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Project Name:
5G Applications and Devices Benchmarking (TRIANGLE)

D2.2 Appendix 4
Test Specification

Apps User Experience Test Specification (AUE)

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1 Introduction

1.1 Purpose

The test cases defined in this Test Specification evaluate and verify the user's satisfaction with an App using a reference Host Device.

1.2 Scope of testing

This Test Specification is applicable to applications.

The test cases included in this test specification are designed to obtain Key Performance Indicators (KPIs) to determine Apps performance in the Applications User Experience TRIANGLE domain.

The KPIs obtained are used by the Applications User Experience metric to obtain the App TRIANGLE mark.

The test cases in this Test Specification are initially defined to be implemented in TRIANGLE testbed.

1.3 Definitions and Acronyms

Table 1 – Definitions

State	Description
Application User Flow	The sequence of actions which the user's AUT is expected to perform on the AUT user interface objects in order to execute a test step of this test specification.
AUT Backend Service	Remote endpoint of the AUT service layer
Dummy Battery Fixture	Device designed to replace the usual Host Device battery to facilitate powering the Host device from an external DC source and simulating normal behaviour of the replaced battery
Host Device	Android or iOS device where the AUT is installed in order to test the AUT
Network Scenario	Usage scenario which is defined by a parameterization of the air interface and the core network
Test System	Integrated system used to measure the AUT's performance against this test specification.
TRIANGLE Testbed	TRIANGLE testing framework. It covers all the software, and the coordination/sequencing that control & connects to the test infrastructure. It is in charge of handling and transforming the end user test requests into actionable steps for the software and hardware components of the testbed.

Table 2 – Acronyms

State	Description
AR	Augmented Reality
AUT	Application Under Test
CPU	Central Processing Unit
CS	Content Distribution Streaming Services
CV	Connected Vehicles
DUT	Device Under Test
EM	Emergency Services
GA	Gaming
GPU	Graphics Processing Unit
HS	High Speed Internet
ICS	Implementation Conformance Statement
IXIT	Implementation eXtra Information for Testing
ksps	KiloSamples per second (thousands of samples per second)
LS	Live Streaming services
PM	Patient Monitoring
SG	Smart Grids
SM	Smart Metering
SN	Social Networking
VR	Virtual Reality

1.4 References

[1] D2.2 Formalization of the certification process, requirements and use. Appendix 2: Product characterization.

2 General Test conditions

Unless otherwise specified in a particular test case, the conditions defined in this section will apply for all test cases.

2.1 Test System configuration

The figure below shows a simplified overview of the testing architecture.

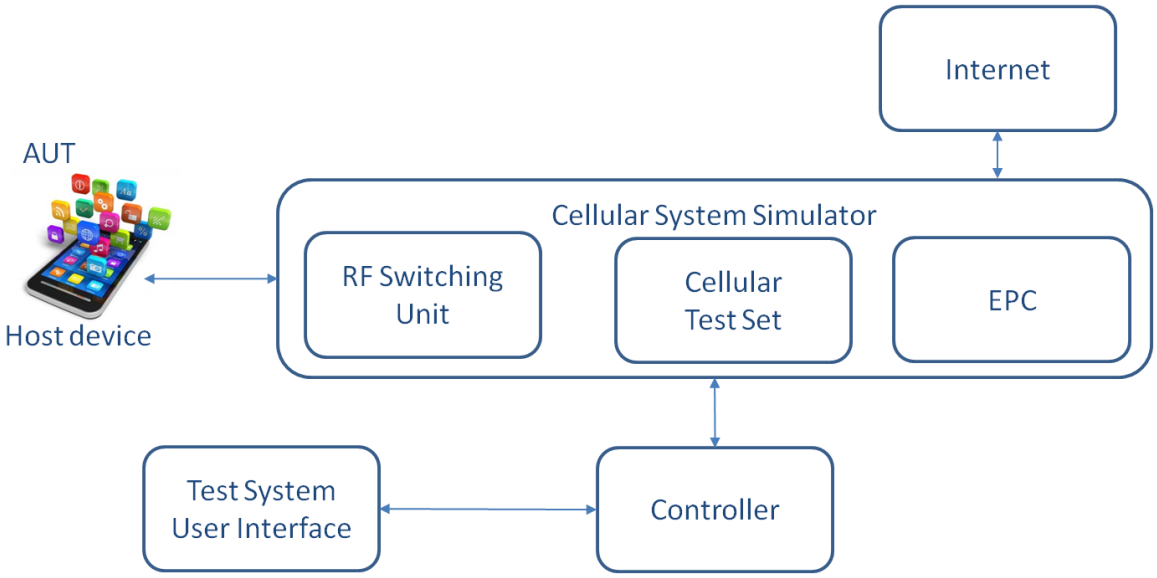

Figure 1 – Test System architecture overview

The App under test (AUT) is installed in the Host Device. The Host Device is connected to the Test System though a conducted RF connection.

The Host Device is grid powered if feasible. If the Host Device is battery powered, the battery of the Host Device is fully charged.

The Test System is configured to perform the test cases will be one of the bands supported by the Host Device. In case any of the bands listed next is supported by the device it will be selected and in the order defined: 1. FDD4; 2.FDD17; 3. FDD14; 4. FDD25; 5. FDD2; 6. FDD5; 7. FDD7; 8. FDD12; 9. FDD12; 10. FDD30.

The Test System network is initially configured as specified by the latest release of 3GPP TS 36.508.

The Test System shall provide a way to rotate the Host Device according to the 3 space axis, as required by certain VR and AR use cases test cases.

2.2 Host Device configuration

The Host Device will be configured as defined below:

- The Host Device is ON and there are no Apps running other than required system apps.

- No antivirus and/or anti-malware App is running.
- Maximum brightness available.
- Maximum screen resolution available.
- No Energy saving or screen saving option is enabled.
- Vibration is enabled if available.
- The Host Device is allowed to use mobile data.
- There is no restriction configuration for data use.
- The Host Device Audio Volume is configured at the middle of the available range.
- The Host Device has been ON for at least three minutes to allow all boot processes to be completed.
- The Host Device screen is configured with screen always ON.

2.3 Network Scenarios Applicability

The test cases will be executed for each of the Network Scenarios applicable for each Use Case as shown in Table 3.

Table 3 – Use Case / Network Scenarios Applicability

Network Scenario	**Use Cases**								
	CS	**LS**	**SN**	**HS**	**VR**	**AR**	**PM**	**ES**	**GA**
Urban-Office	Y		Y	Y	Y	Y		Y	Y
Urban-Pedestrian	Y	Y	Y	Y		Y			Y
Urban-Driving-Normal	Y	Y	Y	Y		Y	Y		Y
Urban-Driving-Traffic jam	Y		Y	Y		Y	Y		Y
Urban-Driving-Emergency driving		Y	Y	Y		Y	Y	Y	
Urban-Internet Café, Busy Hours	Y		Y	Y	Y	Y			Y
Urban-Internet Cafe, Off-Peak	Y		Y	Y	Y	Y			Y
Suburban-Festival	Y	Y	Y	Y		Y		Y	Y
Suburban-Stadium	Y	Y	Y	Y		Y		Y	Y
Suburban-Shopping Mall, Busy Hours	Y		Y	Y		Y		Y	Y
Suburban-Shopping Mall, Off-Peak	Y		Y	Y		Y		Y	Y
High Speed-Relay	Y		Y	Y					Y
High Speed-Direct Passenger Connection	Y		Y	Y					Y

2.4 Number of Test Iterations

In order to obtain statistically relevant measurements out of which the KPIs will be derived (section 5), the test cases will be iterated 100 times, except for the following tests that will be iterated as shown in Table 4.

