Keysight Open RAN Simulators, Cloud Edition 5.2

CoreSIM

User Guide

KEYSIGHT

Document version: 202512031628+02:00

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Location	Phone number	Local time
Americas		
US, Canada	1-888-829-5558	8h00 – 17h00
Brazil	0800-892-0522	8h00 – 17h00
Mexico	001-888-829-5558	8h00 – 17h00
Other	+1-719-273-6516	8h00 – 17h00
EMEAI		
Belgium	0800-18686	8h30 – 17h30
Finland	0800-913-352	8h30 – 17h30
France	0800-917228	8h30 – 17h30
Germany	0800-0824099	8h30 – 17h30
India	1800-18-02552	8h30 – 17h30
Ireland	1800-949245	8h30 – 17h30
Israel	1-809-454975	8h30 – 17h30
Italy	0800-790571	8h30 – 17h30
Luxembourg	0800-25112	8h30 – 17h30
Netherlands	0800-022-9086	8h30 – 17h30

Romania	0213 015 699	8h30 – 17h30
Spain	800-654386	8h30 – 17h30
Sweden	0201-202266	8h30 – 17h30
United Kingdom	0800-0293882	8h30 – 17h30
Asia and Australia		
Australia	1-800-370-558	8h30 – 17h00
China Mainland	800-810-0005	8h30 – 17h30
	400-810-0005	8h30 – 17h30
Hong Kong	800-931-613	9h00 – 18h00
Japan	0120-421-621	9h00 – 17h30
Malaysia	1800-819 092	8h30 – 17h30
South Korea	080-770-0800	8h30 – 17h30
Singapore	800-101-3797	8h30 – 17h30
Taiwan	0800-699-880	9h00 – 18h00
Other	+65 6215 7600	8h30 – 17h30 (Singapore)

Last updated: 11 September 2025

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CHAPTER 1
Introduction

A 4G/5G core simulator, CoreSIM makes Radio Access Network testing easier by eliminating Core Network unwanted dependencies and allowing an easily controllable, repeatable test environment setup. RAN test efforts can thus be concentrated on the Device Under Test, speeding up 3GPP standards implementation.

Highly scalable, CoreSIM allows up to hundred independent test lines in parallel.

Objectives-based testing

The Keysight proprietary goal seeking algorithm allows CoreSIM test agents to converge towards stable and consistent key performance indicators (KPIs) such as bandwidth and connections per second, which represents the real performance of the network infrastructure or device being tested with minimal user intervention. CoreSIM's dual-objective support allows you to set multiple test objectives to determine if the underlying network infrastructure can achieve a specified throughput while maintaining a set number of simulated users. CoreSIM can also gradually ramp-up the traffic load to the desired target in configurable increments for rate-based objectives (throughput and connections per second).

UI overview

The Keysight CoreSIM web UI provides access to all of the tools, functions, and options that are needed to create, run, and manage tests; to view, analyze, and manage test results; to respond to system events; and to administer your Keysight Open RAN Simulators, Cloud Edition 5.2 instance.

The major elements of the UI are:

- Application framework elements below
- Dashboard page on the next page
- Test overview page on the next page
- Search section
- Configuration properties pages on the next page
- Statistics page on page 13

Application framework elements

CoreSIM uses a web-based UI that is common to a number of Keysight applications, including LoadCore and CyPerf. The web page framework includes the following elements:

Title bar

The title bar, which is located across the topic of the Keysight Open RAN Simulators, Cloud Edition 5.2 window, is present on all pages, and provides key information and controls, including:

- Keysight logo: Click the Keysight logo from any point in the interface to return to the dashboard page.

- Session identifier: Shows the current session number and test config name. Clicking the session identifier returns you to the TEST OVERVIEW page.
- Events menu ( ): Provides access to notifications and test events.
- Links to the OVERVIEW and STATISTICS pages.
- User profile menu: The user profile menu provides access to the current user's Edit Account screen in which you can edit your profile preferences, switch theme and logout.
- Settings menu ( ): Provides access to a number of application and administrative functions and resources, including user Logout, License Manager, Agent Management, software update, diagnostics (test logs), product information, and more.

Tool bar

The tool bar is located directly under the title bar. It provides access to functions and content that are specific to your current application context. The **START TEST** and **STOP TEST** buttons are located on the tool bar.

Dashboard page

After you successfully log in, the **Dashboard** page opens. From this page, you can create new tests, access other test sessions (each test session tile displays the test name and status), browse among and manage previously run tests, and browse among and access test results from previously run tests. You can navigate to the other CoreSIM pages to view and customize test setups, view real-time statistics, view and export test results, view events, logs, and other application and test-specific information.

Test overview page

When you create a test session based on any predefined, newly-created, or imported test configuration, CoreSIM opens the **TEST OVERVIEW** page on which you can view a summary of the test configuration and a visual representation of the test topology. The Overview includes a test progress bar, timeline and objectives summary data, a link to the Global Settings, and the test topology section.

The test topology is an interactive graphical representation of the test network. From the topology, you access all of the configurable elements for the current test.

Search

The Search option is situated adjacent to the Test Overview tab within the application's user interface.

The parameter Search functionality enables users to locate specific parameters within a test session. This feature assists in identifying paths where a parameter is configured, aiding navigation and configuration processes.

Configuration properties pages

You use a number of properties pages as you configure a test. They are presented as a series of cascading panels that reveal successively detailed settings for the elements in your test configuration.

Statistics page

Real-time statistics are immediately available while a test is running and can be accessed for tests that were previously run. The statistics page will contain multiple panels that display graphical or textual test run statistics. You can select from among the various tabs to view specific categories of statistics.

CoreSIM presents a default statistics dashboard, which is based on Grafana. You can change the dashboard to accommodate your own needs and select from many Key Performance Indicators (KPIs) that the agent exposes towards the middleware.

Additional information and resources

All of the information in this User Guide is based on the assumption that CoreSIM has already been successfully deployed in your network. The following resources provides information that is not covered in this guide:

Resource	Location
Software and documentation download page	Downloads & Updates
KORA Deployment Guide	A copy is available on the Software Downloads page cited above.
Keycloak user documentation	https://www.keycloak.org/documentation

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CHAPTER 2

Initial administrator login

This chapter describes the actions that are required the first time you log in to CoreSIM as the application administrator, following deployment.

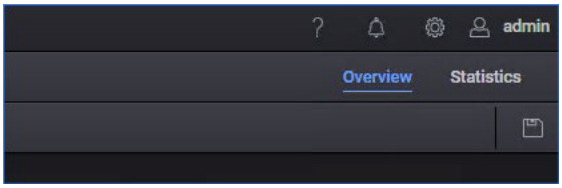
Required information

- The IP address that you set for the CoreSIM web interface during deployment.
- The IP address of the license server.
  The license server is shipped as a separate `.ova` file. After deploying the `.ova` file, you can access it using a web browser.
- Your CoreSIM license activation codes (or entitlement codes).

Initial login and password change

CoreSIM provides a default administrator account, and you will use that account on your initial login and for subsequent administrative tasks.

To log in as the administrator:

1. Enter the IP address of your deployed CoreSIM instance in your browser's address field.
   CoreSIM opens the Keysight login page.
2. Enter the default administrator login credentials:
   - user ID: **admin**
   - password: **admin**
3. Click **Login**.
   Because this is the initial login, CoreSIM requires that you change the password for the admin account.
4. Review and accept the Keysight Software End User License Agreement.
5. Change the default **admin** user password:
   a. Click your account name (*admin*) in the CoreSIM title bar.
   

   CoreSIMopens the **Edit Account** page in a new browser tab.
   b. Click **Password** in the navigation pane.

c. Enter the current password and your new password.

d. Click **Save**.

Next steps:

- Activate licenses
- Configure your license server
- Create user accounts

Activate licenses using License Manager

Once you have completed the initial admin login, you need to activate the licenses for this CoreSIM deployment.

To activate your licenses:

1. Select **Administration** from the setup menu ( ).
2. Select **License Manager** from the **Adminstration** menu. CoreSIM opens the **License Manager** page.
3. To activate your licenses:
   a. Select **Activate licenses**.
      CoreSIM opens the **Activate Licenses** dialog.
   b. Enter your license data in the dialog box.
      You can use either activation codes or entitlement codes (one or more).
   c. Select **Load Data**, indicate the number of licenses you want to activate, then click **Activate**.
      Your new licenses—which should now be listed in the **License Manager** page—are now available for running tests.

Configure the License Server

If you are using an external License server, then you need to select and configure your license provider:

1. Select **Applications Settings** from the setup menu ( ).
   CoreSIM opens the **Application Settings** dialog.
2. Select your **License Provider** from the drop-down list:
   - **Legacy License Server** - this option is set by default on CoreSIM (using the old LicenseManager).
   - **External License Server** - select this option to set an external license server (using the new LicenseManager 1.7).
   - **Embedded License Server** - the license server that is included in the middleware.
3. Enter the **License Server IP** address (see Required information on the previous page, above).
4. Click **Update**.

Create regular user accounts

Before you and other members of your organization start building and running tests, it is recommended that you—logged in as the administrator—create a *regular user account* for each

individual (including yourself). Further, it is recommended that you use the admin account only for administrative activities.

Refer to Manage CoreSIM users for detailed information about user account management.

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CHAPTER 3
User login and logout

Once the CoreSIM application administrator has created user accounts for the individuals who will use CoreSIM, those users can access the system and start to use its services.

Log in as a regular user

The user accounts that the CoreSIM application administrator creates are known as regular user accounts. A *regular user* can create, manage, and run tests, but cannot perform access control functions (such as creating and managing user accounts).

1. Enter the CoreSIM IP address in your browser's URL address field.
2. Press **Enter** to access the Keysight**Login** window.
3. Enter your username and password, then click **Login**.
4. If you are logging in for the first time, you may be required to change your password:
   a. Enter your **New Password**.
   b. Enter the password again in the **Confirm Password** field.
   c. Click **Submit**.

Upon successful login, CoreSIM opens the dashboard.

Log out

To log out of CoreSIM, select **Log Out** from the Settings menu ( ).

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CHAPTER 4

Build and run a test

This chapter describes the sequence of actions needed to build and run a new CoreSIM test.

Chapter contents:

Create a new test config

The first step in building a new test is to create a new config:

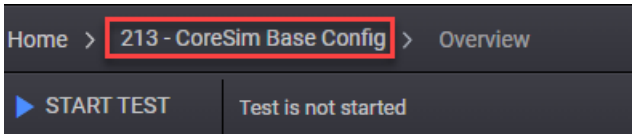
- Create a config based on a template below
- Create a new config based on an existing config on the next page

Create a config based on a template

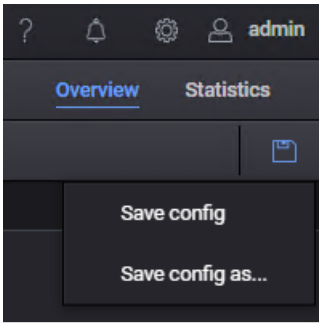
1. Log in to CoreSIM.
2. In the Dashboard page, select the **Wireless CoreSIM** template from the **Create New Test** panel.

   CoreSIM opens the **Test Overview** page, which includes the graphical representation of the test topology.

   CoreSIM assigns a session number and temporary name to the test, and displays that information in the title bar. For example:

3. Assign a name to your new test config:
   a. Select **Save config as...**

CoreSIM opens the **Save config as** dialog.

b. Enter a name for the config, then click **Save As**.

The new test config is immediately available.

NOTE The terms *test config* and *test session* are not entirely synonymous. A "config" refers to a configuration definition file (JSON format), whereas a "session" is an instance of that file that is loaded in memory and is capable of being run.

Create a new config based on an existing config

Rather than creating a new config based on one of the CoreSIM templates, you can create a config based on an existing test config. The only difference is that (in step 2 in the procedure shown above) you will select a test config from the **Browse Configs** panel, and that will be the source for your new config.

When planning the tests that you intend to run, you may want to create one or more "starter" configs of your own, rather than starting with a template. In effect, you can create private templates that are pre-populated with configuration values that you will typically use in your testing.

Configure the test

To configure this test, do the following:

1. On the CoreSIM Dashboard page, under the Create New Test section, select **Wireless CoreSim**.
   The Test Scenario page appears.
2. On the Test Overview panel configure Global Settings. These settings become immediately available for selection in several of the node configuration windows. You define them once and reuse them multiple times.
   For more details about Global Settings configuration, refer to Global Settings panel.
3. Select the services and nodes that the CoreSIM will simulate. Select any or all of the other (non-DUT) nodes and services for testing (they are all selected by default, so you can simply deselect any that you do not require for a test). CoreSIM will simulate these elements during testing.
4. Configure the test settings for the simulated nodes and services. You can configure the nodes in any order, but it may be helpful to work outwards from the DUTs.
   You can click on a node, select one of the ranges (this is a per-range option) and by enabling the **Device Under Test** option, that node will no longer be simulated by our CoreSIM. You still need to configure the IP addresses of the DUT so the nodes simulated by CoreSIM know who they need to communicate with.
   For each node configuration, refer to its dedicated section, as follows:
   - SEG & CoreSim
   - Data Networks (DN)
   - IP Multimedia Subsystem (IMS)
   - Radio Access Network (RAN)

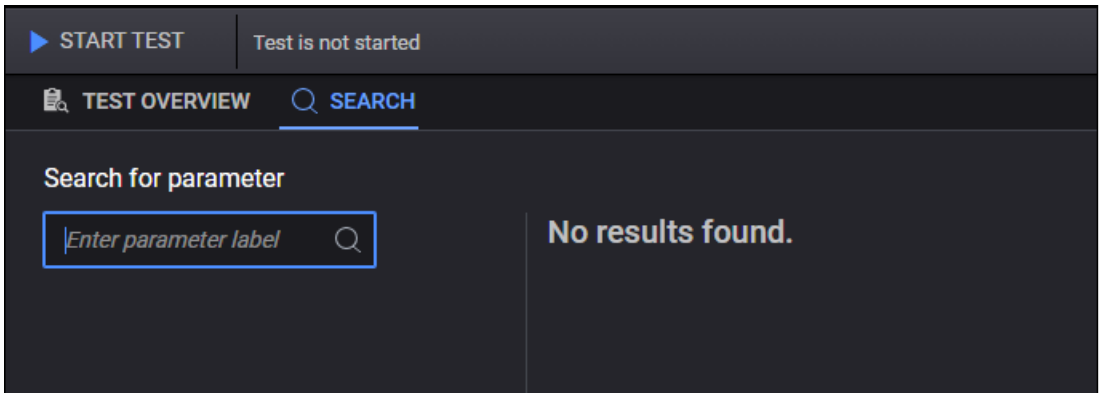
   To locate specific parameters within the test session, use the Search functionality.
5. Select the number of traffic agents for each CoreSIM node. For more details, refer to Traffic Agents.

6. Configure the test settings for the simulated UEs. While there are a large number of UE configuration settings, you can often use the default values with little or no modification.
   For UE configuration, refer to User Equipment (UE).
7. On the User Equipment (UE), configure the test objectives.
   The test *Objectives* determine the behavior of the simulated UEs. The User Plane Objectives determine the volume and rate of data traffic, and The Control Plane Objectives determine the volume and rate of control plane procedures.
8. Start the test. When you click or tap the **Start Test** button, CoreSIM begins the registration procedure, any other configuring or occurring control plane procedure and traffic generation. For more details, refer to Start the test.
9. Evaluate the results.
   Once the test is running, you can click or tap **Statistics** to start monitoring the progress of the test.

TIP If there are multiple test sessions, you can quickly switch between them by selecting the small green triangle next to the name of the current test session. A drop-down list will displays all your current test sessions and allows you to change to a specific test session by selecting it.

Search Parameter

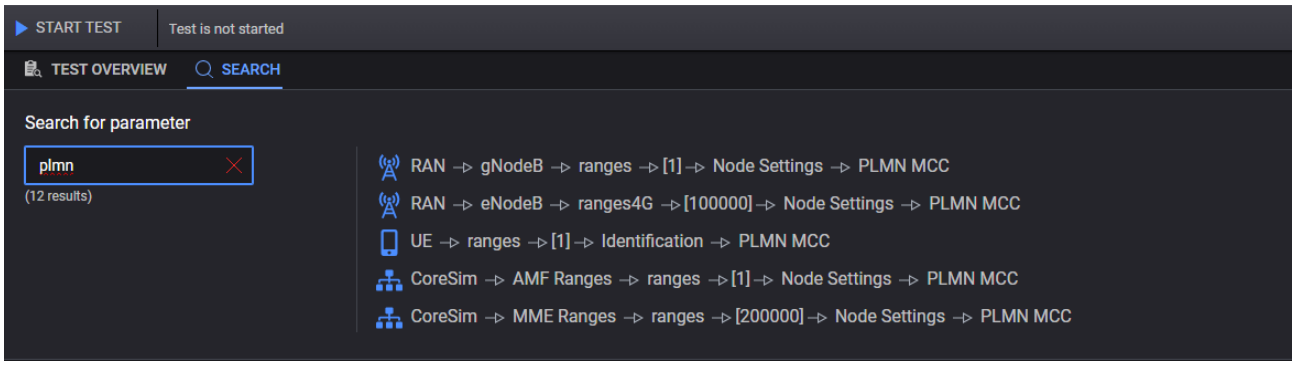
The Search option is situated adjacent to the Test Overview tab within the application's user interface.



IMPORTANT This functionality is exclusive to the test session level and does not extend its search functionality to other sessions or topologies open in the application.

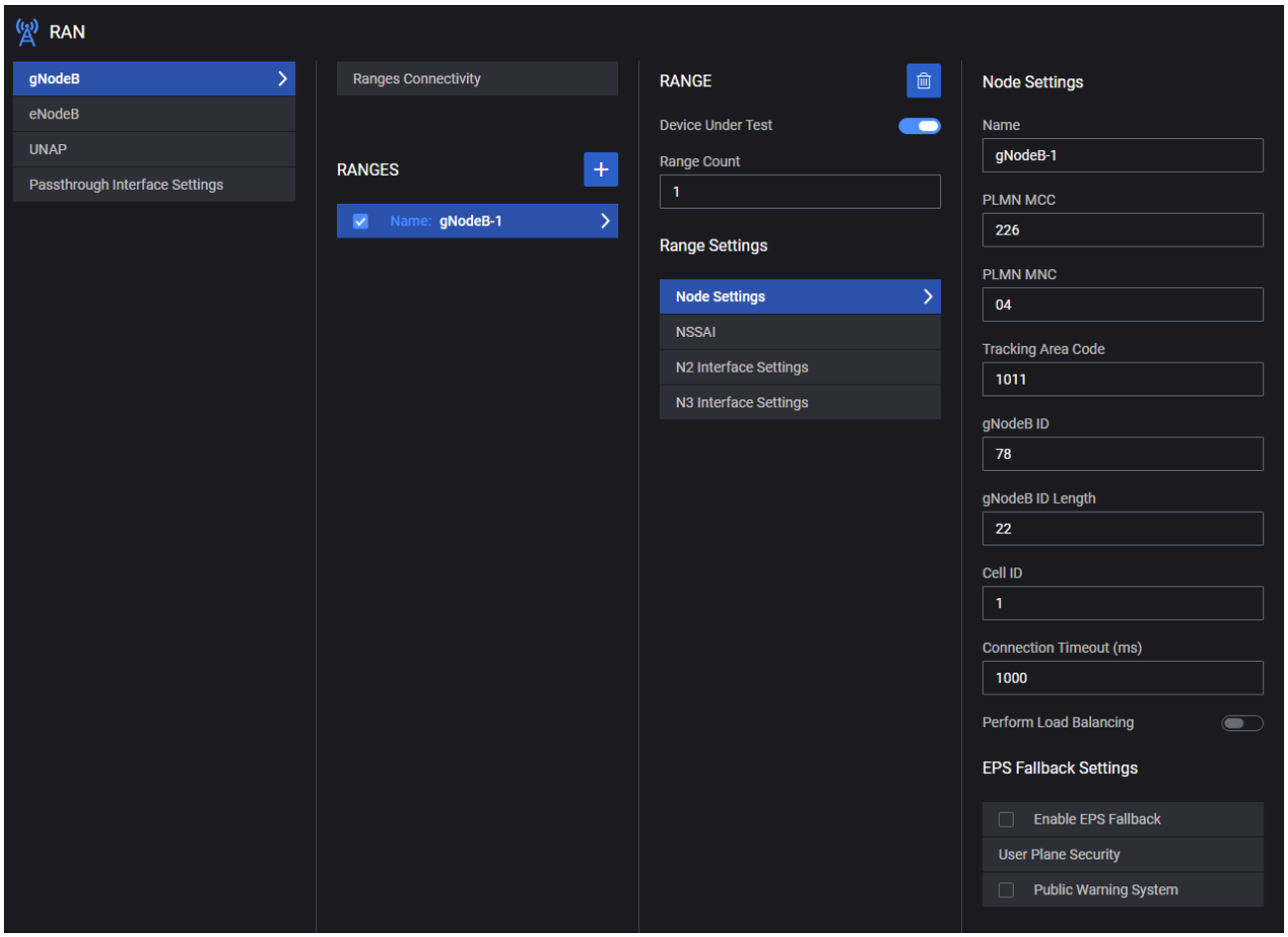
To use the Search functionality, select the **Search** tab and specify the name of the parameter into the **Search for parameter** field.

Upon entering the parameter name (for example, *plmn*), the search generates a list of paths where the parameter is configured within the topology.



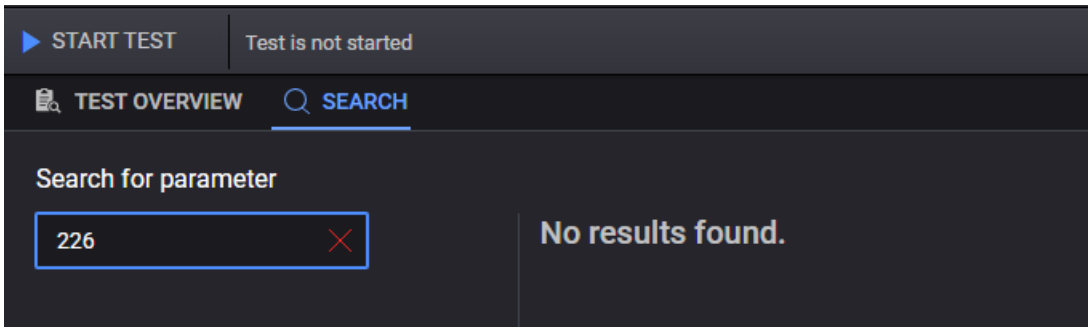
Each result displays the path(s) within the topology where the parameter can be configured.

Clicking on any of the displayed paths enables users to navigate directly to that specific path within the topology.



Limitations

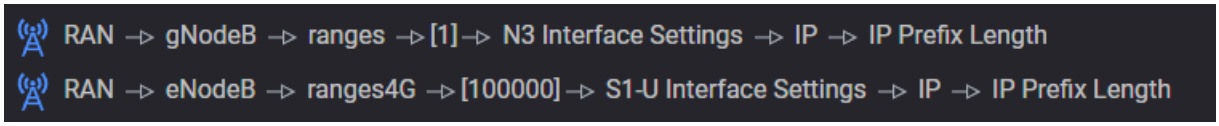
- ***Search Functionality***: Supports searching for parameters to be configured but not for the values of those parameters. For example, searching for the value *226* will not return any results.



- ***Highlighting***: The searched parameter within the search results or selected path is not highlighted.

Additional Information

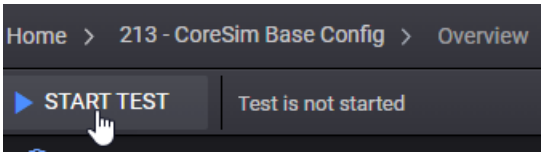
- ***Matched Results Display***: The number of matched results is exhibited below in the search field.
- ***Lists and Indices***: In cases of lists, the index displayed in the result path corresponds to the `id` of the object, mirroring the value found in the exported configuration or obtained from the REST API.



- ***Search Mechanism***: The search mechanism operates in two steps: finding matching results and navigating to the matched result. However, note that navigating to the matched result might not be supported for complex custom components or specific corner case paths.
- **Non-Editing Functionality**: The Search tool functions solely to display results and does not facilitate inline editing of parameter values.

Start the test

Once you have configured all the properties needed for your test, click the **START TEST** button.



Once you start a test, the CoreSIM tool bar displays the test status throughout its execution progress. In addition, each test session tile (located on the CoreSIM Dashboard) displays that test's name and current status. The test status will be one of the following:

- **Test is not started**: The test session is created, the test configuration is loaded, but the test has not yet been started.
- **Test is initializing**: After clicking the **START TEST** button on the test progress bar, the initializing state is displayed on the progress bar and the test session tile. During this phase the hardware resources are allocated and the test is prepared for starting.
- **Test is configuring**: During this stage, the configuration is applied to the test.

- **Test is running**: During this stage, the nodes are connected, test iterations start one-by-one based on the configured parameters, traffic flows are connected, and traffic generation begins.
- **Test is stopping**: During this stage, traffic stops, traffic flows disconnect, logs are collected, ports are released, and the hardware disconnects.
- **Test is stopped**: The test is no longer running.

CoreSIMwill display a message in the tool bar if it cannot successfully initialize the test.

Once the test initialization and configuration phases have been successfully completed, CoreSIM will:

- Start generating traffic (user plane and control plane).
- Display the **STOP TEST** button in the tool bar.
- Open the **STATISTICS** page.

The estimated total time it takes the test to complete and the current run time are also displayed on the progress bar.

If for any reason you want to stop the test before it completes, select the **STOP TEST** button on the progress bar.

View real-time test results

When you successfully start a test, CoreSIM immediately displays the **STATISTICS** page, where you can view real time statistics.

Test results

The Browse Results section can be accessed in order to retrieve the test results, packet captures and logs, and export them.

To access the Test Results window, select **Browse Results**.

The Test Results window displays details about each test that was previously ran regarding the name and the test configuration, the status and the start time of the test, along with the test duration and the user that initiated the test.

On this section, the following actions are possible:

- Search for the results of a specific test.
- Load the test configuration in a new session, by selecting the **Load** button.
- Download the test results and packet captures, by selecting **Download**:
  - **CSV** - download the test results as a CSV.
  - **Report** - download the test results as a pdf file.
  - **Captures** - download an archive containing both MW and Agent logs.

    NOTE To download the captures you need to enable traffic capture on the test agents.
- **Config**
- **Test Diagnostics**
- Delete the test results, by selecting the **Delete** button.

CHAPTER 5

Assign and manage agents

A CoreSIM *agent* is the virtual machine or docker container on which the application traffic and control plane procedure simulation is performed. Assigning and managing traffic agents is one of the essential and required aspects of creating and executing simulation tests.

Chapter contents:

About traffic agents

CoreSIM tests require the use of *agents* to generate traffic for both UP (user plane) and CP (control plane). The containers and virtual machines that act as agents can be horizontally scaled to support a very high level of application traffic throughput and control plane procedure rates.

Tags provide a flexible and simple method of assigning metadata to agents. There are two types of tags:

Type	Color	Description
System tag	Blue	These tags are defined by CoreSIM. You can hover over the system tag icon to display the tag information.
User-defined tags	Gray	You can add custom tags from the Agent Management window. These are tags that you create; they are free-form, which gives you the ability to categorize or mark agents in any way that supports your test requirements. Refer to Agent management on the next page for instructions.

Assigning agents to nodes

You cannot run a CoreSIM test until you have assigned agents to all of the test nodes. To assign an agent to a node:

1. In the topology window, select the traffic agent icon on the top right corner of the node.
   The icon that represents the agent can be any of the following:

	—	No agents are assigned to the node.
	—	One or more agents are assigned.

