



WiMAX FORUM® WiMAX™ ROAMING INTERFACE

based on WiMAX Forum Certified™ Products

Stage 2 Part 3: Clearing Release 1.0 Version 2

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WiMAX Forum Proprietary

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1 WiMAX™ Clearing Reference Point

1.1 Introduction and Scope

Clearing enables settlement of accounts payable and accounts receivable between WiMAX™ operators. Clearing also facilitates financial processes in support of revenue assurance, invoice balancing, and reconciliation. This document describes the reference points required for the WRI clearing process and the X5 Reference Point file, also referred to as the Clearing File, to be shared between Network Service Providers (NSPs) on a daily basis. See the WiMAX™ Roaming Interface (WRI) Stage 2: Part 0 for a high-level description of the WRI architecture and a list of commonly used references, acronyms, and terms.

The Clearing File:

- Contains information required to complete the Clearing Process.
- Is created by the V-NSP on its own or in conjunction with a WiMAX™ Roaming eXchange (WRX)
- Is provided to the H-NSP directly or via the H-NSP's designated WRX.

1.2 Control Plane Protocols and Procedures

This section provides a detailed description of the WRI Clearing logical functions and its reference point with the WRI Financial Settlement logical function.

1.2.1 X5 Flow

The WRI Clearing logical function receives multiple X3 Reference Point files from the WRI Wholesale Rating logical function. The WRI Clearing logical function will then process these files, will create one X5 Reference Point file per roaming partner on a daily basis and will forward this X5 Reference Point file to the H-NSP. When the H-NSP receives the X5 Reference Point file from the V-NSP, it will validate the charges and the session based on its own X3 Reference Point files. If the validation fails, the H-NSP will create an X5 Reject, or X5R, Reference Point file and will send it to the V-NSP. At this point, the V-NSP will accept the rejects, will fix the records previously sent in the X5 Reference file, and will resend the updated file with the appropriate modifications. Figure 1 describes the Clearing process once an X3 Reference Point file has been received from the WRI Wholesale Rating logical function.

R-[X5-S2-1] The data carried through the R5 Reference Point SHALL be used to derive data for the X5 Reference Points.

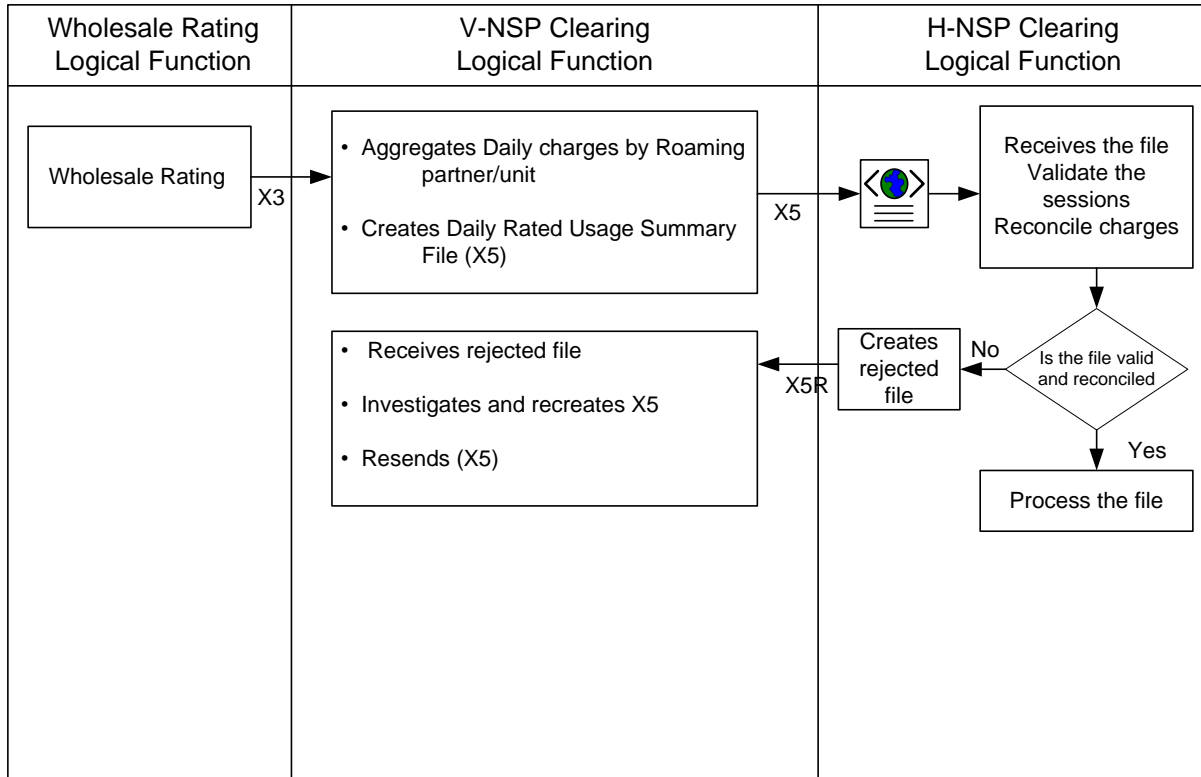


Figure 1: X5 Flow

1.2.1.1 Rules

R-[X5-S2-2] The V-NSP, or its WRX, SHALL create a Clearing File (i.e., X5 Reference Point file) for each roaming partner.

