytime* web services using UDDI must conform to the behaviour described in the UDDI specification [16]. To assist metadata service providers in describing and categorizing their services, the *TV-Anytime* Forum has registered the UDDI tModels described in the following clauses (see clause 1.6.4 of the UDDI specification [16] for a definition of "tModel").

5.2.1 *TV-Anytime* web service tModels

These tModels are used when a business publishes details of their bindingTemplate structures to indicate a web service compliant with the present document. Clients issuing UDDI inquiry requests can use these two tModel keys to find only web services that are *TV-Anytime* metadata services.

5.2.1.1 *TV-Anytime* get_Data port tModel

This technical model represents a `get_Data` port as described in clause 5.1.

Name: TV-Anytime-org:get_Data_v10.

Description: *TV-Anytime* WSDL interface for `get_Data` port.

UDDI Key (V3): uddi:TV-Anytime.org:get_Data_v10.

Categorization: specification, xmlSpec, soapSpec, wsdlSpec.

```
<tModel tModelKey="uddi:TV-Anytime.org:get_Data_v10">
  <name>TV-Anytime-org:get_Data_v10</name>
  <description xml:lang="en">TV-Anytime WSDL interface for get_Data port</description>
  <overviewDoc>
    <overviewURL useType="text">
      http://Location_At_ESI_WebSite/FileName_for_TS102822-6-2
    </overviewURL>
  </overviewDoc>
  <categoryBag>
    <keyedReference keyName="uddi-org:types:wsdl" keyValue="wsdlSpec"
      tModelKey="uddi:uddi.org:categorization:types"/>
    <keyedReference keyName="uddi-org:types:soap" keyValue="soapSpec"
      tModelKey="uddi:uddi.org:categorization:types"/>
    <keyedReference keyName="uddi-org:types:xml" keyValue="xmlSpec"
      tModelKey="uddi:uddi.org:categorization:types"/>
    <keyedReference keyName="uddi-org:types:specification"
      keyValue="specification" tModelKey="uddi:uddi.org:categorization:types"/>
  </categoryBag>
</tModel>
```

5.2.1.2 *TV-Anytime* submit_Data port tModel

This technical model represents a `submit_Data` service as described in clause 5.2.

Name: TV-Anytime-org:submit_Data_v10.

Description: *TV-Anytime* WSDL interface for `submit_Data` port.

UDDI Key (V3): uddi:TV-Anytime.org:submit_Data_v10.

Categorization: specification, xmlSpec, soapSpec, wsdlSpec.

```

<tModel tModelKey="uddi:TV-Anytime.org:submit_Data_v10">
  <name>TV-Anytime-org:submit_Data_v10</name>
  <description xml:lang="en">TV Anytime WSDL interface for get_Data port</description>
  <overviewDoc>
    <overviewURL useType="text">
      http://Location_At_ETSI_WebSite/FileName_for_TS102822-6-2
    </overviewURL>
  </overviewDoc>
  <categoryBag>
    <keyedReference keyName="uddi-org:types:wsdl" keyValue="wsdlSpec"
      tModelKey="uddi:uddi.org:categorization:types"/>
    <keyedReference keyName="uddi-org:types:soap" keyValue="soapSpec"
      tModelKey="uddi:uddi.org:categorization:types"/>
    <keyedReference keyName="uddi-org:types:xml" keyValue="xmlSpec"
      tModelKey="uddi:uddi.org:categorization:types"/>
    <keyedReference keyName="uddi-org:types:specification"
      keyValue="specification" tModelKey="uddi:uddi.org:categorization:types"/>
  </categoryBag>
</tModel>

```

5.2.2 TV-Anytime categorization tModels

These tModels allow a metadata service provider to categorize their services. The metadata service provider assigns the categories at the point of publication (see clause 5.2.3). This enables clients to issue more refined UDDI searches for metadata services. By categorizing a metadata service as richly and accurately as possible, a metadata service provider maximizes the possibility of the metadata service being discovered using UDDI.