CoreSIM opens the **Agents Assignment** window, which presents a list of agents. If the list has no filters set, then all agents are listed.

2. Assign specific agents or all available agents to the node:
   - To assign specific agents (one or more) to the node, select the check box next to the agent's IP address.
   - To assign all available agents to the node, select the **Select Agent** check box (located in the table header).

   Note that you can display the agent ID by hovering over the IP address.

Agent Assignments window

The following table describes the content of each column displayed on the **Agents Assignment** window.

Column	Description
Owner	Hover over the **Owner** icon to see the current agent ownership and status, which will be one of the following: • The agent is owned by the user whose email address is listed. In this case, the agent is not available for assignment. • The agent is offline. In this case, the agent is not available for assignment. • The agent is available for assignment.
Select Agent	Use the check box next to the IP address to select that agent for assignment. You can also select all available agents by selecting the **Select Agent** check box (in the table header).
Tags	This column displays the tags associated with each agent. Each tag indicates the number of agents to which it is associated. Refer to About traffic agents for more information about tags.
Connections	The table displays the available interface and the MAC address for each wireless connection. The interface can be selected from the drop-down list. NOTE For the CoreSIM nodes that have multiple interfaces, for each interface, you can change the interface type using the drill-down option.

Agent management

You manage your CoreSIM agents from the **Agent Management** window, which is accessed from the Setting menu (⚙). This window displays detailed information for all or selected agents and provides all of the functionality needed to manage them.

- Agent Management window on the facing page
- Selecting agents on the facing page
- Search, select, and filter agent data on page 30

- Adding and removing tags on the next page
- Agent management actions on the next page

Agent Management window

The Agent Management window displays a table that shows the current status of your agents.

Column	Description
☐	The first column in the table contains a check box that you use when selecting individual agents for various operations. Note that you can use the *Agent IP* check box in the table header to select all agents.
Agent IP	Displays the IP address of the agent. To see the Agent ID, hover over the agent's IP IP address.
Owner	Indicates whether the agent is assigned, available, or offline.
Status	Indicates the current status of the agent.
Tags	This column displays the tags associated to each agent. There are two types of tags: • system tags (blue): these are defined by CoreSIM. You can hover over a system tag to view more details. • user tags (gray): these are defined by CoreSIM users. Refer to Adding and removing tags for more details. Each tag indicates the number of agents to which it was associated.
Test NICs	Displays the NICs for each agent and, on hover, it displays the MAC address.
Hostname	Displays the hostname.
Memory	Displays the amount of RAM memory allocated to the agent.
CPU info	Displays additional information about the CPU model, the frequency and the number of cores.
Last Run Data	Displays the nodes that were last run on the agent.
Last Run Timestamp	Displays the date and time of the last agent run.

Selecting agents

You can perform management actions on individually-selected agents (one or more) or on all agents:

- To select a specific agent, select the check-box associated with the agent's IP address. (When hovering over the IP address of an agent, the agent ID is displayed.)

- To select all agents currently listed in the table, select the *Agent IP* check box in the table header.

Search, select, and filter agent data

You can selectively locate and display agent data using the following functions:

Function	Description
Filter agents	Use this option to filter the available agents by tag names: 1. Select **Filter agents**. 2. Enter the name of the tag or select it from the available list. 3. Select **Close**. The content on the Agent Management window is updated with the filtering results. To remove the filtering results, select **Clear**.
Include offline agents	Set this option to either include or exclude offline agents from the list.
Search	Search by IP, Owner, hostname, or status.

Adding and removing tags

You can create and use tags to categorize agents in any way that suits your needs.

Add a custom tag:

1. Select one or more agents in the table.
2. Select **Tag as**.
3. Type the name of the tag in the **Search or add tag** field, then select **Add**.
4. Select **Update** to add the tag name.

Remove a tag:

1. Select one or more agents in the table.
2. Select **Tag as**.
3. Select **Remove tags**.
4. Use the search functionality to identify the tag name or select it from the list.
5. Select **Update** to remove the tag name.

Agent management actions

You can perform the following actions on the agents that are currently selected (selected via the selection check box in the first column of the table):

Function	Description
Clear ownership	Releases your ownership of the selected agents.

Function	Description
Hard reboot	Performs a hard reboot on the agent (the agent machine is power-cycled).
Soft reboot	Performs a soft reboot on the agent (the agent system restarts without a power cycle).
Delete	Removes the selected agent(s) from the Agent Management list.

Network Management

All of the agents selected in the **Agents Assignment** window are displayed on the **Network Management** window.

Table description

The following table describes the content of each column displayed on the **Network Management** window.

Column	Description
Order	This option allows you to select the agent distribution order when running with multiple agents on the same node (when you are not using a switch to connect all agents).
Agent	Displays the agent's IP address. When hovering over the IP address of the agent, the agent ID is displayed.
Tags	This column displays the tags associated to each agent.
Impairment profile	Allows you the select an impairment profile from the drop-down list.
Agent Interface	Displays the agent's interface Name and MAC address.
Network Stack	This option allows you to select the network stack used to run the test: • **Linux Stack** • **IxStack over Raw Sockets** • **IxStack over DPDK** An agent compatible with IxStack is marked using an `IxStack: On/Off` system tag.
SRIoV	This option is disabled when *Network Stack* is set to Linux Stack. For IxStack over Raw Sockets or IxStack over DPDK, this option is enabled based on the selection (it can be enabled or disabled based on your agent's configuration).
Traffic Capture	This option allows you to enable or disable traffic capture on all or specific interfaces, based on your test configuration. This option can be used while a test is running.

Column	Description
	If the test was started with the capture disabled, you can enable the capture during the test. After enabling the capture, you must select **Apply** for the changes to take effect. The capture can be downloaded using the Download Capture button. To stop the capture, you must disable the traffic capture (using the toggle button) and then select **Apply**. Also, if the test was started with the traffic capture enabled, the capture can be stopped while the test is running.
Download Capture	Select to download the traffic capture.
Entity	Displays the nodes on which the agent has been assigned. When hovering over the node, it the displays the node's interface names.

IMPORTANT To run tests using IxStack over Raw Sockets or IxStack over DPDK you need at least two agents.

Filtering agents

You can set filters (using tag names) to determine which agents are displayed in the table:

1. Select **Filter agents**.
2. Enter the name of the tag or select it from the available list.
3. Select **Close**.

The content on the **Network Management** window is updated to show only agents that are tagged with one of the tags selected in your filter setting.

Distribution Mode feature

Distribution Modes for Nodes

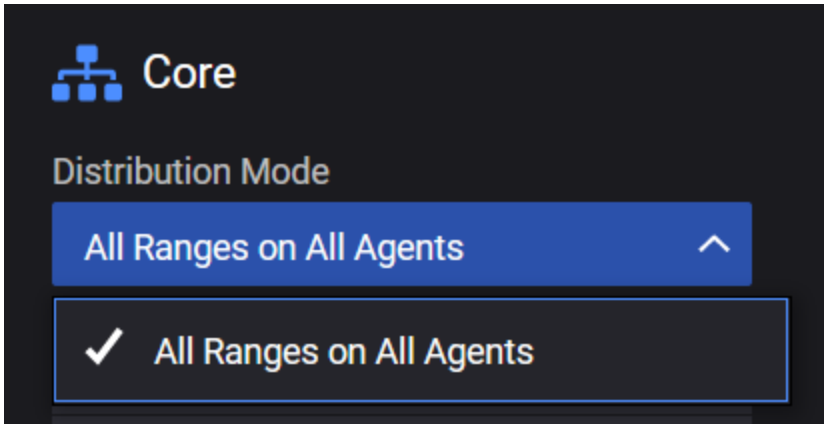
For convenience, you are now able to see or select (if available), the way node ranges are distributed on agents. The **Distribution Mode** parameter is available even if no agents are assigned, but its value can change when assigning multiple agents and/or when adding multiple ranges.

When opening a node for configuration, the **Distribution Mode** parameter is displayed and options such as the following can be selected or observed:

Distribution Mode	Description/Example
All Ranges on All Agents	All ranges will be distributed on all agents and the IP addresses will be incremented. For example, in a test with 2 agents and 3 ranges: • range1 on agent1 and agent2 • range2 on agent1 and agent2 • range3 on agent1 and agent2

Distribution Mode	Description/Example
Round Robin Ranges on Agents	Each range will be configured on one agent. One agent can have multiple ranges configured. For example, in a test with 2 agents and 3 ranges: • range1 on agent1 • range2 on agent2 • range3 on agent1.
One Range on All Agents	One range will be configured on all assigned agents. For example, in a test with 2 agents and 1 range: • range 1 on agent 1 and 2.
All Ranges on One Agent	This mode allows only one agent in the assignment.
One Range on One Agent	In this mode each range requires a different agent.

For more details, refer to each node for the available distribution mode.

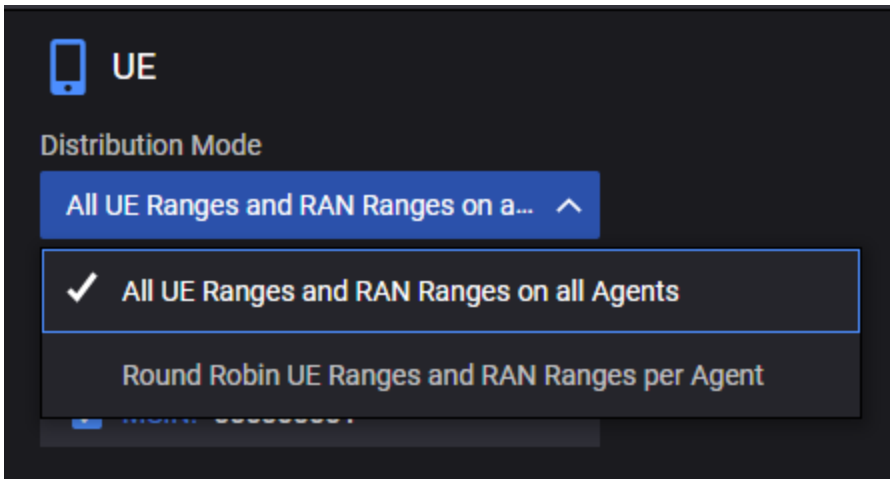


UE-RAN Distribution Modes (configurable on UE box)

Similarly to node distribution, if multiple agents are assigned to RAN, the user can change the distribution mode from the UE box. Based on how many agents were assigned and how many UE ranges are available, the configuration page will display the **Distribution Mode** parameter and the following options can be selected from the drop-down:

Distribution Mode	Description/Example
All UE Ranges and RAN Ranges on All Agents	For example, for a test with 2 agents and 2 UE ranges and 2 RAN ranges: • UE range1 and UE range2 and their parent ranges as well as all RAN ranges part of Mobility Path and Secondary RAN ranges will be distributed to both agent1 and agent2

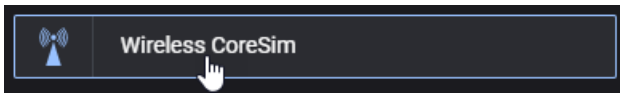
Distribution Mode	Description/Example
Round Robin UE Ranges and RAN Ranges per Agent	For example, if UE range1 is distributed to agent1, parent RAN range as well as all RAN ranges part of the Mobility Path (visited gNB/eNB ranges), and the Secondary RAN ranges will also be distributed on agent1.



CHAPTER 6

CoreSim tests: configuration settings

This section provides descriptions of the configuration settings that are specific to the **Wireless CoreSim** test type:



A 5G core simulator, CoreSim makes Radio Access Network testing easier by eliminating Core Network unwanted dependencies and allowing an easily controllable, repeatable test environment setup. RAN test efforts can thus be concentrated on the Device Under Test, speeding up 3GPP standards implementations.

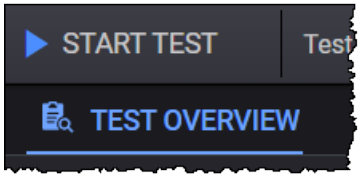
Topics:

Global Settings

The Global Settings include parameters that either have overall applicability to the test or can be used (by reference) in the configurations of other nodes in the test topology.

To access the Global Settings:

1. Select the **Test Overview** tab:



2. Click **Expand** if the Test Overview section is collapsed.
3. Click the Global Settings' **Edit** button:

CoreSIM opens the **Global Settings** panel from which you can:

- Select the technical specification version from the drop-down list:

- Access and configure the following settings:

Global Settings panel

When you open the Global Settings for editing (from the **Test Overview** section), CoreSIM opens the **Global Settings** panel. That panel provides a set of global configuration settings and links to more detailed settings.

Configuration settings

The following table describes the settings that are available on the Global Settings panel.

Setting	Description
Links to detailed settings:	
Node Start/Stop Rates	For more details, refer to Node Start/Stop Rates.
DNS Settings	For more details, refer to DNS Settings.
Advanced Settings	For more details, refer to Advanced Settings.
DNNs	For more details, refer to DNNs.
Impairment	For more details, refer to Impairment.
QoS Flows	For more details, refer to QoS Flows.
CA Certificates	For more details, refer to CA Certificates.
Override Milenage Constants	For more details, refer to Milenage.
Custom Parameters	For more details, refer to Custom Parameters.
External Stats Server	For more details, refer to External Stats Server
Global Playlists	For more details, refer to Global Playlists.

Node Start/Stop Rates

The following table describes the settings that are available on the Node Start/Stop Rates. These include settings with which you control the Stream Control Transmission Protocol (SCTP) connection rates between NG-RAN and AMF. (SCTP—which operates in the transport layer of the NG-C signaling bearer—provides for the reliable transport of signaling messages.)

Setting	Description
Node Start	
Rate	Set the desired start rate for SCTP connections between the NG-RAN and the AMF (connections per second). Measured in procedures per second if Distributed over (s) is not modified.

Setting	Description
Distributed Over (s)	Used to configure procedure rate less than 1/sec. Example: if configured as 3, test will execute one procedure every 3 seconds.
Node Stop	
Rate	Set the desired start rate for SCTP connections between the NG-RAN and the AMF (connections per second). Measured in procedures per second if Distributed over (s) is not modified.
Distributed Over (s)	Used to configure procedure rate less than 1/sec. Example: if configured as 3, test will execute one procedure every 3 seconds.

DNS Settings

The following table describes the settings required for the DNS Resolver configuration.

The DNS information is used only for the user plane path, that is, the configured DNS Server is used to resolve the destination configured for the user plane objectives in case the destination is a host name and not an IP.

Setting	Description
DNS Settings:	
Cache Timeout (ms)	The amount of time (in miliseconds) the local DNS stores the address information.
DNS Name Servers:	
	Select the **Add DNS Name Server** button to add a new DNS server to your test configuration. Set the IP address of the DNS server.
	Select the **Delete** button to remove the DNS server from your test configuration.

Advanced Settings

The following table describes the settings required to enable user plane and control plane advanced statistics.

Setting	Description
Overwrite Capture Size for IxStack	Enable this option to overwrite the capture size for IxStack.
Custom Capture Size for IxStack	Set the custom value of the capture size for IxStack.

Setting	Description
Enable Capture Circular Buffer for IxStack	Select this option to enable circular buffer capture for IxStack.
Enable Capture On Loopback Interface	Select this option to enable packet capture on the loopback interface.
Power Saver on Agents	Select this option to disable the IxStack/DPDK at the end of each test and on all agents.
Enable Per UE Stats	Select this option to enable per UE statistics.
Enable per PDU Session Stats	Select this option to enable per PDU Session statistics.
Enable Per QoS Flow Stats	Select this option to enable per QoS Flow statistics.
Enable Control Plane Advanced Stats	Select this option to enable control plane latency statistics.
Enable User Plane Advanced Stats	Select an option from the drill-down list for the user plane advanced statistics: • **None** - no advanced statistics enabled. • **One Way Delay** - the time spent by the packet on the network from the moment it is sent until it is received. • **Delay Variation Jitter** - the per polling interval average delay variation jitter value calculated for all packets.
Automated Polling Interval	This option is enabled by default. The statistics are retrieved based on a predefined polling interval.
Custom Polling Interval (sec)	This option becomes available only when *Automated Polling Interval* option is disabled. It allows you to create a custom polling interval.
Log Level	Select one of the options: • **Info** - Designates informational messages that highlight the progress of the application at coarse-grained level.

Setting	Description
	• **Debug** - Designates fine-grained informational events that are most useful to debug the application.
Log Tags	Select one or more tags from the drop-down list. Log Tags are used to collect specific information in the logs; they work with Debug and with Info log levels. Rather than allowing the logs to collect information about everything, you can use Log Tags to collect specific information—such as SCTP or HTTP messages—during the test. This limits the amount of information that is collected, making it easier for you to extract the data that you need.
Traffic Settings	*The settings are described here.*
Response Cache Settings	*The settings are described here.*
Ignore Offline Agents At Runtime	**When this option is enabled, if an agent loses connection to the Middleware during a test, the test will not stop but continue without that agent.**

Traffic Settings

The following table describes the settings on the Traffic Settings pane.

Setting	Description
GTPU Source Port:	
Start	Indicates the source port for the GTPU tunnel. By default, the registered UDP port for GTPU is 2152.
Count	Set the count value.
Reserved cores for RTP Tx:	
Enable RTP	Select this option to enable RTP.
Cores	The number of cores reserved for RTP transmission.
Traffic Control	
Traffic Control Port	Set the traffic control port. By default, it is set to 44556.
Enable Jumbo Frame	Enable this option if your test traffic requires the use of jumbo frames (Ethernet frames with more than 1500 bytes of payload).

Setting	Description
	When you enable this option, you can then configure any of the MTU parameters in the test to any valid jumbo frame size (up to 9,000 bytes).
Enable IxStack L4 Port Randomization	Select this option to enable IxStack L4 Port Randomization.
Enable UDP Port Recycling	Select this option to enable IxStack UDP Port Recycling.
Enable TCP Port Recycling	Select this option to enable IxStack TCP Port Recycling.
Enable ICMP Responses	Select this option to enable it. This will permit requests and responses to ICMP packets on subscribers addresses (it will have a significant memory impact on server nodes - AMF, UPF).

Response Cache Settings

During performance testing scenarios, it is possible that not all responses are received by the client. The client initiates messages retries when it is not receiving responses. When a message retry reaches the server, the response is sent again faster and no additional load is put on the server, because the response message is already stored. There is no need to construct the response message again.

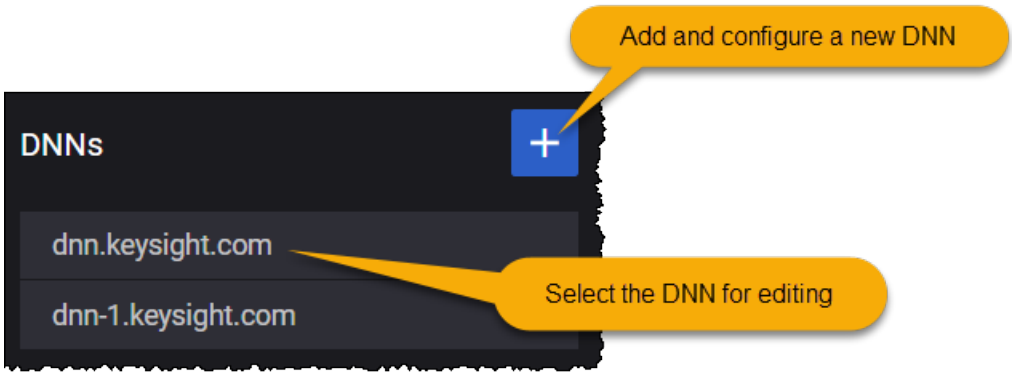
A rotation interval higher than the retry timer on the client node must be configured in order to still have the responses stored when a message retry arrives on the server node.

The following table describes the settings on the Response Cache pane.

Setting	Description
Enable response cache for GTPv2 and PFCP protocols	When this option is enabled, the server node will store the GTPv2 and PFCP Response messages for a period of time equal to Rotation Interval (in seconds).
Rotation interval	The period of time (in seconds) for which the server node will store the GTPv2 and PFCP Response messages. After this interval expires, the stored messages are discarded.

DNNs panel

To access the DNN configuration settings, select **DNNS** from the the **Global Settings** panel. CoreSIM opens the **DNNs** panel from which you can add and edit DNN definitions:



The properties for a DNN are organized into the following groups of configuration settings:

DNN configuration settings

You create and manage Data Network Names (DNNs) for your test network in the **Global Settings** section of the **Test Overview**. The **DNN** panel contains the configuration settings for an individual DNN. In this panel, you can:

- Click the **Delete DNN** button to delete the DNN configuration.
- Edit the DNN settings.

The following table describes the **DNN** settings.

Setting	Description
DNN:	
DNN	Enter the DNN value for this DNN definition. For example: `dnn.keysight.com`. A DNN (as is the case with an EPS APN) is composed of two parts: • A mandatory Network Identifier that defines the external network to which the UPF is connected. • An optional Operator Identifier that defines the PLMN backbone in which the UPF is located. A 5GS Data Network Name (DNN) is equivalent to an EPS APN. It is a reference to a data network, and it may be used to select an SMF or UPF for a PDU session and to determine policies applicable to the PDU session.

Setting	Description
	The DNN field supports dynamic values. These values can be obtained with a sequence generator. The sequence can be added anywhere in the DNN name (beginning, middle or end). The syntax is `[start_value-end_value,increment]`. NOTE The `start_value` and `end_value` must have the same length. For example, we can configure `dnn[008-999,1]` and obtain `dnn008,dnn009,…,dnn998,dnn999`. Syntaxes `dnn[8-999,1]` or `[008-1000,1]` are not valid as the start and end value lengths are different. The start value is mandatory. Omitting certain parameters results in behaviors as exemplified below: • `dnn[4-9,]` an implicit increment of 1 is used • `dnn[4-9]` as above • `dnn[4-,1]` is used as `dnn[4-9,1]`, 9 being the maximum value with the configured length, length of 1 in this case • `dnn[4-,]` as above • `dnn[4-]` as above • `dnn[4]` as above UEs will use the DNN values from the pool in a round robin manner. IMPORTANT If multiple sequence generators are configured and their pools overlap (for example: `dnn[000-600,1].keysight.com dnn[500-999,1].keysight.com`), for UEs that use the second DNN pool, the DNN generated values might not be allocated starting with the `start_value` (they might start with an intermediate value in the second pool).
PDU Type	Select the desired PDU type: IPv4, IPv6 or IPv4v6.
Allowed Session Types	Select the allowed session types from the drop-down list: IPv4 IPv6, IPv4, IPv6, UNSTRUCTURED, ETHERNET, or all.
Default Session Type	Select the default session type from the drop-down list: IPv4 IPv6, IPv4, IPv6, UNSTRUCTURED, or ETHERNET.
QoS Flows IDs	Select the QoS Flows ID(s) from the drop-down list. Each DNN should contain at least the default flow (the default flow is unique per each DNN). In addition, zero or more dedicated flows can be associated to each DNN. For more details about QoS Flow configuration, refer to QoS Flow configuration settings.

Setting	Description
Allowed SSC Modes	Session and Service Continuity (SSC) Mode for this DNN: • SSC Mode 1: The network preserves the connectivity service provided to the UE. The PDU Session IP address (IPv4, IPv6, IPv4v6) is preserved. • SSC Mode 2: The network may release the connectivity service delivered to the UE and release the corresponding PDU Sessions. The release of the PDU induces the release of the IP addresses (IPv4, IPv6, IPv4v6) that had been allocated to the UE. • SSC Mode 3: Changes to the user plane can be visible to the UE, while the network ensures that the UE suffers no loss of connectivity. A connection through a new PDU Session Anchor point is established before the previous connection is terminated in order to allow for better service continuity. The IP address (IPv4, IPv6, IPv4/v6) is not preserved in this mode when the PDU Session Anchor changes.
Default SSC Mode	Select the desired default SSC mode for this DNN. The SSC mode associated with a PDU Session does not change during the lifetime of a PDU Session.
Allowed Services	Select the allowed services from the drop-down list: Service 1, Service 2, Service 3, or all. In the 5G System, the *allowed services* may comprise any number of service identifiers allowed for the subscriber in the PDU Session. The PCF maps those service identifiers into PCC rules according to local configuration and operator policies.
Subscription Categories	Select the desired Subscription Category for this range of UEs. Subscriber Category is an information type structured as a list of category identifiers associated with a subscriber. It may comprise any number of identifiers associated with the subscriber (such as platinum, gold, silver, bronze).
IPv4 Index	The IPv4 Index value for the PDU sessions accessing this DNN. This value identifies the IP address allocation method for IPv4 addresses.
IPv6 Index	The IPv6 Index value for the PDU sessions accessing this DNN. This value identifies the IP address allocation method for IPv6 addresses.
EPS Interworking	Enable this option if the UE subscription data indicates support for interworking with EPS for this DNN.
ADC Support	Enable this option if the DNN will support PDU sessions in which application detection and control (ADC) is enabled for subscribers.
Subscriber Spending Limits	Enable this option if the DNN will support PDU session policies that are based on subscriber spending limits.
Offline	Enable this option if the DNN will support the offline charging method for PDUs sessions.

Setting	Description
Online	Enable this option if the DNN will support the online charging method for PDUs sessions.
Is Emergency DNN	When this option is enabled, if an UE range has mapped this type of DNN, it will perform an emergency PDU Session.
MPS Priority	Enable this option if the DNN will support subscription to MPS priority service. The priority applies to all traffic on the PDU Session.
Dual Registration Mode	When enabled, it transfers this session to the other RAT in dual registration mode. If the session does not exist, it will be created in the other RAT.
MPS Priority Level	Specify the Multimedia Priority Services (MPS) priority level. This is the relative priority level for MPS.
IMS Signaling Priority	Specify the IP Multimedia Subsystem (IMS) signaling priority. This value indicates subscription to IMS signaling priority service. The priority applies only to IMS signaling traffic.
Access Network Instance	Set the access network instance. It represents the value to be sent in the Network Instance IE when the source interface is set to Access.
Core Network Instance	Set the core network instance. It represents the value to be sent in the Network Instance IE when the source interface is set to Core or SGi-LAN/N6-LAN.
Session Rule Name	Set the session rule name.
GBR	*Select this option to open the GBR panel.*
Guaranteed Bit Rate Uplink	Specify the guaranteed bit rate for the uplink traffic.
Guaranteed Bit Rate Downlink	Specify the guaranteed bit rate for the downlink traffic.
Session AMBR	*Select this option to open a new panel that contains the Session AMBR settings. These settings are described in Session AMBR configuration settings.*
ePCO	*Select this option to open the extended protocol configuration options panel. These settings are described in ePCO configuration settings.*
Traffic Control Settings	*Select this option to open the traffic control settings panel. These settings are described in Traffic Control Settings configuration.*

If, for an UE range, Paging is configured and globally per DNN Traffic Control is configured, for that UE range traffic control messages will be sent before entering Idle (as per the Paging objective) but traffic control messages will be sent per DNN as configured in the **Global Settings** > **DNN** > **Remote IPv4/IPv6** and traffic will be resumed per DNN as configured in the **Global Settings** > **DNN** > **Suspend Traffic Interval (s)** field.

Session AMBR configuration settings

Each CoreSIM DNN configuration has its own unique configuration settings, which include:

- The main DNN settings, described in DNN configuration settings.
- The DNN's Session AMBR settings, described below.

About Session AMBR ...

