



**Network Data Management – Usage  
(NDM-U)  
For  
IP-Based Services  
Service Specification –  
Video on Demand (VoD)**

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## Preface

### Contacts

For general questions regarding this document and referrals to technical experts for detailed questions, please contact:

Chief Editor: Steve Cotton  
Cotton Management Consulting  
[scotton@compuserve.com](mailto:scotton@compuserve.com)

#### Architecture Working Group –

Lead: Raghu Dhulipala  
Convergys Corporation  
[raghu.dhulipala@convergys.com](mailto:raghu.dhulipala@convergys.com)

Editor: Aron Heintz  
RateIntegration, Inc.  
[aheintz@rateintegration.com](mailto:aheintz@rateintegration.com)

#### Business Requirements Working Group –

Lead: Kelly Anderson  
SCC Communications Corp.  
[kanderson@sccx.com](mailto:kanderson@sccx.com)

Editor: Pat Walls  
TSI  
Telecommunication Services Inc.  
[pwalls@tsiconnections.com](mailto:pwalls@tsiconnections.com)

#### Protocol Working Group

–

Lead: Jeff Meyers  
HP  
[jeffm@cup.hp.com](mailto:jeffm@cup.hp.com)

Editor: Ken Sarno  
NARUS, Inc.  
[kensarno@narus.com](mailto:kensarno@narus.com)

### Acknowledgements

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#### Charter Members

ACE\*COMM  
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### Abstract

.This document is a companion to NDM-U, which specifies the overall business requirements and protocol generic to all services. The content herein is compliant to those requirements and specifications and is particular to the service specified.

### Change History

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# 1. Introduction

## 1.1. Purpose

This document is intended to specify the business use case and formal XML Schema for the IP-based service.

## 1.2. Scope

This document is limited to the discussion of issues as defined by the mission statement of IPDR.org, namely:

*The IPDR Organization (the “Organization”) is organized and operates as a non-stock not for profit organization for the following purposes:*

- (a) To develop, agree upon and publish a non-proprietary, open specification for the representation and encapsulation of Internet Protocol (IP)-based events for use by business, operations and decision support systems. Such events include, but are not limited to, IP-based network services, application services and e-commerce transactions;*
- (b) To develop, agree upon and publish a non-proprietary, open specification for the representation and encapsulation of IP-based network and service elements provisioning events;*
- (c) To promote work accomplished and uniform specifications to the industry and submit approved published specifications to the appropriate standards bodies for acceptance in the public domain;*  
*and*

To have and exercise all powers necessary or convenient to affect any or all of the purposes for which the Organization is organized.

## 1.3. Compatibility

Future revisions are expected to make every attempt to preserve investments made by service providers and solution vendors by considering backward and forward compatibility whenever it is practical.

## 1.4. References

- [1] NDM-U 2.5, IPDR.org.
- [2] XML Schema Part 1: Structures, W3C Working Draft 7 April 2000.
- [3] XML Schema Part 2: Data Types, W3C Working Draft 7 April 2000.

## 1.5. Overview

This specification is divided into two major chapters:

- Service Specification – description of the specific requirements and business use case for the service in question.
- Formal Specification – XML Schema description of the IPDR Record for this service.