Use of these taxonomies is optional, and for many services it will not be appropriate to use some of the taxonomy types. For example, a metadata service that does not provide schedule information will not be able to use the TV-Anytime-org:serviceURL taxonomy to list the services for which it provides metadata.

These taxonomies do not make strong guarantees about the behaviour of any services that use them. For example, a service categorized as providing information on "example.com" CRIDs may only have data on some subset of them. A get_Data request to that service could fail to provide information on a particular "example.com" CRID. Similarly, a service categorized as providing German language metadata could return some of its metadata in other languages. Metadata service providers should sensibly categorize their services in a way that will enhance their discovery without creating false expectations in the client. It is always the capability description that provides the definitive description of the features supported by a particular operation. Therefore, having discovered a metadata service, a client should always retrieve a capability description of that service. In some cases, this involves no extra steps as the capability description will be included inside the bindingTemplate for that operation.

All of the following tModels are categorization tModels and are unchecked.

5.2.2.1 TV-Anytime authorityName categorization system

The authorityName tModel is used to represent the resolution authorities of the CRIDs for which this metadata service provides *TV-Anytime* information. To establish whether content referencing information or metadata is available for the authority, the tableType tModel may be used (see clause 5.2.2.2).

- Name:** TV-Anytime-org:authorityName.
- Description:** Category system for the resolution authorities handled by a metadata service.
- UDDI Key (V3):** uddi:TV-Anytime.org:authorityName.
- Valid values:** A valid value is a valid resolution authority name, as defined in the Content Referencing Specification [8].
- Example usage:** A client searches for *TV-Anytime* metadata on CRIDs from a particular resolution authority.

```

<tModel tModelKey="uddi:TV-Anytime.org:authorityName">
  <name>TV-Anytime-org:authorityName</name>
  <description xml:lang="en">Category system for the resolution authorities handled by
a metadata service</description>
  <overviewDoc>
    <overviewURL useType="text">
      http://Location_At_ETSI_WebSite/FileName_for_TS102822-6-2
    </overviewURL>
  </overviewDoc>
  <categoryBag>
    <keyedReference keyName="uddi-org:types:categorization"
keyValue="categorization" tModelKey="uddi:uddi.org:categorization:types"/>
    <keyedReference keyName="uddi-org:types:unchecked"
keyValue="unchecked" tModelKey="uddi:uddi.org:categorization:types"/>
  </categoryBag>
</tModel>

```

5.2.2.2 *TV-Anytime* tableType categorization system

The `tableType` `tModel` is used to represent the types of metadata table that this metadata service is capable of providing.

Name: TV-Anytime-org:tableType.

Description: Category system for the metadata table types available from a metadata service.

UDDI Key (V3): uddi:TV-Anytime.org:tableType.

Valid values: A valid value is a table type that can be used in the `ProgramLocationTable` and `ProgramInformationTables` element returned by the `describe_get_Data` operation.

Example usage: A client requires a certain type of metadata (e.g. segmentation information) about a programme.

```

<tModel tModelKey="uddi:TV-Anytime.org:tableType">
  <name>TV-Anytime-org:tableType</name>
  <description xml:lang="en">Category system for the metadata table types available
from a metadata service</description>
  <overviewDoc>
    <overviewURL useType="text">
      http://Location_At_ETSI_WebSite/FileName_for_TS102822-6-2
    </overviewURL>
  </overviewDoc>
  <categoryBag>
    <keyedReference keyName="uddi-org:types:categorization"
keyValue="categorization" tModelKey="uddi:uddi.org:categorization:types"/>
    <keyedReference keyName="uddi-org:types:unchecked"
keyValue="unchecked" tModelKey="uddi:uddi.org:categorization:types"/>
  </categoryBag>
</tModel>

```

5.2.2.3 *TV-Anytime* serviceURL categorization system

The `serviceURL` `tModel` is used to represent the content delivery services (e.g. channels) for which this metadata service provides *TV-Anytime* information.

Name: TV-Anytime-org:serviceURL.

Description: Category system for the content services handled by a metadata service.

UDDI Key (V3): uddi:TV-Anytime.org:serviceURL.

