



Service Specification – Public WLAN Access

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Preface

Abstract

This document is a component of the set of IPDR specifications that describe the generic business requirements and protocol for usage measurement and usage reporting for IP-based services. The content of this document is compliant with this set of specifications [REF 1] and its scope is limited to the IP-based service described in this document.

This document defines the business requirements, information models, and the XML schema for accounting for basic Public Wireless LAN (PWLAN) access and IP-based services delivered over the PWLAN radio interface, possibly involving service delivery platforms for complex services.

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1. Introduction

1.1 Purpose

This document specifies an open, extensible, XML-based record format for accounting. While the focus of this specification is exclusively on PWLAN wholesale accounting, note that the specified record format may also be used to facilitate retail billing.

The purpose of this specification is defined by the mission and objectives of IPDR Wireless LAN Accounting and Settlement Working Group (hereafter referred as WLANAS), as agreed upon by the participating members, namely:

- (a) *To enable PWLAN Roaming by publishing specifications that define open and extensible inter-operator Accounting and Settlement interfaces that support a rich set of PWLAN service offerings.*
- (b) *To develop “service specifications”, based on open IPDR Specifications, for PWLAN Roaming scenarios*
- (c) *To promote industry adoption of the WLANAS specification.*
- (d) *To ensure interoperability thru IPDR compliance interoperability testing program.*

1.2 Scope

The coverage of PWLAN wholesale settlement function is restricted to the specification of information elements that capture usage data for postpaid and prepaid payment scenarios.

The following subjects are within the scope of this document:

- Specification of a record format for usage accounting of PWLAN access.

The following subjects are beyond the scope of this document:

- Authentication and authorization methods for PWLAN access or services – this specification does not describe, specify, or make assumptions about PWLAN Authentication, Authorization, and Accounting (AAA) methods, the associated protocols, or their variants (refer *Note 1* below).
- Retail billing
- Ad hoc local accounting and billing

Note 1: The motivation behind excluding the AAA methods for PWLAN services is to decouple the multiplicity of PWLAN AAA protocols (and their variants) from the inter-provider settlement function, thereby broadening the applicability of this specification. The underlying assumption is that the interworking guidelines between the accounting function of the deployed PWLAN AAA protocol and the proposed settlement record format may be specified outside this specification. As an example, Appendix A1 describes the interworking between IPDR record format and RADIUS accounting. Note also that there will be other business rules and data sources necessary to completely populate the IPDRDocs and SettlementDocs.

1.3 Compatibility

Future revisions of this specification SHALL preserve the investments made by service providers and solution vendors by considering backward and forward compatibility whenever practical. This document’s structure and information model are consistent with the IPDR document set version 3.5 [REF 1].

The key words “MUST”, “MUST NOT”, “REQUIRED”, “SHALL”, “SHALL NOT”, “SHOULD”, “SHOULD NOT”, “RECOMMENDED”, “MAY” and “OPTIONAL” in this specification are to be interpreted as described in [REF 15].

1.4 Overview

This specification comprises two sections:

Section 2 examines the business requirements for wholesale accounting for PWLAN services. This section defines the generic business requirements for PWLAN accounting, and specific business requirements arising from PWLAN deployments by Service Providers belonging to four types of core networks – Wireless ISPs (WISP), GSM Operators, CDMA Operators, and Wireline Operators.

Section 3 develops the formal specification. This section specifies a machine-readable, universal XML schema description that satisfies the business requirements for PWLAN accounting.

2 Business Requirements

2.1 Generic Requirements

The Service Provider must be able to accurately report resource usage by all Service Consumers (Home or Visited). For the Service Consumer, these resources comprise the airtime (for basic PWLAN access) and the services delivered (over the PWLAN interface.)

[R1] The IPDR must contain the billable account identifier.

[R2] The IPDR must identify the PWLAN hotspot where the resource was consumed. It must contain the user device's MAC address, access gateway identifier, and the location of Access Point.

[R3] The IPDR must accurately identify the PWLAN access resources used. It must contain local time of session establishment and the local time of session termination. The minimum required timestamp accuracy should be to the second. Local time zone offset with respect to GMT must be provided. Time should be expressed in ISO 8601 format.

[R4] The IPDR must identify the services consumed over PWLAN access interface. It must contain specific usage data. Usage data comprises the number of bytes transmitted and received by the Mobile Station, types of IP services utilized, content type/bytes purchased during the session, etc.

[R5] The IPDR should contain the billing class of service when available.

[R6] The IPDR must contain the termination cause for each session.

[R7] The IPDR must contain access payment method used by the Service Consumer. If no payment was made (i.e. service was free), it should be recorded in the IPDR.

[R8] The IPDR must contain unique identifiers of all providers and partners. It must uniquely identify the Access Provider and the Service Provider. The IPDR MAY optionally contain fields for identifier that specify the partners namely - Venue Owner, Content Provider.

2.2 Public WLAN Access Use Cases

2.2.1 Definition

This section specifies the business use cases, information flows, and requirements for wholesale settlement for PWLAN Access roaming usage. A settlement record captures the PWLAN services usage of a single PWLAN session or a set of PWLAN sessions cumulated or indexed by a certain parameter (e.g. a Service Provider Identifier). A session is defined as the time period between successful user authentication and logoff (network or user initiated).