## 1.6. Terminology and Glossary

### Terminology

Term	Definition
Accounting	The process of collecting and analyzing <b>service</b> and <b>resource usage</b> metrics for the purposes of capacity and trend analysis, cost allocation, auditing, and billing, etc. Accounting management requires that resource consumption be measured, rated, assigned, and communicated between appropriate business entities.
Mediation	In view of network reference model, Mediation refers to the combination of the logical entities IPDR recorder, IPDR transmitter, and IPDR store.
Resource	A quantifiable asset employed by a <b>Service Provider</b> , or on behalf of a <b>Service Provider</b> by another Service Provider, to fulfill a request of a <b>Service Consumer</b> . (Examples include: files, communications, goods, etc).
Roaming	Service usage initiated by a service consumer and provided by a service provider other than the one with which the service consumer have business relationship.
Service	Network and/or application operation that provides the <b>Service Consumer</b> with the requested <b>resource</b> .
Service Consumer	The beneficiary (human or system) of a <b>service</b> .
Service Element	Any element that is responsible for fulfilling a <b>Service Consumer</b> request. (Examples include: network equipment and system processes)
Service Provider	An enterprise that provides communications-based <b>services</b> .
Session	A set of related service usages; service usages may or may not be time based in the unit of measurement.
Usage	Consumption of <b>resources</b> and <b>services</b> by a <b>Service Consumer</b> .
Usage Attribute	A parameter whose value indicates some aspect of <b>usage</b> of a given <b>service</b> and/or <b>resource</b> .
Usage Entry <sup>1</sup>	A <b>Service</b> -specific trigger resulting in the generation by a <b>Service Element</b> of a set of <b>Usage Attribute</b> values related to <b>Usage</b> specific to a given <b>Service Consumer</b>

<sup>1</sup> Because of legacy issues, a Usage Entry from a given Service Element will not initially conform to an IPDR specification or, in some cases, may never conform. To be considered a Usage Entry the information presented or made available by inference from the Service Element must minimally contain attributes from some of the general attribute categories.

## Glossary:

ANI	- Automatic Number Identification
ASP	- Application Service Provider
BSS	- Business Support Systems
CRM	- Customer Relationship Management
DSS	- Decision Support Systems
DTD	- Document Type Definition
DSL	- Digital Subscriber Line
EP	- End Point
ESN	- Electronic Serial Number
FoIP	- Fax over IP
GK	- Gate Keeper
GPRS	- General Packet Radio Service
IETF	- Internet Engineering Task Force
IMSI	- International Mobile Subscriber Identity
IP	- Internet Protocol
IS	- IPDR Store
ISDN	- Integrated Services Digital Network
ISP	- Internet Service Provider
IT	- IPDR Transmitter
NDM	- Network Data Management
NSE	- Network Service Element
OSS	- Operations Support System
PLMN	- Public Land Mobile Network
PSTN	- Public Switched Telephone Network
QoS	- Quality of Service
RADIUS	- Remote Access Dial-In Usage Server
RAS	- Remote Access Server
SC	- Service Consumer
SE	- Service Element
SMS	- Short Message Service
SP	- Service Provider
TMF	- TeleManagement Forum
TOM	- Telecommunications Operations Map
UA	- Usage Aggregators
UC	- Usage Collectors
VoIP	- Voice over IP
VPN	- Virtual Private Network
WAP	- Wireless Application Protocol
xDSL	- Digital Subscriber Line of type x
XML	- eXtensible Markup Language

## 2. Video on Demand (VoD) Specification

### 2.1. Definition

Video on Demand (VoD) is a service where a consumer can request and view video content using the Internet. The video content can be a cinematic movie, a news report, TV programming or other content.

Figure 1 - VoD

#### 2.1.1. Requirements

- The VoD IPDR must identify the VoD service provider and consumer.
  - The VoD IPDR must contain information about the content provided.
  - The VoD IPDR must contain the time that the video stream was initiated and completed.
- If available, the VoD IPDR should contain information about quality and streaming attributes such as used bandwidth, codec used and transferred data volume.

#### 2.1.2 Usage Attribute List

Table X – VoD Service Attributes List

Category	Usage Attribute Name	Data Type	Presence	Possible Values	Remarks
Who	serviceProviderID	Value / Type *	Required		Service provider of video service.
Who	sourceAddresses	String	Required		IP address of video streaming server
Who	subscriberID	Value / Type *	Required	Ip address, account number etc	Identifies a unique subscriber in the system.
Who	destAddress	String	Required		IP address of streaming destination.
When	startTime	Datetime	Required	ISO 8601 time	Time instant the film starts playing.
When	endTime	Datetime	Required	ISO 8601 time	Time instant the film stops playing.
What	terminationStatus	Enum	Required	Normal, Server Failure, Client Failure, Connection Failure	Describes how the session ended.
What	movieName	String	Required	Rocky IV	Descriptive name of video stream
What	movieID	String	Required	000-111-1234, "Rock IV, widescreen, English"	Unique id of video stream. This id is used to uniquely identify the movie where the name does not provide a unique value.
What	movieClass	String	Optional	Premium, Normal,	Attribute can be used to