5G QoS enforcement and rate limitation policies utilizes Aggregate Maximum Bit Rate (AMBR) values to limit the amount of traffic flowing through the 5GS for a given UE. Every PDU session specifies a per-session AMBR value that limits the aggregate bit rate that can be expected across all non-GBR QoS flows. The Session-AMBR is measured over an AMBR averaging window, which is a standardized value. Downlink Session-AMBR is enforced by the UPF, and uplink Session-AMBR is enforced by the UPF and the UE.

The following tables describes the Session AMBR configuration settings.

Parameter	Description
Session AMBR Uplink	Specify the DNN session AMBR (Aggregate Maximum Bit Rate) uplink rate.
Session AMBR Uplink unit	The unit in which the rate is expressed. The options range from bps to Tbps.
Session AMBR Downlink	Specify the DNN session AMBR (Aggregate Maximum Bit Rate) downlink rate.
Session AMBR Downlink unit	The unit in which the rate is expressed. The options range from bps to Tbps.

ePCO configuration settings

Configuration options for ePCO IE (extended Protocol Configuration Options IE) from PDU Session Establishment Request message and PDU Session Establishment Accept message.

Parameter	Description
Request DNS Server IP Address	Add DNS Server IPv4 Address Request or DNS Server IPv6 Address Request in the Extended Protocol Configuration Options IE included in PDU Session Establishment Request message. If required, enable this option.
Request P-CSCF IP	Add P-CSCF IPv4 Address Request or P-CSCF IPv6 Address Request in the Extended Protocol Configuration Options IE included in PDU Session

Parameter	Description
address	Establishment Request message. If required, enable this option.
Request IPv4 Link MTU	Add IPv4 Link MTU Request in the Extended Protocol Configuration Options IE included in PDU Session Establishment Request message. If required, enable this option.
DNS Server IPv4 Address	If ePCO IE was received in PDU Session Establishment Request on CoreSim and DNS Server IPv4 Address Request was set, send this DNS IPv4 address in the ePCO IE in PDU Session Establishment Accept message if this field is not empty. NOTE If this field is empty and a DNS Name Server is configured in Global Settings > DNS Settings > DNS Name Servers, then this field will be populated with the first IPv4 address of the DNS Name Server(s) defined in Global Settings. NOTE If the DNS Name Server IPv4 address is updated in Global Settings > DNS Settings > DNS Name Servers while there is already a value set for DNS Server IPv4 Address, no update will be done on DNS Server IPv4 Address. If the new IPv4 DNS address is needed, the update in ePCO settings needs to be done manually.
DNS Server IPv6 Address	If ePCO IE was received in PDU Session Establishment Request on CoreSim and DNS Server IPv6 Address Request was set, send this DNS IPv6 address in the ePCO IE in PDU Session Establishment Accept message if this field is not empty. NOTE If this field is empty and a DNS Name Server is configured in Global Settings > DNS Settings > DNS Name Servers, then this field will be populated with the first IPv6 address of the DNS Name Server(s) defined in Global Settings. NOTE If the DNS Name Server IPv6 address is updated in Global Settings > DNS Settings > DNS Name Servers while there is already a value set in ePCO for DNS Server IPv6 Address, no update will be done on ePCO DNS Server IPv6 Address. If the new IPv6 DNS address is needed, the update in ePCO settings needs to be done manually.
P-CSCF IPv4 address	If ePCO IE was received in PDU Session Establishment Request on CoreSim and P-CSCF IPv4 Address Request was set, send this P-CSCF IPv4 address in the ePCO IE in PDU Session Establishment Accept message if this field is not empty. NOTE If this field is empty and the CSCF node is enabled and has an IPv4 address, then this field is automatically updated to the CSCF IPv4 address. NOTE If the IPv4 address of the IMS CSCF node is manually changed while there is already a value set for ePCO P-CSCF IPv4 address, this will not be automatically updated on ePCO P-CSCF IPv4 address. If the new CSCF address is needed, the update in ePCO settings needs to be done manually.

Parameter	Description
P-CSCF IPv6 address	If ePCO IE was received in PDU Session Establishment Request on CoreSim and P-CSCF IPv6 Address Request was set, send this P-CSCF IPv6 address in the ePCO IE in PDU Session Establishment Accept message if this field is not empty. NOTE If this field is empty and the CSCF node is enabled and has an IPv6 address, then this field is automatically updated to the CSCF IPv6 address. NOTE If the IPv6 address of the IMS CSCF node is manually changed while there is already a value set for ePCO P-CSCF IPv6 address, this will not be automatically updated on ePCO P-CSCF IPv6 address. If the new CSCF address is needed, the update in ePCO settings needs to be done manually.
Link MTU value	If ePCO IE was received in PDU Session Establishment Request on CoreSim and IPv4 Link MTU Request was set, send this IPv4 Link MTU value in the ePCO IE in PDU Session Establishment Accept message.

Known limitations:

- ePCO is only supported on NG-RAN and CoreSim 5G.
- The options are only used for signaling, in order to avoid errors. There is no support for sending/receiving traffic according to this option.

Traffic Control Settings configuration

The Traffic Control Settings option offers the ability to use Traffic Control on a per DNN basis.

When enabled, after the Delay Between PDU Session Establishment and Suspend Traffic timer expires, Traffic Control specific messages will be sent from the UE IP address assigned for that specific PDU Session to the configured Remote IPv4 or Remote IPv6 peer address in order to stop downlink traffic. Downlink traffic will be resumed after the configured Suspend Traffic Interval expires.

The following tables describes the Traffic Control Settings parameters.

Parameter	Description
Traffic Control Settings	By default, this option is disabled. Select the check box to enable it.
Suspend Traffic Interval(s)	Set the value (in seconds) for this parameter.
Delay Between PDU Session Establishment and Suspend Traffic	Set the value (in seconds) for this parameter.
Remote IPv4	Select: •  - Select to add the remote IPv4

Parameter	Description
	address. •  - Select to remove the remote IPv4 address.
Remote IPv6	Select: •  - Select to add the remote IPv6 address. •  - Select to remove the remote IPv6 address.

Impairment

The following table describes the settings required to define the impairment profile.

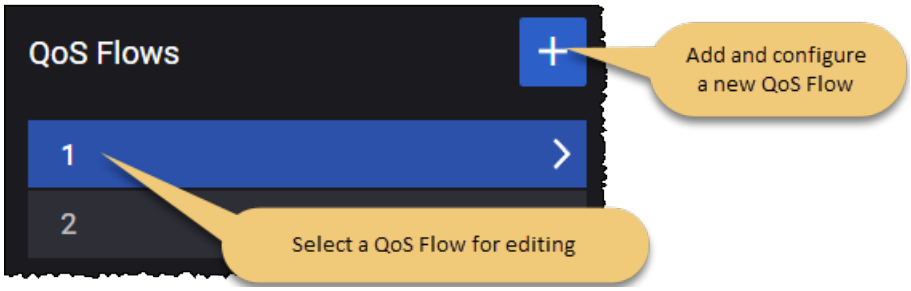
Setting	Description
Impairment Profiles:	
	Select the **Add impairment profile** button to add a new profile to your test configuration.
Impairment Profile:	
	Select the **Delete impairment profile** button to remove the profile from your test configuration.
Name	Each impairment profile is uniquely identified by a name. You can accept the value provided by CoreSIM or overwrite it with your own value.
Action Type	Select an option from the drop-down list. The available option is: **Custom script**.
Script file	This parameter is available only when **Action Type** is set to **Custom script**. It allows you to add a custom script, using the **Upload** button. To remove the script, select the **Clear** button.

QoS Flows panel

The QoS model is based on QoS Flows. A QoS Flow is the finest level of granularity for QoS forwarding treatment in the system. All traffic mapped to the same QoS Flow receives the same forwarding treatment.

Accessing the configuration settings:

To access the QoS Flows configuration settings, select **QoS Flows** from the the **Global Settings** panel. CoreSIM opens the **QoS Flows** panel from which you can add and edit QoS Flow definitions:



q

These QoS Flow configurations become immediately available for selection by other nodes in the test configuration. The properties for a QoS Flow are organized into the following groups of configuration settings:

QoS Flow configuration settings

You create and manage QoS Flows for your test network in the **Global Settings** section of the **Test Overview**. The **QoS Flow** panel contains the configuration settings for an individual QoS Flow. In this panel, you can:

- Click the **Delete QoS Flow** button to delete the QoS Flow configuration.
- Edit the QoS Flow settings.

The **QoS Flow** settings are described in the table that follows.

Setting	Description
QoS Flow:	
Is Default	Enable this option if this QoS Flow is associated with the default QoS rule. In the 5G System, a default QoS rule is required for each UE session, and this rule will be associated with a QoS Flow.

Setting	Description
Type	IMPORTANT This parameter is available only if the Is Default option is not selected. The following options are available: • **Data** - PCF/PCRF is capable by itself to generate Packet filters for this flow/bearer. This type of flow/bearer is used for non-Voice or non-Video traffic. • **Audio** - PCF/PCRF needs information related to this flow/bearer from CSCF. • **Video** - PCF/PCRF needs information related to this flow/bearer from CSCF.
Network Initiated Flow	IMPORTANT This parameter is available only if the Is Default option is not selected. Select the associated check box to enable this option. The following fields are displayed: • *Delay After Initial Registration (s)* - set the value for this parameter. • *Interval between Create and Delete (s)* - set the value for this parameter. • *Iterations* - set the value for this parameter.
QFI	Enter a QoS Flow Identifier (QFI) for this QoS Flow. This identifier will be used to uniquely identify a QoS Flow in the 5G System. All User Plane traffic with the same QFI within a PDU Session receives the same traffic forwarding treatment. The QFI is carried in an encapsulation header on the N3 and N9 reference points.
5QI	Specify the 5QI value (decimal number). 5G QoS Identifier (5QI) is a scalar that is used as a reference to 5G QoS characteristics defined in TS 23.501, clause 5.7.4. These are access node-specific parameters that control QoS forwarding treatment for the QoS Flow (such as scheduling weights, admission thresholds, queue management thresholds, link layer protocol configuration, among others). Standardized 5QI values have a one-to-one mapping to a standardized combination of 5G QoS characteristics as specified in TS 23.501, table 5.7.4-1.
5QI Priority Level	Specify the 5QI Priority Level for this QoS Profile. 5QI Priority Level is a Policy Control parameter that accepts values from 1 through 127 (where 1 is the highest priority). It indicates a priority in scheduling resources among QoS Flows.
Resource Type	Select the type of resource that the QoS Flow requires: Guaranteed Bit Rate (GBR), Non-Guaranteed Bit Rate, or Delay Critical GBR. The Resource Type determines whether or not dedicated network resources related to a QoS Flow-level Guaranteed Flow Bit Rate (GFBR) value are permanently allocated to the flow.
Averaging Window	Specify the *Averaging window* value for this 5GI. Each GBR QoS Flow is associated with an *Averaging window*. It represents the time duration (specified in milliseconds) over which the GFBR and MFBR are calculated.

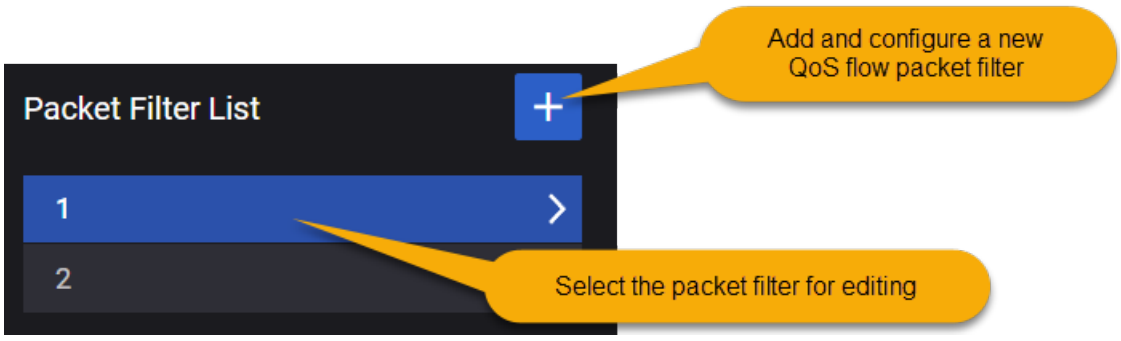
Setting	Description
QoS Rule Precedence	Specify the desired QoS Rule Precedence value for this QFI. The QoS rule precedence value (and the PDR precedence value) determine the order in which a QoS rule or a PDR, respectively, will be evaluated. The evaluation of the QoS rules or PDRs is performed in increasing order of their precedence value.
Packet Delay Budget	The Packet Delay Budget (PDB) defines an upper bound for the time that a packet may be delayed between the UE and the PCEF. For a given QCI, the value of the PDB is the same in uplink and downlink. The purpose of the PDB is to support the configuration of scheduling and link layer functions.
Packet Error Rate	The Packet Error Rate (PER) defines the upper bound for the rate of PDUs (IP packets) that have been processed by the sender of a link layer protocol but are not successfully delivered by the corresponding receiver to the upper layer. It defines an upper bound for the rate of non-congestion related packet losses.
Max Data Burst	The Maximum Data Burst Volume is the amount of data which the RAN is expected to deliver within the part of the Packet Delay Budget allocated to the link between the UE and the radio base station.
QoS Reference	This option is used on the PCF node to identify a particular PCC Rule when QoS reference information is received from the NEF on N33 interface. NOTE QoS Reference is supported only when Technical Spec Version is R16 or higher.
Notification Control	Enable or disable the Notification Control parameter. When enabled, it indicates whether notifications are requested from the RAN when the GFBR can no longer be fulfilled for a QoS Flow during the QoS Flow's lifetime.
Segregation	Enable this option if the Segregation indication is to be included in a UE initiated PDU Session Modification procedure. The Segregation indication is included when the UE requests that the network bind the applicable SDF(s) on a distinct and dedicated QoS Flow.
Use Match-all Packet Filter	IMPORTANT This is available if Is Default option is enabled. If this option is not enabled, a new Packet Filter List option appears and custom packet filter can be configured.
EPS Bearer Identifier	The EBI for the bearer associated with this QoS flow.
PCC Rule Name	Set a value for this parameter.
Is Predefined Rule	Select the check box to enable this option.
Application	Set the application identifier value.

Setting	Description
Identifier	
Send QoS Rule Precedence when Application identifier is configured	If needed, enable this option.
Move to Secondary Node	If needed, enable this option. This option is part of the Option 3x and Dual Connectivity NR feature.
Packet Filter List	IMPORTANT This is available if Use Match-all Packet Filter option is not selected. Refer to the following topic for a description of the Packet Filter configuration settings: QoS Flow Packet Filter configuration settings.
Max Packet Loss Rate	Refer to the following topic for a description of the Max Packet Loss Rate configuration settings: QoS Flow Maximum Packet Loss configuration settings.
ARP	Refer to the following topic for a description of the ARP configuration settings: QoS Flow ARP configuration settings.
MBR	Refer to the following topic for a description of the MBR configuration settings: QoS Flow MBR configuration settings.
GBR	Refer to the following topic for a description of the GBR configuration settings: QoS Flow GBR configuration settings.

QoS Flow Packet Filter configuration settings

A Packet Filter Set is used in the definition of QoS rules or packet detection rules (PDRs) to identify one or more packet flows for filtering.

You use the settings in the QoS Flow **Packet Filter List** panel to configure the packet filters associated with the current flow. You access this panel from the QoS Flow panel:



The **Packet Filter** settings are described in the following table.

Setting	Description
	Select the **Delete Packet Filter** button to delete this Packet Filter from the test configuration.
Direction	Select the direction of the data flow on which the filter is applied from the drop-down list: Uplink, Downlink, or Bidirectional.
IPv4 Remote Address and Subnet Mask	The IPv4 address of the remote node plus the subnet mask. If the *Direction* is Uplink, then this IP address is the destination IP. If the *Direction* is Downlink, then this IP address is the source IP.
IPv6 Remote Address and Prefix Length	The IPv6 address for the remote node, expressed in CIDR notation (for example: 2001:db8::/32). If the *Direction* is Uplink, then this IP address is the destination IP. If the *Direction* is Downlink, then this IP address is the source IP.
Protocol Identifier or Next Header	The Protocol ID of either the protocol above IP in the stack or the next header type. Examples: UDP, TCP, ESP.
Single Local Port	The local port number, if the filter specifies a single port.
Single Remote Port	The remote port number, if the filter specifies a single port.
Local Port Range	The low and high limits for local port range.
Remote Port Range	The low and high limits for remote port range.
Security Parameter Index	The Security Parameters Index (SPI) for this packet filter. The SPI is a pointer that references the session key and algorithms used to protect the data being transported.
Type Of Service or Traffic Class	The IPv4 Type of Service (TOS) or the IPv6 traffic class.
Flow Label	The IPv6 Flow Label. This refers to the 20-bit Flow Label field in the IPv6 header.

QoS Flow Max Packet Loss Rate settings

The settings establish the uplink and downlink maximum packet loss that is permitted for the QoS flow.

Setting	Description
5G QoS Flow, Maximum Packet Loss Rate:	
Uplink	The maximum uplink packet loss rate (packets per second) that is permitted for the QoS Flow.
Downlink	The maximum downlink packet loss rate (packets per second) that is permitted for the QoS Flow.

QoS Flow ARP configuration settings

The Allocation and Retention Priority (ARP) settings specify the priority level, preemption capability, and preemption vulnerability of a resource request. It is used to determine whether a new QoS Flow should be accepted or rejected—and to determine whether an existing QoS Flow can be preempted by another QoS Flow—in response to resource limitations.

The **QoS Flow ARP** settings are described in the table that follows.

Setting	Description
5G QoS Flow, ARP:	
ARP Priority Level	Specify the ARP priority level. The ARP Priority Level defines the relative importance of a resource request, where 1 is the highest priority and 15 is the lowest priority. The ARP priority levels 1–8 should be assigned only to resources for services that are authorized to receive prioritized treatment within an operator domain, whereas the ARP priority levels 9–15 may be assigned to resources that are authorized by the home network and thus applicable when a UE is roaming.
Preemption Capability	Enable this option if the packets in this QoS Flow can preempt other flows. When a flow is preemption-capable, it can be allocated resources that were already assigned to another data flow that has a lower ARP priority level.
Preemption Vulnerability	Enable this option if the packets in this QoS Flow are candidates for being preempted by other flows. When a flow is preemption-vulnerable, it can be dropped to free up resources for packets that have a higher ARP priority level.

QoS Flow MBR configuration settings

MBR indicates the maximum bit rates allowed for service data flows that are mapped to this QoS flow. Separate MBR values are configured for uplink and downlink traffic.

The **QoS Flow MBR** settings are described in the table that follows.

Setting	Description
5G QoS Flow, MBR:	
Uplink Bitrate Unit	Select the uplink bitrate unit from the drop-down list.
Uplink Bitrate Value	Set the maximum bit rate value for uplink traffic.
Downlink Bitrate Unit	Select the downlink bitrate unit from the drop-down list.
Downlink Bitrate Value	Set the maximum bit rate value for downlink traffic.

QoS Flow GBR configuration settings

GBR indicates the guaranteed bit rates for service data flows that are mapped to this QoS flow. Separate GBR values are configured for uplink and downlink traffic.

The **QoS Flow GBR** settings are described in the table that follows.

Setting	Description
5G QoS Flow, GBR:	
Uplink Bitrate Unit	Select the uplink bitrate unit from the drop-down list.
Uplink Bitrate Value	Set the guaranteed bit rate value for uplink traffic.
Downlink Bitrate Unit	Select the downlink bitrate unit from the drop-down list.
Downlink Bitrate Value	Set the guaranteed bit rate value for downlink traffic.

CA Certificates

The following table describes the settings required for CA certificates upload.

Setting	Description
CA Certificates:	
	Select the **Add CA Certificate** button to add a new certificate to your test configuration.
CA Certificate:	
	Select the **Delete CA Certificate** button to remove the certificate from your test configuration.

Setting	Description
Name	Each certificate is uniquely identified by a name. You can accept the value provided by CoreSIM or overwrite it with your own value.
Certificate File (.crt)	It allows you to add the certificate from the storage location, using the **Upload** button. To remove the script, select the **Clear** button.

Override Milenage Constants

The following table describes the settings required to override the milenage constants.

Setting	Description
Milenage Constants	
Override Milenage Constants	Enable this option to override the milenage constants. The following fields are available only when this option is enabled.
C1	Set the C1 value (string type). Default value: **00000000000000000000000000000000**.
R1	Set the R1 value (integer type). Default value: **64**.
C2	Set the C2 value (string type). Default value: **00000000000000000000000000000001**.
R2	Set the R1 value (integer type). Default value: **0**.
C3	Set the C3 value (string type). Default value: **00000000000000000000000000000002**.
R3	Set the R3 value (integer type). Default value: **32**.
C4	Set the C4 value (string type). Default value: **00000000000000000000000000000004**.
R4	Set the R4 value (integer type). Default value: **64**.
C5	Set the C5 value (string type). Default value: **00000000000000000000000000000008**.
R5	Set the R5 value (integer type). Default value: **96**.

Custom Parameters

The section allows you to use custom parameters. When **Use Custom Parameters** is enabled, you can use the text section below to add the custom parameters.

External Stats Server

If this option is selected, it will allow you to add an external statistic server.

The following table describes the settings required for the External Stats Server configuration.

Setting	Description
External Stats Server:	
Profile	This parameter allows you to upload or remove a stats server profile. Press **Upload** and load the preferred server profile, or **Clear** to dismiss one that is set.
Server Address	The address of the external stats server.

Setting up a Profile

The External Stats Server feature allows you to forward statistic logs to an external server, thus requiring to upload a profile that defines where the stats are stored and what stats should be transferred.

IMPORTANT This feature is designed to support any type of external entity, but currently it supports only the Apache Kafka Plugin.

The parameters required to create the request to the external entity are configured in the **Profile** JSON file that is uploaded to Keysight Open RAN Simulators, Cloud Edition 5.2. The following structure and parameters describe the standard content of the JSON file:

Section/ Parameter	Definition	Code Sample
Input section	*Lists all the stats/config parameters used in the profile. All the parameters are already available in CoreSIM. the following types are supported:*	

stat	It can be any stat supported in CoreSIM. The stats can be filtered by any other stat from the stat response.	With filter sample:
		`{`
		`  "type": "stat",`
		`  "group": "AgentStatistics",`
		`  "stat": "CPU Percent",`
		`  "name": "cpu_percent1",`
		`  "filterBy": {`
		`  "stat": "agentIP",`
		`  "value":"10.38.158.83"`
		`  }`
		`}`

<table>
<tr><th>Section/
Parameter</th><th>Definition</th><th>Code Sample</th></tr>
<tr><td></td><td></td><td>Without filter sample:
<pre>{
    "type": "stat",
    "group": "Fullcoreoverview_
RegisteredAttachedUE",
    "stat": "UEs Registered",
    "name": "no_of_UE_Registered"
}</pre></td></tr>
<tr><td>config</td><td>It can be any parameter exposed in the UI. The path is the same as the one used by the UI to set/get a parameter (see <a>Parameter sample path on the next page image).</td><td><pre>{
    "type": "config",
    "group":
"config/nodes/ausf/ranges/1/nodeSettings",
    "stat": "mcc",
    "name": "mcc"
}</pre></td></tr>
<tr><td>Mappings section</td><td colspan="2">Mapping will use any input parameter referred by name. Mapping also supports mathematical expressions to combine stats.</td></tr>
<tr><td></td><td>For example, CoreSIM exposes <code>stat1</code> and <code>stat2</code> but the user needs <code>user_stat</code>which comprises <code>(stat1 + stat2) /100</code>. The expression is evaluated and the result sent under <code>user_stat</code> name.</td><td>• one parameter sample:
<pre>{
    "type":"controlplane",
    "from": "no_of_UE_Registered",
    "to": "no_of_UE_Registered"
}</pre>OR
<pre>{
    "type":"controlplane",
    "from": "mcc",
    "to": "MCC"
}</pre>• with mathematical expression:
<pre>{
    "type":"controlplane",
    "from": "cpu_percent1/(cpu_percent1 +
cpu_percent2)",</pre></td></tr>
</table>

Section/ Parameter	Definition	Code Sample
		"to": "agent1 cpu ratio" }

Parameter sample path

Sample profile

```
{
    "profile": {
        "type":"kafka",
        "3gpp_scenario":"QUIC_ABR_DEBUG",
        "event_type": "ATTS-TOOLS-KEYSIGHT-EVENT",
        "specversion":"1.1",
        "kafkatopics": "com.att.ant.stage.ATTSKeysight.1.0",
        "kafkaschemaUrl":
"https%3A%2F%2Fcl001.eastus2.uat.iebus.3pc.att.com%3A8082%2Fschemas%2Fids%2F6635&schemaId=
14260",
        "kafkaHeaderBootstrapUrl": "cl001.eastus2.uat.iebus.3pc.att.com:9093",
        "kafkaHeaderSaslMechanism": "PLAIN",
        "kafkaHeaderOauthScope": "ANT-data-feed-dev-stage",
        "kafkaUsername": "m30317@ant.att.com",
        "kafkaPassword": "August2023#",
        "input": [
            {
                "type": "stat",
                "group": "AgentStatistics",
                "stat": "CPU Percent",
                "name": "cpu_percent1",
                "filterBy": {
                    "stat": "agentIP",
```

```
                    "value":"10.38.158.83"
                }
            },
            {
                "type": "stat",
                "group": "AgentStatistics",
                "stat": "CPU Percent",
                "name": "cpu_percent2",
                "filterBy": {
                    "stat": "agentIP",
                    "value":"10.38.157.97"
                }
            },
            {
                "type": "config",
                "group": "config/nodes/ausf/ranges/1/nodeSettings",
                "stat": "mcc",
                "name": "mcc"
            },
            {
                "type": "config",
                "group":
"config/nodes/ue/ranges/1/userPlane/tigerObjective/1/statelessUDP",
                "stat": "ipAddress",
                "name": "ipAddress"
            },
            {
                "type": "stat",
                "group": "Fullcoreoverview_RegisteredAttachedUE",
                "stat": "UEs Registered",
                "name": "no_of_UE_Registered"
            },
            {
                "type": "stat",
                "group": "Fullcoreoverview_PDUSessionEstablishment",
                "stat": "PDU Session Establishment Succeeded",
                "name": "no_of_PDU_Session_Established"
            },
            {
                "type": "stat",
                "group": "Fullcoreapplicationtraffic_UserPlaneThroughput",
                "stat": "L2-3 Device Rx Traffic",
                "name": "L3 Server::Total Bits/Sec"
            },
            {
                "type": "stat",
                "group": "Fullcoreapplicationtraffic_UserPlaneThroughput",
                "stat": "L2-3 Device Tx Traffic",
                "name": "L3 Client::Total Bits/Sec"
            },
            {
```

```
            "type": "stat",
            "group": "Fullcoreapplicationtraffic_TCPConnections",
            "stat": "TCP connections established",
            "name": "HTTP/s Handshakes Succeeded"
        },
        {
            "type": "stat",
            "group": "Fullcoreapplicationtraffic_TCPConnections",
            "stat": "TCP connect failed",
            "name": "HTTP/s Handshakes Failed"
        },
        {
            "type": "stat",
            "group": "Fullcoreapplicationtraffic_TCPConnections",
            "stat": "TCP connections closed normally",
            "name": "HTTP/s Connection Closed"
        }
    ],
    "mappings":[
        {
            "type":"controlplane",
            "from": "cpu_percent1 + cpu_percent2",
            "to": "total cpu_percent %"
        },
        {
            "type":"controlplane",
            "from": "cpu_percent1/(cpu_percent1 + cpu_percent2)",
            "to": "agent1 cpu ratio"
        },
                {
            "type":"controlplane",
            "from": "cpu_percent2/(cpu_percent1 + cpu_percent2)",
            "to": "agent2 cpu ratio"
        },
        {
            "type":"controlplane",
            "from": "mcc",
            "to": "MCC"
        },
        {
            "type":"controlplane",
            "from": "ipAddress",
            "to": "Destination IP Address"
        },
        {
            "type":"controlplane",
            "from": "no_of_UE_Registered",
            "to": "no_of_UE_Registered"
        },
        {
            "type":"controlplane",
```

```
                "from": "no_of_PDU_Session_Established",
                "to": "no_of_PDU_Session_Established"
            },
            {
                "type":"userplane",
                "from": "L3 Server::Total Bits/Sec",
                "to": "L3 Server::Total Bits/Sec"
            },
            {
                "type":"userplane",
                "from": "L3 Client::Total Bits/Sec",
                "to": "L3 Client::Total Bits/Sec"
            },
            {
                "type":"userplane",
                "from": "HTTP/s Handshakes Succeeded",
                "to": "HTTP/s Handshakes Succeeded"
            },
            {
                "type":"userplane",
                "from": "HTTP/s Handshakes Failed",
                "to": "HTTP/s Handshakes Failed"
            },
            {
                "type":"userplane",
                "from": "HTTP/s Connection Closed",
                "to": "HTTP/s Connection Closed"
            }
        ]
    }
}
```

Event body sent to Kafka

```
[
    {
        "eventBody": {
            "id": "wireless-0acbc45b-8777-4250-a3ec-4f00e47399c8_39",
            "time": "2024-02-29T13:57:35Z",
            "type": "ATTS-TOOLS-KEYSIGHT-EVENT",
            "specversion": "1.1",
            "source": "https://10.38.157.61/wireless-07a05ef0-a421-4894-869d-
81e6e88831aa",
            "datacontenttype": "application/json",
            "payload": [
                {
                    "type": "resource_info",
                    "resource_info": {
                        "simulated_tool_info": [
                            {
```

```
                                "tool_name": "LoadCore",
                                "middleware_ip": "10.38.157.61"
                            }
                        ],
                        "network_type": "5G",
                        "3gpp_scenario": "QUIC_ABR_DEBUG"
                    }
                },
                {
                    "type": "test_execution_result",
                    "test_execution_result": {
                        "control_plane_result": {
                            "Destination IP Address": "20.0.6.10",
                            "MCC": "226",
                            "agent1 cpu ratio": "0.455321",
                            "agent2 cpu ratio": "0.544679",
                            "no_of_PDU_Session_Established": "100",
                            "no_of_UE_Registered": "0",
                            "total cpu_percent %": "3.0902"
                        },
                        "userplane_plane_result": {
                            "L3 Client::Total Bits/Sec": "0",
                            "L3 Server::Total Bits/Sec": "0"
                        }
                    }
                },
                {
                    "type": "test_execution_details",
                    "test_execution_details": {
                        "testName": "4 - Full Core Base Config",
                        "testSessionID": "wireless-07a05ef0-a421-4894-869d-81e6e88831aa",
                        "UserID": "admin@example.org",
                        "testStatus": "STOPPING",
                        "testStartTime": "2024-02-29T13:55:40Z",
                        "testDuration": 105,
                        "testStopTime": "2024-02-29T13:57:31Z"
                    }
                }
            ]
        },
        "payloadType": "JSON",
        "value": {}
    }
]
```


Global Playlists

The following table describes the settings required to define the global playlists.