The specification covers the following five use cases, each categorized by two parameters – authentication credentials supplied by the user and the type of Home Service Provider:

1. **WISP Use Case.** Authentication credentials supplied: Username/Password. Service Provider: WISP.
2. **GSM Use Case.** Authentication credentials supplied: IMSI and OTP based. Service Provider: GSM Operator.
3. **CDMA Use Case.** Authentication credentials supplied: Username/Password or R-UIM or SID/BID. Service Provider: cdmaOne/cdma2000 Operator.
4. **Wireline Use Case.** Credentials supplied: Username/Password. Service Provider: Regional Telephone Exchange Operators.
5. **DOCSIS® Use Case.** Credentials supplied: Username/Password. Service Provider: MSO.

2.2.2 Use Case Requirements

The requirements for Settlement format for each of the above use case MAY be divided into four categories as follows:

1. Accounting data exchanged between service providers for PWLAN sessions.
2. Settlement data exchanged between Service Providers for PWLAN sessions.
3. Business relationship related data exchanged between SPs.
4. Audit/Revenue Assurance related data exchanged between SPs.

2.2.2.1 Generic Settlement Information Elements

Each use cases of PWLAN deployment requires a unique set of Accounting information elements and their permissible formats and values across the IPDR D and E interfaces. To satisfy the requirement of an open, inter-network standard, these individual sets of information elements must be:

1. Harmonized across service provider types into a single superset of information elements, each with a defined format and datatypes.
2. The possible value of each harmonized information element must be specified for each use case – this may include specifying enumerated values, ranges, or referring to relevant documentation specific to each use case.

Table 1 specifies the information element list for the IPDR Public WLAN Accounting record. Each information element, identified by a unique name, captures one of following generic parameters of usage for any service (PWLAN access service) viz.

- who used the service
- what (or how much) service was consumed
- when was service usage recorded
- where was the service used

Information Element Id	Category	Name	Presence (Required/ Optional/ Conditional) ¹	Format	Permitted Values (Enumerated/ Range/ Reference)	Remarks	Use Cases where Applied
IE1	Who	Username	Required	String	As assigned within home SP network	The end user ID and their domain name (NAI).	All ²
IE2	Who	SC_ID_Type	Conditional	Integer	<enum> “IMSI” “MIN” “MDN”	Type of Service Consumer ID Used when a more specific Identifier of Service Consumer is necessary. For example, IMSI for GSM subscribers.	All
IE3	Who	SC_ID	Conditional	String	As assigned in home SP network.	The Service Consumer ID when a more specific identifier of the Service Consumer is required. For example, IMSI for GSM/GPRS subscribers.	All
IE4	Who	Home_Service_Provider_Type	Required	Integer	<enum> “DOMAIN” “PMN CODE” “SID/BID” “BRI”	Identifies how the home service provider is identified. For example, Domain Name, PMN code, SID/BID number, or Business Relationship Identifier (BRI).	All
IE5	Who	Home-Service-Provider	Required	String	As assigned by home SP network authority. (Domain Name, PMN code, SID or BID number, or BRI)	The user’s Home Service Provider. May be derived from the NAI of the Username. This field, plus the type, will uniquely identify the provider by the same value that they are known in their industry.	All

¹ Required information elements must be present in all IPDRs. Optional Information Elements may be present, but are not required. Conditional Information Elements must be present when business rules agreed upon in roaming agreement between the Service Providers require them to be present. For all other cases, they are optional.

² All denotes that this information element is applicable for settlement records for all the use cases covered in this document (viz. WISP, Wireline, CDMA, GSM and DOCSIS™.)

Information Element Id	Category	Name	Presence (Required/ Optional/ Conditional) ¹	Format	Permitted Values (Enumerated/ Range/ Reference)	Remarks	Use Cases where Applied
IE6	Who	Acct-Session-ID	Required	String		Account session ID assigned by the NAS server. Each session is assigned a unique NAS ID and is therefore used as one of the key criteria in the Settlement Process to identify unique transactions.	All
IE7	Who	User-IP-address	Optional	Ipaddr	IP Address	IP Address of the end user (calling station). This field must support IPv6 format.	All
IE8	Who	Calling-Station-ID	Required	String	MAC-Address	MAC Address of the end user's device as formatted in RFC3580, section 3.21. For example, 00-10-A4-23-19-C0	All
IE9	Where	Location-Port	Optional	String		Describes the user's access area within a given location.	All
IE10	Where	Called Station ID	Required	String	Refer RFC 3580. [REF 10]	A unique name which identifies the hotspot venue. Radius Defined using the Mac Address and SSID in the format shown in RFC3580 section 3.20. For example, "00-10-A4-23-19-C0:AP1".	All
IE11	Where	NAS IP Address	Required	IPAddr	IP Address	The IP address of the local Network Access Server (NAS) (i.e. the access gateway) that provides the service. This field must support IPv6 format.	All