Category	Usage Attribute Name	Data Type	Presence	Possible Values	Remarks
				etc	classify the movie content.
What	rating	String	Optional	R, PG13, etc	Rating of the movie content.
What	charge	Value / Unit *	Optional	\$5.50, 15DEM, etc	Monetary amount to be charged for movie.
What	codec		Optional	DivX, MPEG4, etc	Codec used for video stream.
What	numVideoStreams	Number	Optional		Count of video streams.
What	numAudioStreams	Number	Optional		Count of audio streams.
What	averageBandwidth	Value / Unit *	Optional	56 Kb, ...	Average bandwidth used for video stream.
What	totalVolume	Value / Unit *	Optional	5 MB	Total volume used for video stream.
What	qosRequested	Number	Optional	0..255	Requested QoS corresponding to the SLA or dynamic QoS request
What	qosDelivered	Number	Optional	0..255	Pre-calculated indicator representing the delivered / negotiated QoS. Physical attributes such as latency or error rates are weighted and combined into one value.
What	qosMeasurement	Value/Unit/Type *Array	Optional (0..m)	200 ms delay 1500 frames dropped 20 % jitter	QoS measurement such as delay, jitter or other parameter.

## 2.2 Use Case

### 2.2.1 Basic Flow

1. A consumer visits the site of a video or movie content provider.
  2. The consumer selects a movie or video content to watch. At this point the consumer might be provided with the option to select a QoS for viewing.
  3. The content is streamed to the consumer's video stream client device.
- Upon completion of the video stream, the mediation system provides the information collected about the transaction to the BSS system.

## 3.0 Formal Specification

### 3.1 Schema

```

<?xml version = "1.0" encoding = "UTF-8"?>
<schema xmlns = "http://www.w3.org/2000/10/XMLSchema"
  targetNamespace = "http://www.ipdr.org/namespaces/ipdr"
  xmlns:ipdr = "http://www.ipdr.org/namespaces/ipdr"
  version = "2.5-A.0"
  elementFormDefault = "qualified"
  attributeFormDefault = "unqualified">
<include schemaLocation = "ipdr2.5.xsd"/>
<complexType name = "SC-VOD-Type">
  <complexContent>
    <extension base = "ipdr:SCType">
      <sequence>
        <element name = "subscriberID">
          <complexType>
            <simpleContent>
              <extension base = "string">
                <attribute name = "type"
                  type = "string"/>
              </extension>
            </simpleContent>
          </complexType>
        </element>
        <element name = "destAddress" type = "string"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
<complexType name = "SE-VOD-Type">
  <complexContent>
    <extension base = "ipdr:SEType">
      <sequence>
        <element name = "serviceProviderID">
          <complexType>
            <simpleContent>
              <extension base = "string">
                <attribute name = "type" type =
                  "string"/>
              </extension>
            </simpleContent>
          </complexType>
        </element>
        <element name = "sourceAddress" type = "string"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
<complexType name = "UE-VOD-Type">
  <complexContent>
    <extension base = "ipdr:UEType">
      <sequence>
        <element name = "startTime" type = "timeInstant"/>
        <element name = "endTime" type = "timeInstant"/>
        <element name = "terminationStatus" type = "ipdr:terminationStatusType"/>
        <element name = "movieName" type = "string"/>
        <element name = "movieID" type = "string"/>
        <element name = "charge" minOccurs = "0">
          <complexType>
            <simpleContent>
              <extension base = "decimal">
                <attribute name = "unit" type =
                  "string"/>
              </extension>
            </simpleContent>
          </complexType>
        </element>
      </sequence>
    </extension>
  </complexContent>
</complexType>

