



End-to-End WLAN Roaming Test Cases

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Document History

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Summary

The following document outlines test cases for RADIUS-based username-password authenticated WLAN roaming. The roaming environment is defined in PRD IR.61 WLAN Roaming Guidelines.

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1 Introduction

1.1 Scope of document

This document specifies a set of test cases for WLAN roaming service to confirm that it complies with PRD IR.61 WLAN Roaming Guidelines. RADIUS shall be the protocol to be used for passing authentication, authorization and accounting data (AAA).

Whilst it is expected that WLAN-roaming will be a bilateral activity between two WOs, please note that this document is written in a unidirectional context. Hence Roaming is taking place by a Mobile Terminal MT(a) to Visited WLAN(b) only. There is no reference to a Mobile Terminal MT(b) visiting Home WLAN(a).

To complete End-to-end WLAN Roaming tests for bilateral roaming, it is necessary to perform the tests in this document twice: the second time the real identities of WLAN (a) and WLAN (b) are swapped.

NOTE: Billing cycle will not be part of these tests. However, the production of valid RADIUS accounting data that is used in the billing cycle is tested in similar fashion as the generation of CDRs described in IR.35 *End – to – End Functional Capability Test Specification for Inter-PLMN GPRS Roaming*.

The WLAN roaming environment shall be as described in PRD IR.61.

1.2 Strategy for Testing

To complete the test cases efficiently, the amount of simultaneous joint activity between Home WO (a) and Visited WO (b) should be minimized.

To this effect, testing program forms three separate components:

1. Home WO (a) issues Test User Accounts and programmes Authentication Servers accordingly
2. Visited WO (b) performs tests
3. Visited WO (b) and Home WO (a) exchange data and discuss results

1.3 Pre-requisites

- A GSMA WLAN Roaming Guidelines (PRD IR.61) compliant WLAN roaming test environment implemented.
- RADIUS configuration information shared (Realms, IP addresses of proxies, etc. via IR.21, RADIUS Shared Secret via secure means).
- List of active/valid test accounts made available by the Home WO (a) to Visited WO (b) for testing purposes. 3 accounts to each roaming partner.
- One barred user account provided to Visited WO (b) for the tests.
- Relevant system logs identified. The Visited WO (b) has to collect RADIUS messages going to Home WO (a) network server for to be able to validate RADIUS accounting data.

2 Test Cases

The test cases are divided into four groups:

1. Access tests
 - Login procedure and authentication, routing to correct server, Realm functionality in each proxy
2. Accounting tests
 - Validating that RADIUS accounting logs match.
3. Service Failure tests
4. User Experience tests

2.1 Access Tests

2.1.1 Valid Roaming Authentication

Action: Enter a valid Home WO (a) username and a valid password using the Visited WO (b) network.

Result: Home WO user should be granted access and get full network capabilities.

2.1.2 Valid Username, Invalid Password

Action: Enter a valid Home WO (a) username and an invalid password using the Visited WO (b) network.

Result: Home WO user should be denied access.

2.1.3 Invalid Username

Action: Enter an invalid username and password using the Visited WO (b) network.

Result: User should be denied access.

2.1.4 Operator Determined Barring

Background: The HPLMN decides which ODB 's should stop the customer from using WLAN (e.g. Barring of GPRS, Barring of Roaming, Barring of outgoing calls, or other kind / way of barring).

Action: Enter a valid but barred Home WO (a) Username and a valid Password using the Visited WO(b) network.

Result: User access should be denied by the home WO(a).

2.1.5 Operator Determined Barring While Session Open

Background: Observe the reaction of an open session when the customer gets barred.

Action: HPLMN bars the customer while roaming on WO(b) while he has an open session.

Result: The session is closed and cannot be reestablished.

Comments: The RADIUS protocol defined in RFC 2865 does not support unsolicited messages sent from the Home WO (a)'s RADIUS

server to the Visited WO (b)'s NAS. This means that there is no standardized mechanism as such for active disconnect from the Home WO (a) network in the RADIUS specifications.