R-[X5-S2-3] One Clearing File, i.e., the X5 Reference Point file, SHALL be sent to each H-NSP, or its WRX, within a 24-hour period.

R-[X5-S2-4] The H-NSP, or its designate, SHALL process the X3 Reference Point files and generate results to compare with the information / results as per the Clearing File (i.e., X5 Reference Point file) received from the V-NSP, or its designate, via the X5 Reference Point.

R-[X5-S2-5] The transfer frequency of X5R (Reject) Reference Point file SHALL be as soon as the X5R Reference Point file has been created. X5R Reference Point files SHALL only be created if there are any validation errors detected with received X5 Reference Point files.

1.2.1.2 Procedures

1.2.1.2.1 File Naming Convention

Charge Files

- Charge files must use the following naming convention.

Clearing Charges (Charge)

- DCC_<Sender><Recipient>_<Seqno (999999)>

Clearing Rejects (Charge)

- DRC_<Sender><Recipient>_<Seqno (999999)>
 - clearing reject
 - missing a certain sequence

Clearing Acknowledge (Charge)

- DAC_<Sender><Recipient>_<Seqno (999999)>

Test Files

Test files must use the following naming convention:

- Clearing Charges (Test)
 - DCT_<Sender ><Recipient>_<Seqno (999999)>
- Clearing Rejects (Test):
 - DRT_<Sender><Recipient>_<Seqno (999999)>
- Clearing Acknowledge (Test)
 - DAT_<Sender><Recipient>_<Seqno (999999)>

1.2.1.2.2 File Delivery Schedule

R-[X5-S2-9] The entity generating the X5 Reference Point files SHALL send these files not later than 12 hours past midnight GMT.

1.2.1.2.3 Delivery Mechanism

1.2.1.2.3.1 FTP

R-[X5-S2-10] FTP and secure FTP SHALL be supported as default protocols unless otherwise agreed between the responsible entities exchanging X5 Reference Point files.

R-[X5-S2-11] The initial transmission of a X5 Reference Point file SHOULD use a temporary name until the process is over.

R-[X5-S2-12] Once the X5 Reference Point file has been successfully transferred, it SHOULD be renamed following the agreed naming convention.

1.2.2 X4 Flow

For WRI Release 1.0, no procedures will be specified in WRI Release 1.0 Stage 3. The information in this section will be used to develop the WRI Stage 3 procedures in a future WRI release.

The WRI Clearing logical function will create an X4 Reference Point file on a monthly basis and will send it to the WRI Financial Settlement logical function. The X4 Reference Point file is created based on all the X3 Reference Point files received during the month from the WRI Wholesale Rating logical function. The WRI Financial Settlement logical function will validate that the X4 Reference Point file is readable and in the correct format. If the validation fails, the WRI Financial Settlement logical function will inform the

WRI Clearing logical function, the WRI Clearing logical function will fix the errors and will resend the updated X4 Reference Point file. For additional details, see Figure 2 below.

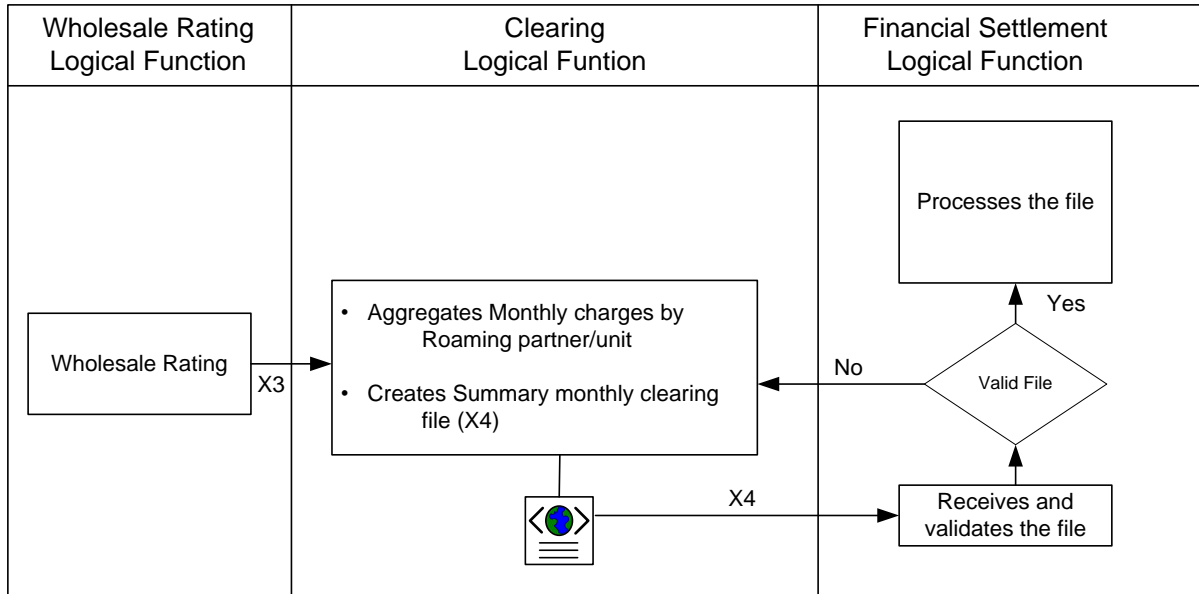


Figure 2: X4 Flow

1.2.2.1 Rules

R-[X4-S2-1] The V-NSP, or its WRX, SHALL create a Monthly Summarization File for each roaming partner.