Valid values: A valid value must comply with the rules defined in TS 102 822-3-1 [4] for the `serviceURL` element in the `ServiceInformationTable`.

Example usage: A client searches for *TV-Anytime* scheduling information on a particular content service.

```
<tModel tModelKey="uddi:TV-Anytime.org:serviceURL">
  <name>TV-Anytime-org:serviceURL</name>
  <description xml:lang="en">Category system for the content services handled by a
metadata service</description>
  <overviewDoc>
    <overviewURL useType="text">
      http://Location_At_ESI_WebSite/FileName_for_TS102822-6-2
    </overviewURL>
  </overviewDoc>
  <categoryBag>
    <keyedReference keyName="uddi-org:types:categorization"
keyValue="categorization" tModelKey="uddi:uddi.org:categorization:types"/>
    <keyedReference keyName="uddi-org:types:unchecked"
keyValue="unchecked" tModelKey="uddi:uddi.org:categorization:types"/>
  </categoryBag>
</tModel>
```

5.2.2.4 *TV-Anytime* genre categorization system

The genre `tModel` is used to broadly classify the types of programmes for which this metadata service provides *TV-Anytime* information. This `tModel` is intended to classify metadata services providing specialist information, and will not be useful for metadata services that describe a wide range of programme types (e.g. broadcasters' metadata services).

Name: TV-Anytime-org:genre.

Description: Category system for the genre of programmes handled by a metadata service.

UDDI Key (V3): uddi:TV-Anytime.org:genre.

Valid values: A valid value is a fully qualified term (classification scheme URN and term), as defined in annex B of TS 102 822-3-1 [4]. Note that aliases cannot be used since a UDDI registry has no knowledge of any `CSAlias` elements from which the full classification scheme name can be deduced.

Example usage: A client searches for a *TV-Anytime* metadata service that specializes in movie information.

```
<tModel tModelKey="uddi:TV-Anytime.org:genre">
  <name>TV-Anytime-org:genre</name>
  <description xml:lang="en">Category system for the genre of programme handled by a
metadata service</description>
  <overviewDoc>
    <overviewURL useType="text">
      http://Location_At_ESI_WebSite/FileName_for_TS102822-6-2
    </overviewURL>
  </overviewDoc>
  <categoryBag>
    <keyedReference keyName="uddi-org:types:categorization"
keyValue="categorization" tModelKey="uddi:uddi.org:categorization:types"/>
    <keyedReference keyName="uddi-org:types:unchecked"
keyValue="unchecked" tModelKey="uddi:uddi.org:categorization:types"/>
  </categoryBag>
</tModel>
```

5.2.2.5 Other categorizations

The Universal Business Registry provides other categorizations that may be useful in describing *TV-Anytime* metadata services (e.g. uddi-org:general_keywords). The use of such categorizations should, in general, follow the rules defined by the particular tModel, but *TV-Anytime* provides guidance for use of the uddi:ubr.uddi.org:categorization:geo3166-2 tModel. Namely, the assigned keyValue should categorize the region(s) where the programmes described by that metadata service are available. For some types of content distribution mechanisms (e.g. via the Internet) such a categorization will not be appropriate.

Categories may be grouped together, as described in clause F.2 of the UDDI specification [16].

5.2.3 Publishing a *TV-Anytime* metadata service

A *TV-Anytime* metadata service provider can publish details of their service to any node in the UDDI Business Registry. The manner in which this is done will depend upon the operator of that node (see the UDDI specification [16]).

An example of the publication process can be found in annex A.

A businessService is created for each metadata service that needs to be registered by that business. The businessService element contains a bindingTemplate for each of the bindings offered by that metadata service (e.g. get_Data or submit_Data).

When publishing a get_Data operation, it is recommended that: the instanceParms element (inside the tModelInstanceInfo) contains a capability description. This allows the client to acquire the capability description of the metadata service (and so determine its usefulness), without having to issue a describe_X request. Since the size of the instanceParms element is restricted, the capability description will sometimes need truncating, in which case the capability description must remain schema valid.