Table 4 – Test case Iterations

Test Case	**# of Iterations**
TBD	TBD

2.5 Test Case Initial Conditions

Following initial conditions modes are defined:

AUT-NOT RUNNING

- The AUT is not installed on the Host Device.
- The Host Device is configured as specified in section 2.2.
- The Test System and the Host Device are connected as shown in figure 1.
- The AUT Backend Service is accessible from the Test System.
- Test Environment Lightning: Office conditions with no direct sun light on the Host Device.
- The Test System is configured according to the target Network Scenario as defined in D2.2 Appendix 8 (Network scenarios parameterization).
- The Test System has established a data path with the Host Device.

AUT-STARTED

- The AUT is installed on the Host Device.
- The Host Device is configured as specified in section 2.2.
- The Test System and the Host Device are connected as shown in figure 1.
- The AUT Backend Service is accessible from the Test System.
- Test Environment Lightning: Office conditions with no direct sun light on the Host Device.
- The Test System is configured according to the target Network Scenario as defined in D2.2 Appendix 8 (Network scenarios parameterization).
- The Test System has established a data path with the Host Device.
- The Test System has cleared the AUT stored data and cache.
- The Test System has opened the AUT.

2.6 Test Case Postamble

Unless stated otherwise in the test case description, the following steps will be executed after the test case steps:

- The System closes the AUT.
- The Test System shuts down the data path with the Host Device.

2.7 Application User Flows

Following Application User Flows are used by the test cases of this test specification.

The table below contains a list of the common Application User Flows to be used in the Test Specifications. Additional Application User Flows may be defined in each Test Specification.

Table 5 –Application User Flows

Identifier	Use Case	Application User Flow
1.1	All	Reopen the App 1. Open the App. 2. Perform login step and wait for 5 seconds. 3. Close App and wait for 5 seconds 4. Open the App (no login required).
1.2	All	Navigate menu 1. Open the App. 2. Perform login step and wait for 5 seconds. 3. Enter all available menu options and views. 4. Close the App.
1.3	All	Login 1. Perform login step and wait for 5 seconds.
2.1	CS	Play three reference videos: 1. Perform login step and wait for 10 seconds. 2. Play sequentially the three reference videos: RV1, RV2 and RV3.
2.2	CS	Play and pause 1. Perform login step and wait for 10 seconds. 2. Start playing RV3 during 10 seconds. 3. Pause the reproduction. 4. Resume the reproduction after 2 minutes
2.3	CS	Rewind and Fast Forward 1. Perform login step and wait for 10 seconds. 2. Start playing RV3 for 10 seconds.

		3. Perform fast forward during 2 minutes (select X8 speed if supported by the App (ICSA_CSFastForwardX8), else select the highest speed supported). 4. Change to normal play and keep this mode for 10 seconds. 5. Perform rewind for 2 minutes (select X8 speed if supported by the App (ICSA_CSRewindX8), else select the highest rewind speed supported), 6. Stop the playback.
2.4	CS	Download a media file 1. Perform login step and wait for 10 seconds. 2. Download RV3. 3. Wait until the download is complete.
2.5	CS	Set background state. 1. Perform login step and wait for 10 seconds. 2. Set the App in background state. 3. Wait for 20 minutes 4. Set the App in active state
2.6	CS	Play and Stop 1. Perform login step and wait for 10 seconds. 2. Start playing RV3. 3. Stop the reproduction after 1 minute. 4. Resume the reproduction after 1 minutes
2.7	CS	Search and Seek 1. Perform login step and wait for 10 seconds. 2. Search reference file RV3. 3. Start playing RV3. 4. Seek the player at 15 minutes position.
2.8	CS	Skip forward and backward 1. Perform login step and wait for 10 seconds. 2. Start playing RV2. 3. After 1 minute, skip backward to the beginning of the media file. 4. After 20 seconds, skip forward to the next media file (RV3). 5. After 5 seconds, skip backward to the previous media file (RV2).
3.1	LS	Play an live video from a know user 1. Perform login step and wait for 10 seconds. 2. Select to play the live video set up in the test case initial conditions.

3.2	LS	Broadcast live video 1. Perform login step and wait for 10 seconds. 2. Broadcast live video
4.1	SN	Post comments 1. Perform login step and wait for 10 seconds. 2. Post reference comment: RC1. 3. Post reference comment: RC2. 4. Post reference comment: RC3.
4.2	SN	Post pictures 1. Perform login step and wait for 10 seconds. 2. Post sequentially the pictures: RP1, RP2 and RP3 and without any delay between the pictures. 3. Wait until the last picture is completely uploaded.
4.3	SN	Post videos 1. Perform login step and wait for 10 seconds. 2. Post sequentially the pictures: RV1, RV2 and RV3 and without any delay between videos. 3. Wait until the last video is completely uploaded.
4.4	SN	Post live video 1. Perform login step and wait for 10 seconds. 2. Post live video.
4.5	SN	Post location 1. Perform login step and wait for 10 seconds. 2. Post the reference location: RL1.
4.6	SN	Post files 1. Perform login step and wait for 10 seconds. 2. Post sequentially the reference files: RF1, RF2 and RF3. 3. Wait until all the files are completely uploaded.
4.7	SN	Get comment 1. Perform login step and wait for 10 seconds. 2. Get the first available comment.
4.8	SN	Show picture 1. Perform login step and wait for 10 seconds. 2. Get the first available picture.
4.9	SN	Play video 1. Perform login step and wait for 10 seconds.

		2. Get the first available video.
4.10	SN	Play live video 1. Perform login step and wait for 10 seconds. 2. Get reference live video
4.11	SN	Get location 1. Perform login step and wait for 10 seconds. 2. Post sequentially the reference location: RL1.
4.12	SN	Get file 1. Perform login step and wait for 10 seconds. 2. Get the first available file.
4.13	SN	Search objects 1. Perform login step and wait for 10 seconds. 2. Search the most relevant item for which the App has been mainly designed (e.g., contacts, flights, hotels, etc.).
5.1	HS	Download three files sequentially 1. Perform login step and wait for 10 seconds. 2. Download sequentially the reference files: RF1, RF2 and RF3 and without any delay between them. 3. Wait until the last file is completely downloaded.
5.2	HS	Upload three files sequentially 1. Perform login step and wait for 10 seconds. 2. Upload sequentially the reference files: RF1, RF2 and RF3 and without any delay between them. 3. Wait until the last file is completely uploaded.
5.3	HS	Download several files simultaneously 1. Perform login step and wait for 10 seconds. 2. Download simultaneously the reference files: RF1, RF2, RF3, RF4, RF5 and RF6. 3. Wait until the last file is completely downloaded.
5.4	HS	Upload several files sequentially 1. Perform login step and wait for 10 seconds. 2. Upload simultaneously the reference files: RF1, RF2, RF3, RF4, RF5 and RF6. 3. Wait until the last file is completely uploaded.
5.5	HS	Download a huge file 1. Perform login step and wait for 5 seconds. 2. Download the reference file RF7.