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IE12	Where	NAS ID	Required	String	Fully qualified domain name or Identifier, hostname, BSSID	Will appear in Access Request record format (depends on WISP network configuration and BSS system). Identifies the access gateway when NAS-IP-Address is insufficient.	All
IE13	Where	Access Provider Type	Required	Integer	<enum> “DOMAIN” “PMN CODE” “SID/BID” “BRI”	Identifies how the serve/visited service provider is identified. For example, Domain Name, PMN code, SID/BID number, or BRI. Need to identify the possible values.	All
IE14	Where	Access Provider	Required	String	As assigned by home SP network authority. (Domain Name, PMN code, SID or BID number, or BRI)	The PWLAN operator providing network access. This field, plus the type, will uniquely identify the provider by the same value that they are known in their industry.	All
IE15	Where	Location_Name	Required	String		Descriptive Location Name of the user access network. For Example: Gate_14_Terminal_C_of_Newark_Airport”. The source of this data will be from Optional VSA or Derived	All
IE16	Where	Location-ID	Optional	String		Describes the user’s access area within a given location. For example: Network=ACMEWISP_NewarkAirport	All

Information Element Id	Category	Name	Presence (Required/ Optional/ Conditional) ¹	Format	Permitted Values (Enumerated/ Range/ Reference)	Remarks	Use Cases where Applied
IE17	Where	Location-Type	Optional	String		Contains the location type defined within the access provider's network. Examples include: airport, hotel, coffee shop, and bookstore.	All
IE18	Where	Location_Country_code	Required	String	Refer ISO 3166-x [REF 10]	ISO country code of the user's location. 2 character alpha string. Derived. Can be derived from Geocode.	All
IE19	Where	Location_StateProvince	Optional	String	http://www.usps.com/nsc/lookups/abbreviations.html#states or http://geonames.nrcan.gc.ca/info/prov_abr_e.php	2 character alpha string. Can be derived from Geocode	All
IE20	Where	location_city	Required	String		Derived, can be derived from Geocode	All
IE21A	Where	Location_Geocode	Conditional	String		Content dictated by Type	GSM
IE21B	Where	Location_Geocode-Type	Conditional	String		UTM, OSGB, Lat/Long	GSM
IE22	What	NAS-Port-Type	Required	Integer	<enum> Refer RFC 2865 [REF 4]	Identifier indicating the Port type. Values from RFC2865.	All

Information Element Id	Category	Name	Presence (Required/ Optional/ Conditional) ¹	Format	Permitted Values (Enumerated/ Range/ Reference)	Remarks	Use Cases where Applied
IE23	What	Payment-type	Conditional	Integer	<enum> “CREDITCARD” “SCRTCHCARD” “SUBSCRIPTION”	Applies only to settlement between Venue and Access provider.	WISP
IE24	What	Network-connection-Type	Optional	String		Uniquely identifies the network type used. For Example: WA=802.11a, WB=802.11b, WG=802.11G, EN=Ethernet (2 character alpha string) [??]=cdma2000	All
IE25	What	Session_duration	Required	Integer		Session duration in seconds (already compensated for idle-timeout). Possible source: RADIUS Acct_Session_Time	All
IE26	What	input-octets	Required	Integer		Bytes user received. Possible Source: RADIUS Acct-input-octets and the input-gigaword field. Take the RADIUS gigaword field, multiply by 2 ³² and add to RADIUS input-octet field to get the IPDR input-octet IE value.	All
IE27	What	output-octets	Required	Integer		Bytes user transmitted. Possible source: RADIUS Acct-output-octets	All
IE28	What	Class	Optional	String		Home Service Provider specified service class and provided if supported by Access Provider for that session	All

Information Element Id	Category	Name	Presence (Required/ Optional/ Conditional) ¹	Format	Permitted Values (Enumerated/ Range/ Reference)	Remarks	Use Cases where Applied
IE29	When	gmt_session_start_date_time	Required	DateTime	22 character alphanumeric string in the format “YYYY-MM-DDThh:mm:ssTZD”.	The universal GMT date and time the session started with the Service Consumer’s perceived time zone. See ISO 8601.	All
IE30	When	gmt_session_end_date_time	Required	DateTime	22 character alphanumeric string in the format “YYYY-MM-DDThh:mm:ssTZD”.	The universal GMT date and time the session ended with the Service Consumer’s perceived time zone. See ISO 8601.	All
IE31	Why	Session-Terminate-Cause	Required	Integer	<enum> “Logoff” “IdleTimeout” “SessionTimeout” “AdminReset” NAS Error” “NAS Request” “NAS Reboot”	RFC 3580 specifies, RFC 2866 enumerates	All
IE32	What	Billing-Class-Of-Service	Optional	String		Indicates Service Type. Service level provided to user derived from Max-bandwidth-level. (Added for compatibility with WISPr)	All
IE33	What	Unit of Measure	Required	Integer	<enum> “Bytes” “Seconds” “Minutes” “Hours” “Days” “Sessions” “Quantity”	Indicates what is being represented in chargeable units field. The “Quantity” enum item may be applicable for settlement for Partner content purchase.	All