5.3 Web Services Inspection language (WS-Inspection)

A *TV-Anytime* web server may declare the presence of its metadata services using WS-Inspection [17]. This allows clients to discover service descriptions (i.e. WSDL implementation definitions) for the web services available on that website. The WS-Inspection file may also lead to the discovery of other types of web services, as well as *TV-Anytime* metadata services available on other web sites.

It is recommended that each description element use a WSDL extensibility reference in the following fashion:

- The endpointPresent attribute should be set to "true" (since a client is looking for existing services, and not abstract service definitions).
- An implementedBinding element should be included for each portType offered by the *TV-Anytime* service. In this way, the client can establish whether the corresponding service actually offers *TV-Anytime* ports and, if so, which portTypes are present, without having to download and parse the WSDL implementation description.

An example WS-Inspection file, along with its corresponding WSDL implementation definition, can be found in annex B.

5.3.1 Discovering the WS-Inspection file

To assist a client in finding a WS-Inspection file, clause 6.1, the WS-Inspection specification states that the document may have a well-known name (inspection.wsil) and be placed at a "common entry point" of the web-site. The term "common entry point" is vague, so *TV-Anytime* defines the following rules to make it easier for embedded clients to retrieve the WS-Inspection document:

- A metadata service provided by a web server with machine name <hostname>, which wishes to provide a WS-Inspection file, should place the document at the root of its web server. Thus, an HTTP GET request to <http://<hostname>/inspection.wsil> will retrieve the file if it exists.
- A resolution authority with the name <domain_name>;<extension_name>, which wishes to provide a WS-Inspection file, should place the document at the location http://<domain_name>/<extension_name>/inspection.wsil. Note that this does not necessarily mean that the web server with the same domain name as the resolution authority has to also provide the metadata service since it is possible that the WS-Inspection document points to a URL on a different server.

Annex A (informative): Example usage of UDDI

A.1 Example publication of get_Data operation

The metadata service provider registers the new operation using the UDDI `save_binding` publication API (assuming that the appropriate parent `businessEntity` and `businessService` structures have already been registered).

```
<save_binding xmlns="urn:uddi-org:api_v3">
  <bindingTemplate>
    <description xml:lang="en">TV-Anytime movie information</description>
    <accessPoint useType="endPoint">
      http://barry-norman.com/movies</accessPoint>
    <tModelInstanceDetails>
      <tModelInstanceInfo tModelKey="uddi:TV-Anytime.org:get_Data_v10">
        <instanceDetails>
          <instanceParms><![CDATA[
            <?xml version="1.0" encoding="utf-8"?>
            <describe_get_Data_Result serviceVersion="3"
              xmlns="urn:tva:transport:2004">
              <!-- etc. See example 3 in Annex D -->
            </describe_get_Data_Result>
          ]]></instanceParms>
        </instanceDetails>
      </tModelInstanceInfo>
    </tModelInstanceDetails>
    <categoryBag>
      <keyedReference tModelKey="uddi:TV-Anytime.org:authorityName"
        keyValue="barry-norman.com"/>
      <keyedReference tModelKey="uddi:TV-Anytime.org:genre"
        keyValue="urn:tva:metadata:cs:FormatCS:2004:3.3"/>
      <keyedReference tModelKey="uddi:TV-Anytime.org:tableType"
        keyValue="ContentReferencing"/>
      <keyedReference tModelKey="uddi:TV-Anytime.org:tableType"
        keyValue="ProgramInformation"/>
      <keyedReference tModelKey="uddi:TV-Anytime.org:tableType"
        keyValue="ProgramReview"/>
    </categoryBag>
  </bindingTemplate>
</save_binding>
```

The `bindingTemplate` structure contains a reference to the `tModel` for the `get_Data` operation. In this way, the `tModel` behaves as a technical fingerprint that formally indicates the *TV-Anytime* compliance of the web service.

The categorization information allows a client to establish the following:

- Metadata is provided on CRIDs from the "barry-norman.com" resolution authority.
- Most of the programmes described by this metadata service have the "movie" genre.
- The metadata service can return `ContentReferencingTable`, `ProgramInformationTable`, and `ProgramReviewTable` elements.