Setting	Description
Global Playlists:	
+	Select the **Add Global Playlist** button to add a new playlist to your test configuration.
Impairment Profile:	
🗑	Select the **Delete Global Playlist** button to remove the playlist from your test configuration.
Name	Each playlist profile is uniquely identified by a name. You can accept the value provided by CoreSIM or overwrite it with your own value.
Playlist file (.csv)	It allows you to add a custom playlist, using the **Upload** button. To remove the file, select the **Clear** button.

UE configuration settings

You use the User Equipment (UE) configuration settings to define one or more ranges of simulated UEs. Every test requires at least one range of simulated UEs. These settings define properties that are representative of real-world UEs that may access a 5G network, including UE identity, security, network slice selection, among others.

In addition, the UE settings include the configuration of test objectives; these settings direct the traffic performance and UE behavior actions during test execution.

The configuration settings are described in the topics listed below.

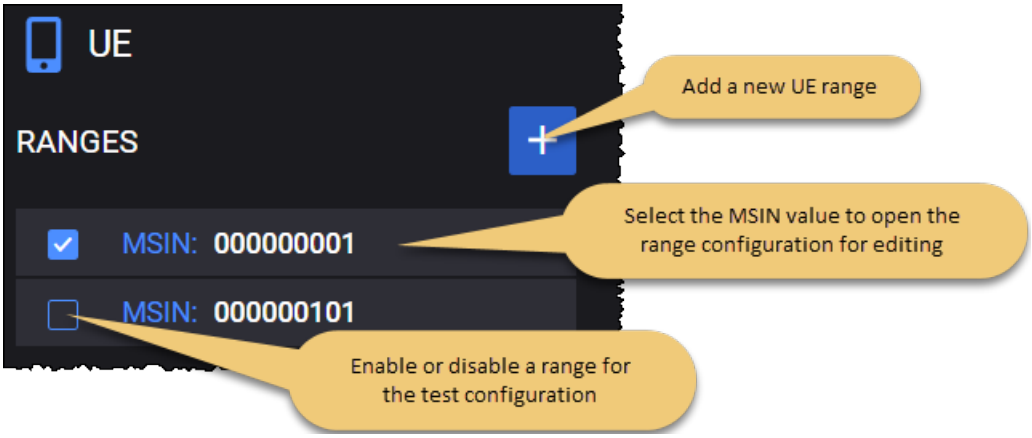
Topics:

UE Ranges panel

The **UE Ranges** panel opens when you select the UE node from the network topology window. You can perform the following tasks from this panel:

- Add a new UE range to your test configuration.
- Open a UE range configuration (for editing or viewing).
- Enable or disable a range for the test configuration.

For example ...



If multiple agents are assigned to the AMF node, the **Distribution Mode** parameter (see Distribution Mode feature on page 32) displays the available options in the drop-down:

- **All UE Ranges and RAN Ranges on All Agents** - on each agent a chunk of UEs from each UE range and a chunk of RANs from each RAN range will be configured.
- **Round Robin UE Ranges and RAN Ranges per Agent** - UE ranges will be distributed round-robin on the assigned agents and chunks from RAN ranges will be distributed on the Agents where the UE ranges from that Agents use the RAN nodes (either as Parent Node or in the Handover or EPS Fallback sections).

UE Range panel

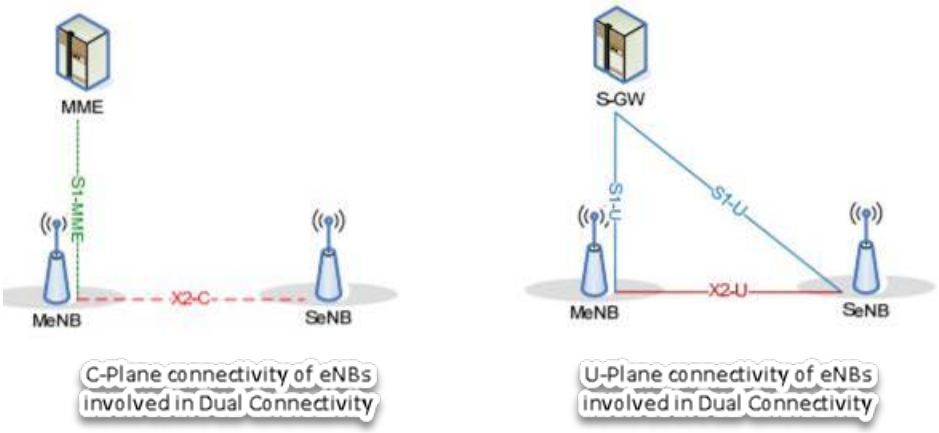
When you select an MSIN from the UE **Ranges** panel, CoreSIM opens the **Range** panel, from which you can:

- Delete the UE range from the test configuration.
- Configure the *Range Count*.
- Create copies of your range by providing the number of copies and selecting the **Create Range Copies** button.
- Select the *Parent NG-RAN/UNAP* for the UE range.
- Select a *Secondary Node*.
- Access the detailed UE configuration settings (Range Settings, Network Slicing, Objectives).

UE range controls and settings

CoreSIM has now support for Option 3x, on the NG-RAN, simulating Dual Connectivity radio connections, as described in 3GPP TS 36.300/38.300.

This will enable the UEs to use the radio resources for sending/receiving application traffic on both E-UTRAN and NR, as seen in the following topology.



The eNodeBs and gNodeBs involved in the communication must have a X2 connection established between them.

The eNodeBs/gNodeBs involved in this communication will have two optional roles:

- a Parent Node – (only eNodeB at this point), or
- a Secondary Node (a gNodeB).

The UE will attach to a 4G eNodeB which can have a Secondary node configured, a gNodeB. This implies all the traffic or just a part of it can be sent through the NR bearer, the IP and GTP tunnel being negotiated in the E-RAB modification procedure over the S1 interface.

Through E-RAB modification CoreSIM supports the following:

- SN addition
- SN change
- SN modification
- SN release

Since the UEs will be able to use both E-UTRAN and NR resources, not all the established bearers need to be moved.

In this configuration, the **Move to Secondary Node** option must be enabled on the QoS flows tab, on each bearer that needs to use the NR resources. The traffic will be moved to NR bearers as soon as the bearer configured to support is successfully setup.

Known limitations:

- Application Traffic is not supported on Dual Connectivity bearers.

The following table describes the available **Range** configuration options for each UE range.

Setting	Description
Range:	
	Select the **Delete Range** button to delete this range from your test configuration.
Range Count	Enter the number of simulated UEs required for the range.
Parent RAN/UNAP	Select the desired parent node from the test configuration. This will be the NG-RAN through which the UEs in the range will access the 5G core network.
Secondary Node	This option is used for Option 3x and Dual Connectivity NR-NR features. Select the secondary node from the drop-down list.

Range Settings

For each range that you add (in the UE Ranges panel), you configure the settings from the **Range** panel (UE Range panel).

The **Range Settings** are organized into the following groups:

UE Identification settings

Each UE range has a set of Identification settings that provide basic identity values for the simulated UEs that populate the range. Some of the values (such as MCC) are shared by all of the UEs in the range, while others (such as MSIN) are unique for each individual UE in the range. The unique values are generated using an initial value plus an increment value.

The following table describes the UE **Identification Settings**.

Setting	Description
PLMN MCC	The MCC that will be assigned to each UE in this range.
PLMN MNC	The MNC that will be assigned to each UE in this range.
MSIN	The MSIN value that will be assigned to the first simulated UE in the range.

Setting	Description
MSIN increment	The value to use for incrementing the MSIN values for each of the UEs in the range.
IMEI	The IMEI value that will be assigned to the first simulated UE in the range. The International Mobile Equipment Identity (IMEI) is a number used to uniquely identify 3GPP and iDEN mobile phones, as well as some satellite phones. It identifies the origin, model, and serial number of the device. It consists of either 15 digits (14 digits plus one check digit); or 16 digits (14 digits plus two software version digits). GSM networks use the IMEI number to identify valid devices, and can also use the number to prevent a stolen phone from accessing the network. When it includes the software version digits, it is referred to as the IMEISV.
IMEI Increment	The value to use for incrementing the IMEI values for each of the UEs in the range.
Software Version	The software version number identifies the software version number of the mobile equipment. Its length is 2 digits.
MSISDN	The first Mobile Station ISDN (MSISDN) value for this range.
MSISDN Increment	The value to use for incrementing the MSISDNs in the range.

UE Security settings

Each UE range requires security settings for subscriber authentication and subscriber privacy. In the 5G system, the SUbscription Permanent Identifier (SUPI) is a globally unique identifier allocated to each subscriber. The serving network must authenticate the SUPI in the process of authentication and key agreement between UE and network. The serving network authorizes the UE through the subscription profile obtained from the home network; this UE authorization is based on the authenticated SUPI.

The SUPI is never transferred in clear text over the 5G-RAN; instead, the SUCI is used. The SUbscription Concealed Identifier (SUCI) is a privacy-preserving identifier containing the concealed SUPI. In the 5G core network, only the UDM has authority to deconceal the SUCI.

For detailed information, refer to 3GPP TS 33.501 (Security architecture and procedures for 5G System).

The following table describes the UE **Security Settings**.

Setting	Description
K	The K (Subscriber Authentication Key) value used for authentication of the UEs in this range. The key is a string with a maximum length of 34 characters. You can accept the value generated by CoreSIM, or enter of a K value of your own choosing.
K Increment	The number used to increment the K value for each subsequent UE in the

<table>
<tr><th>Setting</th><th>Description</th></tr>
<tr><td></td><td>range. A value of zero indicates that each UE in the range uses the same K value.</td></tr>
<tr><td>Authentication Algorithm and Parameters</td><td>Select the operator-specific authentication value. Available options are:
Configure Milenage OP
Configure Milenage OPc
Configure TUAK TOP
Configure TUAK TOPc
Test USIM/XOR</td></tr>
<tr><td>OP</td><td>The Auth OP value specifies the operator-specific authentication value to use for the UEs in this range. It is a string with a maximum length of 34 characters. It remains fix for all Subscriber/SIM of an operator.
You can accept the value generated by CoreSIM, or enter of an OP value of your own choosing.</td></tr>
<tr><td>OPc</td><td>The OPc value is derived from the subscriber key K and the operator dependent value OP. You can accept the value generated by CoreSIM, or enter of an OP value of your own choosing.</td></tr>
<tr><td>OPc Increment</td><td>The number used to increment the OPc value for each subsequent UE in the range. A value of zero indicates that each UE in the range uses the same OPc value.</td></tr>
<tr><td>TOP</td><td>A 256-bit operator variant algorithm configuration field used by the TUAK authentication algorithm.</td></tr>
<tr><td>TOPc</td><td>A 256-bit value derived from TOP and K used by the TUAK authentication algorithm.</td></tr>
<tr><td>TOPc Increment</td><td>The number used to increment the TOPc value for each subsequent UE in the range. A value of zero indicates that each UE in the range uses the same TOPc value.</td></tr>
<tr><td>SUCI Protection Scheme</td><td>The protection scheme used to generate the SUCI (for the purpose of concealing the SUPI) for each UE in the range. The options are as follows:
<table>
<tr><th>Scheme</th><th>Identifier</th><th>Size of the scheme output</th></tr>
<tr><td>null-scheme</td><td>0x0</td><td>Size of the input (size of username used in case of NAI format or MSIN in case of IMSI)</td></tr>
<tr><td>Profile-A</td><td>0x1</td><td>Total of 256-bit public key, 64-bit MAC, and size of input</td></tr>
<tr><td>Profile-B</td><td>0x2</td><td>Total of 264-bit public key, 64-bit MAC, and size of input.</td></tr>
</table></td></tr>
</table>

Setting	Description
Home Network Public Key	The home network public key that will be use for concealing the SUPI. The USIM stores the home network public key (if provisioned by the home operator).
Home Network Public Key ID	The Home Network Public Key Identifier that will be used to indicate which public/private key pair to use for SUPI protection and deconcealment of the SUCI.
Ephemeral Public Key	The ephemeral public key that will be used for computing a fresh SUCI on the UE side and for deconcealing the SUCI on the home network side.
Ephemeral Private Key	The ephemeral private key that will be used for computing a fresh SUCI on the UE side.
Routing Indicator	The Routing Indicator that is used in the construction of the SUCI. The Routing Indicator is used in combination with the MCC and MNC to route network signaling to AUSF and UDM instances that are capable of serving the subscriber. It contains four decimal digits, is assigned by the home network operator, and provisioned in the USIM.
RAND	A hexadecimal number that represents the 128-bit random challenge. You can accept the value generated by CoreSIM, or enter of a RAND value of your own choosing.
RAND Increment	Specify the RAND increment value.
AUTN	The AUthentication TokeN (AUTN) to use when authenticating the UEs in this range.
Authentication Type	Select the Authentication Method to use in the authentication procedures for this range of UEs. In the current release, **5G-AKA** is the only supported Authentication Type.
Integrity Protection Maximum Uplink Data Rate	Select a value from the drop-down list: • **64 kbps** • **Full Data Rate**
Integrity Protection Maximum Downlink Data Rate	Select a value from the drop-down list: • **64 kbps** • **Full Data Rate**
UDM User Plane Security Profile	*With this option you can configure User Plane security profiles. See UDM User Plane Security Profile on the next page table for details.*
Override UE Security Capability	*If selected, this option will override the default UE Security Capability settings. See Override UE Security Capability on the next page table for details.*

UDM User Plane Security Profile

The following parameters are required to configure the UDM User Plane Security Profile:

Parameter	Description
	Select the **Add Security Profile** button to add a new profile to your test configuration.
	Select the **Delete Profile** button to remove the profile from your test configuration.
UDM SNSSAI Mapping Profile	Select the mapping profile from the drop-down list.
DNNs	Select the DNN value for the drop-down list. For example: `dnn.keysight.com`.
Integrity	Select an option from the drop-down list: • **REQUIRED** • **PREFERRED** • **NOT-NEEDED**
Confidentiality	Select an option from the drop-down list: • **REQUIRED** • **PREFERRED** • **NOT-NEEDED**

When the **REQUIRED** option is selected for any of the Integrity or Confidentiality parameters and, on the NGRAN, the same option (Enable Integrity or Enable Confidentiality) is NOT selected, the NGRAN will send in *PduSessionResourceSetupResponse* message an error cause (forcing SMF to send a PDU Session establishment reject). Otherwise, for any other combinations of Integrity or Confidentiality parameters on UDM security profile and NGRAN, the flow should be successfully.

NOTE User Plane Security settings are not taken into account for N2 Handover procedure.UDM User Plane Security Profile

Override UE Security Capability

The following parameters are required to configure the Override UE Security Capability:

Parameter	Description
Include 5G UE Security Capabilities in 4G Attach	If enabled, the 4G Attach Request will contain the UE Additional Security Capability IE (5G UE Security Capability).
5G Ciphering Algorithm	*This section lists the supported 5G ciphering algorithm. By default, all settings are enabled. If required, you can disable each setting individually to avoid override.*

Parameter	Description
NEA0	Null ciphering algorithm (enabled by default).
NEA1	128-bit SNOW 3G based algorithm (enabled by default).
NEA2	128-bit AES based algorithm (enabled by default).
NEA3	128-bit ZUC based algorithm (enabled by default).
5G Integrity Algorithm	*This section lists the supported 5G integrity algorithm. By default, all settings are enabled. If required, you can disable each setting individually to avoid override.*
NIA0	Null ciphering algorithm (enabled by default).
NIA1	128-bit SNOW 3G based algorithm (enabled by default).
NIA2	128-bit AES based algorithm (enabled by default).
NIA3	128-bit ZUC based algorithm (enabled by default).

UE Settings settings

Each UE range has a set of **Settings** that configure subscription data and PDU session data for the range.

Setting	Description
Settings:	
Dual Registration Mode	When enabled, this option allows an UE to be registered/attached in the same time to 5GS via a gNodeB and to EPS via an eNodeB. The UE will activate this feature in case: • Dual Registration Mode option is enabled. • At least one DNN has Dual Registration Mode option enabled. • It has a parent gNodeB (*gNodeB-1* for example). • It has a Handover objective configured with visited nodes (for example, primary node *gNodeB-1* and secondary node *eNodeB-1*). • the Core network advertise support for interworking without N26.
Allow MICO Mode	This option, when selected, indicates that the UEs in the range prefer Mobile Initiated Connection Only (MICO) mode during Initial Registration and Registration Update procedures. Applicable to simulated UDM NF.
Subscribed Registration Timer (s)	The Periodic Registration timer value for this range of UEs. The AMF allocates a periodic registration timer value to the UE based on

Setting	Description
	local policies, subscription information and information provided by the UE. After the expiry of this timer, the UE performs a periodic registration. Applicable to simulated UDM NF.
Active Time (s)	The subscribed Active Time for Power Saving Mode (PSM) UEs.
RAT Restrictions	UE Mobility Restrictions include RAT restrictions, which define the 3GPP Radio Access Technologies (one or more) that a UE is not allowed to access in a PLMN. The options available in CoreSIM are: NR, E-UTRA, WLAN, and Virtual. Applicable to simulated UDM NF.
Set ESM Information Transfer Flag	By default, this option is enabled. This option controls the value of the *ESM information transfer* flag from InitialUEMEssage/AttachRequest 4G message. When this option is disabled, the UE/eNodeB will set the flag *ESM information transfer* to *False* and MME will not send DonwlinkNASTransport/ESM information request.
Switch Off Deregistration/Detach	When this option is enabled, the Deregistration Request/Detach messages will use a deregistration/detach type of Switch-off. When the Deregistration/Detach type is switch-off, the AMF/MME does not send the Deregistration/Detach Accept message back to the UE.
PDU Session Release Before Deregistration	When this option is enabled, the UE will release PDU sessions before deregistration.
Enable Periodic Registration Update/Periodic Tracking Area Update	By default, this option is not enabled. If the periodic registration / TAU functionality is disabled, the UE will ignore the T3512/T3412 timer received in the Registration Accept/TAU Accept and will not send any Periodic Registration Update/Tracking Area Update request. During the Initial Registration/Initial Attach,the AMF/MME sends in the Registration Accept/Attach Accept a T3512/T3412 timer, which consists of a Unit-Value pair. For example, a value of 30 and unit of 10min means 300 minutes. The T3512/T3412 timer can be overridden by subsequent Registration Accept/TAU Accept messages. If T3512/T3412 is 0 or Disabled, no periodic registration/periodic TAU should be performed. If no T3512/T3412 value is present in the Registration Accept /Attach Accept message, the last known T3512/T3412 value is used. If a T3512/T3412 was never transmitted by the AMF/MME, the default value of 54 minutes will be used. The T3512/T3412 timer is triggered when the UE enters idle. If the UE exits the idle state, the T3512/T3412 timer is stopped. When the UE

Setting	Description
	enters again in idle, the T3512/T3412 timer is restarted. While the UE is in idle mode, when the T3512/T3412 timer expires: • If the UE is not registered/attached for emergency services, the UE initiates a Periodic Registration Update/Tracking Area Update procedure and restarts the T3512/T3412 timer. • If the UE is registered/attached for emergency services, the UE locally de-registers/detaches andthe AMF/MME locally detaches the UE.
Include UEContextRequest IE for PRU Initial UE Message	If enabled, it will include the UEContextRequest IE for the PRU Initial UE Message. IMPORTANT This option appears only if **Enable Periodic Registration Update/Periodic Tracking Area Update** is enabled.
Enable Reattach after Network Detach	If enabled, the UE will attempt to reattach after a network-initiated detach.
Reattach after Network Detach Delay (s)	IMPORTANT This option appears only if **Enable Reattach after Network Detach** parameter is enabled. The delay time, in seconds, before the UE will attempt to reattach after a network-initiated detach.
Delay Before PDU Session Creation (ms)	The time that will elapse before the UEs in this range begin creating PDU sessions after successful Registration.
Delay Before Router Solicitation (ms)	The time (in milliseconds) that will elapse before the UE sends an ICMPv6 Router Solicitation message (a ***0*** value means no delay). If, during this time, the UE receives an unsolicited Router Advertisement, the sending of the Router Solicitation will be canceled.
Delay Before Deregister (ms)	The time that will elapse between PDU Session Release Complete and UE initiated Deregistration Request messages.
Delay Before Handover Notify (ms)	The time to wait before handover notification.
User Plane Inactivity Timer (s)	Inactivity time period, in seconds, before UE will be pt into the Idle state. A zero value indicates that detection is stopped.
Check AUTN	By default, this option is disabled. When the option is enabled, then UE will check the value of AUTN in the *Authentication Request* messages and it will reply with *Authentication Failure (MAC failure)* in case of different MAC values or with *Authentication Failure (Synch failure)* in the case the sequence number computed using the AUTN value is invalid.

Setting	Description
Unsolicited Router Advertisement	Select to enable this option.
AMF Force Identification During Registration	This option will force the AMF to always trigger the Identification Procedure to get the identity of the UE. When the NG-RAN node receives this request, it responds with the IMEISV or the SUCI.
Identity Request PEI Type	When the Identification Procedure is triggered by the MME/AMF due to the AMF Force Identification During Registration option being enabled, it allows the selection of the requested PEI type: **IMEISV** or **IMEI**. Default value: **IMEISV**.
Always Include Uplink Data Status IE in Service Request Message	The UE will always include the Uplink Data Status IE for a Service Request message, not only if it has pending data.
Enable Passthrough	Select this option to enable passthrough and any interface. Applicable to all passthrough topologies (UE/gNB or UPF). Applicable to either direction: GTPu to IP or/and IP to GTPu.
Attach/Register with GUTI	When the Primary Objective type is Subscribers Per Second, enabling this option will trigger a Registration/Attach Request with the type of user identity set to temporary identity (GUTI). When option is not enabled, the type of user identity in the Registration/Attach Request will be permanent identity.
Authentication with GUTI	This option is available only when *Attach/Register with GUTI* option is enabled. When enabled, this option triggers authentication in case of attach (4G) / register (5G) with GUTI.
Force Emergency Registration	When this option is enabled, the UE will perform an Emergency registration (instead of Initial Registration). Only the primary objective's DNNs are taken into account when deciding if the UE performs an emergency registration. When the `dnnIdsToActivate` is present but empty in the primary objective, the Emergency Registration will not be performed even if there is a Secondary Objective that uses an emergency DNN.
Identity Type for Emergency Registration	Select the identity type to use from the drop-down list. Available options are: • **SUCI/IMSI** - where SUCI is used for 5G network, and IMSI for 4G network • **IMEISV/IMEI** - where IMEISV is used for 5G network, and IMEI for 4G network.

Setting	Description
	• **IMEI** - where IMEI is used for 5G networks
Support SMS	When this is selected, a flag will be added in the Registration message advertising UE support for SMS over NAS feature.
Delay Before Indirect Forwarding Cleanup (ms)	The time that will elapse before indirect forwarding cleanup. The delay is calculated from the UE Context Release.
Send Native GUTI During IRAT Mobility Registration	Enable this option to send native GUTI during IRAT mobility registration.
Authentication During Mobility Registration	Select a value from the drop-down list: • **Never**: Authentication is not performed during mobility registration. • **Always**: Authentication during mobility registration is always performed. • **No Native Contex**t: Authentication during mobility registration is performed only when the UE does not hold a native 5G security context.
Update GUTI in TAU	Select to enable this option.
Access Class	Select the Access Class of the UE from the drop-down list. The following options are available: *None*, *Low Priority Access*, *11 - For PLMN Use*, *12 - Security Service*, *13 - Public Utilities* , *14 - Emergency Services* , *15 - PLMN Staff*. IMPORTANT This option is available for 4G only.
Index to RFSP	Set the value for the initial Context Setup Request - Index to RFSP IE. Possible values are in range of 0 to 256, where a zero value means the *indexToRFSP* is not sent.
GUTI Reallocation Delay (s)	The time to wait, in seconds, after the UE registers to allocate a new GUTI. A value of zero disables the reallocation.
Radio Capability	
UE Radio Capability IE Value for LTE	The UE radio capability IE value that will be included UE Capability Info Indication message.
UE Radio Capability IE Value for NR	The UE radio capability IE value that will be included UE Capability Info Indication message.
Send UE Capability IE Indication after Initial Context Setup	Enable this option to send UE capability IE indication after initial context setup.