Disputes are managed through the daily reconciliation process. If there is an adjustment, credit or discrepancy that was not resolved in the daily reconciliation process, it must be handled in the Financial Settlement process.

1.2.2.2 Procedures

1.2.2.2.1 File Naming Convention

Charge Files

- Charge files must use the following naming convention.

Clearing Charges (Charge)

- MCC_<Sender><Recipient>_<Seqno (999999)>

Clearing Rejects (Charge)

- MRC_<Sender><Recipient>_<Seqno (999999)>

Clearing Acknowledge (Charge)

- MAC_<Sender><Recipient>_<Seqno (999999)>

- clearing reject
- missing a certain sequence

Test Files

- Test files must use the following naming convention

Clearing Charges (Test)

- MCT_<Sender ><Recipient>_<Seqno (999999)>

Clearing Rejects (Test)

- MRT_<Sender><Recipient>_<Seqno (999999)>

Clearing Acknowledge (Test)

- MAT_<Sender><Recipient>_<Seqno (999999)>

1.2.2.2.2 File Delivery Schedule

R-[X4-S2-2] The entity generating the X4 Reference Point file SHALL send the X4 Reference Point file no later than noon GMT of the third day of the subsequent billing cycle.

1.2.2.2.3 Delivery Mechanism

1.2.2.2.3.1 FTP

R-[X4-S2-3] FTP and secure FTP SHALL be supported as default protocols unless otherwise agreed between the responsible entities exchanging X4 Reference Point files.

R-[X4-S2-4] The initial transmission of a X4 Reference Point file SHOULD use a temporary name until the process is over.

R-[X4-S2-5] Once the X4 Reference Point file has been successfully transferred, it SHOULD be renamed following the agreed naming convention.

1.2.3 WiMAX™ Reference Points

1.2.3.1 X5 Reference Point (Daily Summary file)

1.2.3.1.1 Elements

R-[X5-S2-13] All date and time elements in the X5 Reference Point file SHALL be specified in GMT.

1.2.3.1.2 Header – (Mandatory)

Element Name	Element Description and Requirement	Mandatory or Optional Element
Sending WRI Code	R-[X5-S2-47] The Sending WRI Code field identifies the Serving operator and SHALL be populated before the Clearing File, i.e., the X5 Reference Point file, is received by the Home or Home Exchange Provider. The Sending WRI Code SHALL have a unique ID.	Mandatory
Receiving WRI Code	R-[X5-S2-48] The Receiving WRI Code field identifies the Home operator and SHALL be	Mandatory

Element Name	Element Description and Requirement	Mandatory or Optional Element
	populated before the Clearing File, i.e., X5 Reference Point file, is received by the Home or Home exchange provider. The Receiving WRI Code SHALL have a unique ID.	
Sending WRX WRI Code	R-[X5-S2-14] The Sending WRX WRI Code field identifies the Sending Exchange Provider and SHALL be populated before the Clearing File, i.e., X5 Reference Point file, is received by the Home or Home exchange provider, if applicable. This field is a unique code by which the sending CSN's Exchange Provider is identified. If there is no Sending Exchange Provider, this field is null. An Exchange Provider SHALL have a unique ID.	Mandatory
Receiving WRX WRI Code	R-[X5-S2-15] The Receiving WRX WRI Code field identifies the Receiving Exchange Provider and SHALL be populated before the Clearing File, i.e., X5 Reference Point file, is received by the Home or Home exchange provider. This field is a unique code that identifies the receiving CSN's exchange provider. If there is no Receiving Exchange Provider, this field is null. An Exchange Provider SHALL have a unique ID.	Mandatory
Visited NSP ID	R-[X5-S2-16] The Visited NSP ID SHALL be populated before the X5 Reference Point file is received by the Home or Home exchange provider. This field is a unique code that identifies the visited CSN.	Mandatory
Home NSP ID	R-[X5-S2-17] The Home NSP ID SHALL be populated before the X5 Reference Point file is received by the Home or Home exchange provider. The field is a unique code that identifies the home CSN.	Mandatory
NAP ID	R-[X5-S2-18] The NAP ID SHALL be populated before the X5 Reference Point file is received by the Home or Home exchange provider. The field is a unique code identifying the visited NAP.	Mandatory
IOT Currency	R-[X5-S2-19] the Visited operator's IOT Currency SHALL always be populated. This information is derived from the WiMAX™ Roaming Agreement document referenced in WRI Stage 2 Part 0.	Mandatory
Exchange Rate	<p>The Exchange Rate is the rate used to convert Source currency to Destination currency.</p> <p>R-[X5-S2-30] The Exchange Rate field SHALL contain the value of the exchange rate expressed as the ratio of units of the IOT Currency to the units of the File Currency. That is, Exchange Rate = IOT Currency divided by File Currency</p> <p>R-[X5-S2-31] The Exchange Rate SHALL always be presented in six decimal places.</p>	Mandatory