		3. Wait until the file is completely downloaded.
5.6	HS	Upload a huge file 1. Perform login step and wait for 5 seconds. 2. Upload the reference file RF7. 3. Wait until the last file is completely uploaded.
5.7	HS	Pause and Resume Download 1. Perform login step and wait for 10 seconds. 2. Start downloading the reference file RF7. 3. After 30 seconds, pause the file transfer. 4. Wait for 15 seconds and resume the transfer
5.8	HS	Pause and Resume Upload 1. Perform login step and wait for 10 seconds. 2. Start uploading the reference file RF7. 3. After 30 seconds, pause the file transfer. 4. Wait for 15 seconds and resume the file upload.
6.1	VR	Load Virtual Experience 1. Perform login step and wait for 10 seconds. 2. Load reference virtual experience RVE1. 3. Load until the virtual experience is completely loaded
7.1	AR	Load Augmentation layer on physical marker 1. Perform login step and wait for 10 seconds. 2. Start an augmented reality session. 3. Aim at a physical marker.
7.2	AR	Load Augmentation layer at a location 1. Perform login step and wait for 10 seconds. 2. Start an augmented reality session. 3. Aim at a specific location.
8.x	PM	TBD
9.x	ES	TBD
10.1	GA	Start session game 1. Perform login step and wait for 10 seconds. 2. Set most common configuration (as required) 3. Start session game
10.2	GA	Short Session game 1. Perform login step and wait for 10 seconds.

		2. Set game most common configuration. 3. Start game. 4. Perform standard game session for 2 minutes
10.3	GA	Large Session game 1. Perform login step and wait for 10 seconds. 2. Set game most common configuration. 3. Start game. 4. Perform standard game session for 15 minutes
10.4	GA	Pause and resume game 1. Perform login step and wait for 5 seconds. 2. Set game most common configuration. 3. Start game session. 4. After 2 minutes set the session in pause mode. 5. After 30 seconds resume the game session.
10.5	GA	Start saved session game 1. Perform login step and wait for 5 seconds. 2. Set game most common configuration. 3. Start game session. 4. After 2 minutes save game session data. Note: Some Apps may need a longer time to allow saving game session. 5. Exit the game session. 6. After 10 seconds restart the saved game session. 7. After 20 seconds, exit the game session.
10.6	GA	Start two game sessions 1. Perform login step and wait for 10 seconds. 2. Set most common configuration (as required). 3. Start a new session game. 4. After 1 minute, exit the game session. 5. Exit the game session and wait for 15 seconds. 6. Start a new session game. 7. After 15 seconds, exit the game session.

2.8 Additional configuration requirements

2.8.1 Live Streaming transmission configuration

Some test cases need that a live streaming is generated during test case execution.

If possible, the Test System will avoid the need of using an external camera by replacing the default camera app with a video/image file streamer. This way, a more accurate control over the conditions of what is streamed will be obtained.

If the option of replacing the camera app is not available (e.g. due to limitation of the specific OS), the live streaming will be generated as defined in the figure below:

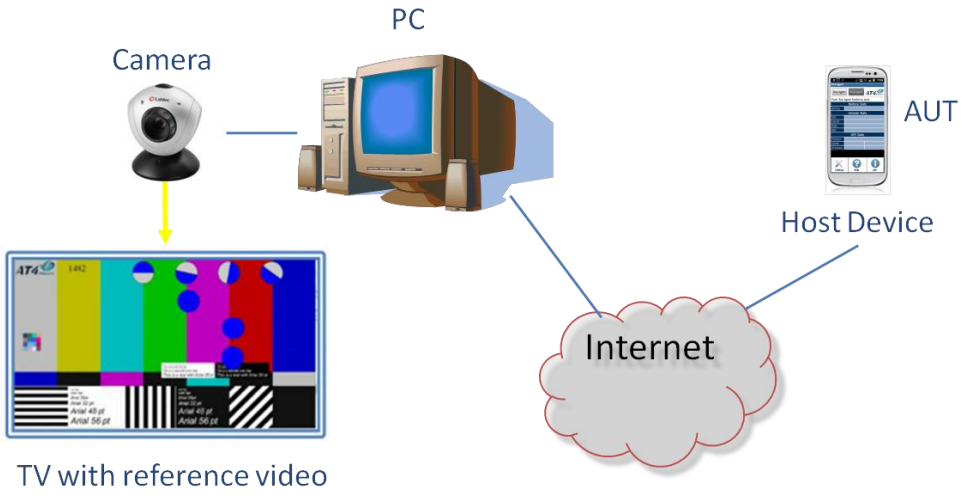

Figure 2 – Live streaming transmission configuration

Personal Computer (or equivalent hardware) connected to an Internet wide band connection.

Camera with video resolution no less than 1080p@30fps connected to the PC.

Live Streaming Services Reference App to stream live videos with operative account valid for live streaming transmission.

The camera will be recording a reference video (RTVP*n*) in a properly illuminated room.

2.8.2 Reference elements

The following reference elements are used in this Test Specification:

- RV1: Reference video 1 (Short duration video): TBD
- RV2: Reference video 2 (Medium duration video): TBD
- RV3: Reference video 3 (Long duration video (at least 30 minutes)): TBD
- RP1: Reference picture 1 (Small size picture): TBD
- RP2: Reference picture 2 (Medium size picture): TBD
- RP3: Reference picture 3 (Large size picture): TBD
- RC1: Reference comment 1: “The rain in Spain stays mainly in the plain.”

- RL1: Reference location 1: TBD
- RF1: Reference file 1 (Small size file): TBD
- RF2: Reference file 2 (Medium size file): TBD
- RF3: Reference file 3 (Large size file): TBD
- RF4: Reference file 4 (Large size file): TBD
- RF5: Reference file 5 (Large size file): TBD
- RF6: Reference file 6 (Large size file): TBD
- RVE1: Reference Virtual Experience 1: TBD
- RTVP1: Reference Fixed TV Pattern 1: TBD
- RTVP2: Reference TV Pattern 2 (High definition): TBD

3 Test cases

3.1 Common Services

The tests cases in this section apply to all Use Cases.

3.1.1 Open the AUT

Identifier: *AUE/CO/001*

Title: Open the AUT

Objective: Verify that the AUT performs the login and logout actions properly.

Applicability:

(ICSG_ProductType = Application) AND ICSA_Login

Initial Conditions:

AUT is in [AUT-NOT-RUNNING] mode.

Steps:

1. The Test System commands the AUT to replay the Application User Flow 1.1: Reopen the app.
2. The Test System measures the time from initiating the App to starting using the App when login is required and when login is not required.
3. The Test System measures whether de AUT has been unintentionally interrupted or not.

Postamble:

- Execute the Postamble sequence (see section 2.6).

Measurements:

- Open Access Time: The time elapsed from initiating the AUT when login is required to starting using the App.
- Re-open Access Time: The time elapsed from initiating the AUT when login is not required to starting using the App.
- Access Operation: Access the application when user intends to use the application to close it.
- Application Cut-Off: Probability that the AUT is interrupted without being done intentionally by the user.

3.1.2 Menu Navigation

Identifier: *AUE/CO/001*

Title: Menu Navigation

Objective: Verify that the AUT does not crash when the user navigates throughout the AUT menu tree.

Applicability:

(ICSG_ProductType = Application) AND ICSA_Login

Initial Conditions:

AUT is in [AUT-NOT-RUNNING] mode.

Steps:

1. The Test System commands the AUT to replay the Application User Flow 1.2: Navigate menu
2. The Test System measures the time from initiating the App to starting using the App, and whether the AUT could be used or not (as would be intended by a user).
3. The Test System measures whether de AUT has been unintentionally interrupted or not.

Postamble:

- Execute the Postamble sequence (see section 2.6).

Measurements:

- Access Time: The time elapsed from initiating the AUT to starting using the App.
- Access Operation: Access the application when user intends to use the application.
- Application Cut-Off: Probability that the AUT is interrupted without being done intentionally by the user.

3.2 CS Content Distribution Streaming Services

Note: The following test cases are defined to prevent any device-side content caching which the AUT could implement. However, if the AUT Backend Service also implements a server-side caching (e.g., storing the current playback time for a user), preventing that effect is left to the implementation of the test case.