However, there are various vendor specific ways to implement such a mechanism. The methods for active disconnect demand specific functionality from the Home WO (a)s and Visited WO (b)s networks. For example the following methods can be utilized to disconnect an active session:

- o By using the Session-Timeout attribute in the RADIUS Access-Accept messages the user can be forced to re-authenticate periodically. If the user account gets barred, the next authentication attempt will be a failure.
- o The Session-Timeout and Termination-Action attribute –pair can be used to make the re-authentication transparent to the end-user. If the Termination-Action is set to RADIUS-Request, the NAS MAY send a new Access-Request to the RADIUS server. The NAS has to be able to distinguish between re-authentication after Session-Timeout period and user initiated session termination.
- o Some vendors have implemented support for additional unsolicited RADIUS messages in their RADIUS and NAS implementations. This enables dynamic authorization changes, e.g. active disconnect.

Some methods are described in more detail in RFC 2882 and IETF Internet Draft <draft-chiba-radius-dynamic-authorization-07.txt>.)

2.2 Accounting Tests

2.2.1 RADIUS Accounting Data Generation (Session Time)

- Action: Login with a valid Home WO(a) username in Visited WO(b) network, logout after set time.
- Result: RADIUS accounting log should reflect the set time.
- Comments: If Interim RADIUS accounting messages are used, the set time should be longer than the interim interval and interim message(s) should be generated during this test.

2.2.2 RADIUS Accounting Data Generation (Data Transferred)

- Action: Login with a valid Home WO(a) username in Visited WO(b) network, download a test file of known size, upload a test file of known size, and logout.
- Result: RADIUS accounting log Bytes-In and Bytes-Out fields should reflect the transferred file size and some network overhead.
- Comments: If Interim RADIUS accounting messages are used, the transferred file should be big enough that interim message(s) are generated during this test.

2.2.3 Verifying RADIUS Accounting Logs

- Action: Exchange RADIUS session logs of the accounting tests between Home WO(a) and Visited WO(b)

Result: Both accounting logs should have the same values in correct fields for the accounting tests. Also verify that proxy-state attributes are logged and that the values are correct.

2.3 Service Failure Tests

2.3.1 Implicit Logout

Action: Login with a valid Home WO (a) username in Visited WO (b) network, disconnect the WLAN card or switch off the Mobile Terminal (a). Wait for set time, re-insert card or switch on the Mobile Terminal (a).

Result: Access should be denied to the user without a new login and accounting session should be closed.

Comments: The wait time depends on the access controller configuration.

2.3.2 Inactivity Logout

Action: Login with a valid Home WO (a) username in Visited WO (b) network and leave the Mobile Terminal (a) idle.

Result: An automatic logout should happen after a pre-determined time.

Comments: The idle-timeout time depends on the used system. Normal accounting data should be generated after an automatic logout.

2.4 User Experience Tests

While conducting Access and Accounting tests, some user experience related issues should also be checked.

2.4.1 Login Page

Action: Visited WO (b)'s login page is displayed after association with Visited WLAN.

Result: Yes/No.

2.4.2 Help Page

Action: Visited WO (b)'s help page is available on the login page and is displayed before login.

Result: Yes/No.

2.4.3 Start Page

Action: Visited WO (b)'s start page and/or session status window are displayed after a successful login.

Result: Yes/No.

2.4.4 Unsuccessful Login

Action: An error message is displayed after an unsuccessful login.

Result: Yes/No.

2.4.5 Successful Login

Action: Logout method is clearly displayed after a successful login.

Result: Yes/No.

2.4.6 Logout Confirmation

Action: Logout confirmation is displayed after explicit and inactivity logouts.

Result: Yes/No.

3 Test Evaluation

1. Accounting logs to be prepared to check that they match between all participants
2. Analyse failures
3. Produce Test Report:
 - Completed Test cases
 - Experiences
 - Problems
 - Solutions
 - Proposals

APPENDIX A

Item	Information
WLAN Operator Name: ¹	
WLAN Operator Country (Abbreviated according to ISO 3166):	
Testing Personnel's Name:	
Test Execution Date:	

¹ Maximum 22 letters - This field is only used for administrative purposes, however, it must always be filled in in order to identify the operator.