Element Name	Element Description and Requirement	Mandatory or Optional Element
Exchange Rate Date	<p>This is the date when the exchange rate is pegged.</p> <p>R-[X5-S2-32] The Exchange Rate Date SHALL be present.</p>	Mandatory
Decimal Places	<p>The Decimal Places field identifies the number of decimal places used to represent all the monetary values within this file. The decimal place applies to the following elements within this file: charges and taxes.</p> <p>R-[X5-S2-21] The default value of the Decimal Places for charges and taxes SHALL be 2 unless otherwise specified.</p>	Optional
File Creation Timestamp	<p>The File Creation Timestamp represents the date and time that the Clearing File (i.e., X5 Reference Point file) is generated by the WRI Clearing logical function.</p> <p>R-[X5-S2-22] The File Creation Timestamp SHALL be populated.</p>	Mandatory
Settlement Date	<p>The Settlement Date represents the first day of the settlement period.</p> <p>R-[X5-S2-23] The Settlement Date SHALL be the first day of the month of the Settlement Period.</p> <p>R-[X5-S2-25] The Settlement Period SHALL be calendar month.</p> <p>R-[X5-S2-26] The Settlement Date SHALL always be present.</p>	Mandatory
Earliest Session Timestamp	<p>The Earliest Session Timestamp field identifies the earliest session stop timestamp contained within the X5 Reference Point file.</p> <p>R-[X5-S2-27] The Earliest Session Timestamp is the earliest session stop time processed by the WRI AAA Proxy logical function and SHALL always be present in GMT.</p>	Conditional Mandatory
Latest Session Timestamp	<p>Latest Session Timestamp identifies the latest session stop time for the clearing period.</p> <p>R-[X5-S2-28] The Latest Session Timestamp is the latest session stop time processed by the WRI AAA Proxy logical function, and SHALL always be present in GMT.</p>	Conditional Mandatory
GMT Time-Zone Offset	<p>R-[X5-S2-49] The GMT Time-Zone Offset SHALL be the value of the first accounting Start\Stop message pair for the same Acct-Multi-Session-Id processed and extracted by the WRI AAA Proxy logical function.</p>	Mandatory
Tax Rate	<p>Tax Rate defines the rate of the Tax being</p>	Mandatory

Element Name	Element Description and Requirement	Mandatory or Optional Element
	<p>applied to the charges.</p> <p>R-[X5-S2-31] For every Tax ID, a distinct Tax Rate SHALL be populated with a % value if Tax Rate type is variable (V) or a monetary value if Tax Rate Type is fixed (F).</p>	
Tax Rate Type	<p>Tax Rate Type defines the type of Tax Rate.</p> <p>R-[X5-S2-32] The Tax Rate Type SHALL be populated with either F (Fixed) or V (Variable). The Tax Rate Type values are: F=Fixed amount to be charge in a monetary figure V=Variable tax applied in a percentage figure.</p>	Mandatory
Tax Type	<p>Tax Type defines the type of Tax.</p> <p>R-[X5-S2-33] The Tax Type SHALL be populated with one of the below mentioned values. Possible Tax Type values are: National, Regional, State, County, Province, Local/City.</p>	Mandatory
File Type	<p>The File Type field identifies if the field is a Charge File or a Test File.</p> <p>R-[X5-S2-50] The File Type SHALL be present if the file is a test file else it is assumed to be a Charge file.</p>	Conditionally Mandatory
Is Notification	<p>The Is Notification field identifies if the file is a notification file or not.</p> <p>R-[X5-S2-51] Is Notification SHALL be present if the file is a notification file.</p>	Conditionally Mandatory
Release	<p>The Release field identifies the WRI Stage 3 Part 3 Specification Release number used to create the X5 Reference Point file.</p> <p>R-[X5-S2-34] The Release SHALL be populated with the WRI Stage 3 Clearing Specification Release used to create the X5 Reference Point file.</p>	Mandatory
File Currency	<p>R-[X5-S2-42] The File Currency field SHALL be always present if the currency is not Special Drawing Right (SDR) defined by the International Monetary Fund (IMF).</p>	Conditionally Mandatory
Version	<p>The Version field identifies the WRI Stage 3 Part 3 Specification Version number used to create the X5 Reference Point file.</p> <p>R-[X5-S2-35] The Version SHALL be populated with the WRI Stage 3 Clearing Specification Version used to create the X5 Reference Point file.</p>	Mandatory

1.2.3.1.3 Charge Information (Mandatory)

Charge Information is the body (detail) of the file.

Element Name	Element Description and Requirement	Mandatory or Optional Element
Subscriber Identity	<p>The Subscriber Identity field could be mapped to Chargeable User Identity (CUI) or Class processed by the WRI AAA Proxy logical function.</p> <p>R-[X5-S2-52] The Subscriber Identity SHALL be a unique temporary handle to the user responsible for paying the bill.</p>	Mandatory
IP Technology	<p>R-[X5-S2-47] The IP Technology SHALL be from the first accounting Start message processed and extracted by the WRI AAA Proxy logical function.</p>	Optional
Location	<p>The Location field identifies the subscriber's location during his session. This is based on the first RADIUS Start message processed by the WRI AAA Proxy logical function.</p> <p>R-[X5-S2-53] The Location SHALL be from the first accounting Start message processed by the WRI AAA Proxy logical function.</p> <p>Recommendation is to adopt a known format to avoid compatibility issues when roaming in other technologies. An example would be location information following IETF RFC 1876. This attribute is not implemented in this release and will be a place holder for a future GRWG release.</p>	Optional
Base Station ID	<p>R-[X5-S2-36] The Base Station ID SHALL be the value of the first accounting Start/Stop message pair for the same Acct-Multi-Session-Id processed and extracted by the WRI AAA Proxy logical function.</p>	Optional
Charge Type	<p>The Charge Type field identifies the type of charge.</p> <p>R-[X5-S2-54] Charge Type SHALL be present.</p>	Mandatory
Usage Unit Indicator	<p>The Usage Unit Indicator identifies the units of measurements for Chargeable Usage and Charged Usage.</p> <p>R-[X5-S2-37] The Usage Unit Indicator SHALL contain only one valid value. Valid Usage Unit Indicator values are: M1: Megabytes - Downloaded M2: Megabytes – Uploaded M3: Megabytes Downloaded + uploaded K1: Kilobytes – Downloaded K2: Kilobytes - Uploaded K3: Kilobytes Downloaded + uploaded</p>	Mandatory