Setting	Description
Trigger UE Radio Capability Check Procedure after Registration	This option will trigger from CoreSim the UE radio capability check procedure after registration in 5G or UE radio capability match procedure after attach in 4G.
Replay UE Radio Capability	The UE Radio Capability IE is replayed in the Initial Context Setup Request and UE Radio Capability Match / Check messages on 4G and 5G. This option is applicable for the AMF and MME nodes. NOTE It is not applicable for Initial Context Setup Request of an inter-RAT handover procedure. NOTE After UE Radio Capability Match / UE Radio Capability Check procedures, UE always sends UE Radio Capability Info Indication.
Location Reporting	*Select the check box to enable location reporting as defined in TS 23.502 (supported on the AMF and NG-RAN nodes).*
Reporting Type	Select the value from the drop-down list. The available options are: • **Direct** - If the test timeline is long enough, the AMF generates *n* `LocationReportingControl` messages at every *m* seconds from the moment Registration Complete message is received by the AMF (*n* is the value configured for Number of Repeats and *m* is the value of Interval Between Requests. • **Change of Serving Cell** - In case of Handover with AMF change, if **Change of Serving Cell** is selected, after handover, the new AMF will send a `LocationReportingControl` message to the NG-RAN.
Interval Between Requests (seconds)	Set the time interval between requests.
Number of Repeats	Set the number of repeats.
Start Time (seconds)	The number of seconds after successful attach when the AMF sends a `LocationReportingControl` message (`event-type: change-of-serve-cell`).
Stop Time (Seconds)	The number of seconds since the Start Time when the AMF sends `LocationReportingControl` message (`event-type: stop-change-serving-cell`).
SMF Initiated PDU Session Release	*Select the check box to enable this option.*
Time to Wait before SMF Initiated PDU Session Release (s)	Time in seconds to wait before SMF initiated PDU session release.

Setting	Description
DNNs	Select the DNNs from the drop-down list. The available options are: • All: Select this item to choose all of the available DNNs that are configured for the UE. • specific DNNs: Select one or more of the individual DNNs from the list.
Network Initiated Deregistration	*Select the check box to enable this option.*
Time to wait before Network Initiated Deregistration (s)	Time in seconds to wait before network initiated deregistration.
Set Reregistration Required Flag in Deregistration Request Message	Enable this option to set a required reregistration flag in the deregistration request message.
AMF Initiated UE Context Release	*Select the check box to enable this option.*
Time to Wait before AMF Initiated UE Context Release (s)	Time in seconds to wait before AMF initiated UE context release.
Location Services	*Select the check box to enable Location Services (as described in TS23271/23273). The Location Services procedures over the LPPa /NRPPa interface are detailed in TS36455/38455.* NOTE *When Location Services is enabled, at least 1 profile must be configured (a maximum of 15 profiles allowed).*
Reroute NAS Request	*Select the check box to enable this option.*
AMF Set ID	The AMF Set ID to use for this simulated AMF node. The Set ID uniquely identifies the AMF Set within the AMF Region.
Reroute After SMC	If selected, the AMF will reroute after Security Mode procedure.
NSSAI	*See the NSSAI table for details.*
Network Initiated PDU Session Modification	*See the Network Initiated PDU Session Modification on page 87 table for details.*
Refresh Security Context	*When enabled, the AMF/MME will initiate the Security Mode Control procedure to obtain a fresh uplink NAS Count which is used to generate a new Security Key.*

Setting	Description
Delay(s)	The time to wait, in seconds, before triggering the Security Mode Control procedure after the UE is registered.
Iterations	The number of times the security context will be refreshed.
Interval(s)	The time, in seconds, between two iterations.
Core Network Assistance Information For Inactive	*If enabled, the configured Core Network Assistance Information for RRC INACTIVE IE is present only in the INITIAL CONTEXT SETUP REQUEST message carrying the initial Registration Accept. It is not present in the INITIAL CONTEXT SETUP REQUESTS carrying other types of NAS messages, UE CONTEXT MODIFICATION REQUEST, HANDOVER REQUEST or PATH SWITCH REQUEST ACKNOWLEDGE. It is not present for Emergency Registration.* *This option is disabled by default. See Core Network Assistance Information For Inactive for configuration details.*
Paging Settings	*See Paging Settings for configuration details.*
Trace Settings	*Enable this option to send Trace Start/Deactivate Trace IEs as defined in TS38.413 chapter 8.11 (Trace Procedures). See Trace Settings for configuration details.*
Management Based MDT	*Select to enable and click this setting to open the configuration panel. See Management Based MDT for more details.*
Mobile Terminated SMS Configuration	*Select to enable and click this setting to open the configuration panel. See Mobile Terminated SMS Configuration for more details.*
Generic UE Configuration Update	*Select to enable and click this setting to open the configuration panel.*
Delay (s)	The time to wait, in seconds, before initiating the Generic UE Configuration Update procedure, after the UE is registered. A zero value means the procedure is not initiated.
Acknowledgment Request	If enabled (default), it indicates if the UE was asked to respond to the Configuration Update Command message with a *Configuration Update Complete* message.
Allocate New GUTI	If enabled (default), it will allocate a new Global Unique Temporary Identifier (GUTI) to the configuration update.

Location Services

The following table describes the **Location Services** settings.

Setting	Description
Location Services:	
+	Select the **Add LCS Profile** button to add a new profile.
🗑	Select the **Delete LCS Profile** button to remove the profile from your test configuration.
Trigger	Select an option from the drop-down list: • **None** - no trigger (default option). • **UE Available** - UE exits Idle mode. • **Change of Area** - UE performs handover with TAC change.
E-CID Measurements:	
+	Select the **Add E-CID Measurements** button to add a new measurement. IMPORTANT A maximum of 15 E-CID Measurements can be configured across all LCS Profiles for an UE range.
🗑	Select the **Delete E-CID Measurements** button to delete the measurement from your test configuration.
Report Characteristics	Select an option from the drop-down list: • **On Demand** - information is needed on demand in real time. • **Periodic** - periodic E-CID measurement reports.
Measurement Quantities	Select an option (or more) from the drop-down list. The available options are: **Cell-ID** (default), **Angle of Arrival**, **Timing Advance Type 1**, **Timing Advance Type 2**, **RSRP**, **RSRQ**. Th following measurement quantities become available as follows: • **SS-RSRP**, **SS-RSRQ**, **CSI-RSRP**, **CSI-RSRQ**, **Angle of Arrival NR** - for 5G only, when *Technical Spec Version* is set to either **R16 September 2020**, or **R17 December 2022** (see Global Settings). • **Timing Advance NR** - for 5G only, when *Technical Spec Version* is set to **R17 December 2022**. NOTE There is no support for Inter-RAT Measurement Quantities and WLAN Measurement Quantities.
Delay (ms)	This option is available only when the *Trigger* is set to **None**. It represents the time trigger for E-CID measurement initiation.
Periodicity	This option is available only when the *Report Characteristics* is set to **Periodic**. It represents the periodicity of E-CID measurement reports. The available options are: **120 ms**, **240 ms**, **480 ms**, **640 ms**, **1024 ms**, **2048 ms**, **5120 ms**, **10240 ms**, **1 min**, **6 min**, **12 min**, **30 min**, **60 min**.

Setting	Description
Duration (ms)	This option is available only when the *Report Characteristics* is set to **Periodic**. It represent the timer to trigger E-CID measurement termination.

5G Location Services Release 16 specific additions are not supported:

- LMF UE Measurement ID in E-CID MEASUREMENT messages doesn't support (1 ... 256) values, supporting (1 ... 15) instead.
- RAN UE Measurement ID in E-CID MEASUREMENT messages doesn't support (1 ... 256) values, supporting (1 ... 15) instead.
- Measurement Periodicity in E-CID MEASUREMENT messages doesn't support 20480ms, 40960ms values.
- Measurement Quantities in E-CID MEASUREMENT messages doesn't support SS-RSRP, SS-RSRQ, CSI-RSRP, CSI-RSRQ, NR Angle of Arrival values.

5G Location Services LPPa/NRPPa Routing ID values in DOWNLINK/UPLINK UE ASSOCIATED LPPa/NRPPA TRANSPORT messages are hardcoded to **0**.

NSSAI

The following table describes the **NSSAI** settings.

<table>
<tr><th>Setting</th><th>Description</th></tr>
<tr><td colspan="2">NSSAI:</td></tr>
<tr><td>  </td><td>Select the Add UE NSSAI button to add a new UE NSSAI to your test configuration.</td></tr>
<tr><td colspan="2">NSSAI Settings:</td></tr>
<tr><td>  </td><td>Select the Delete UE NSSAI button to delete this UE NSSAI from your test configuration.</td></tr>
<tr><td>SST</td><td>The value that identifies the SST (Slice/Service Type) for this S-NSSAI. SST comprises octet 3 in the S-NSSAI information element. The standardized SST values are:
<table>
<tr><th>SST</th><th>Value</th></tr>
<tr><td>eMBB</td><td>1</td></tr>
<tr><td>URLCC</td><td>2</td></tr>
<tr><td>MIoT</td><td>3</td></tr>
</table></td></tr>
<tr><td>SD</td><td>The Slice Differentiator (SD) value for this S-NSSAI. SD is an optional information that differentiates amongst multiple Network Slices of the same Slice/Service type. The SD field comprises octets 4 through 6 in the S-NSSAI.</td></tr>
</table>

Setting	Description
Mapped SST	The Mapped configured Slice/Service Type (SST) value for this S-NSSAI.
Mapped SD	The Mapped configured Slice Differentiator (SD) value for this S-NSSAI.

Network Initiated PDU Session Modification

The following table describes the **Network Initiated PDU Session Modification** settings.

Setting	Description
Network Initiated PDU Session Modification:	
+	From the panel, you can select a **DNN Config** for editing and also add additional DNN configurations. Select the **Add DNNs Config** button to add a new DNN configuration.
DNN Config:	
🗑	Select the **Delete DNN Config** button to delete this DNN config from your test configuration.
DNN	From the drop-down, select one of the previously-defined DNNs.
Delay Before Network Initiated PDU Session Modification (s)	The time to wait, in seconds, between the PDU Session Establishment end and the start ofNetwork Initiated PDU Session Modification procedure start.
Interval Between Consecutive Network Initiated PDU Session Modification procedures (s)	The time, in seconds. between two Consecutive Network Initiated PDU Session Modification procedures.
Iterations	The number of consecutive Network Initiated PDU Session Modification procedures per UE.
Flows:	*This option lists all the flows defined and associated to the selected DNN. Select the check-box to configure a flow. By default, the default bearer is selected.*
+	Select the **Add Flow** button to add a new flow to your test configuration.

<table>
<tr><th>Setting</th><th>Description</th></tr>
<tr><td>Flow:</td><td></td></tr>
<tr><td>  </td><td>Select the Delete Flow button to delete this DNN config from your test configuration.</td></tr>
<tr><td>Flow ID</td><td>Select the flow's ID from the drop-down list.</td></tr>
<tr><td>ARP</td><td>If enabled, the Allocation and Retention Priority (ARP) setting specifies the priority level, preemption capability, and preemption vulnerability of a resource request.</td></tr>
<tr><td>ARP Priority Level</td><td>Specify the ARP priority level.
The ARP Priority Level defines the relative importance of a resource request, where 1 is the highest priority and 15 is the lowest priority. The ARP priority levels 1–8 should be assigned only to resources for services that are authorized to receive prioritized treatment within an operator domain, whereas the ARP priority levels 9–15 may be assigned to resources that are authorized by home network and thus applicable when a UE is roaming.</td></tr>
<tr><td>ARP Preemption Capability</td><td>The available options are:
Not Preempt
May Preempt - if selected, the packets in this Flow can preempt other flows. When a flow is preemption-capable, it can be allocated resources that were already assigned to another data flow that has a lower ARP priority level.</td></tr>
<tr><td>ARP Preemption Vulnerability</td><td>The available options are:
Not Premptable
Premptable - if selected, the packets in this QoS Flow are candidates for being preempted by other flows. When a flow is preemption-vulnerable, it can be dropped to free up resources for packets that have a higher ARP priority level.</td></tr>
<tr><td>GBR</td><td>If enabled, configure the parameters to indicate the guaranteed bit rates (GBR) for the selected flow.</td></tr>
<tr><td>GBR Type</td><td>Select the desired guaranteed bit rate (GBR) type for the flow. Based on your selection, CoreSIM will show the appropriate settings to configure.
<table>
<tr><td colspan="2">QoS Rates:</td></tr>
<tr><th>Parameter</th><th>Description</th></tr>
<tr><td>Uplink</td><td>Set the uplink bitrate.</td></tr>
<tr><td>Downlink</td><td>Set the downlink bitrate.</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Setting</th><th>Description</th></tr>
<tr><td></td><td>
<table>
<tr><td colspan="2">Dynamic QoS Rates:</td></tr>
<tr><td>Parameter</td><td>Description</td></tr>
<tr><td>Uplink Action</td><td>Select the action type to apply to the uplink bitrate.</td></tr>
<tr><td>Uplink Step</td><td>Select the step to increase or decrease the uplink bitrate.</td></tr>
<tr><td>Downlink Action</td><td>Select the action type to apply to the downlink bitrate.</td></tr>
<tr><td>Downlink Step</td><td>Select the step to increase or decrease the downlink bitrate.</td></tr>
</table>
</td></tr>
<tr><td>MBR</td><td>If enabled, configure the maximum bit rates (MBR) allowed for the selected flos.</td></tr>
<tr><td>MBR Type</td><td>Select the desired maximum bit rate (MBR) type for the flow. Based on your selection, CoreSIM will show the appropriate settings to configure.
<table>
<tr><td colspan="2">QoS Rates:</td></tr>
<tr><td>Parameter</td><td>Description</td></tr>
<tr><td>Uplink</td><td>Set the uplink bitrate.</td></tr>
<tr><td>Downlink</td><td>Set the downlink bitrate.</td></tr>
<tr><td colspan="2">Dynamic QoS Rates:</td></tr>
<tr><td>Parameter</td><td>Description</td></tr>
<tr><td>Uplink Action</td><td>Select the action type to apply to the uplink bitrate.</td></tr>
<tr><td>Uplink Step</td><td>Select the step to increase or decrease the uplink bitrate.</td></tr>
<tr><td>Downlink Action</td><td>Select the action type to apply to the downlink bitrate.</td></tr>
<tr><td>Downlink Step</td><td>Select the step to increase or decrease the downlink bitrate.</td></tr>
</table>
</td></tr>
</table>

Core Network Assistance Information For Inactive

Setting	Description
Core Network Assistance Information For Inactive	
UE Specific DRX	The UE Specific DRX value can be selected from the available options: • **DRX32** • **DRX64** (default value) • **DRX128** • **DRX256**

Setting	Description
	• **None** - if selected, this IE will not be included in the message
Include MICO Mode Indication	Indicates if the UE is configured with MICO Mode by the AMF. If disabled, this IE will not be included in the message.
Expected UE Behaviour	
Expected Handover Interval	The expected time interval between inter NG-RAN node handovers. When set to ***None***, this IE will not be included in the message. Select a value from the drop-dowm: • **None** (default) • **Sec15** • **Sec30** • **Sec60** • **Sec90** • **Sec120** • **Sec180** • **Long Time**
Expected UE Mobility	Indicates whether the UE is expected to be stationary or mobiles. When set to ***None***, this IE will not be included in the message. Select a value from the drop-dowm: • **None** (default) • **Stationary** • **Mobile**
Expected UE Activity Behaviour	
Expected Activity Period	The expected activity time in seconds. Any period longer than 180 seconds is represented by the value 181. When left empty, this IE will not be included in the message.
Expected Idle Period	The expected idle time in seconds. Any period longer than 180 seconds is represented by the value 181. When left empty, this IE will not be included in the message.
Source Of UE Activity Behaviour Information	Indicates the source of the UE activity behaviour. When set to 'None' this IE will not be included in the message. Select a value from the drop-down: • **None** (default) • **Subscription Information** • **Statistics**

Paging Settings

Setting	Description
Individual UE Paging	
Delay Before Paging (ms)	The time to wait before paging, after UE enters idle.
Paging Storm Iterations	The number of times the UE will be paged.
Paging Storm Interval (ms)	The delay between paging messages, in miliseconds.
UE Group Paging	*If selected, a group of Idle UEs will be paged from their last parent based on the configured criteria. The configuration is applied per parent node.*
Group Paging Condition	Select from the drop-down the condition that needs to be met in order to trigger Paging: • **Time To Wait** - is counted from the moment the first UE goes to idle or after one iteration completes (in case iterations is used). When this time elapses, all the UEs that are idle at that moment will be paged. • **Number Of UEs** - when the respective amount of UEs are in idle state, Paging will be triggered for all of them.
Group Paging Value	This is the condition value. The maximum value should be the same as for the maximum value for UE Range count.
Group Paging Iterations	The number of times to repeat the condition.
Group Paging Rate	The number of UEs per second for which Paging is started. The value zero disables the rate, and Paging will be done as soon as possible.
Paging Throttling	
Throttling Criterion	Select the criterion on which two consecutive Paging messages triggered by the downlink traffic should be sent: • Seconds • Packets
Value	Assign a number of seconds to wait, or packets to skip until Paging is sent again. A value of 0 disables this option.

Trace Settings

Setting	Description
Trace Activation Delay (s)	Time, in seconds, after the UE registers to send the Trace Activation. A value of zero means the Trace Activation is sent within the ICS Request message.

Setting	Description
Trace Deactivation Delay (s)	Time, in seconds, after the trace activation was sent for the CoreSim to deactivate the trace. A value of zero disables the trace deactivation.
Interfaces to Trace	Select the interfaces to trace from the drop-down.
Trace Depth	The expected time interval between inter NG-RAN node handovers.
Trace Collection Entity IP Address	The starting IP address.
MDT Settings	
MDT Activation	Select the Minimization of Drive Test (MDT) type used as MDT activation trigger. Options are: • **Immediate MDT Only** (default) • **Logged MDT Only** • **Immediate MDT Only and Trace**
Scope	Select the area scope of the MDT. You can choose from: • **Cell Based** • **TA Based** • **PLMN Wide** (default) • **TAI Based**
Cell Defining the Area Scope for MDT	IMPORTANT *This option appears only if the **Scope** is set to **Cell Based**.* *See Cell Defining the Area for MDT Settings table for more details.*
TACs Defining the Area Scope for MDT	IMPORTANT *This option appears only if the **Scope** is set to **TA Based**.* *See TACs Defining the Area for MDT Settings table for more details.*
TAIs Defining the Area Scope for MDT	IMPORTANT *This option appears only if the **Scope** is set to **TA Based**.* *See TAIs Defining the Area for MDT Settings table for more details.*
Mode	Select the MDT mode you want to apply. Options are: • **Immediate MDT** (default) • **Logged MDT**
Immediate MDT Settings	IMPORTANT *This option appears only if **Mode** is set to **Immediate MDT**.* *See Immediate MDT Settings table for more details.*

Setting	Description
Logged MDT Settings	IMPORTANT *This option appears only if **Mode** is set to **Logged MDT**.* *See Logged MDT Settings table for more details.*
Signaling Based MDT	*Select and click this setting to open the configuration panel. See Signaling Based MDT for more details.*

Cell Defining the Area for MDT Settings

Setting	Description
TACS:	
+	Select the Add TACS button to add a new UE ID to your test configuration.
Cell:	
🗑	Select the Delete Cell ID button to delete the UE ID from your test configuration.
PLMN MCC	The PLMN Mobile Country Code (MCC) used in the construction of the Cell ID.
PLMN MNC	The PLMN Mobile Network Code (MNC) used in the construction of the Cell ID.
Cell ID	The cell identifier of the UE.

TACs Defining the Area for MDT Settings

Setting	Description
TACS:	
+	This represents the Tracking Area Code (TAC) for this eNodeB. Select the **Add TAC** button to add a new TAC to your configuration. A Tracking Area Code (TAC) is a 2 or 3-octet string identifying a Tracking Area within a PLMN. A Tracking Area (TA) is a geographical combination of several neighboring base stations. When a UE is in the Idle state, its location is know to the network at the TA level (versus the cell level, as is the case with a UE in the Connected state). The TAC is used in the construction of the Tracking Area Identity (TAI).
🗑	Select the **Delete** button to remove the tracking area code from your configuration.

TAIs Defining the Area for MDT Settings

Setting	Description
TAI:	
	Select the Add TAI button to add a new TAI (Tracking Area Identity) to your test configuration.
TAI:	
	Select the Delete TAI button to delete this TAI from your test configuration.
PLMN MCC	The PLMN Mobile Country Code (MCC) used in the construction of the TAI.
PLMN MNC	The PLMN Mobile Network Code (MNC) used in the construction of the TAI.
TAI	The Tracking Area Identity (TAI) used in the construction of the TAI.

Immediate MDT Settings

Setting	Description
Measurements	
Logging M1 Event Triggered Measurements	If enabled, the UE logs the M1 measurements (RSRP/RSRQ) that are triggered by specific events.
DL Signal Quantities (M1)	*Select to enable and click to open the configuration panel.*
Reporting Trigger	Select the trigger for M1 measurement report. Options are: • **Periodic** • **A2 Event Triggered** • **A2 Event Triggered Periodic**
Event Type	IMPORTANT This option appears only if the **Reporting Trigger** is set to ***A2 Event Triggered*** or ***A2 Event Triggered Periodic***. Select a specific type of radio event configured for data collection during MDT operations. Options are: • **RSRP** • **RSRQ** • **SINR**

Setting	Description
Event Threshold	IMPORTANT This option appears only if the **Reporting Trigger** is set to ***A2 Event Triggered*** or ***A2 Event Triggered Periodic***. Set the value for the event. Allowed values are between 0 (default) and 127.
Report Interval	IMPORTANT This option appears only if the **Reporting Trigger** is set to ***Periodic*** or ***A2 Event Triggered Periodic***. Select from the drop-down the time interval between successive event notifications. Possible values are: **ms120**, **ms240**, **ms480**, **ms640**, **ms1024**, **ms2048**, **ms5120**, **ms10240**, **min1**, **min6**, **min12**, **min30**, **min60**.
Report Amount	IMPORTANT This option appears only if the **Reporting Trigger** is set to ***Periodic*** or ***A2 Event Triggered Periodic***. Select from the drop-down the number of measurement reports that the UE sends to the network before stopping. Possible values are: **r1**, **r2**, **r4**, **r8**, **r16**, **r32**, **r64**, **infinity**.
Power Headroom (M2)	*Select to enable and click to open the configuration panel.*
Enable M2 Measurement	If enabled, the UE will transmit Power Headroom (M2) values measured as the difference between the maximum transmission power of the UE and the current transmission power that the UE is using.
PDCP SDU Data Volume (M4)	*Select to enable and click to open the configuration panel.*
Collection Period	Select the time duration over which the User Equipment (UE) collects measurement data related to network performance. Possible values are: **ms1024**, **ms2048**, **ms5120**, **ms10240**, **min1**.
Links to log	Specifies which direction of the communication channel the measurements are collected from, impacting how network performance is analyzed and optimized. Available options are: • **Uplink** • **Downlink** • **Both Uplink and Downlink**
Average UE Throughout (M5)	*Select to enable and click to open the configuration panel.*
Collection Period	Select the time duration over which the User Equipment (UE) collects measurement data related to network performance. Possible values

Setting	Description
	are: **ms1024**, **ms2048**, **ms5120**, **ms10240**, **min1**.
Links to log	Specifies which direction of the communication channel the measurements are collected from, impacting how network performance is analyzed and optimized. Available options are: • **Uplink** • **Downlink** • **Both Uplink and Downlink**
Packet Delay (M6)	*Select to enable and click to open the configuration panel.*
Report Interval	Select from the drop-down the time interval between successive event notifications. Possible values are: **ms120**, **ms240**, **ms480**, **ms640**, **ms1024**, **ms2048**, **ms5120**, **ms10240**, **ms20480**, **ms40960**, **min1**, **min6**, **min12**, **min30**.
Links to log	Specifies which direction of the communication channel the measurements are collected from, impacting how network performance is analyzed and optimized. Available options are: • **Uplink** • **Downlink** • **Both Uplink and Downlink**
Packet Loss Rate (M7)	*Select to enable and click to open the configuration panel.*
Collection Period	Set the period (in minutes) in which the collection of data will occur.
Links to log	Specifies which direction of the communication channel the measurements are collected from, impacting how network performance is analyzed and optimized. Available options are: • **Uplink** • **Downlink** • **Both Uplink and Downlink**

Logged MDT Settings

Setting	Description
Report Type	Select the report type for logged MDTs. Options are: • **Periodic** • **Event Triggered**
Logging Interval	Specifies the time interval between consecutive logged measurements. Possible values are: **ms320**, **ms640**, **ms1280**, **ms2560**, **ms5120**,

Setting	Description
	ms10240, **ms20480**, **ms30720**, **ms40960**, **ms61440**, **infinity**.
Logging Duration	Defines the total duration for which the UE should perform logging of measurements. Once this duration expires, the UE stops logging. Possible values are: **m10**, **m20**, **m40**, **m60**, **m90**, **m120**.
Event Trigger	IMPORTANT This option is available only if the **Report Type** is set to ***Event Triggered***. Select from the drop-down the type of event trigger. Options are: • **Out of Coverage** • **L1 Event**
L1 Event Type	IMPORTANT This option is available only if the **Event Trigger** is set to ***L1 Event***. Select the threshold type of the L1 event trigger: • **RSRP** • **RSRQ**
L1 Event Threshold	IMPORTANT This option is available only if the **Event Trigger** is set to ***L1 Event***. Specify the threshold value for triggering a Layer 1 event.
Hysteresis	IMPORTANT This option is available only if the **Event Trigger** is set to ***L1 Event***. Define a margin above or below the L1 Event Threshold that must be exceeded before the event is triggered or canceled.
Time to Trigger	IMPORTANT This option is available only if the **Event Trigger** is set to ***L1 Event***. Select from the drop-down the time during which specific criteria for the event has to be met in order to trigger a measurement report. Available values are: **ms0**, **ms40**, **ms64**, **ms80**, **ms100**, **ms128**, **ms160**, **ms256**, **ms320**, **ms480**, **ms512**, **ms640**, **ms1024**, **ms1280**, **ms2560**, **ms5120**.

Signaling Based MDT

Setting	Description
PLMNs:	
+	Select the Add PLMN button to add a new public land mobile network to your test configuration.
PLMN:	

Setting	Description
	Select the Delete PLMN button to delete the public land mobile network from your test configuration.
PLMN MCC	The Mobile Country Code (MCC) is a three-digit code that uniquely identifies the country of domicile of the mobile subscriber.
PLMN MNC	The Mobile Network Code (MNC) is a two-digit (North America) or three-digit (European Standard) code that is used in combination with a Mobile Country Code (MCC) to uniquely identify a mobile network operator. Add the MNC that will be assigned to each UE in this range.

Management Based MDT

Setting	Description
PLMNs:	
	Select the Add PLMN button to add a new public land mobile network to your test configuration.
PLMN:	
	Select the Delete PLMN button to delete the public land mobile network from your test configuration.
PLMN MCC	The Mobile Country Code (MCC) is a three-digit code that uniquely identifies the country of domicile of the mobile subscriber.
PLMN MNC	The Mobile Network Code (MNC) is a two-digit (North America) or three-digit (European Standard) code that is used in combination with a Mobile Country Code (MCC) to uniquely identify a mobile network operator. Add the MNC that will be assigned to each UE in this range.

