



**Network Data Management – Usage  
(NDM-U)  
For  
IP-Based Services  
Service Specification –  
Internet Access and Content, Including  
Wireless**

**Version 2.5-A.0**

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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.  
[ahheintz@rateintegration.com](mailto:ahheintz@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)

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### Abstract

This document identifies business and information requirements for usage based billing of Internet Access Service. It also provides a formal specification, in the form of an XML schema, for an Internet Protocol Data Record (IPDR) that is intended to be used to record and transport Internet Access Service usage event information for billing purposes.

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

1.0 RDA	February 19, 2001
1.0 RBD	March 6, 2001
2.5-A.0	April 13, 2001 – Initial Release

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## 1. Introduction

### 1.1. Purpose

This document specifies the business use cases, requirements and formal IPDR XML Schema for usage data for Internet Access Services. These services include but are not limited to those using dial-up, DSL, ISDN, fixed wireless, cable and mobile technologies such as GPRS and WAP.

### 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.

This document is further limited to addressing only those requirements for providing service usage data, for the purpose of billing, for Internet Access Services. The usage data requirements for other Internet Protocol-based services, such as e-mail, voice over IP and video on demand are addressed in companion documents, the list of which is included in the References section.

### 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:

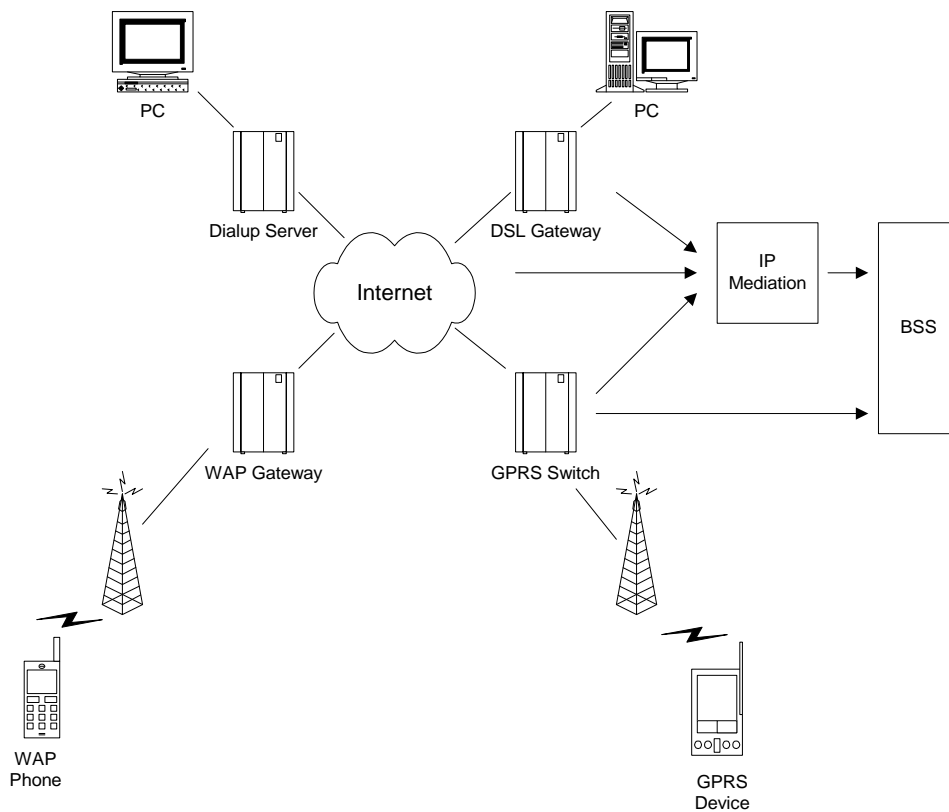
ANI	- Automatic Number Identification
ASP	- Application Service Provider
BSS	- Business Support Systems
CRM	- Customer Relationship Management
DSS	- Decision Support Systems
DTD	- Document Type Definition
DSL	- Digital Subscriber Line
EP	- End Point
ESN	- Electronic Serial Number
FoIP	- Fax over IP
GK	- 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. Internet Access Specification

Currently, multiple billing models (for example, Sprint's WAP or Palm Net) are used for wireless internet access:

- Flat rate (\$20 per month)
- By Volume (\$5 per megabyte)
- By Time (\$0.2 per minute)
- Free

The goal of the Internet Access IPDR definition is to provide a means to capture the information for current billing models, as well as providing the possibility for future models (for example time combined with QoS, or download volume combined with bandwidth). The Internet Access IPDR is defined in a generic fashion so that it can be used for existing internet access methods, such as fixed-wire dialup or DSL.