3.2.1 Non Interactive Playback

Identifier: *AUE/CS/001*

Title: Non Interactive Playback

Objective: Measure the user experience KPIs by the AUT while executing the feature media file playing from the Content Distribution Streaming Services use case.

Applicability:

(ICSG_ProductType = Application) AND (ICSG_UseCases includes CS) AND ICSA_CSPlay

Initial Conditions:

AUT is in [AUT STARTED] mode.

Steps:

1. The Test System commands the AUT to replay the Application User Flow 2.1: Play three reference media files.
2. The Test System measures the initial buffering, the number and duration of re-buffering occurrences and the video resolution.

Postamble:

- Execute the Postamble sequence (see section 2.6).

Measurements:

- Time to load first media frame: The time elapsed since the user clicks play button until the media reproduction starts.
- Playback Cut-off: Probability that successfully started stream reproduction is ended by a cause other than the intentional termination by the user.
- Content Stall (s): The elapsed duration of content stalls while playing the content.
- Video resolution: Used video resolution.

3.2.2 Play and Pause

Identifier: *AUE/CS/002*

Title: Play and Pause

Objective: Measure the ability of the AUT to pause and the resume a media file.

Applicability:

(ICSG_ProductType = Application) AND (ICSG_UseCases includes CS) AND ICSA_CSPause

Initial Conditions:

AUT is in [AUT STARTED] mode.

Steps:

1. The Test System commands the AUT to replay the Application User Flow 2.2: Play and Pause.
2. The Test System measures whether pause operation was successful or not.

Postamble:

- Execute the Postamble sequence (see section 2.6).

Measurements:

- Playback Cut-off: Probability that successfully started stream reproduction is ended by a cause other than the intentional termination by the user.
- Pause Operation: Whether pause operation is successful or not.
- Time to load first media frame (s) after resuming: The time elapsed since the user clicks resume button until the media reproduction starts.

3.2.3 Stop and Replay

Identifier: *AUE/CS/003*

Title: Stop and Pause

Objective: Measure the ability of the AUT to stop and the re-play a media file.

Applicability:

(ICSG_ProductType = Application) AND (ICSG_UseCases includes CS)

Initial Conditions:

AUT is in [AUT STARTED] mode.

Steps:

1. The Test System commands the AUT to replay the Application User Flow 2.6: Stop and Replay.
2. The Test System measures whether stop re-play operations were successful or not.

Postamble:

- Execute the Postamble sequence (see section 2.6).

Measurements:

- Time to load first media frame: The time elapsed since the user clicks play button until the media reproduction starts.
- Playback Cut-off**:** Probability that successfully started stream reproduction is ended by a cause other than the intentional termination by the user.
- Stop Operation: Whether stop operation is successful or not.

3.2.4 Search and Seek

Identifier: *AUE/CS/004*

Title: Media file Seek

Objective: Measure the ability of the AUT to search a media file and seek at any time in the media file.

Applicability:

(ICSG_ProductType = Application) AND (ICSG_UseCases includes CS) AND ICSA_CSSearchSeek

Initial Conditions:

AUT is in [AUT STARTED] mode.

Steps:

1. The Test System commands the AUT to replay the Application User Flow 2.7: Search and Seek.
2. The Test System measures the search time and the time to load the first media frame after the seek operation.

Postamble:

- Execute the Postamble sequence (see section 2.6).

Measurements:

- Search Time: The time elapsed since the user clicks search button until the first search result is shown.
- Playback Cut-off: Probability that successfully started stream reproduction is ended by a cause other than the intentional termination by the user.
- Time to load first frame: The time elapsed since the user clicks play button until reproduction resumes after seek operation.

3.2.5 Rewind and Fast Forward

Identifier: *AUE/CS/005*

Title: Rewind and Fast Forward

Objective: Measure the ability of the AUT to perform rewind and fast forward operations while playing a media file.

Applicability:

(ICSG_ProductType = Application) AND (ICSG_UseCases includes CS) AND ICSA_CSRewind AND ICSA_CSFastForward

Initial Conditions:

AUT is in [AUT STARTED] mode.

Steps:

1. The Test System commands the AUT to replay the Application User Flow 2.3: Rewind and Fast Forward.
2. The Test System measures the time to load the first media frame after the rewind operation and after the fast forward operation.

Postamble:

- Execute the Postamble sequence (see section 2.6).

Measurements:

- Playback cut-off: Probability that successfully started stream reproduction is ended by a cause other than the intentional termination by the user.
- Time to load first media frame: The average of the time elapseds since the user clicks play button until reproduction resumes after rewind and fast forward operations.
- Rewind operation: Whether rewind operation is successful or not.
- Fast forward operation: Whether fast forward operation is successful or not.

3.2.6 Playlist Skip Forward and Backward

Identifier: *AUE/CS/006*

Title: Playlist Skip Forward and Backward

Objective: Measure the ability of the AUT to skip forward and backward through a playlist while playing a media file.

Applicability:

(ICSG_ProductType = Application) AND (ICSG_UseCases includes CS) AND ICSA_CSSkipForward AND ICSA_CSSkipBackward

Initial Conditions:

AUT is in [AUT STARTED] mode.

Steps:

1. The Test System commands the AUT to replay the Application User Flow 2.8: Skip Forward and Backward.
2. The Test System measures the time to load the first media frame after the first skip backward operation.
3. The Test System measures the time to load the first media frame after the first skip forward operation.
4. The Test System measures the time to load the first media frame after the second skip backward operation.

Postamble:

- Execute the Postamble sequence (see section 2.6).

Measurements:

- Video Playback cut-off: Probability that successfully started stream reproduction is ended by a cause other than the intentional termination by the user.
- Time to load first media frame: The time elapsed since the user clicks play button until reproduction resumes after rewind and fast forward operations.

3.2.7 Download content for offline playing

Identifier: *AUE/CS/007*

Title: Download content for offline playing

Objective: Measure the ability of the AUT to download a media file for offline playing.

Applicability:

(ICSG_ProductType = Application) AND (ICSG_UseCases includes CS) AND ICSA_CSDownloadMedia

Initial Conditions:

AUT is in [AUT STARTED] mode.

Steps:

1. The Test System commands the AUT to replay the Application User Flow 2.4: Download a media file.
2. The Test System measures the time to download load the media file.
3. The Test System commands the AUT to delete the media file.

Postamble:

- Execute the Postamble sequence (see section 2.6).

Measurements:

- Media Download Operation: Whether the download operation is successful or not.
- File Downloading Time: The time elapsed since the user clicks download button until the media reproduction is ready to be started.

3.3 Live Streaming Services

3.3.1 Play Live Video from User

Identifier: *AUE/LS/001*

Title: Play Live Video from User

Objective: Measure the user experience KPIs by the AUT while executing the feature live video playing from the Live Streaming Services use case.

Applicability:

(ICSG_ProductType = Application) AND (ICSG_UseCases includes LS)

Initial Conditions:

- AUT is in [AUT STARTED] mode.
- An Internet connected PC transmits live video as defined in section 2.8.1.

Steps:

1. The Test System commands the AUT to replay the Application User Flow 3.1: Playing live video from a known user.
2. The Test System measures the initial buffer, the number of stall occurrences and the video resolution.

Postamble:

- Execute the Postamble sequence (see section 2.6).

Measurements:

- Time to load first picture**:** The time elapsed since the user clicks play button until AUT starts playing the selected broadcast source.
- Broadcasting Reproduction Cut-off**:** Probability that successfully started broadcast reproduction is ended by a cause other than the intentional termination by the AUT user.
- Content Stall (s): The elapsed duration of content stalls while playing the selected broadcast source.
- Video resolution: Used video resolution.

3.3.2 Broadcast Live Video

Identifier: *AUE/LS/002*

Title: Broadcast Live Video to User

Objective: Measure the capability of broadcasting live content.