Information Element Id	Category	Name	Presence (Required/ Optional/ Conditional) ¹	Format	Permitted Values (Enumerated/ Range/ Reference)	Remarks	Use Cases where Applied
IE34	What	Chargeable_unit	Required	Integer	<enum> “Incoming volume” “Outgoing volume” “Total volume” “Duration” “Event” “Fixed” “Content”	Indicates what activity the Chargeable_Quantity and Unit of Measure are metering.	All
IE35	What	Chargeable_Quantity	Required	Integer		Volume of chargeable_unit charged for this record	All
IE36	What	Charge_Amount	Required	Currency		Amount of the charge, not including taxes	All
IE37	What	Charge Currency Type	Required	String	<reference> Refer ISO 4217 [REF 11]	Standard currency abbreviation from ISO 4217	All
IE38	Who	Other-party	Conditional	String	Values dependent on Roaming Agreement	Identifies content or other party involved in transaction, if applicable. The party is associated with the charge since types of charges may have involved different parties. For example, the charge for network access is applied to access provider while charge for content applies to content provider	All
IE39	What	Tax Percentage	Conditional	Integer Array Group IE39-41	0-100	The tax % applied to the charge. If blank, then the tax amount was a percentage or fixed value applied	GSM

Information Element Id	Category	Name	Presence (Required/ Optional/ Conditional) ¹	Format	Permitted Values (Enumerated/ Range/ Reference)	Remarks	Use Cases where Applied
IE40	What	Tax Amount	Required	Currency Array Group IE39-41		The amount of tax. The charge amount does not include tax	
IE41	What	Tax Type	Conditional	Integer Array Group IE39-41	<enum> “National” (01) “Regional” (02) “County” (03) “Local/City” (04) “Province” (05) “Dominion” (06) “Gross Receipts” (07) “Absolute/fixed” (no rate specified) 08 “Public Utilities” (09) “Sales And Use” (10) “Excise” (11) “Communications” (12) “Value Added Tax” (13) “Harmonized” (14)	Type of tax applied.	GSM
IE42	What	Intermediary-Name	Optional	String		Represents a human-readable PWLAN intermediary name string. Could be a reseller, aggregator, clearinghouse, etc.	All
IE43		Service-Name	Required	Integer	<enum> “Basic-Access” “VoIP” “Streaming Media” “Content” “Email” “VPN”	Specifies the service type used. VoIP, Basic Access, Purchased Content, etc. Mention in remark that it’s not the RADIUS service type.	All
IE44	What	Related-IPDR-ID-List	Conditional	UUID [Array]		Used to link together multiple related IPDRs when usage scenario and business rules demand so.	All

Information Element Id	Category	Name	Presence (Required/ Optional/ Conditional) ¹	Format	Permitted Values (Enumerated/ Range/ Reference)	Remarks	Use Cases where Applied
						Can't change parent IPDR for audit/revenue assurance integrity.	
IE45	Who	Temp-User-Id	Optional	String		Temporary user identification allocated by home SP. This is an ID assigned by the Access Point.	All

Table 1: Usage Attribute List for IPDR Public WLAN Accounting Record

2.2.3 WISP Use Case

This use-case describes the accounting and settlement flows when a Service Consumer makes PWLAN access on any type of Service Provider network, but is authenticated by, and pays for usage charges to a Wireless ISP (WISP) – its home Service Provider. These flows describe the accounting and settlement flows between the WISP, the Access Provider, and Partners (e.g. Venue Owner).

The Service Consumer uses username/password, assigned by the WISP, as authentication credentials. The payment method may be either subscription or prepaid. Usage of the RADIUS standard is assumed between the home Service Provider (WISP) and the visited Service Provider for Authentication, Authorization and Accounting (AAA) information exchange. As a result, the availability of RADIUS accounting data is assumed. This use case also covers the cases wherein the home Service Provider is a Dial-up ISP or any other type of ISP using the RADIUS protocol for AAA.

WISPs have widely deployed the Universal Access Method (UAM), recommended by Wi-Fi Alliance, as the basic method to enable PWLAN access to a WISP Service Consumer. This method requires only an Internet browser and the WLAN network interface on the user terminal – enabling a wide variety of terminal devices (operating systems, device types etc.) to access PWLAN roaming services. To enable a similar roaming experience and interface, this method employs an Internet-browser based secure Authentication Portal, user credential entry, and RADIUS AAA for granting access to a WISP network. The UAM may be optionally enhanced by using a proprietary Smart Client on the terminal device. The recently introduced enhanced security framework of Wi-Fi Protected Access (WPA) is independent of the accounting and settlement scope of this specification. As a result, this use case covers the UAM based PWLAN access both with and without the WPA security enhancements.

2.2.3.1 Basic Flow

1. Service Consumer wants to establish a PWLAN session in an Access Provider’s public hotspot.
2. Service Consumer uses the Username/Password that is supplied by the home Service Provider as authentication credentials.
3. Access Provider uses RADIUS to facilitate AAA functions with the home Service Provider.
4. Access Provider MAY charge roaming access fee from the home Service Provider.
5. Intermediaries MAY optionally be involved in performing settlement between the Access Provider, Venue Owner, and the home Service Provider.