### 2.1. Definition

Internet access is the service of providing access to the internet using one of the following methods or protocols: Modem Dialup, WAP, GPRS, DSL, ISDN, etc

#### 2.1.1. Requirements

- The Internet Access IPDR must provide all the information necessary so that a user can be billed by flat rate, volume, time or a combination of the above.
- The Internet Access IPDR has to cover mobile as well as stationary Internet access services.

## 2.1.2 Usage Attribute List

### Internet Access

Category	Usage Attribute Name	Data Type	Presence	Possible Values	Remarks
What	transportProtocol	String	Required	WAP, TCP, PPPoE	Transport protocol that was used for internet access.
What	connectionType	String	Optional	Fixed Wire Dialup, DSL, ...	Connection type that was used for internet access.
What	upBandwidth	Value/Unit	Optional	28 Kb, ...	Upstream bandwidth provided.
What	downBandwidth	Value/Unit	Optional	56 Kb, ...	Downstream bandwidth provided.
What	upVolume	Value/Unit	Optional	257 KB	Volume that was uploaded.
What	downVolume	Value/Unit	Optional	5 MB	Volume that was downloaded.
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.
When	startTime	Datetime	Required	ISO 8601 time	When access started.
When	endTime	Datetime	Optional Conditional	ISO 8601 time	When access stopped. At least endTime or duration needs to be present.
When	duration	Value/Unit	Optional Conditional	# of Seconds	Duration of access
Where	accessPoint	String	Required	Dialup number, Gateway IP Address, etc	Identifies access point to the internet. Equivalent to APN for GPRS, NAS
Who	subscriberId	Value/Type	Required	Phone Number, IP Address, Device Id, SIM Card Id, Custom Id	Identifies a unique subscriber in the system. Type can be IMSI, IMEI, IP, PN, CUST
Where	serviceElement	String	Optional	MSCID, CGSN or SGSN (GPRS)	Service element used to provide access. Probably part of IPDR base header.
Who	serviceProviderId	String	Required		Service provider providing internet access.

**Wireless Internet Access (Extension to Internet Access)**

Category	Usage Attribute Name	Data Type	Presence	Possible Values	Remarks
Where	routingArea	String	Required for cellular only		Cellular specific information
Where	locationArea	String	Required for cellular only		Cellular specific information
Where	cellId	String	Required for cellular only		Cellular specific information
What	serviceBearer	String	Required for cellular only	TDMA, CDMA	Service Bearer that was used for connection protocol.

**2.2 Use Case – Content/Service****2.2.1 Basic Flow**

The Content/Service IPDR provides a simple method for accounting of access to content on the web or for execution of simple transactions over the internet. The Content/Service IPDR can be used to bill for access to premium sites and/or for the use of transaction based services (for example directory assistance or stock quotes).

**2.2.1.1 Basic Flow**

- The Service/Content IPDR must provide all the information necessary so that a user can be billed for access to content and services that are available at a premium.
- The Service/Content IPDR must cover access to content and services from stationary as well as mobile devices.

**2.2.1.2 Basic Flow Usage Attribute List****Content/Service (Extension to Internet Access)**

Category	Usage Attribute Name	Data Type	Presence	Possible Values	Remarks
What / Where	ipServiceId	Value/Unit	Required	URL or other service Id	Service address
What	ipServiceClass	String	Optional	Email, etc	Service classification. For example web site, quote service, directory service etc.
What	classOfTransaction	String	Optional	Emails sent, etc	Transaction type qualifier associated with billable event. For example: Real-time quote, delayed quote, Emails sent, Emails read, etc.
What	numberOfTransactions	Number	Optional		Number of transaction associated with the service.

Category	Usage Attribute Name	Data Type	Presence	Possible Values	Remarks
What	amount	Value/Type	Optional	\$5.50	Amount to be charged for service.

#### Wireless Content/Service (Extension to Content/Service)

Category	Usage Attribute Name	Data Type	Presence	Possible Values	Remarks
Where	routingArea	String	Required for cellular only		Cellular specific information
Where	locationArea	String	Required for cellular only		Cellular specific information
Where	cellId	String	Required for cellular only		Cellular specific information
What	serviceBearer	String	Required for cellular only	TDMA, CDMA	Service Bearer that was used for connection protocol.