Mobile Terminated SMS Configuration

Setting	Description
Delay	After the UE registers, the network waits the configured number of seconds before it initiates the MT SMS.
Originating Address	The originating address of the SMS text message.
Service Center Address	The service center address of the SMS text message.
Type of Number	Select from the drop-down the type of number to be used. Options are: • Unknown • International Number

Setting	Description
	• National Number • Network Specific Number • Subscriber Number • Alphanumeric • Abbreviated Number • Reserved Number
Numbering Plan Identification	Select from the drop-down the numbering plan identification. Options are: • Unknown • ISDN • Data Numbering Plan • Telex Numbering Plan • National Numbering Plan • Private Numbering Plan • Ermes Numbering Plan • Reserved Numbering Plan
Text	The actual text message of the SMS.
Character Set	Select the character set used in the data coding scheme for the text message. Options are: • GSM7 • UCS2

UE Subscribed AMBR settings

Each UE range has a set of **Subscribed AMBR** settings that configure the Aggregate Maximum Bit Rate (AMBR) for which the UEs in the range are subscribed.

Setting	Description
Subscribed AMBR:	
Subscribed AMBR Uplink	The subscribed uplink UE AMBR value for this range of UEs. Applicable to simulated UDM NF, part of the UE subscription Access and Mobility Data.
Subscribed AMBR Uplink Unit	The unit in which the rate is expressed. The options range from bps to Tbps.
Subscribed AMBR Downlink	The subscribed downlink UE AMBR value for this range of UEs. Applicable to simulated UDM NF, part of the UE subscription Access and Mobility Data.

Setting	Description
Subscribed AMBR Downlink Unit	The unit in which the rate is expressed. The options range from bps to Tbps.

DNNs Config

You use the DNNs Config panel to configure one or more Data Network Names (DNNs) for each UE range. These settings establish a mapping between DNNs and UE IPs, thereby enabling multiple PDU sessions for each UE in the range.

The following table describes the UE **DNNs Config** settings.

Setting	Description
DNNs Config:	
	From the panel, you can select a DNN Config for editing and also add addition DNN configurations. Select the **Add DNNs Config** button to add a new DNN configuration.
DNN Config:	
	Select the **Delete DNN Config** button to delete this DNN config from your test configuration.
SSC Mode	Session and Service Continuity (SSC) Mode for this DNN: • SSC Mode 1: The network preserves the connectivity service provided to the UE. The PDU Session IP address (IPv4, IPv6, IPv4v6) is preserved. • SSC Mode 2: The network may release the connectivity service delivered to the UE and release the corresponding PDU Sessions. The release of the PDU induces the release of the IP addresses (IPv4, IPv6, IPv4v6) that had been allocated to the UE. • SSC Mode 3: Changes to the user plane can be visible to the UE, while the network ensures that the UE suffers no loss of connectivity. A connection through a new PDU Session Anchor point is established before the previous connection is terminated in order to allow for better service continuity. The IP address (IPv4, IPv6, IPv4/v6) is not preserved in this mode when the PDU Session Anchor changes.
Session ID	Provide the session ID value.
Deactivation Delay (s)	Delay measured from PDU Session Establishment until CN initiated selective deactivation of the User Plane connection.
Reactivation Delay (s)	Delay measured from CN initiated selective deactivation of a User Plane connection until UE initiated reactivation (Service Request in CM-Connected Mode).
DNN	Select one of the previously-defined DNNs from the drop-down list.

Setting	Description
Local IPv4 Address	The IPv4 address that the UE receives from the SMF during PDU Session Establishment. This address is used for L4-7 traffic (source IP for the UL traffic, destination IP for the DL traffic. IP address is also used to create UE Routes from DN.
Local IPv4 Prefix Length	The IP address prefix assigned to this range. It specifies the number of leftmost bits in the address, which indicates the network portion of the address.
Local IPv4 Address Increment	The value by which the IP addresses will be incremented.
Configure S-NSSAI:	*When this check-box is selected, you can configure which slice (S-NSSAI) to be send in PDU Session Establishment messages. If the check-box is not selected, the first slice from Allowed NSSAI list (received in Registration Accept) is used in PDU Session Establishment message.* NOTE *This is applicable for the N1/N2 interface only and is not propagated beyond the AMF.*
S-NSSAI	This list contains all the slices defined for the selected UE range. Select from the drop-down list the slice to be used in PDU Session Establishment.
Force S-NSSAI	This option is used to control the behavior in case you select a slice that is not part of Allowed NSSAI received from AMF, as follows: • if the check-box is not selected, the UE will not send any slice in PDU Session Establishment message (as the slice selected from the above list is not part of Allowed NSSAI). • if the check-box is selected, the UE will use the slice selected from the above list, although it is not part of Allowed NSSAI. This option is for negative testing purposes, and it is expected the PDU Session Establishment to fail as it uses a slice that is not allowed.
Secondary Authentication:	
Method type	The following options are available: • **None** • **EAP-TTLS** (Extensible Authentication Protocol – Tunnelled Transport Layer Security) • **CHAP** (Challenge-Handshake Authentication Protocol) • **PAP** (assword Authentication Protocol)
EAP-TTLS Auth Method:	
CA Certificate	Provide the client certificate.
Tunneled	Select the tunneled authentication method:

Setting	Description
Authentication Method	• **PAP** • **CHAP**
Password	Provide the password.
Send User Identity	By default, this option is disabled. Enabling this option will add SM PDU DN Request Container IE (Authentication Identity) to the PDU Session Establishment Request message send by NG-RAN.
Chap Auth Method:	
User	Provide the user.
Secret	Provide the password.
PAP Auth Method:	
User	Provide the user.
Password	Provide the password.

SMS Configuration

The following table describes the UE **SMS Configuration** settings.

Setting	Description
Mobile Settings:	
Service Center Address	The service center address used by the UE range for SMS messaging.
Type of Number	The type of number can be one of the following: • Unknown • International number • National number • Network specific number • Subscriber number • Alphanumeric • Abbreviated number
Numbering Plan Identification	The numbering plan identification can be one of the following: • Unknown • ISDN • Data numbering plan

Setting	Description
	• Telex numbering plan • National numbering plan • Private numbering plan • ERMES numbering plan
Character Set	The character set used in the data coding scheme for the text message.
Text Message	The content of text message sent by the UE via SMS.

Untrusted WiFi Settings

The following table describes the UE **Untrusted WiFi Settings** settings.

Setting	Description
Remote N3IWF	Select the remote N3IWF range from drop-down list.
Destination Port	Read-only field. Value set to **500**.
Source Port	Provide the source port. By default, set to **500**.
Enable NAT-T	Select to enable the NAT Traversal keepalive.
NAS IP Type	Select the NAS IP type from the drop-down list: **IPv4** (default) or **IPv6**.
Configure a CA Certificate	By default this option is disabled. When enabled, the CA Certificate drop-down is displayed which allows the selection of one of the CA Certificates defined in global settings.
CA Certificate	IMPORTANT This parameter appears only if Configure a CA Certificate is enabled. Select the CA Certificate from the drop-down list.
IKE Phase 1	
Encryption Algorithm	Select the encryption algorithm from the drop-down list. Default value: **AES-128-GCM-16**. Available options: **AES-128-CBC**, **AES-192-CBC**, **AES-256-CBC**, **AES-128-GCM-16**, **AES-192-GCM-16**, **AES-256-GCM-16**.
Hash Algorithm	Select the hash algorithm from the drop-down list. Default value: **NONE**. Available options: **NONE**, **HMAC-MD5-96**, **HMAC-SHA1-96**, **HMAC-MD5-128**, **HMAC-SHA1-160**, **HMAC-SHA2-256-128**, **HMAC-SHA2-384-192**, **HMAC-SHA2-512-256**. Restrictions:

Setting	Description
	• When *Encryption Algorithm* is set to one of **AES-128-GCM-16**, **AES-192-GCM-16** or **AES-256-GCM-16**, the only available *Hash Algorithm* is **NONE**. • If **Encryption Algorithm** is set to a value other than one of **AES-128-GCM-16**, **AES-192-GCM-16** or **AES-256-GCM-16**, the **NONE** hash algorithm is not available.
DH Group	Select an option from the drop-down list. Available options are: **modp768(1)**, **modp1024(2)**, **modp1536(5)**, **modp2048(14)**, **modp3072(15)**, **modp4096(16)**, **modp6144(17)**, **modp8192(18)**, **prime256v1(19)**, **secp384r1(20)**, **secp521r1(21)**, **prime192v1(25**, **secp224r1(26)**, **x25519(31)**, **x448(32)**. Default value: **prime256v1(19)**.
PRF Algorithm	Select an option from the drop-down list. Default value: **HMAC-SHA256**. Available options: **HMAC-MD5**, **HMAC-SHA1**, **HMAC-SHA256**, **HMAC-SHA384**, **HMAC-SHA512**.
IKE Phase 2	
Encryption Algorithm	Select the encryption algorithm from the drop-down list. Default value: **AES-128-GCM-16**. Available options: **AES-128-CBC**, **AES-192-CBC**, **AES-256-CBC**, **AES-128-GCM-16**, **AES-192-GCM-16**, **AES-256-GCM-16**.
Hash Algorithm	Select the hash algorithm from the drop-down list. Default value: **NONE**. Available options: **NONE**, **HMAC-MD5-96**, **HMAC-SHA1-96**, **HMAC-MD5-128**, **HMAC-SHA1-160**, **HMAC-SHA2-256-128**, **HMAC-SHA2-384-192**, **HMAC-SHA2-512-256**. Restrictions: • When *Encryption Algorithm* is set to one of **AES-128-GCM-16**, **AES-192-GCM-16** or **AES-256-GCM-16**, the only available *Hash Algorithm* is **NONE**. • If **Encryption Algorithm** is set to a value other than one of **AES-128-GCM-16**, **AES-192-GCM-16** or **AES-256-GCM-16**, the **NONE** hash algorithm is not available.
Identification	
Local Identification Type	Select an option from the drop-down list. Select an option from the drop-down list. Available options are: **ID_IPV4_ADDR**, **ID_FQDN**, **ID_USER_FQDN**, **ID_IPV6_ADDR**, **ID_DER_ASN1_DN**, **ID_KEY_ID**. Default value: **ID_FQDN**.

Setting	Description
Local Identification Value	Set the value for this parameter. This field is mandatory if the *Local Identification Type* is set to: **ID_FQDN**, **ID_KEY_ID** or **ID_RFC822_ADDR**.
Timers	
Enable Rekey	By default, this option is disabled. Select the toggle button to enable it.
IKE Phase 1 (IKE) Lifetime (s)	Set a value for this parameter. Default value: **0** (disabled).
IKE Phase 1 (IKE) Lifetime (s)	Set a value for this parameter. Default value: **0** (disabled).
DPD Interval (s)	Set a value for this parameter. Default value: **0** (disabled).

Network Slicing settings

A UE may access multiple *network slices* over a single Access Network. A Network Slice is defined within a PLMN and includes the Core Network Control Plane and User Plane Network Functions. In addition, it includes the NG Radio Access Network and/or the N3IWF functions to the non-3GPP Access Network. It functions as a logical end-to-end network that runs on a shared physical infrastructure, capable of providing specific network capabilities and characteristics.

Each UE range requires at least one NSSAI (Network Slice Selection Assistance Information) range.

The **Network Slicing** settings include:

UE NSSAI settings

Each UE range requires at least one NSSAI range.

An NSSAI (Network Slice Selection Assistance Information) is a collection of S-NSSAIs (Single Network Slice Selection Assistance Information). An NSSAI may be a Configured NSSAI, a Requested NSSAI, or an Allowed NSSAI. A maximum of eight S-NSSAIs can be sent in signaling messages between the UE and the Network. The Requested NSSAI signaled by the UE to the network allows the network to select the Serving AMF, Network Slice(s), and Network Slice instance(s) for the UE.

The S-NSSAI information element includes a mandatory Slice/Service Type (SST) field, an optional Slice Differentiator (SD) field, and it can also include an optional Mapped Configured SST and an optional Mapped Configured SD.

The NSSAI slices are the ones supported by UE (DNN mapping is done from here also) that will be sent in NAS messages (for example Registration, PDU Session Establishment).

The following table describes the **UE NSSAI** settings.

Setting	Description
UE NSSAI:	
+	Select the **Add UE NSSAI** button to add a new UE NSSAI to your test configuration.
UE NSSAI settings:	
🗑	Select the **Delete UE NSSAI** button to delete this UE NSSAI from your test configuration.
SST	The value that identifies the SST (Slice/Service Type) for this S-NSSAI. SST comprises octet 3 in the S-NSSAI information element. The standardized SST values are: **SST** / **Value** eMBB / 1 URLCC / 2 MIoT / 3
SD	The Slice Differentiator (SD) value for this S-NSSAI. SD is an optional information that differentiates amongst multiple Network Slices of the same Slice/Service type. The SD field comprises octets 4 through 6 in the S-NSSAI.
Mapped SST	The Mapped configured Slice/Service Type (SST) value for this S-NSSAI.
Mapped SD	The Mapped configured Slice Differentiator (SD) value for this S-NSSAI.

UDM SNSSAI Mappings

You can add and delete SNSSAI Mappings as required to meet your test objectives.

In an Initial Registration or Mobility Registration Update, the UE may include the Mapping Of Requested NSSAI, which is the mapping of each S-NSSAI of the Requested NSSAI to the HPLMN S-NSSAIs. This mapping ensures that the network can verify whether or not the S-NSSAIs in the Requested NSSAI are permitted based on the Subscribed S-NSSAIs.

The following table describes the UE **UDM SNSSAI Mapping** settings.

Setting	Description
UDM SNSSAI Mapping:	
+	Select the **Add SNSSAI Mapping** button to add the NSSAI mapping to your test configuration.

Setting	Description
UDM SNSSAI Mapping settings:	
	Select the **Delete SNSSAI Mapping** button to delete this NSSAI mapping from your test configuration.
SST	The Slice/Service Type (SST) value.
SD	The Slice Differentiator (SD) value for this S-NSSAI.
Mapped SST	The Mapped Slice/Service Type (SST) value for this S-NSSAI.
Mapped SD	The Mapped Slice Differentiator (SD) value for this S-NSSAI.
DNNS	The Subscription Information for each S-NSSAI may contain a Subscribed DNN list. Select all DNNs required to be activated in this S-NSSAI (via multiple PDU Sessions).

Objectives

In a CoreSIM test, an *objective* is a set of performance and event targets that the test is attempting to achieve. The objectives are individually configured for a given UE range. A test, therefore, may have multiple UE ranges each of which is attempting to achieve a specific set of objectives.

Test Objective categories:

Control Plane Objective

You configure Control Plane Objectives for each individual UE range. They are structured as Primary and Secondary objectives. The focus of the primary objectives is on the establishment of subscriber PDU sessions, whereas the focus of the secondary objectives is on the achievement of specific mobile user events during those sessions.

Refer to the following topics for descriptions of the Control Plane Objective settings:

- About primary objectives
- Primary Control Plane Objective
- Secondary Control Plane Objective

About primary objectives

In the current CoreSIM release, there are two available primary objectives: *active subscribers* and *subscribers per second*. This topic gives a general description of their respective roles and behaviors.

- Active Subscribers
- Subscribers Per Second

Active Subscribers

The active subscribers objective operates over a sequence of three phases: ramp up, sustain, and ramp down. Each of these has its own scope.

Phase	Activity during this phase
Ramp up	Registration + PDU Session Establishment (if enabled via DNNs to Activate option)
Sustain time	Traffic and/or secondary objectives are executed
Ramp down	Delete PDU Session (if enabled) + Deregistration

This can be viewed as a timeline:

|------- Ramp up -------|--------- Sustain ---------|------- Ramp down -------|

Observations:

- The duration of the ramp up phase is not directly configurable. The ramp up time is automatically computed from the total number of subscribers in the range divided by the configured Ramp-up Rate (`<number_of_subscribers_in_the_range> / <RampUpRate>`).
  If the ramp up rate cannot be maintained, ramp up will last longer.
- During the sustain time phase, only secondary objectives are running.
- If configured, uplink traffic will start after the ramp up stage is complete.
- Subscribers will accept any downlink traffic once they are attached (registered and PDU session established).
- The duration of ramp down is not directly configurable. The ramp down time is automatically computed from the total number of subscriber in the range divided by the configured Ramp-up Rate (`<number_of_subscribers_in_the_range> / <RampUpRate>`).
  If the ramp down rate cannot be maintained, ramp down will last longer.
- All User Plane Traffic except Stateless UDP will be started during Ramp Up phase. Stateless UDP traffic starts after all UEs have Registered and Established PDU Sessions.

Example:

Consider a test with 20000 subscribers, configured with an active subscribers objective with a ramp up rate of 1000/s, a secondary objective with a rate of 2000/s, and a sustain time set for 30 seconds. Such a test will give the following results.

Ramp Up Time:	20000 / 1000 = 20s for subscribers to register
Rate in ramp up time:	1000 registrations per second
Sustain time:	30 seconds
Rate in sustain time:	2000 secondary procedures per second
Ramp down time:	20000 / 1000 = 20s for subscribers to deregister
Rate in ramp down time:	1000 deregistrations per second

Subscribers Per Second

The Subscribers per Second objective operates over two phases: sustain and ramp down.

Phase	Activity during this phase
Sustain time	All objectives will run: primary objective—both registration and deregistration—and all secondary objectives.
Ramp down	Deregistration will be executed for the UEs that did not complete the hold time during the sustain phase.

This can be viewed as a timeline:

|---------- Sustain ----------|------- Ramp down -------|

Observations:

- The duration of ramp down is equal to the value of hold time.
- During the ramp down time, only deregistration occurs.

Example:

Consider a test with 20000 subscribers, configured with: a Subscribers per Second primary objective with a rate of 1000/s and a hold time of 10s, a secondary objective with a rate of 2000/s, and a Sustain time configured for 30 seconds.

Such a test will give the following results.

Sustain time:	30 seconds
Rate in sustain time:	~4000 per second (1000 per second from registration + 1000 per second from deregistration + 2000 per second from secondary objective, because both primary and secondary objective will run at the same time)
Ramp down time:	10 seconds
Rate in ramp down time:	1000 deregistrations per second

Primary Control Plane Objective

Control Plane Objectives are structured as Primary and Secondary objectives. The focus of the primary objectives is on the establishment of subscriber PDU sessions.

The following table describes the **Primary** control plane objectives.

Parameter	Description
Objective Type	Select the desired Primary Objective Type: • **Active Subscribers**: The test attempts to activate and maintain the configured objective throughout the entire sustain time. Deactivation procedures will start only at the end of the sustain time. • **Subscribers Per Second**: The test attempts to activate a specified number of subscriber sessions per second, within the rate and time parameters that you configure. The panel will display the settings for the selected Objective Type.
Active Subscribers:	
Ramp-up Rate	The number of UE registrations that the test will establish per second. In the current release, each UE registration establishes exactly one PDU session.

Parameter	Description
Sustain Time (s)	The duration of time (in Seconds) that each subscriber session will be active.
Max Outstanding	The maximum number of UE registration procedures that may be outstanding while new procedures are being started. If the number of outstanding procedures reaches this limit, no new procedures may be started until the outstanding procedures have successfully started.
Delay (s)	The number of seconds to wait before starting the objective after NG-Setup/S1-Setup have successfully completed.
DNNs to Activate	Select the DNNs to activate for this secondary objective. (These are the DNNs configured for the UE in the **DNNs Config** Range settings.) The choices are: • All: Select this item to choose all of the available DNNs that are configured for the UE. • specific DNNs: Select one or more of the individual DNNs from the list. The list of available DNNs include those that have not been activated for the primary objective.
Number of Retries	This value indicates how many times UE/NGRAN will retry the Register or PDU Session Establishment procedures if any message from these procedures encounters an error (timeout or an error is received). The available options are: • **-1** : infinite retries for entire sustain time. • **0** (default value) : the retry option is disabled. • **1** to **127**: the number of retries per UE (Register + PDU Session procedure).
Subscribers Per Second:	
Hold Time (s)	The number of seconds that each subscriber session will remain active. This is, therefore, the amount of time that will elapse between the subscriber attach and the subscriber detach. At the end of the session hold time, the subscriber performs the detach procedure.
Rate	The number of subscriber sessions to activate per second.
Sustain Time (s)	The duration of time (in Seconds) that the specified session activation rate will be maintained.
Max Outstanding	The maximum number of UE registration procedures that may be outstanding while new procedures are being started. If the number of outstanding procedures reaches this limit, no new procedures may be started until the outstanding procedures have successfully started.
Delay (s)	The number of seconds to wait before starting the objective after NG-Setup/S1-

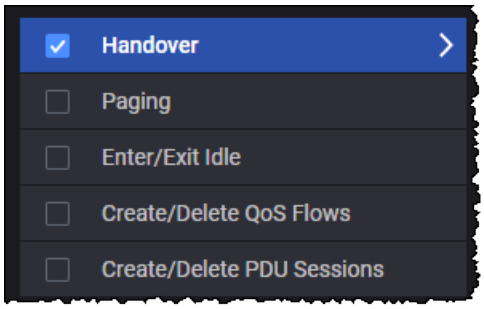
Parameter	Description
	Setup have successfully completed.
DNNs to Activate	Select the DNNs to activate for this secondary objective. (These are the DNNs configured for the UE in the **DNNs Config** Range settings.) The choices are: • All: Select this item to choose all of the available DNNs that are configured for the UE. • specific DNNs: Select one or more of the individual DNNs from the list. The list of available DNNs include those that have not been activated for the primary objective.

Secondary Control Plane Objective

The focus of the secondary objectives is on the achievement of specific mobile user events during subscriber PDU sessions. For each primary objective that you configure for the UE range, you can select one or multiple Secondary Objectives.

IMPORTANT The number of UEs must be equal to or greater than the number of secondary objectives configured, in order for all objective procedures to execute. For example, if only one UE is configured and two secondary objectives are configured (such as Handover and Enter/Exit Idle), one of the objectives will be skipped.

In this example, only Handover has been selected:



Note that:

When the primary objective is:	then the secondary objectives will start...
Active Subscribers	after all users are registered.
Subscribers Per Second	at the beginning of the test (immediately after the first user has registered).

Refer to the following topics for descriptions of the Secondary Control Plane objectives:

- Handover
- Paging
- Enter/Exit Idle
- Create/Delete QoS Flows
- Create/Delete PDU Sessions
- SMS

Handover

When you configure a **Handover** secondary objective, each of the active subscribers configured for the primary objective attempts to execute the handover event defined for the objective. During a handover, the UEs in the range are moving amongst a group of NG-RANs. At the start of a handover, the UEs are registered with the Parent NG-RAN (which is configured in the UE Range panel). The UEs then traverse the NG-RANs that you configure (the *Visited NG-RAN* list).

Handover configuration parameters

The following table describes these objective parameters.

Parameter	Description
Handover:	
Iterations	The number of times this procedure runs for each subscriber, it can be finite or infinite (set to zero).
Rate	The rate at which handovers are initiated, measured in procedures per second if **Distributed over (s)** is not modified.
Distributed over (s)	Used to configure procedure rate less than 1/sec. Example: if configured as 3, test will execute one procedure every 3 seconds.
Max Outstanding	The maximum number of UE registration procedures that may be outstanding while new procedures are being started. If the number of outstanding procedures reaches this limit, no new procedures may be started until the outstanding procedures have successfully started.
Delay (s)	The number of seconds to wait before starting the secondary objective, from the start of sustain time.
Force N2 Handover	Enable this option to force N2 handover with direct forwarding instead of X2 / Xn handover.
Mobility for State	This option specifies in what state should the UE perform the handover objective. The following options can be selected from the drop-down list: • **Connected** • **Idle**

Parameter	Description
	• **Any** When **Any** is selected, the UE will execute the handover objective, regardless if the UE is in Connected or Idle state.
Force UE State Before Returning to Parent Node	Select an option from the drop down list: • **None** - The UE will perform either Idle Mode Mobility or Connected Handover to parent RAN, depending on what state the UE is before executing the procedure. • **Connected** - The UE will perform Connected Handover from the last node in the visited gNodeBs/eNodeBs list to the parent RAN. This means that **if the UE was in idle state** before performing this mobility, the UE will **first perform exit idle**, and only after the UE is in connected state, will it initiate **the connected handover** to the parent RAN. • **Idle** - The UE will perform Idle Mode Mobility from the last node in the visited gNodeBs/eNodeBs list to the parent RAN. This means that if the UE was in **connected** state before performing this mobility, the UE will **first perform enter idle**, and only after the UE is in idle state, will it initiate the **idle mode mobility** to the parent RAN.
Send Service Request after Returning to Parent Node	By default, this option is disabled. Send Service Request immediately after Return to Parent Node Mobility if UE State was idle.
Handover Cancel	*When this option is enabled, NG-RAN will trigger a Handover Cancel after receiving Handover Request from AMF. Handover Cancel is applicable only for N2 Handover.*
Percentage	The percentage of N2 Handover Procedures that will trigger a Handover Cancel from the gNodeB.
Seed	The seed of Random Number Generator.
Visited gNodeBs/eNodeBs/UNAPs : A list of the NG-RANs that UEs will visit during the test.	
	Add next node to the list.
	Remove the selected node from the list.
Force UE State before Mobility	The following options can be selected from the drop-down list: • **Connected** • **Idle** • **Any**
Primary Node	Select the primary node from the drop-down list.

Parameter	Description
	If an UNAP is selected as the Primary Node, the Secondary Node field will not be displayed.
Secondary Node	Select the secondary node from the drop-down list.
Send Service Request After Mobility	By default, this option is disabled. Send Service Request immediately after Mobility if UE State was idle.

Paging

When you configure a **Paging** secondary objective, each of the active subscribers configured for the primary objective attempts to execute the Paging event defined for the objective. Upon receiving a Paging message, each simulated UE—the UEs are in CM-IDLE state—will initiate the UE Triggered Service Request procedure (Reference: 23.502, section 4.2.3.2).

The following table describes the Paging objective parameters.

Parameter	Description
Paging:	
Iterations	The number of times this procedure runs for each subscriber, it can be finite or infinite (set to zero).
Rate	The rate at which procedures are initiated, measured in procedures initiated per second.
Distributed over (s)	Used to configure procedure rate less than 1/sec. Example: if configured as 3, test will execute one procedure every 3 seconds.
Max Outstanding	The maximum number of procedures that may be outstanding while new procedures are being started. If the number of outstanding procedures reaches this limit, no new procedures may be started until the outstanding procedures have successfully started.
Delay (s)	The number of seconds to wait before starting the secondary objective, from the start of sustain time.
Suspend Traffic Interval (s)	The time (in seconds) to suspend traffic on the remote IP address.
Remote IP Address	Set the remote IP address: • If the UPF is the DUT in the test topology, then set the *Remote IP Address* to the DN IP address. • If the UPF is simulated in the test topology, then set the *Remote IP Address* to the N3 IP address of the UPF.

Notes:

- Paging objective should be configured with **Stateless UDP** as User Plane.
- Enter IDLE procedure is executed for each UE after Delay(s) once DN responds to instrumentation packet sent inband by the UE. See also *Global Settings* > *Advanced Settings* > *Traffic Settings* > *Traffic Control Port*.
- Following Enter IDLE, Downlink User Plane traffic is suspended for *Suspend Traffic Interval (s)*.

Enter/Exit Idle

When you configure an **Enter/Exit Idle** secondary objective, each of the active subscribers configured for the primary objective attempts to transition between the CM-IDLE and CM-CONNECTED states.

NOTE When UE is scheduled to Exit Idle but the UE state is not Idle anymore (for example Paging event occurred), the Exit Idle procedure cannot be performed, therefore the Service Request is going to be skipped and the statistics for Service Request Skipped (on NG-RAN) will be incremented accordingly.

The following table describes the objective parameters.