Applicability:

(ICSG_ProductType = Application) AND (ICSG_UseCases includes LS)

Initial Conditions:

- AUT is in [AUT STARTED] mode.
- The Host Device camera is focused on a TV displaying reference video RTVP2.

Steps:

1. The Test Systems starts playing RTVP2 on the TV.
2. The Test System commands the AUT to replay the Application User Flow 3.2: Broadcast live video.
3. The Test System receives the broadcasted video from the AUT and measures the number of stall occurrences and the video resolution.

Postamble:

- Execute the Postamble sequence (see section 2.6).

Measurements:

- Time to load receive first picture**:** The time elapsed since the user clicks broadcast button until the Test System starts playing the AUT broadcast video.
- Broadcasting Reproduction Cut-off**:** Probability that successfully started broadcast reproduction is ended by a cause other than the intentional termination by the AUT user.
- Content Stall (s): The elapsed duration of content stalls while broadcasting the content.
- Broadcast Video resolution: Used video resolution.

3.4 Social Networking

3.4.1 Picture Posting

Identifier: *AUE/SN/001*

Title: Picture Posting

Objective: Measure the user experience KPIs by the AUT while executing the feature picture uploading in the Social Networking use case.

Applicability:

(ICSG_ProductType = Application) AND (ICSG_UseCases includes SN) AND ICSA_SNPostImage

Initial Conditions:

AUT is in [AUT STARTED] mode.

Steps:

1. The Test System commands the AUT to replay the Application User Flow 4.2: Uploading three reference pictures separately.
2. The Test System measures the time to successfully upload each of the pictures, and whether each upload was successful or not.

Postamble:

- Execute the Postamble sequence (see section 2.6).

Measurements:

- Picture Upload Operation: Whether the upload operation is successful or not.
- Picture Upload Time: The time elapsed since the user clicks upload button until the picture is stored in the AUT Backend Service.

3.4.2 Video Posting

Identifier: *AUE/SN/002*

Title: Video Posting

Objective: Measure the user experience KPIs by the AUT while executing the feature video uploading in the Social Networking use case.

Applicability:

(ICSG_ProductType = Application) AND (ICSG_UseCases includes SN) AND ICSA_SNPostVideo

Initial Conditions:

AUT is in [AUT STARTED] mode.

Steps:

1. The Test System commands the AUT to replay the Application User Flow 4.3: Post videos sequentially.
2. The Test System measures the time to successfully upload each of the video clips, and whether each upload was successful or not.

Postamble:

- Execute the Postamble sequence (see section 2.6).

Measurements:

- Video Upload Operation: Whether the upload operation is successful or not.
- Video Upload Time: The time elapsed since the user clicks upload button until the video clip is stored in the AUT Backend Service.

3.4.3 Comment Posting

Identifier: *AUE/SN/003*

Title: Comment Uploading

Objective: Measure the user experience KPIs by the AUT while executing the feature comment uploading in the Social Networking use case.

Applicability:

(ICSG_ProductType = Application) AND (ICSG_UseCases includes SN) AND ICSA_SNPostComment

Initial Conditions:

AUT is in [AUT STARTED] mode.

Steps:

1. The Test System commands the AUT to replay the Application User Flow 4:1: Uploading three reference comments separately.
2. The Test System measures the time to successfully upload each of the comment, and whether each upload was successful or not.

Postamble:

- Execute the Postamble sequence (see section 2.6).

Measurements:

- Comment Upload Operation: Whether the upload operation is successful or not.
- Comment Upload Time: The time elapsed since the user clicks upload button until the comment is stored in the AUT Backend Service.

3.4.4 File Posting

Identifier: *AUE/SN/004*

Title: File Uploading

Objective: Measure the user experience KPIs by the AUT while executing the feature file posting in the Social Networking use case.

Applicability:

(ICSG_ProductType = Application) AND (ICSG_UseCases includes SN) AND ICSA_SNPostFile.

Initial Conditions:

AUT is in [AUT STARTED] mode.

Steps:

1. The Test System commands the AUT to replay the Application User Flow 4.6: Post three reference files separately.
2. The Test System measures the time to successfully upload each of the files, and whether each upload was successful or not.

Postamble:

- Execute the Postamble sequence (see section 2.6).

Measurements:

- File Upload Operation: Whether the upload operation is successful or not.
- File Upload Time: The time elapsed since the user clicks upload button until the file is stored in the AUT Backend Service.

3.4.5 Show Picture

Identifier: *AUE/SN/005*

Title: Show picture

Objective: Measure the user experience KPIs by the AUT while executing the feature show picture in the Social Networking use case.

Applicability:

(ICSG_ProductType = Application) AND (ICSG_UseCases includes SN) AND ICSA_SNGetImage

Initial Conditions:

AUT is in [AUT STARTED] mode.

Steps:

1. The Test System commands the AUT to replay the Application User Flow 4.8: Show three reference pictures.
2. The Test System measures the time to successfully download and show each of the pictures, and whether each download was successful or not.

Postamble:

- Execute the Postamble sequence (see section 2.6).

Measurements:

- Show Picture Operation: Whether the download operation is successful or not.
- Show Picture Time: The time elapsed since the user clicks download button until the picture is shown.

3.4.6 Play Video

Identifier: *AUE/SN/006*

Title: Play Video

Objective: Measure the user experience KPIs by the AUT while executing the feature play video in the Social Networking use case.

Applicability:

(ICSG_ProductType = Application) AND (ICSG_UseCases includes SN) AND ICSA_SNGetVideo

Initial Conditions:

AUT is in [AUT STARTED] mode.

Steps:

1. The Test System commands the AUT to replay the Application User Flow 4.9 Play three reference videos.
2. The Test System measures the initial buffer, the number of re-buffering and the content resolution.

Postamble:

- Execute the Postamble sequence (see section 2.6).

Measurements:

- Time to load first media frame: The time elapsed since the user clicks play button until the media reproduction starts.
- Playback Cut-off Ratio: Probability that successfully started stream reproduction is ended by a cause other than the intentional termination by the user.
- Content Stalling: The elapsed duration of content stalling while playing the content.
- Video resolution: Used video resolution.

3.4.7 File Downloading

Identifier: *AUE/SN/007*

Title: File Downloading

Objective: Measure the user experience KPIs by the AUT while executing the feature file downloading in the Social Networking use case.

Applicability:

(ICSG_ProductType = Application) AND (ICSG_UseCases includes SN) AND ICSA_SNGetFile

Initial Conditions:

AUT is in [AUT STARTED] mode.

Steps:

1. The Test System commands the AUT to replay the Application User Flow 4.12: Downloading three reference flies.
2. The Test System measures the time to successfully download each of the files, and whether each download was successful or not.

Postamble:

- Execute the Postamble sequence (see section 2.6).

Measurements:

- File Download Operation: Whether the download operation is successful or not.
- File Download Time: The time elapsed since the user clicks download button until the file is stored in the Host Device.

3.4.8 Play Live Video from User

Identifier: *AUE/SN/009*

Title: Play Live Video from User

Objective: Measure the user experience KPIs by the AUT while playing a live video from a user.

Applicability:

(ICSG_ProductType = Application) AND (ICSG_UseCases includes SN)

Initial Conditions:

AUT is in [AUT STARTED] mode.

Steps:

1. The Test System commands the AUT to replay the Application User Flow 4.10: Play live video from a user.
2. The Test System measures the initial buffer, the number of re-buffering and the content resolution.

Postamble:

- Execute the Postamble sequence (see section 2.6).