2.2.3.2 Requirements Specific to Basic Flow

The settlement information element exchange to support the WISP use case MAY be described using the following interfaces:

1. Access Provider and Venue Owner Rating Information
2. RADIUS Attributes for Usage, Accounting, and Settlement
3. Home Service Provider, Access Provider, and Venue Owner Identification

Basic Flow of Accounting and Settlement

This case covers the Accounting and Settlement for PWLAN access and services when the User is a Service Consumer to a Home Service Provider selling PWLAN usage services.

1. The Service Consumer wants to establish a PWLAN session in a hotspot provided by the Access Provider
2. The Service Consumer connects to the PWLAN, opens the browser, and is redirected to the sign-on page of the Access

Provider or the Home Provider.

3. The service consumer enters the username/password and initiates an authentication request through the Access Provider's network.
4. The Access Provider uses RADIUS to authenticate and authorize the Service Consumer.
5. The home Service Provider acknowledges the RADIUS request and replies with an AUTH-Request Accept.
6. Once authorized, the User is able to use the PWLAN connection to browse the Internet or access the Corporate VPN.
7. When the user completes the session, they click the logout button to disconnect from the network.
8. Upon a Service Consumer disconnect, the PAC terminates the Internet access session and sends the RADIUS STOP record.
9. The Access Provider collects the RADIUS session information for delivery to downstream BSS systems.
10. The Access Provider creates an IPDR PWLAN settlement record.
11. The Access Provider sends the IPDR PWLAN settlement records and a request for payment to the Home Service Provider for the Service Consumer usage (this may be done via an intermediary, such as a clearinghouse).
12. The Home Service Provider bills the Service Consumer for usage.
13. The Home Service Provider pays the Access Provider the agreed rate for the User's PWLAN usage (this may be done via an intermediary, such as a clearinghouse).

2.2.3.3 Alternative Flow: Settlement with Content Provider/Venue Owner

This alternate flow describes the settlement information element flow between the Access Provider and the Venue Owner. In PWLAN environments, the Access Provider typically shares usage revenue with the venue partner.

2.2.3.4 Requirements Specific to Settlement with Content Provider/Venue Owner

1. The Service Consumer enters a Venue and establishes a PWLAN session in the hotspot operated by the Access Provider.
2. The Service Consumer has a roaming subscription with a Home Service Provider that is a roaming partner of the Access Provider.
3. The user enters a Venue and wants to purchase a PWLAN session.
4. The user enters a Venue and uses a Prepaid scratch card to establish a PWLAN session.
5. The Access Provider MAY grant authorized services without a user-specific NAI (ex. Access Provider may authorize services based on the user entering in the Room Number of their room).
6. The Venue does not require authorization replies.
7. The Access Provider pays the Venue the agreed rate for the User's PWLAN usage (this may be done thru an intermediary such as an aggregator).

2.2.4 Wireline Use Case

This use case describes the accounting and settlement flows when a Service Consumer makes PWLAN access on any type of Service Provider network, but pays for usage charges to a regional telephony services provider (e.g. a Local Exchange Carrier in the United States) – its home Service Provider. These flows describe the accounting and settlement flows between the LEC, the Access Provider, and the Venue Owner.

The Service Consumer uses username/password, assigned by the regional telephony services provider, as authentication credentials. The payment method may be by subscription. It is assumed that Authentication, Authorization and Accounting (AAA) information exchange is completed via RADIUS and therefore RADIUS accounting data is available.

2.2.4.1 Basic Flow

2.2.4.2 Requirements Specific to Basic Flow

The information element exchange to support the WISP use case MAY be described using the following interfaces :

1. Access Provider and Venue Owner Rating Information
2. RADIUS Attributes for Usage, Accounting, and Settlement
3. Home Service Provider, Access Provider and Venue Owner Identification

Basic Flow of Accounting and Settlement

This case covers Accounting and Settlement for PWLAN access and services when the Service Consumer is a subscriber of a Local Exchange Carrier.

1. The Service Consumer wants to establish a PWLAN session in a hotspot provided by the Venue Owner/Access Provider
2. The Service Consumer connects to the PWLAN and provides authentication credentials.
3. The Access Provider uses RADIUS/AAA to communicate with the HOME RADIUS/AAA server and authenticate, authorize, and account for the Service Consumer's session.
4. Once authenticated and authorized, the Service Consumer is able to use the PWLAN connection to browse the Internet or access the Corporate VPN. A RADIUS Acct-Start record is sent by the Access Provider to the Service Provider.
5. When the Service Consumer terminates the session, they are disconnected from the network and a RADIUS STOP record is generated to account for the end of the session.
6. The Access Provider collects and aggregates the RADIUS accounting information for delivery to downstream BSS systems.
7. The Access Provider creates an IPDR PWLAN record from the RADIUS accounting data.
8. The Access Provider sends the IPDR PWLAN records and a request for payment to the Regional Telephony Services Provider for the Service Consumer's Usage (this may be done via an intermediary, such as a clearinghouse).
9. The Regional Telephony Services Provider bills the subscriber according service plan terms.
10. The Regional Telephony Services Provider pays the Access Provider the agreed rate for the Service Consumer's PWLAN usage (this may be done via an intermediary, such as a clearinghouse).