Parameter	Description
Enter Exit Idle:	
Iterations	The number of times this procedure runs for each subscriber, it can be finite or infinite (set to zero).
Rate	The rate at which procedures are initiated to transition UEs between the CM-IDLE state to the CM-CONNECTED states, measured in state transitions per second.
Distributed Over (s)	Used to configure procedure rate less than 1/sec. Example: if configured as 3, test will execute one procedure every 3 seconds.
Max Outstanding	The maximum number of procedures that may be outstanding while new procedures are being started. If the number of outstanding procedures reaches this limit, no new procedures may be started until the outstanding procedures have successfully started.
Delay (s)	The number of seconds to wait before starting the secondary objective, from the start of sustain time.
Interval	The number of seconds to wait between each successive state transition.

Create/Delete QoS Flows

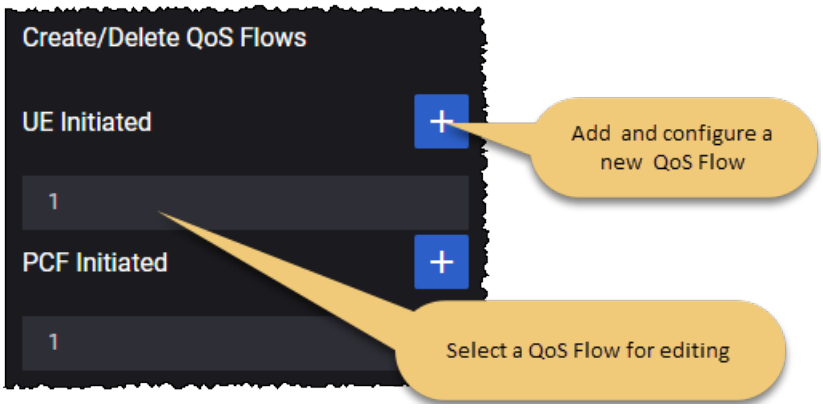
When you configure a **Create/Delete QoS Flows** secondary objective, each of the active subscribers configured for the primary objective attempts to meet the requirements defined by the QoS Flow ID. The selected flows will be created following a configured *Delay* value, and deleted when the configured *Interval* expires.

QoS flow options

There are two options for creating QoS flows:

- UE initiated - the QoS flows are initiated by the UE
- PCF Initiated - the QoS flows are network initiated

The QoS Flow panel contains the configuration settings for an individual QoS Flow (UE initiated or PCF initiated).



Objective parameters

The following table describes the objective parameters (for both UE initiated QoS flows and PCF initiated QoS flows).

Parameter	Description
Create/Delete QoS Flows:	
+	Select the **Add Objective** button to add an instance of this objective.
Objective:	
🗑	Select the **Delete Objective** button to delete this Secondary Objective from your test configuration.
Iterations	The number of times this procedure runs for each subscriber, it can be finite or infinite (set to zero).
Rate	The rate at which procedures are initiated, measured in procedures initiated per second. Using higher values for this parameters requires a large number of UEs configured in the test in order to achieve the desired rate.
Distributed over (s)	Used to configure procedure rate less than 1/sec. Example: if configured as 3, test will execute one procedure every 3 seconds.
Max	The maximum number of procedures that may be outstanding while new

Parameter	Description
Outstanding	procedures are being started. If the number of outstanding procedures reaches this limit, no new procedures may be started until the outstanding procedures have successfully started.
Delay(s)	The number of seconds to wait before starting the secondary objective, from the start of sustain time.
Interval	Interval between the triggering of creation and deletion of the QoS flow, in seconds.
DNN	Select the DNN value for the drop-down list. For example: `dnn.keysight.com`.
QoS Flow ID	Select the QoS Flows ID(s) from the drop-down list.

Support for Network Initiated QoS Flow modification

The Create/Delete QoS Flows secondary objective also provides support for Network Initiated QoS Flow modification of existing QoS flows on the N1/N2 interfaces. This support is available when all topology nodes except for **RAN** are selected as DUTs.

By triggering the Network Initiated PDU Session Modification procedure, the network can modify the following parameters of the existing QoS flows, both default and dedicated:

- ARP
- QoS flow descriptions parameters (MBR, GBR)
- Session AMBR
- QoS rules – all supported filters

Notes:

- In order to modify the default QoS flow, it needs to be configured on the DNN tab.
  The QoS Flows and DNNs are configured in the Global Settings.
- None of the parameters changed by the network initiated QoS flow modification will be enforced.
- The NG-RAN node supports handling the QoS flow modification procedure only for one PDU session per procedure (Create QoS Flow, Modify QoS Flow, Release QoS Flow).
- For UE Initiated dedicated QoS Flows, the interval between the creation and deletion of the QoS flow should be large enough to support the successful finalization for the modification of the existing QoS flow. (*Interval* is one of the Objective settings.)

Create/Delete PDU Sessions

When you configure a **Create/Delete PDU Sessions** secondary objective, each of the active subscribers configured for the primary objective attempts to meet the requirements specified by the objective configuration. The PDU sessions will be created following a configured *Delay* value, and then deleted when the configured *Interval* expires.

The following table describes the objective parameters.

Parameter	Description
Create/Delete PDU Sessions:	
	Select the **Add Objective** button to add an instance of this objective.
Objective:	
	Select the **Delete Objective** button to delete this Secondary Objective from your test configuration.
Iterations	The number of times this procedure runs for each subscriber, it can be finite or infinite (set to zero).
Rate	The rate at which procedures are initiated, measured in procedures initiated per second. Using higher values for this parameters requires a large number of UEs configured in the test in order to achieve the desired rate.
Distributed over (s)	Used to configure procedure rate less than 1/sec. Example: if configured as 3, test will execute one procedure every 3 seconds.
Max Outstanding	The maximum number of procedures that may be outstanding while new procedures are being started. If the number of outstanding procedures reaches this limit, no new procedures may be started until the outstanding procedures have successfully started.
Delay(s)	The number of seconds to wait before starting the secondary objective, from the start of sustain time.
Interval	The interval between the triggering of creation and deletion of the PDU Session, in seconds.
DNNs to Activate	Select the DNNs to activate for this secondary objective. (These are the DNNs configured for the UE in the **DNNs Config** Range settings.) The choices are: • All: Select this item to choose all of the available DNNs that are configured for the UE. • specific DNNs: Select one or more of the individual DNNs from the list. The list of available DNNs include those that have not been activated for the

Parameter	Description
	primary objective. You configure DNNs for the selected UE in the **DNNs Config** Range settings. The list of available DNNs include those that have not been activated for the primary objective.

SMS

This objective will perform the procedure of sending SMS messages.

The following table describes the objective parameters.

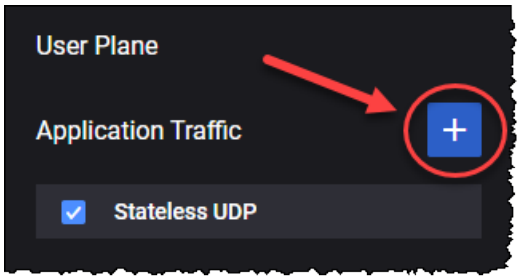
Parameter	Description
Iterations	The number of times this procedure runs for each subscriber, it can be finite or infinite (set to zero).
Rate	The rate at which procedures are initiated, measured in procedures initiated per second. Using higher values for this parameters requires a large number of UEs configured in the test in order to achieve the desired rate.
Distributed over (s)	Used to configure procedure rate less than 1/sec. Example: if configured as 3, test will execute one procedure every 3 seconds.
Max Outstanding	The maximum number of procedures that may be outstanding while new procedures are being started. If the number of outstanding procedures reaches this limit, no new procedures may be started until the outstanding procedures have successfully started.
Delay(s)	The number of seconds to wait before starting the secondary objective, from the start of sustain time.
Destination MSISDN	The MSISDN of the destination UE for the sent SMS.
Destination MSISDN Increment	The increment for the destination MSISDN.

NOTE No support for MT only SMS (CoreSIM initiated SMS).

User Plane Objectives

The User Plane Objectives focus on the rate and volume of user plane traffic that the simulated UEs are sending to the 5G network. You define separate User Plane objectives for each UE range.

CoreSIM provides multiple traffic application that can be added by selecting the **Add Objective** button.



NOTE Based on your test requirements, the configuration of the User Plane Objectives may involve settings for the traffic generators on the UE and also on the DN. For the DN User Plane settings, refer to DN User Plane.

The following table describes the Application Traffic generation parameters.

Parameter	Description
+	Select this button to add a new application traffic objective. The objective can be: • **Stateless UDP** • **Data** • **Voice** • **Video OTT** • **DNS Client** • **Predefined Applications** • **ICMP Client** • **Capture Replay** • **Synthetic** • **UDG**
🗑	Select this button to remove the application traffic objective from your test configuration.
Stateless UDP	For the settings required to configure the Stateless UDP traffic objective, refer to Stateless UDP Traffic.
Data	For the settings required to configure the Data traffic objective, refer to Data Traffic.
Voice	For the settings required to configure the Voice traffic objective, refer to Voice Traffic.
Video OTT	For the settings required to configure the Video OTT traffic objective, refer to Ott Traffic.
DNS Client	For the settings required to configure the DNS Client objective, refer to DNS Client Traffic.

Parameter	Description
Predefined Applications	For the settings required to configure the Predefined Applications objective, refer to Predefined Applications Traffic.
ICMP Client	For the settings required to configure the ICMP Client objective, refer to ICMP Client.
Capture Replay	For the settings required to configure the Capture Replay objective, refer to Capture Replay.
Synthetic	For the settings required to configure the Synthetic objective, refer to Synthetic.
UDG	For the settings required to configure the UDG objective, refer to UDG.
REST API Client	For the settings required to configure the RESt API Client objective, refer to REST API Client.

Stateless UDP Traffic

The **Stateless UDP** objective generates IP packets that encapsulate dummy UDP payload. The Stateless UDP generator configuration settings for the uplink traffic are described below.

The following table describes the Stateless UDP parameters.

Parameter	Description
Application Type	Select the type of traffic you want to generate. In this case, this parameter must be set to **Stateless UDP**.
Label	Set the label name. You can accept the value provided by CoreSIM or overwrite it with your own value.
Flow Type	This field is set to **uplink** and can not be modified since on the UE you can only configure the uplink flow.
Throughput Tx (kbps)	This value is computed based on the parameters in the test and will be recalculated if one of these parameters change.
Packet Rate	The rate at which the test generates uplink packets, measured in packets per second (pps).
Distributed Over (s)	Used to configure procedure rate less than 1/sec. Example: if configured as 3, test will execute one procedure every 3 seconds.
Payload Size	The size of the packet payload, in bytes.
Delay(s)	The number of seconds to wait from the start of sustain time (i.e. after all UEs have registered).
Destination IP Address	The destination IP address to place in the IP packet.

Parameter	Description
Destination UDP Port Start	The start destination port number to place in the UDP header.
Destination UDP Port Count	Total number of UDP ports in this range.
Source UDP Port	The source port number to place in the UDP header.
DNN ID	Select the DNN value for the drop-down list. For more details about DNN configuration, refer to DNN configuration settings.
QoS Flow ID	Select the QoS Flows ID(s) from the drop-down list. For more details about QoS Flow configuration, refer to QoS Flow configuration settings.
Fallback to Default Flow	This option supports use cases in which it is desirable for user traffic to use the default QoS flow if the requested dedicated flow is not available. • When this option is selected, traffic will flow from the start of the test until the end. If the dedicated flow or bearer is not yet activated, it will fall back to the default flow. Once the dedicated bearer becomes active the traffic will move to that flow. If the dedicated bearer is deleted, the traffic will move back to the default flow. • When this option is not selected, traffic will not flow until the designated QoS flow is activated (the flow selected in the *QoS Flow/Bearer ID* field). This option is useful in a test in which you are using more than one traffic type. For example, you may want HTTP traffic to be running throughout the duration of the test while voice traffic is running only when a default flow is activated for it.

Data Traffic

The following table describes the Data Traffic parameters.

Parameter	Description
Application Type	Select the type of traffic you want to generate. In this case, this parameter must be set to **Data**.
Label	Set the label name. You can accept the value provided by CoreSIM or overwrite it with your own value.
Objective Type	By default, this parameter is set to **Throughput**. The other options are: **Concurrent Connections** and **Connections Rate**.
Concurrent Connections	Set the number of concurrent connections. This parameter is available only when Objective type is set to **Concurrent Connections**.

Parameter	Description
Connection Duration (s)	Set a value for the connection duration. This parameter is available only when Objective type is set to **Concurrent Connections**.
Connections Rate per Second	Se the value for connections rate per second. This parameter is available only when Objective type is set to **Connections Rate**.
Throughput (kbps)	The desired throughput (in kbps) for the combined traffic flows that will be generated.
Optimize Throughput (per UE)	Select this option to enable it.
Connection Multiplier (per UE)	Set the connection multiplier value.
MSS	The desired Maximum Segment Size (MSS) for the user plane traffic that will be generated for this UE range, specified in bytes. The MSS is the largest TCP segment that the IP device can transmit as a single, unfragmented unit. It is typically calculated as the MTU minus the TCP header size minus the IP header size. For example,for traditional Ethernet, the MSS value is 1460 (1500 minus 40).
Delay application traffic start (ms)	The time (in milliseconds) to wait before the application traffic flows start after each PDU Session has been established.
IP Preference	Select a value from the drop-down list: **IPv4** or **IPv6**.
Application Traffic Flows	Each Application Traffic entry requires at least one traffic flow definition, and can support multiple such definitions. • To select an existing traffic flow definition, click its name to open the Flow panel where you can view and modify the flow settings. • To add another traffic flow, click the **Add Flow** button. CoreSIM will open the Flow panel where you will select the flow type and configure the flow settings. Refer to Flow for a description of the configuration settings for these traffic flows. Also, you can add custom parameters, based on your test configuration requirements.

Flow

You can add and delete traffic flows as needed to meet your test objectives. The **Flow** parameters are described in the following table.

Parameter	Description
	Click the **Delete Flow** button to remove the flow from your configuration.
Transport Protocol available for Data	Select the transport protocol from the drop-down list. Available options: • If Optimize Throughput (per UE) option is enabled: **TCP**, **TLS**, **QUIC** or **UDP**. • If Optimize Throughput (per UE) option is disabled: **TCP**, **TLS** or **UDP**.
Type	Select the L4/L7 protocol type from the list of pre-defined flows. The available options are: • For **TCP** transport protocol: **HTTP Get**, **HTTP Put**, **HTTP Post** and **FTP**. • For **TLS** transport protocol: **HTTPS Get**, **HTTPS Put** and **HTTPS Post**. • For **QUIC** transport protocol: **HTTP3 Get**, **HTTP3 Put** and **HTTP3 Post**. • For **UDP** transport protocol: **UDP Bidirectional** (a flow in which a UDP client communicates with a server over a bidirectional datagram socket) NOTE UDP bidirectional works for each UE by sending the number of TX packets configured in the objective (by default 8). After the packets have been received by the DN (or UPF), it sends RX packets (by default 8) to each UE. If the UEs receives the packets, they will send again the number of TX packets and so on. If the UEs did not receive downlink packets, it will send another set of TX packets after 60 seconds.
Port	The port used by the flow.
Iterations	The number of times the flow will run. It can be finite or infinite (set to zero). For example, a flow may have default actions: log in to a social media site, post a message, then log out. Iterations is the number of times you want this flow of actions to be executed.
Percentage	The percentage of the throughput will be of this type of flow.
Page Size (bytes)	The page size represents the size of the web page or data file that will be retrieved from or stored to an HTTP or FTP server.
Client Tx Count	This parameter is available only when the flow type is set to UDP Bidirectional. Refer to UDP Bidirectional for more details.
Server Tx Count	This parameter is available only when the flow type is set to UDP Bidirectional. Refer to UDP Bidirectional for more details.

Parameter	Description
URL	The URL that is being accessed by the flow's protocol.
Destination Hostname	Destination hostname of the server. If DNS hostname resolution is enabled for the flow and Name Servers are configured under Global Settings, this name will be resolved before being used as L7 destination IP for the flow and included in HTTP headers. If empty, the "Address" from the previous fly-out level will be used as L7 destination IP for the flow.
Max Transactions per Connection	Set the value for this parameter.
Enable DNS Query Per Connection	Select the check-box to process only one DNS query per TCP connection.
DNN ID	Select the DNN for this flow. The DNNs are configured in the UE Range settings (DNNs Config).
QoS FlowID	Select a QoS Flow ID for this flow.

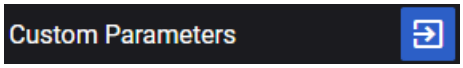
Custom Parameters

From this section you can add custom parameters or custom header fields by selecting the required pane:

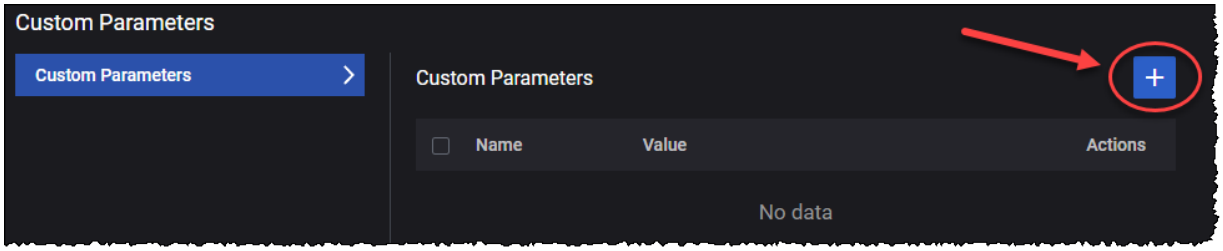
- **Custom Parameters** or,
- **Custom Headers**

You can add custom parameters as follows:

1. Select the **Open Custom Parameters** button.

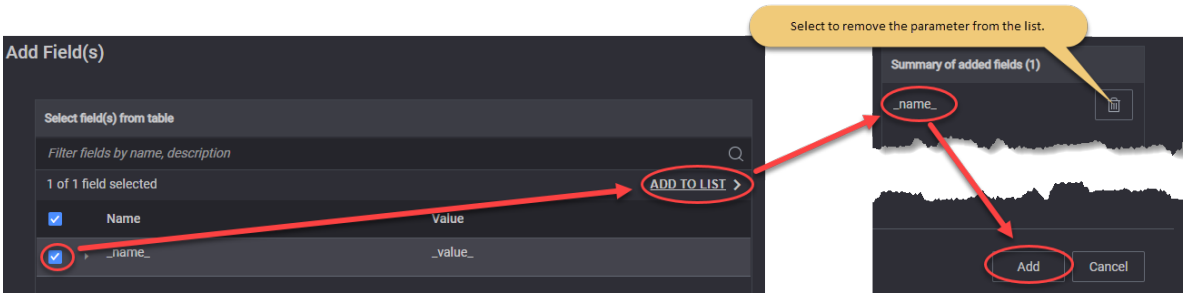
   

   The Custom Parameters panel opens.
2. Select the **Add** button. The Add Field(s) opens.

3. From the Add Field(s), select the fields you want to add and select **ADD TO LIST** to move them to the added fields section. To add the fields to your configuration select **Add**.

   For example ...



To add custom header fields, select the **Custom Headers** pane and follow the steps presented above for custom parameters.

Voice Traffic

The following table describes the Voice Traffic parameters.

Parameter	Description
Application Type	Select the type of traffic you want to generate. In this case, this parameter must be set to **Voice**.
Label	Set the label name. You can accept the value provided by CoreSIM or overwrite it with your own value.
Objective Type	By default, this parameter is set to **Simulated Users** and cannot be changed.
Delay application traffic start (ms)	The time (in milliseconds) to wait before the application traffic flows start after each PDU Session has been established.
IP Preference	Select the IP address preference: **IPv4** or **IPv6**.
Call Type	Select the type of call from the drop-down list. Available options are: • **Basic Call** • **Basic Call Mo** (Mobile Originated) • **Basic Call Mt** (Mobile Terminated) • **Custom Flow** When creating a new test or when adding a new UE range, the Call Type default option is the **Basic Call**, which allows you to run a basic SIP call without the IMS entity and with DN simulating the Mobile Terminating (MT) side. When selecting **Basic Call MO**/**Basic Call MT**, the app will use a predefined SIP Flow intended for the use-case in which a DUT IMS or simulated IMS is involved. If the test requirements need an extended set of SIP flows or higher level of flexibility, it is recommended to use the **Custom Flow** Call Type, which enables the Flow Editor.

Parameter	Description
Flow Editor:	IMPORTANT *This configurator becomes available only if Call Type is set to Custom Flow.* *Click to open the page and create a particular state machine for SIP calls that allows you a higher flexibility to customize the SIP message sequence and SIP headers/SDP body as desired. For settings, refer to Flow Editor section.*
Dial Plan:	*For the settings required to configure the dial plan, refer to Dial Plan.*
Sip Settings:	
Local Port	Set the local port number. You can accept the value provided by CoreSIM or overwrite it with your own value.
Transport Protocol	Select the transport protocol. The available options are: • **TCP** - Transmission Control Protocol • **TLS** - Transport Layer Security • **UDP** - User Datagram Protocol
Persistent TCP Connection	If enabled, it will not close the TCP connection on the iteration end.
Enable IPsec	Select this option to enable IPsec.
Registration Refresh Time	Select whether to use a **Negotiated** refresh time, or a **Custom** type: • **Negotiated** - the registration refresh will be sent after 50% of the expiration time received in ***200 OK*** response. • **Custom** - allows you to set the registration refresh interval
Custom Registration Refresh Interval (s)	This parameter appears only if **Registration Refresh Time** is set to ***Custom***. The time interval (in seconds) to send SIP Registration Refresh.
Number of Loops after Registration to Send Deregistration	This parameter will send the SIP Deregister at the end of each configured iteration number.
Advanced SIP Settings	For more details about these settings, refer to Advanced SIP Settings.
RTP Settings	
Local Port	Set the local port number. You can accept the value provided by CoreSIM or overwrite it with your own value.
Local Port Increment	The value by which the local port number is incremented.

Parameter	Description
Enable OWD	If selected, one way delay statistics for audio RTP traffic are computed.
Enable RTCP	Select this option in order to enable RTCP.
Enable SRTP	Select this option in order to enable Secure Real-time Transport Protocol (SRTP).
RTP Session Duration (ms)	Set the value for the session duration.
Audio settings:	*For the configuration of audio settings, refer to Audio Settings.*
Video Settings:	*For the configuration of video settings, refer to Video Settings.*
MSRP Settings:	*For the configuration of MSRP settings, refer to MSRP Settings.*
MCTTP Settings	*For the configuration of MCTTP settings, refer to MCPTT Settings.*
Advanced Media Settings:	
Custom SDP	*Select this panel to open the custom SDP settings.*
Use Custom SPD	Select the check box to use the custom SDP.
Custom SDP Template	Select the template from the drop-down list: • **None** • **EVS/AMR IPv4** • **NB Codecs IPv6** • **AMR-WB IPv6** • **Multimedia IPv4**
QoE Settings	*Select this panel to open the audio QoE settings.*
Enable MOS	Select this option to enable MOS (Mean Opinion Score).

Flow Editor

Press  to open the editor's window. The following settings are available:

Parameter	Description
Procedures Library	TIP This library can also be accessed from Test Overview > Procedures Library, while the procedures are managed from the **Settings > Resource Library**. Select to access the Procedures Library, where you will find the following categories: • **SIP** - will include the procedures related to SIP signaling.

Parameter	Description
	• **Media** - will include the procedures related to media (audio or/and video) • **Flow** - will include the Start and Stop procedures used to define an iteration. The number of iterations can be configured per each UE range on the Voice objective, Dial Plan section (0 meaning infinite loops). See **Resource Library > Procedures Library** in *CoreSIM User Guide*, for more information.
Current Range	This field will be automatically populated with the name of the UE range on which the Voice application traffic is configured.
Add required procedures first > Procedures	Add the procedures required for this custom flow.
Linked Range	Select from the drop-down the UE range that will be connected. Then, add the procedures corresponding to the configuration of state machine.

Note that every procedure added under the Procedures list includes an **Add +** button and an **Expand** button:

- Use the Expand button to see the **Next On Success** and **Next on Error** configuration fields for the respective procedure. Proceed on setting up these fields for each procedure added.
- Use the **Add** button to add more steps to the procedure. Set the procedures as above.
- The red connections that appear between procedures will let you know how these are connected.

See also the **Procedures Resources (SIP/Media/Flow)** section from *CoreSIMUser Guide* for complete information on:

- procedures resources and their management
- adding predefined procedures from the Resource Library
- using the Flow Editor and other configurations required
- creating a procedure from scratch

Dial Plan

The parameters required to configure the dial plan are presented in the table below.

Parameter	Description
DNN	Select the DNN from the drop-down list.
Destination IP	The destination IP address.
Destination IP Increment	The value by which the destination IP is incremented.
Iterations	The number of times the Call Type will be executed. It can be finite or

Parameter	Description
	infinite (set to zero).
MCC	The MCC that will be assigned to each UE in this range.
MNC	The MNC that will be assigned to each UE in this range.
MSIN	The MSIN value that will be assigned to the first simulated UE in the range.
IMSI Phone Increment	The value by which the IMSI phone number is incremented.
Destination Phone	The destination phone number.
Destination Phone Increment	The value by which the destination phone number is incremented.
Source Phone	The source phone number.
Source Phone Increment	The value by which the destination phone number is incremented.
Destination Port	The destination port number.

Audio Settings

The parameters required for audio settings are presented in the table below.

Parameter	Description
Enable Audio	Select to enable this option.
QoS Flow ID for Voice	Select the QoS flow used for audio from the drop-down list.
Jitter Buffer Settings:	
Initial Delay (ms)	Set the value of the initial delay until playback starts (ms).
Audio Codecs	
	Select this button to add the audio codec to your test configuration.
	Select this button to remove the audio codec from your test configuration.
Codec Name	Select the audio codec from the drop-down list. The available options are: • **AMR** - The Adaptive Multi-Rate (AMR) is an audio data compression schemes optimized for speech coding, which have been adopted as the standard

Parameter	Description
	speech codec by 3GPP. • **AMR-WB** - The Adaptive Multi-Rate Wide Band (AMR-WB) is an audio data compression schemes optimized for speech coding, which have been adopted as the standard speech codec by 3GPP. • **EVS** - The EVS (Enhanced Voice Services) codec specified by 3GPP TS 26.445 compresses 20ms input blocks of audio samples. In addition to the EVS Primary mode, 3GPP TS 26.445 specifies that the codec implement the EVS AMR-WB IO mode for interoperability with AMR WB devices. • **PCMU** • **PCMA** • **iLBC** • **G722** • **G723** • **G729** The parameters of each audio codec are presented below.

AMR/AMR-WB

Parameter	Description
Packet Time (ms)	Length of time in milliseconds represented by the media in a packet. AMR speech encoding is performed on 20 ms speech frames.
Payload Type	Specifies the audio payload type.
Payload Format	For a given session, the payload format can be either bandwidth efficient or octet aligned, depending on the mode of operation that is established for the session via out-of-band means. • **Bandwidth efficient**: In the bandwidth efficient format only the full payload is octet aligned, so fewer padding bits are added. • **Octet aligned**: In the octet-aligned format, all the fields in a payload, including payload header, table of contents entries, and speech frames themselves, are individually aligned to octet boundaries to make implementations efficient. All fields of an AMR payload (payload header, table of contents and speech) are individually octet aligned.
Bitrate	Indicates the mode(bitrate) of the AMR codec. For AMR there are 8 available modes. All these modes can be changed dynamically without negotiation, reflecting the main characteristics of this codec – adaptive rate. For AMR WB there are 9 modes available.