Measurements:

- Time to load first media frame: The time elapsed since the user clicks play button until the media reproduction starts.
- Playback Cut-off: Probability that successfully started stream reproduction is ended by a cause other than the intentional termination by the user.
- Content Stalling: The elapsed duration of content stalling while playing the content.
- Video resolution: Used video resolution.

3.4.9 Search Object

Identifier: *AUE/SN/010*

Title: Search Object

Objective: Measure the ability of the AUT to search the most relevant item for which the AUT has been mainly designed (e.g., contacts, flights, hotels, etc.).

Applicability:

(ICSG_ProductType = Application) AND (ICSG_UseCases includes SN)

Initial Conditions:

AUT is in [AUT STARTED] mode.

Steps:

1. The Test System commands the AUT to replay the Application User Flow 4.13: Search object.
2. The Test System measures the search time.

Postamble:

- Execute the Postamble sequence (see section 2.6).

Measurements:

- Search Time: The time elapsed since the user clicks search button until the first search result is shown.
- Search Operation: Whether the search operation is successful or not.

3.5 High Speed Internet

3.5.1 File Downloading

Identifier: *AUE/HS/001*

Title: File Downloading

Objective: Measure the user experience KPIs by the AUT while executing the feature file downloading in the High Speed Internet use case.

Applicability:

(ICSG_ProductType = Application) AND (ICSG_UseCases includes HS)

Initial Conditions:

AUT is in [AUT STARTED] mode.

Steps:

1. The Test System commands the AUT to replay the Application User Flow 5.1: Download three reference flies.
2. The Test System measures the time to successfully download each of the files, and whether each download was successful or not.

Postamble:

- Execute the Postamble sequence (see section 2.6).

Measurements:

- File Download Operation: Whether the download operation is successful or not.
- File Download Time: The time elapsed since the user clicks download button until the file is stored in the Host Device.

3.5.2 File Uploading

Identifier: *AUE/HS/002*

Title: File uploading

Objective: Measure the user experience KPIs by the AUT while executing the feature file uploading in the High Speed Internet use case.

Applicability:

(ICSG_ProductType = Application) AND (ICSG_UseCases includes HS)

Initial Conditions:

AUT is in [AUT STARTED] mode.

Steps:

1. The Test System commands the AUT to replay the Application User Flow 5.2: Upload three reference flies.
2. The Test System measures the time to successfully upload each of the files, and whether each upload was successful or not.

Postamble:

- Execute the Postamble sequence (see section 2.6).

Measurements:

- File Upload Operation: Whether the upload operation is successful or not.
- File Upload Time: The time elapsed since the user clicks upload button until the file is stored in the AUT Backend Service.

3.5.3 Pause and Resume Download Transfer

Identifier: *AUE/HS/003*

Title: Pause and Resume Download Transfer

Objective: Measure the ability of the AUT to pause and resume a file download.

Applicability:

(ICSG_ProductType = Application) AND (ICSG_UseCases includes HS)

Initial Conditions:

AUT is in [AUT STARTED] mode.

Steps:

1. The Test System commands the AUT to replay the Application User Flow 5.7 Pause and Resume one reference media file download.
2. The Test System measures whether the pause operation and the resume operation were successful or not.

Postamble:

- Execute the Postamble sequence (see section 2.6).

Measurements:

- File Pause Download Operation: Whether the pause download operation is successful or not.
- File Resume Download Operation: Whether the resume download operation is successful or not.

3.5.4 Pause and Resume Upload Transfer

Identifier: *AUE/HS/004*

Title: Pause and Resume Upload Transfer

Objective: Measure the ability of the AUT to pause and resume a file upload.

Applicability:

(ICSG_ProductType = Application) AND (ICSG_UseCases includes HS)

Initial Conditions:

AUT is in [AUT STARTED] mode.

Steps:

1. The Test System commands the AUT to replay the Application User Flow 5.8 Pause and Resume one reference media file upload.
2. The Test System measures whether the pause operation and the resume operation were successful or not.

Postamble:

- Execute the Postamble sequence (see section 2.6).

Measurements:

- File Pause and Resume Upload Operation: Whether the pause and resume upload operation is successful or not.

3.6 Virtual Reality

3.6.1 Virtual Experience Loading

Identifier: *AUE/VR/001*

Title: Virtual Experience Loading

Objective: Measure the ability of the AUT to look around with three degrees of movement freedom from a single observation point.

Applicability:

(ICSG_ProductType = Application) AND (ICSG_UseCases includes VR)

Initial Conditions:

AUT is in [AUT STARTED] mode.

Steps:

1. The Test System commands the AUT to replay the Application User Flow 6.1 Select a virtual experience.
2. The Test System measures the time to recognize the target object.
3. The Test System spins up the Host Device 30 degrees.
4. The Test System measures the time to recognize the target object.
5. The Test System spins down the Host Device 60 degrees.
6. The Test System measures the time to recognize the target object.
7. The Test System spins up the Host Device 30 degrees and spins left 60 degrees.
8. The Test System measures the time to recognize the target object.
9. The Test System spins right the Host Device 120 degrees.
10. The Test System measures the time to recognize the target object.
11. The Test System spins left 60 degrees.

Postamble:

- Execute the Postamble sequence (see section 2.6).

Measurements:

- Time to load the virtual world: Time elapsed from selecting a scenario (world, experience, etc.) to loading the 3D visual context.
- Immersion Cut-off: Probability that successfully started immersion is ended by a cause other than the intentional termination by the user.

3.6.2 Virtual Scene Loading

Identifier: *AUE/VR/002*

Title: Virtual Scene Loading

Objective: Measure the ability of the AUT to move horizontally from the initial observation point under the user control.

Applicability:

(ICSG_ProductType = Application) AND (ICSG_UseCases includes VR)

Initial Conditions:

AUT is in [AUT STARTED] mode.

Steps:

1. The Test System commands the AUT to replay the Application User Flow 6.1 Select a virtual experience.
2. The Test System waits until the target object is recognized.
3. The Test System spins up the Host Device a random number of degrees between 10 and 50.
4. The Test System waits until the target object is recognized.
5. The Test System commands the AUT to move horizontally (walking speed, 4 km/h) during 20 seconds in order to change the scene.
6. The Test System measures the time to recognize the target object.
7. The Test System spins back the Host Device to the original position.

Postamble:

- Execute the Postamble sequence (see section 2.6).

Measurements:

- Time to load the virtual scene: Time elapsed from selecting an scenario (world, experience, etc.) to loading the 3D visual context.
- Immersion Cut-off: Probability that successfully started immersion is ended by a cause other than the intentional termination by the user.
- Video resolution: Used frame resolution.

3.7 Augmented Reality

3.7.1 Load Augmentation Layer on Physical Marker

Identifier: *AUE/AR/001*

Title: Load Augmentation Layer on physical marker

Objective: Measure the performance of the AUT to render a virtual layer on top of a moving physical marker.

Applicability:

(ICSG_ProductType = Application) AND (ICSG_UseCases includes AR)

Initial Conditions:

AUT is in [AUT STARTED] mode.

Steps:

1. The Test System commands the AUT to replay the Application User Flow 7.1 Load augmentation layer on a physical marker.
2. The Test System forces the Host Device to aim at a physical maker.
3. The Test System measures the time elapsed by the AUT to display a virtual layer on top of the physical marker.
4. The Test System spins (in any direction) the Host Device 30 degrees, while the physical marker remains in the same position.
5. The Test System measures whether the AUT keeps showing the virtual layer on top of the physical virtual or not.
6. The Test System spins back to the original position.
7. The Test System measures whether the AUT keeps showing the virtual layer on top of the physical marker or not.
8. The Test System commands the AUT to exit augmented reality mode.
9. The Test System measures whether the AUT clears up the virtual layer or not.