2.2.5 CDMA Use Case

This use case describes the accounting and settlement flows when a Service Consumer makes PWLAN access on any type of Service Provider network, but pays for usage charges to a cdmaOne/cdma2000 operator – its home Service Provider. These flows describe the accounting and settlement flows between the Regional Telephony Services Provider, the Access Provider, and the Venue Owner.

The Service Consumer uses username/password, assigned by the CDMA operator, as authentication credentials. The payment method may be either subscription. Prepaid method is beyond the scope of this use case. It is assumed that Authentication, Authorization and Accounting (AAA) information exchange is completed via RADIUS and therefore RADIUS accounting data is available.

2.2.5.1 Basic Flow

Accounting and Settlement Basic Flows

This case covers Accounting and Settlement for PWLAN access and services when the User is a subscriber to a CDMA mobile network operator.

1. The Service Consumer wants to establish a PWLAN session in a hotspot provided by the Access Provider
2. The Service Consumer connects to the PWLAN, opens the browser, and is redirected to the sign-on page of the Access Provider
3. The Service Consumer enters his username (e.g., mobilenumber@mobileoperator.net) and password
4. The Access Provider uses RADIUS to authenticate and authorize the User.
5. Once authorized, the User is able to use the PWLAN connection to browse the Internet or access the Corporate VPN
6. When the user finishes, they click the logout button to disconnect from the network
7. A RADIUS accounting record is generated for the session. This record is available to both Home and Access providers.
8. The Home Service Provider bills the User for his usage.
9. The Access Provider collects the RADIUS accounting records for a period of time
10. The Access Provider creates an IPDR PWLAN settlement record.
11. The Access Provider sends the IPDR PWLAN Settlement records and a request for payment to the Home Service Provider for the usage by the Home Provider's users (this may be done via an intermediary, such as a clearinghouse).
12. The Home Service Provider pays the Access Provider the agreed rate for the User's PWLAN usage (this may be done via an intermediary, such as a clearinghouse).

2.2.5.2 Requirements Specific to Basic Flow

None.

2.2.6 GSM Use Case

This use case describes the accounting and settlement flows when a Service Consumer makes PWLAN access on any type of Service Provider network, but pays for usage charges to a GSM Operator – its home Service Provider. These flows describe the accounting and settlement flows between the Regional Telephony Services Provider, the Access Provider, and the Venue Owner.

The Service Consumer uses the GSM authentication credentials assigned by the GSM Operator for PWLAN access. The payment method may be either subscription. Prepaid method is beyond the scope of this use case. It is assumed that Authentication, Authorization and Accounting (AAA) information exchange is completed via RADIUS and therefore RADIUS accounting data is available.

This contribution is largely based on public / non-binding working documents from the GSM Association (GSMA) WLAN Task Force and the 3GPP-WLAN Inter-working Group.

2.2.6.1 Basic Flow

Basic Flow of Accounting and Settlement

This use case covers Accounting & Settlement in the GSM environment for PWLAN access and services to the Service Consumer where:

1. Service Consumer wants to establish a PWLAN session in a hotspot provided by the Access Provider.
2. The Service Consumer connects to the PWLAN, opens the browser, and is redirected to the sign-on page of the Access Provider.
3. The Service Consumer uses the username (username@realm where username is an IMSI or some other identifying string) and password supplied by the Service Provider as authentication credentials.
4. The Service Consumer may or may not have a SIM card attached to their PWLAN device.
5. The Access Provider uses RADIUS to authenticate and authorize the User.
6. Once authorized, the User is able to use the PWLAN connection to browse the Internet or access the Corporate VPN
7. A user session is ended when it is detected that they have disconnected from the network.
8. A RADIUS accounting record is generated for the session. This record is available to both Home and Access providers.
9. The Access Provider collects and rates the RADIUS accounting records for a period of time.
10. The Access Provider creates an IPDR PWLAN settlement record.
11. The Access Provider sends the IPDR PWLAN settlement records and a request for payment to the Home Operator for the usage by their subscribers.
12. The Home Operator bills the User for his usage.
13. The Home Operator pays the Access Provider the agreed rate for the User's PWLAN usage.
14. Intermediaries may or may not be involved at all stages.

2.2.6.2 Requirements Specific to Basic Flow

None.

2.2.7 DOCSIS™ Use Case

This use case describes PWLAN access by a cable MSO's DOCSIS™ subscriber who wishes to use a public "hotspot" when away from their cable system. The MSO has a pre-arranged business agreement with the WISP from which the Service Consumer is receiving access. The Service Consumer has been assigned authentication credentials (typically username and password) by the service provider for use when accessing PWLAN services. It is assumed that AAA is completed via the RADIUS protocol and therefore RADIUS accounting data is available. The Service Consumer will pay for usage charges to the MSO based on previously mentioned service agreement.

These processes include, settlement between an MSO and a venue owner/access provider, identification of the necessary end user billing and usage information as well as the information needed for traffic analysis reporting. This section identifies the information and data elements necessary for to account for the settlement between an MSO and a PWLAN Venue operator, the RADIUS NAS specific attributes, and the information needed to support the settlement necessary between the MSO and the venue owner/Access Provider.