## 2.2. Push-Delivery

Push-delivery of content is used in the areas of SMS, WAP and broadcast email deliveries. The Push-Delivery IPDR can be used to account for push-delivery transactions.

### 2.2.2.1 Alternative/Specific Flow

- The Push-Delivery IPDR must provide the information necessary so that a content provider using push delivery or a recipient of content delivered through push-delivery can be billed for content, volume or other method.
- The Push-Delivery IPDR must cover push delivery to stationary as well as mobile device

### 2.2.2.2 Usage Attributes List

#### Push-Delivery

Category	Usage Attribute Name	Data Type	Presence	Possible Values	Remarks
Who	pushInitiator	Value/Type	Required	IMSI, IMEI, IP, PN, Custom Id	Identity of push initiator
What	deliveryStatus	String	Required	Unconfirmed, succeeded, failed	Status of push delivery
What	deliveryFeatures	String	Optional	Deliver at, after, before	Mode of delivery
When	deliveryTime	DateTime	Required	ISO 8601 time	Time of push delivery or schedule
What	pushId	String	Optional		Id of push message as provided by push initiator.

<i>Category</i>	<b>Usage Attribute Name</b>	<b>Data Type</b>	<b>Presence</b>	<b>Possible Values</b>	<b>Remarks</b>
What	contentType	String	Required	Text, Query, etc	Type of push content
What	contentSize	Value/Unit	Required	200 bytes	Size of push message
What	priority	Number	Optional	1-10	Priority of push message
What	applicationId	String	Optional		Id of receiving application
Who	pushRecipient	Value/Type	Required	Phone Number, IP Address, Device Id, SIM Card Id, Custom Id	Identifies a unique subscriber in the system to receive the push message. Type can be IMSI, IMEI, IP, PN, CUST
What	transportProtocol	String	Required	WAP, TCP, PPPoE	Transport protocol that was used for internet access.
What	connectionType	String	Optional	Fixed Wire Dialup, DSL, ...	Connection type that was used for internet access.
Where	serviceElement	String	Optional	MSCID, CGSN or SGSN (GPRS)	Service element used to deliver push message.
Who	serviceProviderId	String	Required		Service provider delivering push message.

**Wireless Push-Delivery (Extension to Push-Delivery)**

<i>Category</i>	<b>Usage Attribute Name</b>	<b>Data Type</b>	<b>Presence</b>	<b>Possible Values</b>	<b>Remarks</b>
Where	routingArea	String	Required for cellular only		Cellular specific information
Where	locationArea	String	Required for cellular only		Cellular specific information
Where	cellId	String	Required for cellular only		Cellular specific information
What	serviceBearer	String	Required for cellular only	TDMA, CDMA	Service Bearer that was used for message delivery.

## 3.0 Formal Specification

### 3.1 Internet Access Service-Specific 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">
  <include schemaLocation = "ipdr2.5.xsd"/>
  <complexType name = "SC-CS-Type">
    <complexContent>
      <extension base = "ipdr:SCType"/>
    </complexContent>
  </complexType>
  <complexType name = "SE-CS-Type">
    <complexContent>
      <extension base = "ipdr:SEType"/>
    </complexContent>
  </complexType>
  <complexType name = "UE-CS-Type">
    <complexContent>
      <extension base = "ipdr:UEType">
        <sequence>
          <element name = "ipServiceId">
            <complexType>
              <simpleContent>
                <extension base = "string">
                  <attribute name = "type"
type = "string"/>
                </extension>
              </simpleContent>
            </complexType>
          </element>
          <element name = "ipServiceClass" type = "string" minOccurs
= "0"/>
          <element name = "classOfTransaction" type = "string"
minOccurs = "0"/>
          <element name = "numberOfTransactions" type = "integer"
minOccurs = "0"/>
          <element name = "amount" minOccurs = "0">
            <complexType>
              <simpleContent>
                <extension base = "decimal">
                  <attribute name = "unit"
type = "string"/>
                </extension>
              </simpleContent>
            </complexType>
          </element>
        </sequence>
      </extension>
    </complexContent>
  </complexType>

```

</schema>

## Wireless Internet Access Service-Specific Schema