A.2 Example search for *TV-Anytime* Metadata service

Consider the example of a newly purchased PDR trying to create an enhanced EPG. The PDR wishes to display information on a known set of content service URLs (which happen to be DVB locators, obtained from DVB service information). To enable the construction of an EPG, the metadata service will need to offer a `get_Data` operation that is capable of delivering at least a `ProgramLocationTable` and `ProgramInformationTable`. The following search could be used to find appropriate bindings.

```
<find_binding xmlns="urn:uddi-org:api_v3">
  <tModelBag>
    <tModelKey>uddi:TV-Anytime.org:get_Data_v10</tModelKey>
  </tModelBag>
  <categoryBag>
    <keyedReference tModelKey="uddi:TV-Anytime.org:serviceURL"
      keyValue="dvb://1.2.a"/>
    <keyedReference tModelKey="uddi:TV-Anytime.org:serviceURL"
      keyValue="dvb://1.2.b"/>
    <keyedReference tModelKey="uddi:TV-Anytime.org:serviceURL"
      keyValue="dvb://1.2.c"/>
    <!-- Etc for other DVB locators -->
    <keyedReference tModelKey="uddi:TV-Anytime.org:tableType"
      keyValue="ProgramLocationTable"/>
    <keyedReference tModelKey="uddi:TV-Anytime.org:tableType"
      keyValue="ProgramInformationTable"/>
  </categoryBag>
</find_binding>
```

The data structure returned to the device will contain a list of `bindingTemplate` elements that satisfy the above query. The list can then be refined by the user (based on brand preferences, recommendations, languages used, etc.), or automatically by the PDR (based on the capability description, and other taxonomies provided in each `bindingTemplate` element).

TV-Anytime clients may also register their interest in a particular type of metadata service, by registering with a node using the subscription API (see clause 5.5 of the UDDI specification [16]). In this case, the same `find_binding` element above could be used in the `subscriptionFilter` of the subscription message, thus defining the types of services that the PDR is interested in being notified about.

Annex B (informative): Referencing a WSDL implementation description using WS-Inspection

The following WS-Inspection file contains a reference to a TV-Anytime metadata service providing both a `get_Data` and `submit_Data` port.

<http://example.com/inspection.wsil>

```
<inspection xmlns="http://schemas.xmlsoap.org/ws/2001/10/inspection/">
  xmlns:wsdl="http://schemas.xmlsoap.org/ws/2001/10/inspection/wsdl/"
  xmlns:tva="urn:tva:transport:wsdl:2004">
  <service>
    <description referencedNamespace="http://schemas.xmlsoap.org/wsdl/">
      location="http://example.com/TV_week/tva_TV_week.wsdl"
      <wsdl:reference endpointPresent="true">
        <wsdl:implementedBinding>tva:get_Data_SOAP</wsdl:implementedBinding>
        <wsdl:implementedBinding>tva:submit_Data_SOAP</wsdl:implementedBinding>
      </wsdl:reference>
    </description>
  </service>
</inspection>
```

The location attribute in the above description allows a client to download a WSDL implementation description.

http://example.com/TV_week/tva_TV_week.wsdl

```
<definitions targetNamespace="http://example.com/tva">
  xmlns:tva="urn:tva:transport:wsdl:2004"
  xmlns:soap="http://schemas.xmlsoap.org/wsdl/soap/"
  xmlns="http://schemas.xmlsoap.org/wsdl/">
  <import namespace="urn:tva:transport:wsdl:2004"/>
  <service name="TvaThisWeek">
    <port name="get_Data_TV_Week" binding="tva:get_Data_SOAP">
      <soap:address location="http://example.com/tv_week"/>
    </port>
    <port name="submit_Data_TV_Week" binding="tva:submit_Data_SOAP">
      <soap:address location="http://example.com/tv_week"/>
    </port>
  </service>
</definitions>
```

The referenced WSDL implementation definition is simple, and allows a client to establish the URL of the two *TV-Anytime* ports. Also, the technical version of the port is indicated via the namespace of the fully qualified binding name.

Annex C (informative): Bibliography

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History

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