```

```

                </extension>
            </simpleContent>
        </complexType>
    </element>
    <element name = "codec" type = "string" minOccurs = "0"/>
    <element name = "numAudioStreams" type = "nonNegativeInteger"
minOccurs = "0"/>
    <element name = "numVideoStreams" type = "nonNegativeInteger"
minOccurs = "0"/>
    <element name = "averageBandwidth" minOccurs = "0">
        <complexType>
            <simpleContent>
                <extension base = "nonNegativeInteger">
                    <attribute name = "unit" type =
"ipdr:throughputUnit"/>
                </extension>
            </simpleContent>
        </complexType>
    </element>
    <element name = "totalVolume" minOccurs = "0">
        <complexType>
            <simpleContent>
                <extension base = "nonNegativeInteger">
                    <attribute name = "unit" type =
"ipdr:volumeUnit"/>
                </extension>
            </simpleContent>
        </complexType>
    </element>
    <element name = "qosRequested" type = "byte" minOccurs = "0"/>
    <element name = "qosDelivered" type = "byte" minOccurs = "0"/>
    <element name = "qosMeasurement" minOccurs = "0">
        <complexType>
            <simpleContent>
                <extension base = "string">
                    <attribute name = "unit" type =
"string"/>
                    <attribute name = "type" type =
"string"/>
                </extension>
            </simpleContent>
        </complexType>
    </element>
</sequence>
</extension>
</complexContent>
</complexType>
<simpleType name = "terminationStatusType">
    <restriction base = "string">
        <enumeration value = "Normal"/>
        <enumeration value = "Client Failure"/>
        <enumeration value = "Server Failure"/>
        <enumeration value = "Connection Failure"/>
    </restriction>
</simpleType>
<simpleType name = "volumeUnit">
    <restriction base = "string">
        <enumeration value = "bytes"/>
        <enumeration value = "KB"/>
        <enumeration value = "MB"/>
        <enumeration value = "GB"/>
        <enumeration value = "TB"/>
    </restriction>
</simpleType>
<simpleType name = "throughputUnit">
    <restriction base = "string">
        <enumeration value = "baudps"/>
        <enumeration value = "Kbps"/>
        <enumeration value = "Mbps"/>
    </restriction>
</simpleType>

```

```

                <enumeration value = "Gbps"/>
                <enumeration value = "Tbps"/>
            </restriction>
        </simpleType>
</schema>

```

### 3.2 Sample Instance Document

```

<?xml version="1.0" ?>
<IPDRDoc xmlns="http://www.ipdr.org/namespaces/ipdr"
  xmlns:xsi="http://www.w3.org/2000/10/XMLSchema-instance"
  xsi:schemaLocation="http://www.ipdr.org/namespaces/ipdr VoD2.5-A.0.xsd"
  docId="f9c0ca84-1111-11b2-a222-90ef-fd7354696bb"
  version="2.5">
  <IPDRRec info="CGI"/>
  <IPDR seqNum="6279" time="2001-01-24T16:17:32Z">
    <SS id="session1" service="RTSP">
      <SC xsi:type="SC-VOD-Type">
        <subscriberId type="acctId">001-312-55</subscriberId>
        <destAddress>192.1.1.12</destAddress>
      </SC>
      <SE xsi:type="SE-VOD-Type">
        <serviceProviderID type="string">eBroadcasting</serviceProviderID>
        <sourceAddress>192.1.1.13</sourceAddress>
      </SE>
    </SS>
    <UE xsi:type="UE-VOD-Type">
      <movieName>Cast Away</movieName>
      <movieID>0013-2001-1289-001</movieID>
      <startTime>2000-06-26T09:39:03Z</startTime>
      <endTime>2000-06-26T10:51:22Z</endTime>
      <charge unit="USD">5.50</charge>
      <codec>rm 3.9</codec>
      <terminationStatus>Normal</terminationStatus>
      <totalVolume unit="bytes">2520515</totalVolume>
    </UE>
  </IPDR>
</IPDRDoc>

```