```
<?xml version="1.0"?>
<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-WIA-Type" base="ipdr:SC-IA-Type" derivedBy="extension">
    <element name="cellId" type="string" minOccurs="1" maxOccurs="1">
      <annotation>
        <documentation> Id of the cell that that is handling the connection to the wireless terminal.
        </documentation>
      </annotation>
    </element>
  </complexType>

  <complexType name="SE-WIA-Type" base="ipdr:SE-IA-Type" derivedBy="extension">
    <element name="serviceBearer" type="string" minOccurs="1" maxOccurs="1">
      <annotation>
        <documentation>
          Service bearer that was used for connection protocol.
        </documentation>
      </annotation>
    </element>
  </complexType>

  <complexType name="UE-WIA-Type" base="ipdr:UE-IA-Type" derivedBy="extension">
    <element name="routingArea" type="string" minOccurs="1" maxOccurs="1">
      <annotation>
        <documentation> Subset of location area.
        </documentation>
      </annotation>
    </element>
    <element name="locationArea" type="string" minOccurs="1" maxOccurs="1">
      <annotation>
        <documentation> The geographical area from which the connection is established.
        </documentation>
      </annotation>
    </element>
  </complexType>
</schema>
```

## Content/Service

### Content/Service Service-Specific Schema

```

<?xml version="1.0"?>
<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"/>

  <annotation>
    <documentation>The name of the master IPDR schema file can either be:

      http://www.ipdr.org/public/ipdr2.5.xsd

    Alternatively, it can be a local copy of this file. Please modify the preceding
    appropriately. Referring to a local copy will normally yield significantly faster performance.
    </documentation>
  </annotation>

  <complexType name="SC-CS-Type" base="ipdr:SC-IA-Type" derivedBy="extension">
    <annotation>
      <documentation> There are no new elements, this exists so that the SC-CS-Type is a valid type.
    </documentation>
    </annotation>
  </complexType>

  <complexType name="SE-CS-Type" base="ipdr:SE-IA-Type" derivedBy="extension">
    <annotation>
      <documentation> There are no new elements, this exists so that the SE-CS-Type is a valid type.
    </documentation>
    </annotation>
  </complexType>

  <complexType name="UE-CS-Type" base="ipdr:UE-IA-Type" derivedBy="extension">
    <element name="ipServiceId" minOccurs="1" maxOccurs="1">
      <complexType base="string" derivedBy="extension">
        <attribute name="type" type="string"/>
      </complexType>
    <annotation>
      <documentation> Service address.
    </documentation>
    </annotation>
  </element>
  <element name="ipServiceClass" type="string" minOccurs="0" maxOccurs="1">
    <annotation>
      <documentation>
        Service classification, for example website, quote service, directory service, etc.
      </documentation>
    </annotation>
  </element>

```

```
</element>
<element name="classOfTransaction" type="string" minOccurs="0" maxOccurs="1">
  <annotation>
    <documentation>
      Transaction type qualifier associated with billable event. For example:
      Real-time quote, delayed quote, Emails sent, Emails read, etc.
    </documentation>
  </annotation>
</element>
<element name="numberOfTransactions" type="integer" minOccurs="0" maxOccurs="1">
  <annotation>
    <documentation>
      Number of transactions associated with the service.
    </documentation>
  </annotation>
</element>
<element name="amount" minOccurs="0" maxOccurs="1">
  <complexType base="decimal" derivedBy="extension">
    <attribute name="unit" type="string"/>
    <annotation>
      <documentation>
        Use ISO 4217 codes for monetary unit (USD, EUR, etc)
      </documentation>
    </annotation>
  </complexType>
  <annotation>
    <documentation> Monetary amount to be charged for service.
  </documentation>
</annotation>
</element>
</complexType>
</schema>
```

## Wireless Content/Service Service-Specific Schema

```

<?xml version="1.0"?>
<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"/>

  <annotation>
    <documentation>The name of the master IPDR schema file can either be:

      http://www.ipdr.org/public/ipdr2.5.xsd

      Alternatively, it can be a local copy of this file. Please modify the preceding
      appropriately. Referring to a local copy will normally yield significantly faster performance.
    </documentation>
  </annotation>

  <complexType name="SC-WCS-Type" base="ipdr:SC-CS-Type" derivedBy="extension">
    <element name="cellId" type="string" minOccurs="1" maxOccurs="1">
      <annotation>
        <documentation> Id of the cell that that is handling the connection to the wireless terminal.
        </documentation>
      </annotation>
    </element>
  </complexType>