Element Name	Element Description and Requirement	Mandatory or Optional Element
	B1: Bytes Downloaded B2: Bytes Uploaded B3: Bytes Downloaded + uploaded H0: Hours M0: Minutes S0: Seconds.	
Chargeable Usage	The Chargeable Usage field represents the actual number of usage units without rounding. R-[X5-S2-39] The Chargeable Usage field SHALL contain a positive integer.	Mandatory
Charged Usage	The Charged Usage element indicates the rounded number of units. R-[X5-S2-40] The Charged Usage field SHALL contain a positive integer.	Mandatory
Mobile Originated Volume	The Mobile Originated Volume represents the number of bytes derived from Acct-Input-Octets and Acct-Input-Gigawords from all accounting Stop messages processed by the WRI AAA Proxy logical function. R[X5-S2-55] The Mobile Originated Volume SHALL be present.	Mandatory
Mobile Terminated Volume	The Mobile Terminated Volume is derived from Acct-Output-Octets and Acct-Output-Gigawords from all accounting Stop messages processed by the WRI AAA Proxy logical function. R[X5-S2-56] The Mobile Terminated Volume SHALL be present.	Mandatory
Mobile Station Identifier	The Mobile Station Identifier field identifies the MAC address of the subscriber's device. R-[X5-S2-57] The value for Mobile Station Identifier field SHALL be the MAC address of the subscriber's device in binary format.	Mandatory
NAS Identifier	The NAS Identifier field identifies the NAS that generated the RADIUS record. The value is derived from the first Accounting Start message processed by the AAA Proxy logical function.	Optional
Multi-Session ID	The Multi-Session ID field identifies the AAA-Session-Id which is generated by home AAA (hAAA) after successful authentication and delivered to the NAS in an Access-Accept message processed by the WRI AAA Proxy logical function. It is unique per CSN and is used to match all accounting records within a session. R-[X5-S2-58] Multi-Session ID SHALL always be present.	Mandatory
Session Active Time	R-[X5-S2-59] The Session Active Time SHALL be derived from Active-Time from all accounting Stop messages processed and extracted by the	Mandatory

Element Name	Element Description and Requirement	Mandatory or Optional Element
	WRI AAA Proxy logical function.	
Session Duration	R-[X5-S2-60] The Session Duration, derived from the Acct-Session-Time of the accounting STOP messages processed and extracted by the WRI AAA Proxy logical function, SHALL be the number of seconds the flow or session was active.	Mandatory
Session End Time	R-[X5-S2-61] The Session End Time stamp SHALL be the value representing the time the event occurred and is extracted from the final accounting Stop record by the WRI AAA Proxy logical function. R-[X5-S2-62] The Session End Time SHALL be populated in GMT.	Mandatory
Session ID	The Session ID is used to match accounting Start, Stop, and Interim messages. It is generated by the accounting NAS client and is unique per Start/Stop pair. Value is passed via X2 Reference Point. R-[X5-S2-63] Session ID SHALL be the value of the Acct-Session-Id attribute of the first RADIUS start\stop message pair for the same Acct-Multi-Session-Id processed by the WRI AAA Proxy logical function.	Mandatory
Session Start Time	The Session Start Time is calculated from the last accounting Stop record timestamp minus the duration (Acct-Session-Time) by the WRI AAA Proxy logical function. The Session Start Time is derived using Event-Timestamp of first accounting Start message potentially modified based on NAS support of Idle-Timeout period subtraction. R-[X5-S2-46] The Session Start Time SHALL be populated in GMT.	Mandatory
Taxable Amount	The Taxable Amount field identifies the amount of monies that is taxable. R-[X5-S2-64] Taxable Amount SHALL be present.	Mandatory
Username	R-[X5-S2-65] The Username SHALL be extracted from the Outer NAI by the WRI AAA Proxy logical function if applicable. R-[X5-S2-66] The Home MAY provide a mapping table indexed on CUI to derive the User-Name.	Mandatory
Charge	Charge represents the calculated charge for the usage before any taxation. Charge is calculate as Charged usage * Tariff	Mandatory

Element Name	Element Description and Requirement	Mandatory or Optional Element
	(Tariff as defined in the Roaming Agreement). R-[X5-S2-41] The Charge field SHALL contain a positive numeric value.	
Tax ID	The Tax ID field is the reference Tax ID from the Header of the file.	Mandatory
Tax Value	The Tax Value is the calculated value of the tax based on the tax rate and the charge.	Mandatory
Termination Cause	R-[X5-S2-67] The Acct-Terminate-Cause SHALL be from the last accounting Stop message processed and extracted by the WRI AAA Proxy logical function. Valid values for Termination Cause are defined by IETF RFC 2866 Section 5.10.	Optional

1.2.3.1.3.1 Trailer

The trailer information facilitates the validation and audit of the file.