Test Results

Access Tests

Valid Roaming Authentication

Username Used in Test	
Date	
Start Time	
End Time	
Test Result (Pass/Fail)	
Description	Enter valid roaming username and password
Status/Comments/Expectations	Username should be in the proper format. User should be granted access and have full network capabilities.

Valid Username, Invalid Password

Username Used in Test	
Date	
Start Time	
End Time	
Test Result (Pass/Fail)	
Description	Enter valid roaming username and invalid password
Status/Comments/Expectations	Access denied. No network access.

Invalid Username

Username Used in Test	
Date	
Start Time	
End Time	
Test Result (Pass/Fail)	
Description	Enter invalid roaming username and password
Status/Comments/Expectations	Username should be in the proper format. User should be denied access and have no network capabilities.

Operator Determined Barring

Username Used in Test	
Date	
Start Time	

End Time	
Test Result (Pass/Fail)	
Description	Enter a valid roaming username and password of an account that has been barred by Home WO(a)
Status/Comments/Expectations	Access denied. No network access.

Operator Determined Barring While Session Open

Username Used in Test	
Date	
Start Time	
End Time	
Test Result (Pass/Fail)	
Description	Enter a valid roaming username and password . When the session is open, the WO(a) should assign a barring to this subscriber.
Status/Comments/Expectations	The session should be cancelled automatically a pair of seconds later (quasi-online).

Accounting Tests

RADIUS Accounting Data Generation (Session Time)

Username Used in Test	
Date	
Start Time	
End Time	
Test Result (Pass/Fail)	
Test Verification Result ²	
Description	Login, Logoff after a set time
Status/Comments/Expectations	Accounting logs should reflect the connection time.

RADIUS Accounting Data Generation (Data Transferred)

Username Used in Test	
Date	
Start Time	
End Time	

² Test Verification Result field is used for verifying test result against HPLMN RADIUS messages. HPLMN Testing Personnel should check that RADIUS logs correspond to values mentioned in this testing document.

Volume (Amount of transferred data)	
Test Result (Pass/Fail)	
Test Verification Result ²	
Description	Login, download test file, upload test file and Logoff
Status/Comments/Expectations	Bytes-In and Bytes-Out in Accounting Logs should be values which are approximately the size of the test file + some network overhead.

Verifying RADIUS Accounting Logs

Username Used in Test	
Date	
Start Time	
End Time	
Volume (Amount of transferred data)	
Test Result (Pass/Fail)	
Test Verification Result ²	
Description	Verify that both accounting logs have the same results for all of the accounting tests. Specially, verify that proxy-state attributes are logged and that values are correct.
Status/Comments/Expectations	Session logs to be exchanged along with a copy of the test plan used (for username/time resolution per test).

Service Failure Tests

Implicit Logout

Username Used in Test	
Start Time	
End Time	
Test Result (Pass/Fail)	
Test Verification Result ²	
Description	Disconnect Wireless LAN card or turn off computer while connected. Wait a set time. Re-insert card or turn on computer.
Status/Comments/Expectations	Accounting should show a closed session and user should have no network access.

Inactivity Logout

Username Used in Test	
Start Time	
End Time	
Test Result (Pass/Fail)	
Test Verification Result ²	

Description	The WLAN connection is left idle, an automatic log-off should happen after a pre-determined time.
Status/Comments/Expectations	Absence time-out.

User Experience Tests

Login Page

Username Used in Test	
Test Result (Yes/No)	
Description	User's welcome page is displayed after association to network.
Status/Comments/Expectations	

Help Page

Username Used in Test	
Test Result (Yes/No)	
Description	Help-page displayed by clicking on link at Login page.
Status/Comments/Expectations	

Start Page

Username Used in Test	
Test Result (Yes/No)	
Description	Local Start-page and session window are displayed after successful login
Status/Comments/Expectations	

Unsuccessful Login

Username Used in Test	
Test Result (Yes/No)	
Description	Error message shown after unsuccessful login.
Status/Comments/Expectations	

Successful Login

Username Used in Test	
Test Result (Yes/No)	
Description	Logout method is clearly displayed after successful login.
Status/Comments/Expectations	

Logout Confirmation

Username Used in Test	
Test Result (Yes/No)	
Description	Logout confirmation is displayed after explicit and inactivity logouts.
Status/Comments/Expectations	