  <complexType name="SE-WCS-Type" base="ipdr:SE-CS-Type" derivedBy="extension">
    <element name="serviceBearer" type="string" minOccurs="1" maxOccurs="1">
      <annotation>
        <documentation> Service bearer that was used for connection protocol.
        </documentation>
      </annotation>
    </element>
  </complexType>

  <complexType name="UE-WCS-Type" base="ipdr:UE-CS-Type" derivedBy="extension">
    <element name="routingArea" type="string" minOccurs="1" maxOccurs="1">
      <annotation>
        <documentation> Subset of location area.
        </documentation>
      </annotation>
    </element>
    <element name="locationArea" type="string" minOccurs="1" maxOccurs="1">
      <annotation>
        <documentation> The geographical area from which the connection is established.
        </documentation>
      </annotation>
    </element>
  </complexType>
</schema>

```

## Push-Delivery

### Push-Delivery Service-Specific Schema

```

<?xml version="1.0"?>
<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"/>
  <annotation>
    <documentation>The name of the master IPDR schema file can either be:
      <br/>
      <a href="http://www.ipdr.org/public/ipdr2.5.xsd">http://www.ipdr.org/public/ipdr2.5.xsd</a>
      <br/>
      Alternatively, it can be a local copy of this file. Please modify the preceding
      appropriately. Referring to a local copy will normally yield significantly faster performance.
    </documentation>
  </annotation>
  <complexType name="SC-PD-Type" base="ipdr:SCType" derivedBy="extension">
    <element name="pushRecipient" minOccurs="1" maxOccurs="1">
      <complexType base="string" derivedBy="extension">
        <attribute name="type" type="string"/>
      </complexType>
      <annotation>
        <documentation>
          Identifies a unique subscriber in the system to receive the push message.
        </documentation>
      </annotation>
    </element>
  </complexType>
  <complexType name="SE-PD-Type" base="ipdr:SEType" derivedBy="extension">
    <element name="serviceElement" type="string" minOccurs="0" maxOccurs="1">
      <annotation>
        <documentation> Service element used to deliver push message.
      </documentation>
    </annotation>
  </element>
  <element name="serviceProviderId" type="string" minOccurs="1" maxOccurs="1">
    <annotation>
      <documentation> Service provider delivering push message.
    </documentation>
  </annotation>
  </element>
</complexType>

```

```

<complexType name="UE-PD-Type" base="ipdr:UEType" derivedBy="extension">
  <element name="pushInitiator" minOccurs="1" maxOccurs="1">
    <complexType base="string" derivedBy="extension">
      <attribute name="type" type="string"/>
    </complexType>
    <annotation>
      <documentation> Identity of push initiator.
    </documentation>
    </annotation>
  </element>
  <element name="deliveryStatus" type="string" minOccurs="1" maxOccurs="1">
    <annotation>
      <documentation>
        Status of push delivery. Can be unconfirmed, succeeded, failed.
      </documentation>
    </annotation>
  </element>
  <element name="deliveryFeatures" type="string" minOccurs="0" maxOccurs="1">
    <annotation>
      <documentation> Mode of delivery .
    </documentation>
    </annotation>
  </element>
  <element name="deliveryTime" type="timeInstant" minOccurs="1" maxOccurs="1">
    <annotation>
      <documentation> Time of push delivery.
    </documentation>
    </annotation>
  </element>
  <element name="pushId" type="string" minOccurs="0" maxOccurs="1">
    <annotation>
      <documentation> Id of push message as provided by push initiator.
    </documentation>
    </annotation>
  </element>
  <element name="contentType" type="string" minOccurs="1" maxOccurs="1">
    <annotation>
      <documentation> Type of push content.
    </documentation>
    </annotation>
  </element>
  <element name="contentSize" minOccurs="1" maxOccurs="1">
    <complexType base="nonNegativeInteger" derivedBy="extension">
      <attribute name="unit" type="ipdr:volumeUnit"/>
    </complexType>
    <annotation>
      <documentation> Size of push message.
    </documentation>
    </annotation>
  </element>
  <element name="priority" type="nonNegativeInteger" minOccurs="0" maxOccurs="1">
    <annotation>
      <documentation> Priority of push message.
    </documentation>
    </annotation>
  </element>

```