Element Name	Element Description and Requirement	Mandatory or Optional Element
Total Records Transmitted	The Total Records Transmitted is the sum of total sessions contained within the X5 Reference Point file. R-[X5-S2-43] Total Records Transmitted SHALL equal the total number of sessions contained within the X5 Reference Point file.	Mandatory
Total Duration	The Total Duration represents the sum of all Active-Time within the X5 Reference Point file. R-[X5-S2-68] Total Duration SHALL be equal to sum of all Active-Time within the X5 Reference Point file.	
Total Mobile Originated Volume	The Total Mobile Originated Volume represents the sum of all Mobile Originated values. R-[X5-S2-69] Total Mobile Originated Volume SHALL be sum of all Mobile Originated Volume values within the X5 Reference Point file.	Mandatory
Total Mobile Terminated Volume	The Total MobileTerminated Volume represents the sum of all Mobile Terminated values. R-[X5-S2-70] Total Mobile Terminated Volume SHALL be sum of all Mobile Terminated Volume values within the X5 Reference Point file.	Mandatory
Total Charges	The Total Charges represent the sum of all charges for each session without taxes. R-[X5-S2-44] Total Charges SHALL equal the	Mandatory

Element Name	Element Description and Requirement	Mandatory or Optional Element
	sum of all charges within the X5 Reference Point file.	
Total Taxes	The Total Taxes represent the sum of all taxes for each session. R-[X5-S2-45] Total Taxes SHALL equal the sum of all taxes within the X5 Reference point file.	Mandatory

1.2.3.2 Daily Clearing Validation and Reconciliation

1.2.3.2.1 Rejection Reasons

1.2.3.2.1.1 File Level Error

- Invalid name
- Invalid sequence
- Invalid sender/receiver (exchange provider/Operator)
- Roaming Agreement not found
- Petition for detail records for the processing period

1.2.3.2.1.1.1 Disputed Sessions

- Sessions that have not been made or received but that have been billed through X2.
- Sessions that have been made or received while they should not have occurred. (Example: the subscriber had no valid subscription).
- Sessions with values in the record detail which don't match (Duration,Volume,Flat sessions)
- Wrong Rates applied
- Wrong Tax applied
- Duplicates sessions

1.2.3.2.1.1.2 File Containing Disputed Records

Contains an exact copy of the original session sent in X3 processed by H-NSP.

1.2.3.3 X4 Reference (Monthly Summary File)

1.2.3.3.1 Elements

R-[X4-S2-6] All date and time elements in the X4 Reference Point file SHALL be specified in GMT.

1.2.3.3.2 Header – (Mandatory)

Element Name	Element Description and Requirement	Mandatory or Optional Element
Sending WRI Code	R-[X4-S2-43] The Sending WRI Code field identifies	Mandatory

Element Name	Element Description and Requirement	Mandatory or Optional Element
	the Serving operator and SHALL be populated before the X4 Reference Point file, is received by the WRI Financial Settlement Logical Function. The Sending WRI Code SHALL have a unique ID.	
Receiving WRI Code	R-[X4-S2-44] The Receiving WRI Code field identifies the Home operator and SHALL be populated before the X4 Reference Point file, is received by the WRI Financial Settlement Logical Function. The Receiving WRI Code SHALL have a unique ID.	Mandatory
Sending WRX WRI Code	R-[X4-S2-7] The Sending WRx WRI Code field identifies the Sending Exchange Provider and SHALL be populated before the X4 Reference Point file, is received by the WRI Financial Settlement Logical Function. if applicable. This field is a unique code by which the sending CSN's exchange provider is identified. If there is no Sending Exchange Provider, this field is null. An Exchange Provider SHALL have a unique ID.	Mandatory
File Creation Timestamp	The File Creation Timestamp represents the date and time that X4 Reference Point file is generated by the WRI Clearing logical function. R-[X4-S2-22] The File Creation Timestamp SHALL be populated.	Mandatory
Receiving WRX WRI Code	R-[X4-S2-8] The Receiving WRX WRI Code field identifies the Receiving Exchange Provider and SHALL be populated before the X4 Reference Point file, is received by the WRI Financial Settlement Logical Function. This field is a unique code that identifies the receiving CSN's exchange provider. If there is no Receiving Exchange Provider, this field is null. An Exchange Provider SHALL have a unique ID.	Mandatory
Visited NSP ID	R-[X4-S2-9] The Visited NSP ID SHALL be populated before the X4 Reference Point file is received by the Home or Home exchange provider. This field is a unique code that identifies the visited CSN.	Mandatory
Home NSP ID	R-[X4-S2-10] The Home NSP ID SHALL be populated before the X4 Reference Point file is received by the Home or Home exchange provider. The field is a unique code that identifies the home CSN.	Mandatory
NAP ID	R-[X4-S2-11] The NAP ID SHALL be populated before the X4 Reference Point file is received by the Home or Home exchange provider. The field is a unique code identifying the visited NAP.	Mandatory
IOT Currency	R-[X4-S2-12] The Visited operator's IOT Currency SHALL always be populated. This information is derived from the WiMAX Roaming Agreement document referenced in WRI Stage 2 Part 0.	Mandatory
Decimal Places	The Decimal Places field identifies the number of decimal places used to represent all the monetary values within this file. The decimal place applies to	Optional