Postamble:

- Execute the Postamble sequence (see section 2.6).

Measurements:

- Time to load augmentation: Time elapsed from aiming the device at physical marker to displaying the virtual layer on top of it.
- Augmentation Cut-off: Probability that successfully started immersion is ended by a cause other than the intentional termination by the user.
- Clear Augmentation Layer Operation: Whether the clear virtual operation is successful or not.

3.7.2 Load Augmentation Layer at Location

Identifier: *AUE/AR/002*

Title: Load Augmentation Layer on physical marker

Objective: Measure the performance of the AUT to render a virtual layer at a specific location.

Applicability:

(ICSG_ProductType = Application) AND (ICSG_UseCases includes AR)

Initial Conditions:

AUT is in [AUT STARTED] mode.

Steps:

1. The Test System commands the AUT to replay the Application User Flow 7.2 Load augmentation layer at a specific location.
2. The Test System forces the Host Device to be set at specific position.
3. The Test System measures the time elapsed by the AUT to display a virtual layer at the current location.
4. The Test System commands the AUT to exit augmented reality mode.
5. The Test System measures whether the AUT clears up the virtual layer from the Host Device screen or not.

Postamble:

- Execute the Postamble sequence (see section 2.6).

Measurements:

- Time to load augmentation: Time elapsed from setting the Host Device at a specfic locaiton to displaying the virtual layer.
- Augmentation Cut-off: Probability that successfully started immersion is ended by a cause other than the intentional termination by the user.
- Clear Augmentation Layer Operation: Whether the clear virtual operation is successful or not.

3.8 Emergency Services

Test cases TBD

3.9 Patient Monitoring

Test cases TBD

3.10 Gaming

3.10.1 Start new game sessions

Identifier: *AUE/GA/001*

Title: Start new game sessions

Objective: Measure the ability of the AUT to start new game sessions.

Applicability:

(ICSG_ProductType = Application) AND (ICSG_UseCases includes GA)

Initial Conditions:

- AUT is in [AUT STARTED] mode.
- AUT options are configured to their default values.
- Any AUT screen saving option is disabled.
- AUT resolution is configured to maximum resolution available.
- AUT Music and sound effects are configured to be ON.
- No energy saving option is enabled in the AUT.

Steps:

1. The Test System commands the AUT to replay the Application User Flow 10.6: Start two game sessions.
2. The Test System measures the time to successfully start the game session the first time (including connection to server and loading).
3. The Test System measures the time to successfully start the game a second time.

Postamble:

- Execute the Postamble sequence (see section 2.6).

Measurements:

- Time to load the game: The time elapsed since the user clicks play button until the AUT loads the game session and the user can start the interaction with the Host Device for playing.
- Start Game Operation: Whether the game session is successfully loaded or not.
- Time to load the second game: The time elapsed since the user clicks play button until the AUT loads the game session the second time and the user can start the interaction with the Host Device for playing.
- Start Game Operation: Whether the second game session is successfully loaded or not.

3.10.2 Game session ongoing

Identifier: *AUE/GA/002*

Title: Game session ongoing

Objective: Measure the ability of the AUT to play a game session.

Applicability:

(ICSG_ProductType = Application) AND (ICSG_UseCases includes GA)

Initial Conditions:

- AUT is in [AUT STARTED] mode.
- AUT options are configured to their default values.
- Any AUT screen saving option is disabled.
- AUT resolution is configured to maximum resolution available.
- AUT Music and sound effects are configured to be ON.
- No energy saving option is enabled in the AUT.

Steps:

1. The Test System commands the AUT to replay the Application User Flow 7.3: Play long gaming session. The application user flow must last at least 5 minutes.
2. The Test System measures the number of times and the duration that the game session stalls and the content resolution.

Postamble:

- Execute the Postamble sequence (see section 2.6).

Measurements:

- Game Cut-off: Probability that successfully started gaming session is ended by a cause other than the intentional termination by the user.
- Game Content Stall: The elapsed duration of content stalling while executing the gaming session.
- Video resolution: Used video resolution.

3.10.3 Pause and Resume

Identifier: *AUE/GA/003*

Title: Pause and resume

Objective: Measure the ability of the AUT to pause and the resume a game session.

Applicability:

(ICSG_ProductType = Application) AND (ICSG_UseCases includes GA) AND ICSA_GAPause

Initial Conditions:

- AUT is in [AUT STARTED] mode.
- AUT options are configured to their default values.
- Any AUT screen saving option is disabled.
- AUT resolution is configured to maximum resolution available.
- AUT Music and sound effects are configured to be ON.
- No energy saving option is enabled in the AUT.

Steps:

1. The Test System commands the AUT to replay the Application User Flow 10.4: Pause and resume a game session.
2. The Test System measures whether pause operation and the resume operation were successful or not during step1.

Postamble:

- Execute the Postamble sequence (see section 2.6).

Measurements:

- Pause Operation: Whether pause operation is successful or not.
- Resume Operation: Whether resume operation is successful or not.
- Time to load game session after resuming: The time elapsed since the user clicks resume button until the AUT user can resume the interaction with the Host Device for playing.

3.10.4 Start saved game session

Identifier: *AUE/GA/004*

Title: Start saved game session

Objective: Measure the ability of the AUT to start a saved game session.

Applicability:

(ICSG_ProductType = Application) AND (ICSG_UseCases includes GA) AND ICSA_GASaveGame

Initial Conditions:

- AUT is in [AUT STARTED] mode.
- AUT options are configured to their default values.
- Any AUT screen saving option is disabled.
- AUT resolution is configured to maximum resolution available.
- AUT Music and sound effects are configured to be ON.
- No energy saving option is enabled in the AUT.

Steps:

1. The Test System commands the AUT to replay the Application User Flow 10.5: Saved game session.
2. The Test System measures the time to successfully start the game when starting the saved game version (including connection to server and loading).

Postamble:

- Execute the Postamble sequence (see section 2.6).

Measurements:

- Time to load the game: The time elapsed since the user clicks play button until the AUT loads the saved game session and the user can start the interaction with the Host Device for playing.
- Start Game Operation: Whether the saved game session is successfully loaded or not.

4 Test cases applicability

The applicability of each individual test is identified in Table C.1.

The applicability of every test is formally expressed by the use of Boolean expressions that are based on parameters (ICS) included in annex A of the present document.

The columns in Table C.1 have the following meaning:

Test case column

The Test case column indicates the test case number for each test case as described in the Control Panel Service Framework test case specification for which the applicability is identified.

Description column

The Title column indicates the title of each test case as described in the Control Panel Service Framework test case specification for which the applicability is identified.

Release column

The Release column indicates the earliest release from which each test case is applicable, except if otherwise stated of an individual test case.

Status column

The following notations are used for the Status column:

A	applicable - the test is applicable.
O	optional – the capability may be supported or not.
N/A	not applicable – in the given context, the test case is not applicable.
Ci	conditional – the test is applicable ("A") or not ("N/A") depending on the support of other optional or conditional items. "i" is an integer identifying an unique conditional status expression which is defined immediately following the table. For nested conditional expressions, the syntax "IF ... THEN (IF ... THEN ... ELSE...) ELSE ..." is used to avoid ambiguities.

The conditional expressions are added in the last row of the table. These expressions may use ICS as defined in D2.2 Appendix 2. ICS/IXIT. The ICS items will be referred as A.n/m where A.n refers to the table in which the ICS is defined and m refers to the item of the table.

A practical example is detailed below Table 6.