```
</element>
<element name="applicationId" type="string" minOccurs="0" maxOccurs="1">
  <annotation>
    <documentation>
      Id of receiving application.
    </documentation>
  </annotation>
</element>
<element name="transportProtocol" type="string" minOccurs="1" maxOccurs="1">
  <annotation>
    <documentation>
      Transport protocol that was used for internet access.
    </documentation>
  </annotation>
</element>
<element name="connectionType" type="string" minOccurs="0" maxOccurs="1">
  <annotation>
    <documentation>
      Connection type that was used for internet access.
    </documentation>
  </annotation>
</element>
</complexType>
<simpleType name="volumeUnit" base="string">
  <enumeration value="bytes"/>
  <enumeration value="KB"/>
  <enumeration value="MB"/>
  <enumeration value="GB"/>
  <enumeration value="TB"/>
</simpleType>
</schema>
```

## Wireless Push-Delivery Service-Specific Schema

```

<?xml version="1.0"?>

<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"/>

  <annotation>
    <documentation>The name of the master IPDR schema file can either be:

      http://www.ipdr.org/public/ipdr2.5.xsd

      Alternatively, it can be a local copy of this file. Please modify the preceding
      appropriately. Referring to a local copy will normally yield significantly faster performance.
    </documentation>
  </annotation>

  <complexType name="SC-WPD-Type" base="ipdr:SC-PD-Type" derivedBy="extension">
    <element name="cellId" type="string" minOccurs="1" maxOccurs="1">
      <annotation>
        <documentation> Id of the cell that that is handling the connection to the wireless terminal.
      </documentation>
    </annotation>
  </element>
</complexType>

  <complexType name="SE-WPD-Type" base="ipdr:SE-PD-Type" derivedBy="extension">
    <element name="serviceBearer" type="string" minOccurs="1" maxOccurs="1">
      <annotation>
        <documentation> Service bearer that was used for connection protocol.
      </documentation>
    </annotation>
  </element>
</complexType>

  <complexType name="UE-WPD-Type" base="ipdr:UE-PD-Type" derivedBy="extension">
    <element name="routingArea" type="string" minOccurs="1" maxOccurs="1">
      <annotation>
        <documentation> Subset of location area.
      </documentation>
    </annotation>
  </element>
  <element name="locationArea" type="string" minOccurs="1" maxOccurs="1">
    <annotation>
      <documentation>The geographical area from which the connection is established.
    </documentation>
  </annotation>
</element>

```

```
</complexType>
</schema>
```

### 3.2 Sample Instance Document

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- Assumptions:      Simple company content access from WAP phone.
                       Transaction based.
                       -->
<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/Ipdr IAC2.5-A.0.xsd"
docId="f9c0ca84-1111-11b2-a222-90ef-fd73546596bb"
version="2.5">
  <IPDRRec info="apex.virtualsummit.com" />
  <IPDR seqNum="1" time="2001-01-30T22:30:04Z">
    <SS id="ses10" service="rstp">
      <SC xsi:type="SC-WCS-Type">
        <subscriberId>virtualsummit-160</subscriberId>
        <cellId>5034</cellId>
      </SC>
      <SE xsi:type="SE-WCS-Type">
        <serviceElement>192.168.1.242</serviceElement>
        <serviceProviderId>InterChange v3.61.08</serviceProviderId>
        <serviceBearer>CDMA</serviceBearer>
      </SE>
    </SS>
    <UE xsi:type="UE-WCS-Type" type="Start-Stop">
      <transportProtocol>TCP</transportProtocol>
      <upBandwidth unit="Kbps">128</upBandwidth>
      <downBandwidth unit="Kbps">128</downBandwidth>
      <upVolume unit="KB">1</upVolume>
      <downVolume unit="KB">5</downVolume>
      <startTime>2001-01-30T22:30:04Z</startTime>
      <endTime>2001-01-30T22:30:08Z</endTime>
      <accessPoint>192.168.1.161</accessPoint>
      <ipServiceId type="Server">POP3</ipServiceId>
      <ipServiceClass>Mail</ipServiceClass>
      <numberOfTransactions>105</numberOfTransactions>
      <classOfTransactions>E-Mail Sent</classOfTransactions>
      <amount unit="USD">10.50</amount>
    </UE>
  </IPDR>
</IPDRDoc>
```