2.2.7.1 Basic Flow

See WISP use case.

2.2.7.2 Requirements Specific to Basic Flow

See WISP use case.

2.2.7.3 Basic Flow Usage Attribute List

See WISP use case.

3 Formal Specification

3.1 Public WLAN Access

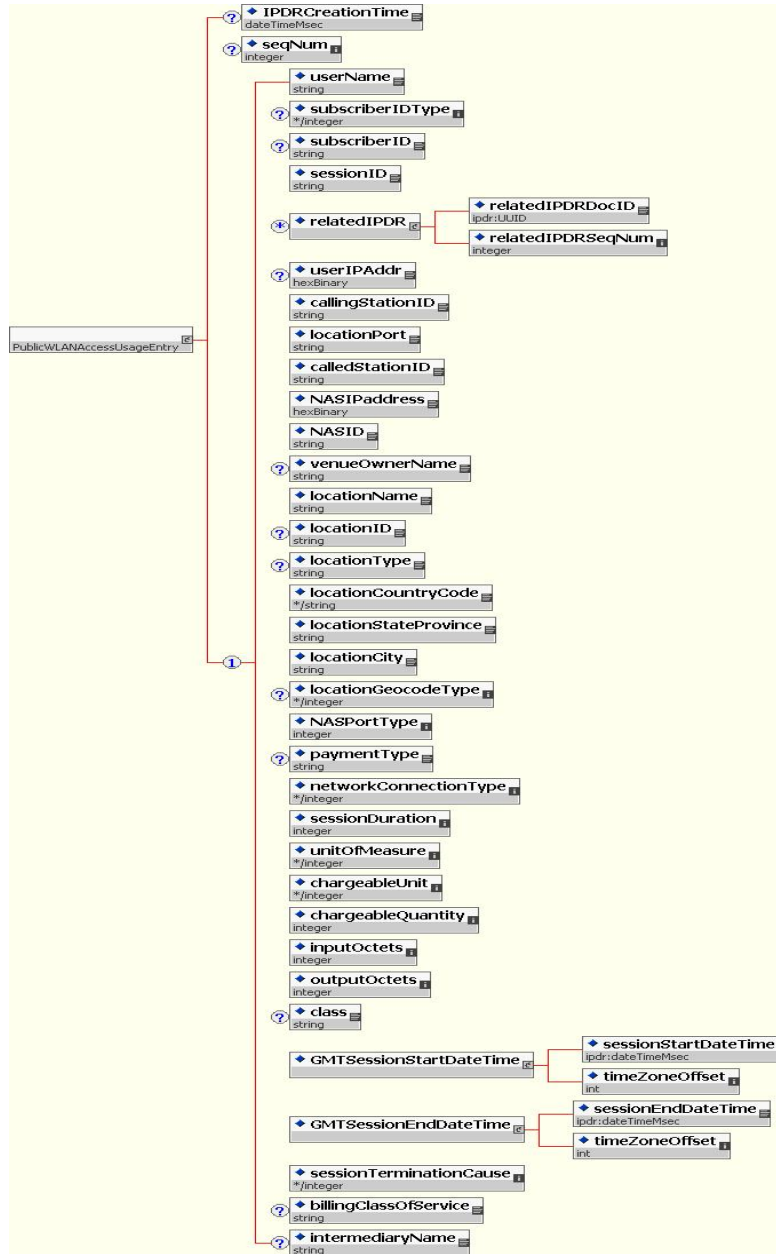


Figure 1 - Public WLAN Access IPDR Model

Visit the following hyperlink for the XML Schema source code:

<http://www.ipdr.org/public/PublicWLANAccess3.5-A.0.xsd>

3.2 Sample Instance Documents- WISP/DSL/DOCSIS® Use Case

```

<?xml version="1.0" ?>
  <IPDR xsi:type = "PWA:PublicWLANAccessUsageEntry"
    xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance"
    xmlns:PWA = "http://www.ipdr.org/namespaces/PWA"
    PWA:schemaLocation =
      "http://www.ipdr.org/namespaces/PWA http://www.ipdr.org/public/PublicWLANAccess3.5-A.0.xsd"
    docId="f9c0ca84-1111-11b2-a222-90ef-fd735469"
    creationTime="2004-01-25T16:17:33Z"
    IPDRRecorderInfo="XYZ"
    version="3.5">
    <IPDRCreationTime>2004-01-24T22:39:38Z</IPDRCreationTime>
    <seqNum>2437</seqNum>
    <userName>XYZ@A.com</username>
    <sessionID>1234</sessionID>
    <userIPAddr>999.999.999.999</userIPAddr>
    <callingStationID></callingStationID>
    <locationPort></locationPort>
    <calledStationID></calledStationID>
    <NASIPAddress>255.255.255.255</NASIPAddress>
    <NASID>ID1</NASID>
    <locationName>HotSpot Alpha</locationName>
    <locationID></locationID>
    <locationType></locationType>
    <locationCountryCode></locationCountryCode>
    <locationStateProvince></locationStateProvince>
    <locationCity></locationCity>
    <locationGeocodeType></locationGeocodeType>
    <NASPortType></NASPortType>
    <networkConnectionType>2</networkConnectionType>
    <sessionDuration></sessionDuration>
    <unitOfMeasure></unitOfMeasure>
    <chargeableUnit>5</chargeableUnit>
    <chargeableQuantity>10</chargeableQuantity>
    <inputOctets>10500</inputOctets>
    <outputOctets>502</outputOctets>
    <GMTSessionStartDateTime></GMTSessionStartDateTime>
    <GMTSessionEndDateTime></GMTSessionEndDateTime>
    <terminationSessionCause>1</terminationSessionCause>
  </IPDR>