Element Name	Element Description and Requirement	Mandatory or Optional Element
	<p>the following elements within this file: charges and taxes.</p> <p>R-[X4-S2-14] The default value of the Decimal Places for charges and taxes SHALL be 2 unless otherwise specified.</p>	
Settlement Date	<p>The Settlement Date represents the first day of the settlement period.</p> <p>R-[X4-S2-15] The Settlement Date shall be the first day of the month of the Settlement Period.</p> <p>R-[X4-S2-17] The Settlement Period SHALL be calendar month.</p> <p>R-[X4-S2-18] The Settlement Date SHALL always be present.</p>	Mandatory
Earliest Session Timestamp	<p>The Earliest Session Timestamp field identifies the earliest session stop timestamp contained within the file.</p> <p>R-[X4-S2-19] The Earliest Session Timestamp is the earliest session stop time processed and extracted by the WRI AAA Proxy logical function, and SHALL always be present in GMT.</p>	Conditional Mandatory
Latest Session Timestamp	<p>The Latest Session Timestamp field represents the latest session stop time for the settlement period.</p> <p>R-[X4-S2-20] The Latest Session Timestamp is the latest session stop time, and SHALL always be present in GMT.</p>	Conditional Mandatory
Tax Rate	<p>Tax Rate defines the rate of the Tax being applied to the charges.</p> <p>R-[X4-S2-23] For every Tax ID a distinct Tax Rate SHALL be populated with a % value if Tax Rate type is variable (V) or a monetary value if Tax Rate Type is fixed (F).</p>	Mandatory
Tax Rate Type	<p>Tax Rate Type defines the type of Tax Rate.</p> <p>R-[X4-S2-24] The Tax Rate Type SHALL be populated with either F (Fixed) or V (Variable). The Tax Rate Type values are: F=Fixed amount to be charge in a monetary figure V=Variable tax applied in a percentage figure.</p>	Mandatory
Tax Type	<p>Tax Type defines the type of Tax.</p> <p>R-[X4-S2-25] The Tax Type SHALL be populated with one of the below mentioned values. Possible values are: National, Regional, State, County, Province, Local/City.</p>	Mandatory
Release	<p>The Release field identifies the WRI Stage 3 Part 3 Specification Release number used to create the X4 Reference Point file.</p>	Mandatory

Element Name	Element Description and Requirement	Mandatory or Optional Element
	R-[X4-S2-26] The Release SHALL be populated with the WRI Stage 3 Clearing Specification Release used to create the X4 Reference Point file.	
File Currency	R-[X4-S2-42] The File Currency field SHALL be always present if the currency is not Special Drawing Right (SDR) defined by the International Monetary Fund (IMF).	Conditionally Mandatory
Version	The Version field identifies the WRI Stage 3 Part 3 Specification Version number used to create the X4 Reference Point file. R-[X4-S2-27] Version SHALL be populated with the WRI Stage 3 Clearing Specification Version used to create X4 Reference Point file.	Mandatory

1.2.3.3.3 Charge Information (Mandatory)

Element Name	Element Description and Requirement	Mandatory or Optional Element
Usage Unit Indicator	The Usage Unit Indicator identifies the units of measurements for Chargeable Usage and Charged Usage. R-[X4-S2-29] The Usage Unit Indicator SHALL contain only one valid value. Valid Usage Unit Indicator values are: M1: Megabytes - Downloaded M2: Megabytes – Uploaded M3: Megabytes Downloaded + uploaded K1: Kilobytes – Downloaded K2: Kilobytes - Uploaded K3: Kilobytes Downloaded + uploaded B1: Bytes Downloaded B2: Bytes Uploaded B3: Bytes Downloaded + uploaded H0: Hours M0: Minutes S0: Seconds.	Mandatory
Chargeable Usage	Chargeable Usage represents the actual number of usage units without rounding. R-[X4-S2-31] The Chargeable Usage field SHALL contain a positive integer.	Mandatory
Charged Usage	The Charged Usage element indicates the rounded number of units. R-[X4-S2-32] The Charged Usage field SHALL contain a positive integer.	Mandatory
Charge	The Charge field represents the calculated charge for the usage before any taxation. Charge is calculated as Charged usage * Tariff (Tariff as defined in the Roaming Agreement). R-[X4-S2-33] The Charge field SHALL contain a positive numeric value.	Mandatory

Element Name	Element Description and Requirement	Mandatory or Optional Element
Tax Value	The Tax Value is the calculated value of the tax based on the tax rate and the charge.	Mandatory
Termination Cause	The Termination Cause identifies the cause of the session termination. It is derived from the Acct-Terminate-Cause from the last Accounting Stop message processed and extracted by the WRI AAA Proxy logical function. Valid values for the Termination Cause field are defined by IETF RFC 2866 Section 5.10.	Optional