Table 6 – Test cases applicability

Test case	Test case title	Status
AUE/CO/001	Open the AUT	C08
AUE/CO/002	Menu Navigation	C08
AUE/CS/001	Non Interactive Playback	C01
AUE/CS/002	Play and Pause	C020
AUE/CS/003	Stop and Replay	C01
AUE/CS/004	Search and Seek	C22
AUE/CS/005	Rewind and Fast Forward	C21
AUE/CS/006	Playlist Skip Forward and Backward	C23
AUE/CS/007	Download content for offline playing	C09
AUE/LS/001	Play Live Video from User	C02
AUE/LS/002	Broadcast Live Video	C02
AUE/SN/001	Picture Posting	C10
AUE/SN/002	Video Posting	C11
AUE/SN/003	Comment Posting	C12
AUE/SN/004	File Posting	C13
AUE/SN/005	Show Picture	C14
AUE/SN/006	Play Video	C15
AUE/SN/007	File Downloading	C16
AUE/SN/008	Play Live Video from User	C17
AUE/SN/009	Search Object	C03
AUE/HS/001	File Downloading	C04
AUE/HS/002	File Uploading	C04
AUE/HS/003	Pause and Resume Download Transfer	C04
AUE/HS/004	Pause and Resume Upload Transfer	C04
AUE/VR/001	Virtual Experience Loading	C05
AUE/VR/002	Virtual Scene Loading	C05
AUE/AR/001	Load Augmentation Layer on Physical Marker	C06
AUE/AR/002	Load Augmentation Layer at Location	C06
AUE/GA/001	Start new game sessions	C07
AUE/GA/002	Game session ongoing	C07
AUE/GA/003	Pause and Resume	C18

Test case	Test case title	Status
AUE/GA/004	Start saved game session	C19
C01 IF (A.1/1 = Application) AND (A.1/3 includes CS) THEN **A** ELSE **N/A** C02 IF (A.1/1 = Application) AND (A.1/3 includes LS) THEN **A** ELSE **N/A** C03 IF (A.1/1 = Application) AND (A.1/3 includes SN) THEN **A** ELSE **N/A** C04 IF (A.1/1 = Application) AND (A.1/3 includes HS) THEN **A** ELSE **N/A** C05 IF (A.1/1 = Application) AND (A.1/3 includes VR) THEN **A** ELSE **N/A** C06 IF (A.1/1 = Application) AND (A.1/3 includes AR) THEN **A** ELSE **N/A** C07 IF (A.1/1 = Application) AND (A.1/3 includes GA) THEN **A** ELSE **N/A** C08 IF (A.1/1 = Application) AND A.2/1 THEN **A** ELSE **N/A** C09 IF (A.1/1 = Application) AND (A.1/3 includes CS) AND A.2/14 THEN **A** ELSE **N/A** C10 IF (A.1/1 = Application) AND (A.1/3 includes SN) AND A.2/17 THEN **A** ELSE **N/A** C11 IF (A.1/1 = Application) AND (A.1/3 includes SN) AND A.2/16 THEN **A** ELSE **N/A** C12 IF (A.1/1 = Application) AND (A.1/3 includes SN) AND A.2/15 THEN **A** ELSE **N/A** C13 IF (A.1/1 = Application) AND (A.1/3 includes SN) AND A.2/19 THEN **A** ELSE **N/A** C14 IF (A.1/1 = Application) AND (A.1/3 includes SN) AND A.2/20 THEN **A** ELSE **N/A** C15 IF (A.1/1 = Application) AND (A.1/3 includes SN) AND A.2/21 THEN **A** ELSE **N/A** C16 IF (A.1/1 = Application) AND (A.1/3 includes SN) AND A.2/17 THEN **A** ELSE **N/A** C17 IF (A.1/1 = Application) AND (A.1/3 includes SN) AND A.2/24 THEN **A** ELSE **N/A** C18 IF (A.1/1 = Application) AND (A.1/3 includes GA) AND A.2/26 THEN **A** ELSE **N/A** C19 IF (A.1/1 = Application) AND (A.1/3 includes GA) AND A.2/25 THEN **A** ELSE **N/A** C20 IF (A.1/1 = Application) AND (A.1/3 includes CS) AND A.2/11 THEN **A** ELSE **N/A** C21 IF (A.1/1 = Application) AND (A.1/3 includes CS) AND A.2/8 AND A.2/10 THEN **A** ELSE **N/A** C22 IF (A.1/1 = Application) AND (A.1/3 includes CS) AND A.2/27 THEN **A** ELSE **N/A** C23 IF (A.1/1 = Application) AND (A.1/3 includes CS) AND A.2/7 AND A.2/9 THEN **A** ELSE **N/A** Note: See example below for expression interpretation.		

Example of expression interpretation in the table above.

Test case	Test case title	Status
AUE/CS/001	Non Interactive Playback	C01

The status (applicability) of test case ‘AUE/CS/001’ is defined by condition’ C01’

C01 IF (A.1/1= Application) AND (A.1/3 includes CS) THEN A ELSE N/A

Where:

C01: Condition to be used in the test cases to define applicability

A.1/1 Value of Item 1 of table A.1 defined in D2.2 Appendix 2. ICS/IXIT In this case, value of ICS 'ICSG_ProductType' (Table A.1, item 1)

A.1/3 includes CSCS is one of the values of ICS 'ICSG_UseCases' (table A.1, item 3). (ICSG_UseCases ICS status is Mn, meaning that several options may be supported.

If the value of the sub-expresion *(A.1/1= Application)* is TRUE AND the value of the sub-expression *(A.1/3 includes CS) is TRUE, the test case status is Applicable (A); In any other case, the status is Not-applicable (N/A).*

5 Annex 1: Key Performance Indicators

The following table summarizes the Key Performance Indicators that will be obtained based on the measurements obtained by the execution of the test cases and each test case repetition.

Table 7 – Application User Experience Key Performance Indicators

Measurements	Use Cases	Type	Unit	Summarization	KPI
Access Time	All	Unsigned Integer	n/a	Average, Deviation, CDF	App Access Time
Accessibility	All	Boolean	n/a	Ratio	App Accessibility
Availability	All	Boolean	n/a	Ratio	App Availability
Time to load first media frame	CS, LS SN, GA	Unsigned Integer	s	Average, Deviation, CDF	Content Load Time
Time to load after resuming	CS, LS SN, GA				
Time to load the virtual world	VR				
Time to load the virtual scene	VR				
Time to load augmentation	AR				
Response Time	VR, AR, GA	Unsigned Integer	S	Average, Deviation, CDF	Response Time
Playback	CS, LS, SN	Boolean	n/a	Ratio	Feature Availability
Pause Operation	CS, SN, GA				
Resume Operation	CS, SN, GA				
Stop Operation	CS, LS, SN				
Rewind Operation	CS				
Fast Forward Operation	CS				
Search Operation	CS, LS, SN				
Seek Operation	CS				
Skip Forward Operation	CS				
Skip Backward Operation	CS				
{Picture, Video, Comment, File} Transfer	CS, SN, HS				
Load Augmentation Layer Operation	AR				
Clear Augmentation Layer Operation	AR				
Content Stall	CS, LS, SN,	Vector of	s	Count, Index (1), CDF	Content Stall

	VR, GA	Unsigned Integer			
Search Time	CS, LS, SN	Unsigned Integer	s	Average, Deviation, CDF	Content Search Time
{Picture, Video, File} Download Time	CS, SN, HS	Unsigned Integer	s	Average, Deviation, CDF	Content Download Throughput
{Picture, Video, File} Upload Time	CS, SN, HS	Unsigned Integer	s	Average, Deviation, CDF	Content Upload Throughput
Video Resolution	CS, SN, AR, VR	Vector of Nominal	n/a	Mode, CDF	Content Resolution
Broadcast Video Resolution	LS	Vector of Nominal	n/a	Mode, CDF	Broadcast Content Resolution