```

Appendix - Consolidated Attributes – RADIUS-based AAA

This appendix maps the IPDR information elements to RADIUS attributes.

Information Element Id	Category	IPDR Information Element	GSMA RADIUS Attribute	WFA/PA 3 RADIUS Attribute
IE1	Who	Username	User-name	User-name
IE2	Who	Service consumer_ID_Type		
IE3	Who	Service consumer_ID		
IE4	Who	Home_Service_Provider_Type		
IE5	Who	Home-Service-Provider		
IE6	Who	Acct-Session-ID	Acct-Session-Id	Acct-Session-Id

Information Element Id	Category	IPDR Information Element	GSMA RADIUS Attribute	WFA/PA 3 RADIUS Attribute
IE7	Who	User-IP-address	Framed-IP-Address	Framed-IP-Address
IE8	Who	Calling-Station-ID	Calling-Station-ID	Calling-Station-ID
IE9	Where	Location-Port	.	Go back to latest PA3 spreadsheet. It may be defined there now.
IE10	Where	Called Station ID	Called-Station-Id	Called-Station-ID
IE11	Where	NAS IP Address	NAS-IP-Address	NAS-IP-Address
IE12	Where	NAS ID	NAS-Identifier	NAS-Identifier

Information Element Id	Category	IPDR Information Element	GSMA RADIUS Attribute	WFA/PA 3 RADIUS Attribute
IE13	Where	Access Provider Type	.	-
IE14	Where	Access Provider	.	-
IE15	Where	Location_Name	Location-Name (VSA)	Location-Name (VSA)
IE16	Where	Location-ID	Location-ID (VSA)	Location-ID (VSA)
IE17	Where	Location-Type	.	-
IE18	Where	Location_Country_code	.	-

Information Element Id	Category	IPDR Information Element	GSMA RADIUS Attribute	WFA/PA 3 RADIUS Attribute
IE19	Where	Location_StateProvince	.	-
IE20	Where	location_city	.	-
IE21A/B	Where	Location_Geocode/Type	.	-
IE22	What	NAS-Port-Type	NAS-Port-Type	NAS-Port-Type
IE23	What	Payment-type	.	-
IE24	What	Network-connection-Type	.	-
IE25	What	Session_duration	Acct-Session-Time	Acct-Session-Time
IE26	What	input-octets	Acct-Input-Octet + Acct-Input-Gigaword	Acct-Input-Octet + Acct-

Information Element Id	Category	IPDR Information Element	GSMA RADIUS Attribute	WFA/PA 3 RADIUS Attribute
				Input-Gigaword
IE27	What	output-octets	Acct-Output-Octet + Acct-Output-Gigaword	Acct-Output-Octet + Acct-Output-Gigaword
IE28	What	Class	Class (GSMA puts IMSI in that)	Class
IE29	When	gmt_session_start_date_time	Event-Timestamp (of Acct-Start Record) minus Duration	Event-Timestamp (of Acct-Start Record) minus Duration
IE30	When	gmt_session_end_date_time	Event-Timestamp (of Acct-Stop Record)	Event-Timestamp (of Acct-Stop Record)

Information Element Id	Category	IPDR Information Element	GSMA RADIUS Attribute	WFA/PA 3 RADIUS Attribute
IE31	Why	Session-Terminate-Cause	Acct-Termination-Cause	Acct-Termination-Cause
IE32	What	Billing-Class-Of-Service	.	Billing-Class-of-Service (VSA)
IE33	What	Unit of Measure	.	-
IE34	What	Chargeable_unit	Charged-Item (TAP 3.10)	-
IE35	What	Chargeable_Quantity	Charged-Unit (TAP 3.10)	-
IE36	What	Charge_Amount	Charge (TAP 3.10)	-
IE37	What	Charge Currency Type	Currency (TAP 3.10)	-
IE38	Who	Other-party	.	-
IE39	What	Tax Percentage	Tax Value (TAP 3.10)	-
IE40	What	Tax Amount	Taxable Amount (TAP 3.10)	-

Information Element Id	Category	IPDR Information Element	GSMA RADIUS Attribute	WFA/PA 3 RADIUS Attribute
IE41	What	Tax Type	Tax Type (TAP 3.10)	-
IE42	What	Intermediary-Name	.	-
IE43	What	Related-IPDR-Ids	.	Multi-Session-Id

Table 2: IPDR Information Element Mappings to RADIUS/TAP Information Elements