1.2.3.3.4 Trailer

Element Name	Element Description and Requirement	Mandatory or Optional Element
Total Records Transmitted	Total Records Transmitted is the sum of total sessions contained within the file. R-[X4-S2-35] Total Records Transmitted SHALL equal the total number of sessions contained within the X4 Reference Point file.	Mandatory
Total Charges	Total Charges is the sum of all charges for each session without taxes. R-[X4-S2-36] Total Charges SHALL equal the sum of all charges within the X4 Reference Point file.	Mandatory
Total Taxes	Total Taxes is the sum of all taxes for each session. R-[X4-S2-37] Total Taxes SHALL equal the sum of all taxes within the X4 Reference Point file.	Mandatory

1.2.3.4 Monthly Financial Validation

1.2.3.4.1 Rejection MR Files

1.2.3.4.1.1 Rejection Reasons

1.2.3.4.1.1.1 File level error

- Invalid name
- Invalid sequence
- Invalid sender/receiver (Exchange Provider/Operator)
- Roaming Agreement not found

1.2.3.4.1.1.2 Invalid Field

- Field number
- Reason (Business rule or Roaming Agreement)

1.3 Limitations of this Specification

This specification is not intended as a development or test document. It is limited to describing the interfaces/reference point rules and procedures. Any specific implementation, code unit or system testing consideration shall be addressed in a separate document.

2 Revision History

Revision	Changes	Date
1	Initial Publication	August 4, 2008
2	<p>Modifications to align with WRI Release 1.0 Stage 3</p> <p>1) WRI Release 1.0 Stage 3: Part 3 Clearing Comments: 1601, 1834, 1835, 1840, 1841, 1842, 1848, 1853, 1855, 1856, 1858, 1862, 1872, 1873, 1874, 1879, 1880, 1897, 1898, 1899, 1907</p> <p>The following WRI Release 1.0 Stage 3: Part 3 Clearing related to the X4 Reference Point were:</p> <p>a) Incorporated: 1925, 1926, 1927, 1928, 1936, and 1937</p> <p>b) Not incorporated:</p> <p>i) Comment 1906 introduces missing fields. As the X4-file might become a summary file, the need for the missing fields need to be re-examined. Update: There is no need to incorporate missing fields as the section was removed from WRI Stage 3.</p> <p>ii) Some fields may not be needed when the X4 is converted to a summary file: Base-Station-ID (1908, 1914) and Charge Type (1919).</p> <p>2) Exchange Rate will always be expressed in six Decimal places.</p> <p>3) Editorial changes include:</p> <p>a) Add the letter S2 to all requirements. b) Change "Copyright ©" to "Copyright" c) Apply the recommended ® and TM where appropriate. d) Change interface with Reference Point/reference point where appropriate. e) Expand acronym (SDR) and included reference to IMF. f) Introduce Revision History section.</p>	March 23, 2009
2	<p>The following modifications were made</p> <p>1) Editorial change</p> <p>a) Changed 'X4 file' and 'X5 file' to 'X4 Reference Point file' and 'X5 Reference Point file' respectively</p> <p>b) Changed 'modules' to 'logical functions' in the text.</p> <p>c) Changed the header and front page to include the new document format numbers.</p> <p>d) Deleted empty rows in the tables</p> <p>e) Cleaned up Figure 1 and Figure 2. In Figure 1, word for financial was misspelled.</p> <p>f) Added the qualifier "processed by the WRI AAA Proxy logical function" when referencing AAA messages in the text.</p> <p>g) Modified the descriptive text in the X4 Reference Point section for Sending WRI Code, Receiving WRI Code, Sending WRX WRI Code, and Receiving WRX WRI Code.</p> <p>h) Updated the Cover Page.</p> <p>2) Technical Modifications:</p> <p>a) In Section 1.2.1 changed FROM: 'When the H-NSP receives the X5 file from the V-NSP, it will validate the charges and the session based on its own X2 and X3 files' TO:</p>	May 3, 2009

Revision	Changes	Date
	<p>'When the H-NSP receives the X5 Reference Point file from the V-NSP, it will validate the charges and the session based on its own X3 Reference Point files'</p> <p>b) In Section 1.2.1.1 'R-[X5-S2-4] The H-NSP, or its designate, SHALL process the X2 files and generate results to compare with the information / results as per the Clearing File received from the V-NSP, or its designate, via the X5 Reference Point.'</p> <p>TO: 'R-[X5-S2-4] The H-NSP, or its designate, SHALL process the X3 Reference Point files and generate results to compare with the information / results as per the Clearing File (i.e., X5 Reference Point files) received from the V-NSP, or its designate, via the X5 Reference Point.'</p> <p>d) Changed FROM: R-[X5-S2-63] The Acct-Session-Id SHALL be the value of the first RADIUS start\stop message pair for the same Acct-Multi-Session-Id processed by the WRI AAA Proxy logical function.</p> <p>TO: R-[X5-S2-63] The Session ID SHALL be the value of the Acct-Session-Id attribute of the first RADIUS Start\Stop message pair for the same Acct-Multi-Session-Id processed by the WRI AAA Proxy logical function.</p> <p>d) Modificaitons were made to the Release and the Version requirements to align with the WRI Stage 3 specificaiton</p>	
2	Changes include editorial changes made during May 11, 2009 Dublin meeting	May 15, 2009
2	WiMAX Forum Board of Directors Approved	June 24, 2009