EVS

Parameter	Description
Packet Time (ms)	Length of time in milliseconds represented by the media in a packet.
Payload Type	Specifies the audio payload type.
Payload Format	The following options are available: • **Full header** - In this payload format, the payload consists of one or more coded frame(s). The packet headers contain the Table of Contents (ToC) byte(s) and the Change Mode Request (CMR) byte. • **Compact** - In this payload format a single codec data frame is sent in each RTP packet. The format uses protected payload sizes that uniquely identify the EVS codec bitrates for the EVS Primary or EVS AMR-WB IO mode.
Bitrate	Indicates the mode(bitrate) of the EVS codec. Select the value from the drop-down list.

PCMU/PCMA/iLBC/G722/G723/G729

Parameter	Description
Packet Time (ms)	Length of time in milliseconds represented by the media in a packet.
Payload Type	Specifies the audio payload type.

Video Settings

The parameters required for audio settings are presented in the table below.

Parameter	Description
Enable video	Select to enable this option.
QoS Flow ID for Video	Select the QoS Flows ID(s) from the drop-down list.
Video Codecs	*This section is available only when **Enable video** is selected*
	Select this button to add the audio codec to your test configuration.
	Select this button to remove the audio codec from your test configuration.
Codec Name	Select the audio codec from the drop-down list. The available options are: **H264** or **H265**.
FPS	Set the FPS value.
Payload Type	Set the payload type value.

Parameter	Description
Average Bitrate (kbps)	Set the average bit rate value.

MSRP Settings

The parameters required for MSRP settings are presented in the table below.

Parameter	Description
Enable MSRP	Select to enable this option.
QoS Flow ID for MSRP	Select the QoS Flows ID(s) from the drop-down list.
MSRP Port	Provide the MSRP port.
MSRP Local domain	Provide the MSRP local domain.

MCPTT Settings

The parameters required for Mission Critical Push to Talk (MCPTT) settings are presented in the table below.

Parameter	Description
Enable MCPTT	Select to enable this option.
QoS Flow ID for MCPTT	Select the QoS Flows ID(s) from the drop-down list.
MCPTT Message Format	The MCPTT message format defined according to TS 24.380 standard.
MCPTT Group	The first MCPTT Group ID.
MCPTT Group Size	The number of participants per MCPTT group call.
Use CRLF in flow csv	If enabled, it will use the CRLF line terminator in the generated CSV of the configured MCPTT flow. If disabled, it will use LF.
MCPTT Flow 	Press the **Open MCPTT Flow Editor** button to open the configuration page. Use the **Add New Row** button, and then select each column field to edit the flow.

Advanced SIP Settings

The following settings are available under the Advanced SIP Settings section:

- SIP Custom Headers
- SIP Authentication

- Custom Parameters
- SIP 3GPP IPSEC

SIP Custom Headers

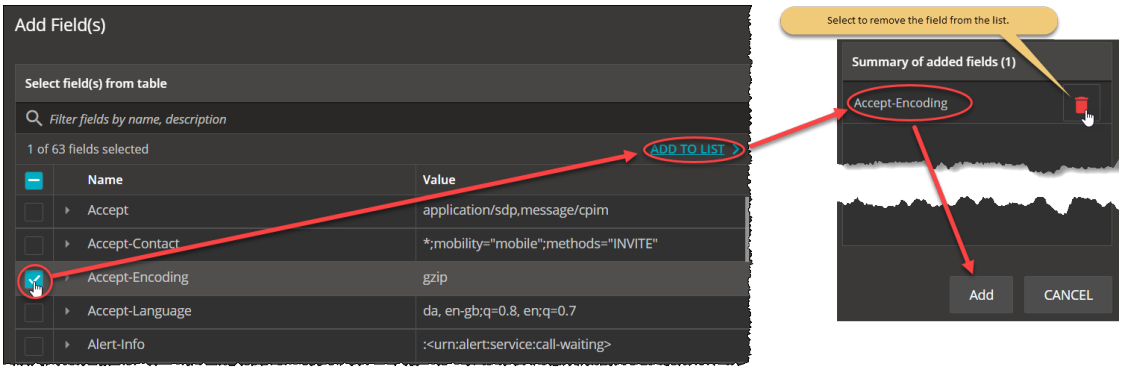
From the SIP Message with Custom Header pane, select the **Add** button to add a new SIP message.

NOTE The message can be deleted by selecting the corresponding **Delete** for each message. Also, you can use the **Edit** button for bulk selection and, then, delete the message in one action.

For each message, you can:

- Edit the custom header by selecting the **Message Type** from the drop-down list: **ANY**, **REGISTER**, **INVITE**, **ACK**, **BYE**, **OPTIONS**, **CANCEL**, **NOTIFY**, **SUBSCRIBE**, **REFER**, **MESSAGE**, **INFO**, **UPDATE**, **PRACK**, **RESPONSE**, **1xx**, **2xx**.
- Add custom header fields:
  - Select the **Add** button. The Add Field(s) opens.
  - From the Add Field(s), select the fields you want to add and select **ADD TO LIST** to move them to the added fields section. To add the fields to your configuration select **Add**.

    For example ...



The following custom header are available:

Parameter	Description	Value
Accept	IETF RFC 3261	application/sdp,message/cpim
Accept-Contact	IETF RFC 3841	*;mobility="mobile";methods="INVITE"
Accept-Encoding	IETF RFC 3261	gzip
Accept-Languag	IETF RFC	da, en-gb;q=0.8, en;q=0.7

Parameter	Description	Value
e	3261	
Alert-Info	IETF RFC 3261	:<urn:alert:service:call-waiting>
Allow	IETF RFC 3261	INVITE, ACK, UPDATE, PRACK, CANCEL, PUBLISH, MESSAGE, OPTIONS, SUBSCRIBE, NOTIFY
Allow-Events	IETF RFC 6665	conference
Authentication-Info	IETF RFC 3261, IETF RFC 3310	nextnonce="47364c23432d2e131a5fb210812c"
Call-Info	IETF RFC 3261	<http://wwww.example.com/alice/photo.jpg> ;purpose=icon
Content-Disposition	IETF RFC 3261	session
Content-Encoding	IETF RFC 3261	gzip
Content-ID	IETF RFC 8262	<target123@atlanta.example.com>
Content-Language	IETF RFC 3261	fr
Date	Sat,13 Nov 2010 23:29:00 GMT	IETF RFC 3261

Parameter	Description	Value
Error-Info	IETF RFC 3261	<sip:announcement10@example.com>
Event	IETF RFC 6665, IETF RFC 6446, IETF RFC 3680	reg
Expires	IETF RFC 3261	3600
Feature-Caps	IETF RFC 6809, 3GPP TS 24.229	+3gpp.trf=sip:trf3.operator3.com
Geolocation	IETF RFC 6442	<user1@operator1.com>
In-Reply-To	IETF RFC 3261	70710@saturn.bell-tel.com, 17320@saturn.bell-tel.com
Max-Forwards	IETF RFC 3261	70
MIME-Version	IETF RFC 3261	1.0
Min-Expires	IETF RFC 3261	40
Min-SE	IETF RFC	60

Parameter	Description	Value
	4028	
Organization	IETF RFC 3261	Keysight
P-Access-Network-Info	IETF RFC 7315	3GPP-E-UTRAN-FDD;e-utran-cell-id-3gpp=1234
P-Associated-URI	IETF RFC 7315	sip:user2@operator3.com
Path	IETF RFC 3327	<sip:P2.example.com;lr>,<sip:P1.example.com;lr>
P-Called-Party-ID	IETF RFC 7315	sip:user1-business@example.com
P-Charging-Function-Addresses	IETF RFC 7315	ccf=192.0.8.1; ecf=192.0.8.3
P-Charging-Vector	IETF RFC 7315	icid-value=1234bc9876e;icid-generated-at=192.0.6.8;orig-ioi=home1.net
P-Early-Media	IETF RFC 5009	supported
Permission-Missing	IETF RFC 5360	userC@example.com
P-Preferred-Identity	IETF RFC 3325	"Cullen Jennings" <sip:fluffy@cisco.com>
P-	IETF	urn:urn-7:3gpp-service.ims.icsi.mmtel

Parameter	Description	Value
Preferred-Service	RFC 6050	
Priority	IETF RFC 3261	emergency
Proxy-Authenticate	IETF RFC 3261	Digest realm="atlanta.com",domain="sip:ss1.carrier.com", qop="auth",nonce="f84f1cec41e6cbe5aea9c8e88d359",opaque="", stale=FALSE, algorithm=MD5
Proxy-Authorization	IETF RFC 3261	Digest username="Alice", realm="atlanta.com",nonce="c60f3082ee1212b402a21831ae",response="245f23415f11432b3434341c022"
Proxy-Require	IETF RFC 3261	foo
P-Visited-Network-ID	IETF RFC 7315	Visited network number 1
RAck	IETF RFC 3262	10
Reason	IETF RFC 3326	Q.850;cause=16;text="Terminated"
Record-Route	IETF RFC 3261	<sip:server10.biloxi.com;lr>, <sip:bigbox3.site3.atlanta.com;lr>
Refer-To	IETF RFC 3515	<sip:dave@bobster.example.org?Replaces=425928%40bobster.example.com.3%3Bto-tag%3D7743%3Bfrom-tag%3D6472>
Reply-To	IETF RFC 3261	Bob <sip:bob@biloxi.com>
Request-Disposition	IETF RFC 3841	proxy

Parameter	Description	Value
Require	IETF RFC 3261	Path
Retry-After	IETF RFC 3261	3600
Route	IETF RFC 3261	<sip:bigbox3.site3.atlanta.com;lr>,<sip:server10.biloxi.com;lr>
RSeq	IETF RFC 3262	10
Server	IETF RFC 3261	HomeServer v2
Service-Route	IETF RFC 3608	<sip:P2.HOME.EXAMPLE.COM;lr>
Session-Expires	IETF RFC 4028	3600;refresher=uac
Session-ID	IETF RFC 7329	0123456789abcdef123456789abcdef0
SIP-Etag	IETF RFC 3903	12345
SIP-If-Match	IETF RFC 3903	12345
Subject	IETF RFC 3261	Need more boxes
Subscription-State	IETF RFC 6665	active

Parameter	Description	Value
Supported	IETF RFC 3261	100Rel,timer,precondition
Timestamp	IETF RFC 3261	Timestamp
Unsupported	IETF RFC 3261	100Rel
User-Agent	IETF RFC 3261	LoadCore
Warning	IETF RFC 3261	307 isi.edu "Session parameter `foo` not understood"

SIP Authentication

The parameters required for SIP authentication are presented in the table below.

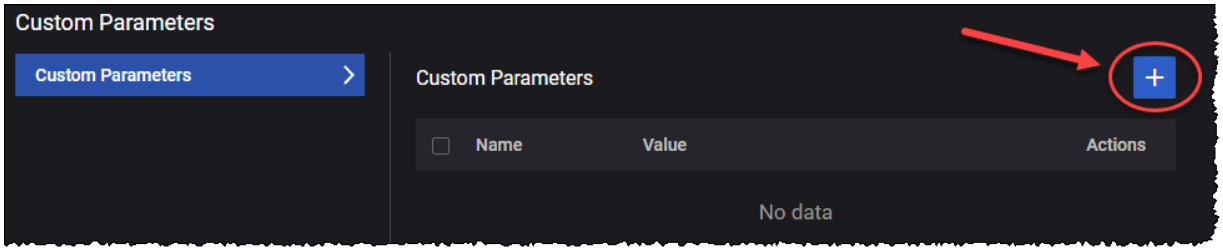
Parameter	Description
Username	Provide the username.
Password	Provide the password.
Authentication Type	Select the authentication type: • **Digest MD5** • **AKAv1** • **AKAv2** • **ProxyDefined**
UPDATE	Select this button to update with UE range security settings.
K	The K (Subscriber Authentication Key) value used for authentication of the UEs in this range. The key is a string with a maximum length of 34 characters. You can accept the value generated by CoreSIM, or enter of a K value of your own choosing.
K Increment	The number used to increment the K value for each subsequent UE in the range. A value of zero indicates that each UE in the range uses the same K value.
Configure OP or	Select the operator-specific authentication value.

Parameter	Description
OPc	
Op	The Auth OP value specifies the operator-specific authentication value to use for the UEs in this range. It is a string with a maximum length of 34 characters. It remains fix for all Subscriber/SIM of an operator. You can accept the value generated by CoreSIM, or enter of an OP value of your own choosing.
Opc	The OPc value is derived from the subscriber key K and the operator dependent value OP. You can accept the value generated by CoreSIM, or enter of an OP value of your own choosing.
Opc Increment	The number used to increment the OPc value for each subsequent UE in the range. A value of zero indicates that each UE in the range uses the same OPc value.

Custom Parameters

You can add custom parameters as follows:

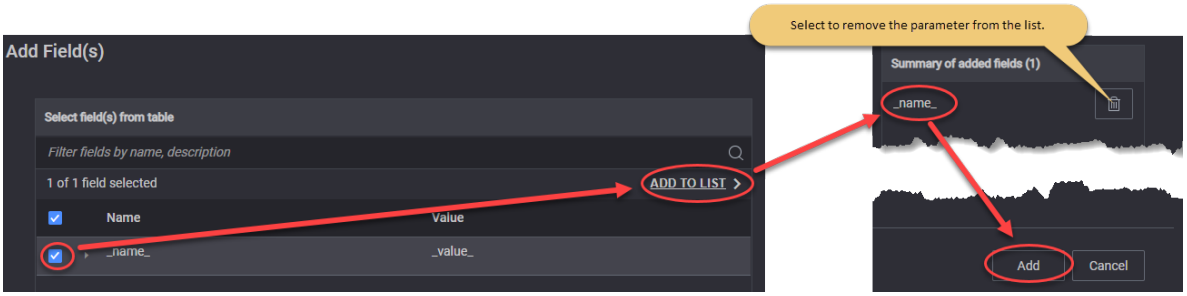
1. The Custom Parameters panel, select the **Add** button.



   The Add Field(s) opens.

2. From the Add Field(s), select the fields you want to add and select **ADD TO LIST** to move them to the added fields section. To add the fields to your configuration select **Add**.

   For example ...



The following custom parameters are available:

Parameter	Description	Value
DelayBefore SIPInvite	Delay in miliseconds before sending SIP INVITE.	1000

Parameter	Description	Value
DealyBeforeRTP	Delay in miliseconds before RTP session start.	0
DelayAfterRTP	Delay in miliseconds after RTP session end.	0
DeregisterLoop	Set the number of calls/loops before a SIP deregistration will be performed. Any SIP deregistration will be followed by a new SIP registration.	0
DelayBefore180	Delay in miliseconds before 180 Ringing message will be sent.	0
DelayBefore200INVITE	Delay in miliseconds before 200 OK message for INVITE will be sent.	0
debugIPSEC	Activate IPSEC debug. Please use debug only for a reduced number of simulated UEs.	0
timeoutSIP	Global timeout in miliseconds foe any SIP message. Default is set to standard 32000ms. Use this parameter to modify the default value.	32000
MaxActiveLimit	Set maximum allowed concurrent TCP connections per CPU Core. Default it is set to 8000. Please use this parameter to modify the deafult value.	8000

SIP 3GPP IPSEC

The parameters required for SIP 3GPP IPSEC are presented in the table below.

Parameter	Description
Port-C	Set the value for this parameter.
Port-S	Set the value for this parameter.
Authentication Algorithm	Select the authentication algorithm: • **hmac-sha-1-96** • **aes-gmac** • **null**
Encryption Algorithm	Select the encryption algorithm: • **aes-gcm** • **aes-cbc** • **null**

Video OTT Traffic

The following table describes the Video OTT(Over-the-Top) traffic parameters.

Parameter	Description
Application Type	Select the type of traffic you want to generate. In this case, this parameter must be set to **Video OTT**.
Label	Set the label name. You can accept the value provided by CoreSIM or overwrite it with your own value.
Objective Type	Select the value from the drop-down list: **Simulated Users** or **Throughput**.
Throughput (kbps)	The desired throughput (in kbps) for the combined traffic flows that will be generated.
MSS	The desired Maximum Segment Size (MSS) for the user plane traffic that will be generated for this UE range, specified in bytes. The MSS is the largest TCP segment that the IP device can transmit as a single, unfragmented unit. It is typically calculated as the MTU minus the TCP header size minus the IP header size. For example,for traditional Ethernet, the MSS value is 1460 (1500 minus 40).
Delay application traffic start (ms)	The time (in milliseconds) to wait before the application traffic flows start after each PDU Session has been established.
IP Preference	Select a value from the drop-down list: **IPv4** or **IPv6**.
Advanced OTT	*Select the **Open Advanced OTT** button to enable and configure Advanced OTT Settings.*

Advanced OTT Settings

The parameters required to configure the OTT advanced settings are presented in the table below.

Parameter	Description
Application Traffic Flow	Each Application Traffic entry requires at least one Ott traffic flow definition, and can support multiple such definitions. • To select an existing traffic flow definition, click its name to open the Flow panel where you can view and modify the flow settings. • To add another traffic flow, click the **Add Flow** button. CoreSIM will open the Flow panel where you will select the flow type and configure the flow settings.
Flow:	

Parameter	Description
	Select this button to remove this flow from your test configuration.
Type	Select the Ott traffic type from the drop-down list. Available options: • **DASH** • **HLS**
Destination Hostname	Destination hostname of the server. This value is editable.
Port	This represents the server(destination) port. This value is editable.
URL	Select the URL from the drop-down list populated with the defined on the server.
Play Until End	If this check box is selected, the Play Duration field is disabled and the original playtime is used.
Play Duration (sec)	This field is available only if the Play Until End check box is not selected. It allows you to set a custom playtime.
Transport	Select the transport protocol from the drop-down list. Available options: • **HTTP** • **HTTPS** • **HTTP/QUIC**
Iterations	The number of times the flow will run. It can be finite or infinite (set to zero).
Percentage	The percentage of Test Objective to execute this flow.
Quality Control	These settings are presented in the Quality Control pane.
Advanced Client settings	These settings are presented in the Advanced Client Settings pane.

Quality Control

The parameters required for Quality Control settings are presented in the table below.

Parameter	Description
Jitter Buffer:	
Initial Delay (s)	Set the number of seconds to wait before playback. The default value is 20.
Maximum Size (s)	Set the number of seconds to be buffered on the client side.

Parameter	Description
	The default value is 20.
MOS P.1203	Select an option from the drop-down list: **Disabled** or **Mode 0**.
Quality Control Mode	Select the quality control mode from the drop-down list: • **Adaptive Bit Rate** • **Quality Predefined Levels** • **Lowest Quality** • **Highest Quality**
Number of segments	This field is available and editable only when the Quality Control Mode is set to **Adaptive Bit Rate**.
*Play Profiles: The following settings are available and editable only when the Quality Control Mode is set to **Quality Predefined Levels**.*	
	Select this button to add a predefined play profile to your test configuration.
Quality Shift	
	Select this button to remove this play profile from your test configuration.
Shift Type	Select the shift type from the drop-down list. Available options • **Stay at Current Bitrate** • **Change to the Lowest Bitrate** • **Change to the Lowest Bitrate** • **Change to the Lower Bitrate** • **Change to the Higher Bitrate**
Numbers of levels to shift	This field is available and editable only when the Shift Type is set to **Change to Higher Bitrate** or **Change to Lower Bitrate**.
Play Until End	If this check box is selected, the **Play duration** field is disabled and the original playtime is used.
Pay duration(sec)	This field is available only if the **Play Until End** check box is not selected. It allows you to set a custom playtime.

Advanced Client Settings

The parameters required for Advanced Client settings are presented in the table below.

Parameter	Description
DNN ID	Select the DNN from the drop-down list.
QoS Flow ID	Select the QoS Flows ID(s) from the drop-down list.
Timeshift for Live	Set a value for this field. 0 means no timeshift.
Enable DNS Query Per Connection	Select the check box to process only one DNS query per TCP connection.
Custom Parameters	For more details, refer to Custom parameters and headers.
Custom Headers	For more details, refer to Custom parameters and headers.

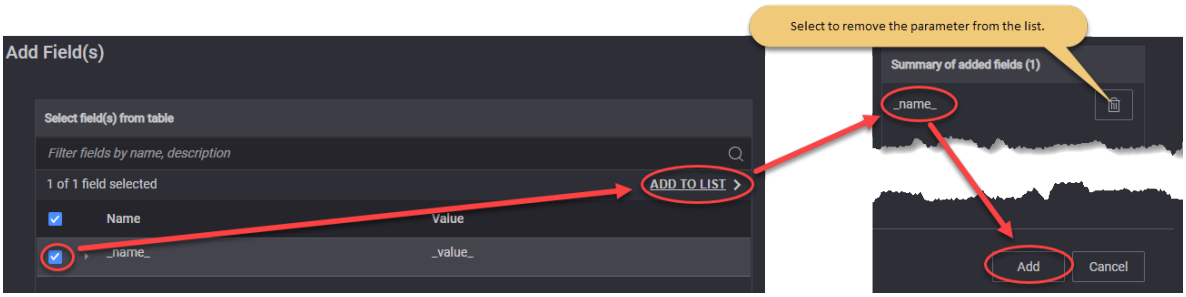
Custom Parameters and Headers

From this section you can add custom parameters or custom header fields:

- **Custom Parameters** or,
- **Custom Headers**

You can add custom parameters as follows:

1. Select the **Custom Parameters** pane.
   The Custom Parameters panel opens.
2. Select the **Add** button. The Add Field(s) opens.
3. From the Add Field(s), select the fields you want to add and select **ADD TO LIST** to move them to the added fields section. To add the fields to your configuration select **Add**.
   For example ...



   To add custom header fields, select the **Custom Headers** pane and follow the steps presented above for custom parameters.

DNS Client Traffic

The following table describes the DNS Client Traffic parameters.

Parameter	Description
Application Type	Select the type of traffic you want to generate. In this case, this parameter must be set to **DNS Client**.

Parameter	Description
Label	Set the label name. You can accept the value provided by CoreSIM or overwrite it with your own value.
Objective Type	By default, this parameter is set to **Simulated Users** and cannot be changed.
Connection multiplier (per UE)	Set the value for the connection multiplier.
MSS	The desired Maximum Segment Size (MSS) for the user plane traffic that will be generated for this UE range, specified in bytes. The MSS is the largest TCP segment that the IP device can transmit as a single, unfragmented unit. It is typically calculated as the MTU minus the TCP header size minus the IP header size. For example,for traditional Ethernet, the MSS value is 1460 (1500 minus 40).
Delay application traffic start (ms)	The time (in milliseconds) to wait before the application traffic flows start after each PDU Session has been established.
IP Preference	Select the IP address preference: **IPv4** or **IPv6**.
Application Traffic Flows	Each Application Traffic entry requires at least one traffic flow definition, and can support multiple such definitions. • To select an existing traffic flow definition, click its name to open the Flow panel where you can view and modify the flow settings. • To add another traffic flow, click the **Add Flow** button. CoreSIM will open the Flow panel where you will select the flow type and configure the flow settings. Refer to Flow for a description of the configuration settings for these traffic flows. Also, you can add custom parameters, based on your test configuration requirements.

Flow

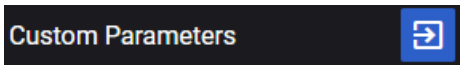
You can add and delete traffic flows as needed to meet your test objectives. The **Flow** parameters are described in the following table.

Parameter	Description
	Click the **Delete Flow** button to remove the flow from your configuration.
Type	By default, the type is set to **DNS Client**.
Port	The port used by the flow.
DNS Server IP	Set the DNS server IP address.
Number of DNS servers	Set the number of DNS servers.
Hostname	Set the hostname.
Query Type	Select the query type from the drop-down list. The available options are: • **A** • **AAAA** • **CNAME** • **TXT** • **PTR** • **NS**
Iterations	The number of times the flow will run. It can be finite or infinite (set to zero). Iterations is the number of times you want this flow of actions to be executed.
DNN ID	Select the DNN for this flow. The DNNs are configured in the UE Range Settings (DNNs Config).
QoS FlowID	Select a QoS Flow ID for this flow.

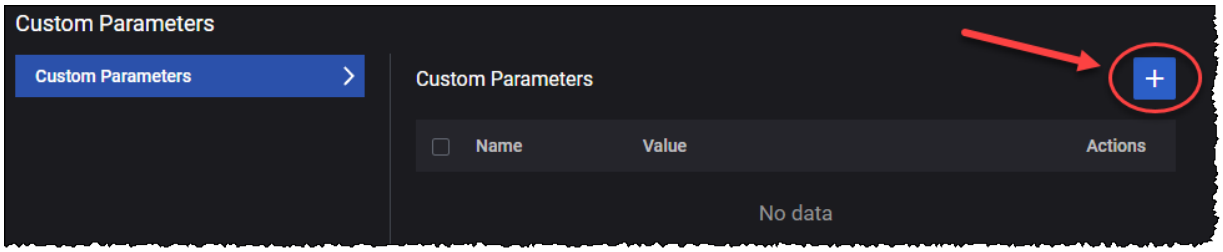
Custom Parameters

You can add custom parameters as follows:

1. Select the **Open Custom Parameters** button.

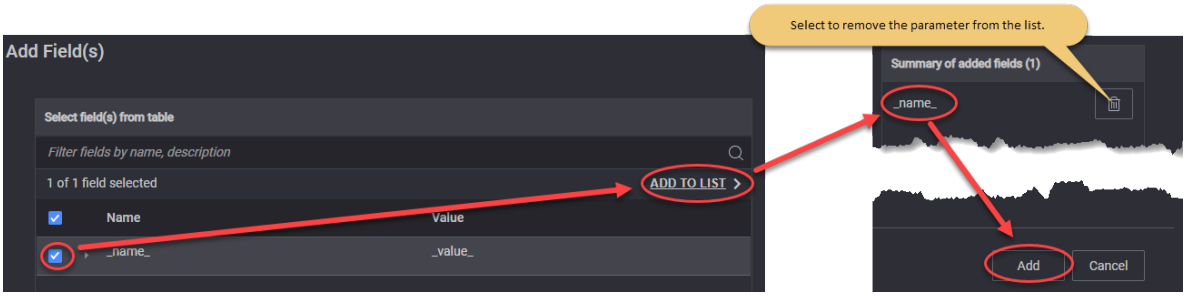
   The Custom Parameters panel opens.
2. Select the **Add** button.



The Add Field(s) opens.

3. From the Add Field(s), select the fields you want to add and select **ADD TO LIST** to move them to the added fields section. To add the fields to your configuration select **Add**.

   For example ...



ICMP Client

The following table describes the ICMP Client parameters.

Parameter	Description
Application Type	Select the type of traffic you want to generate. In this case, this parameter must be set to **ICMP Client**.
Label	Set the label name. You can accept the value provided by CoreSIM or overwrite it with your own value.
Objective Type	By default, this parameter is set to **Simulated Users** and cannot be changed.
Delay application traffic start (ms)	The time (in milliseconds) to wait before the application traffic flows start after each PDU Session has been established.
IP Preference	Select the IP address preference: **IPv4** or **IPv6**.
Traffic Flow	Refer to Traffic Flow for a description of the configuration settings for these traffic flows.

Traffic Flow

The **Traffic Flow** parameters are described in the following table.

Parameter	Description
Destination Hostname	Set the destination hostname.
Iterations	The number of times the flow will run. It can be finite or infinite (set to zero). Iterations is the number of times you want this flow of actions to be executed.
Interval (ms)	Set the interval value.
Timeout (ms)	Set the timeout value.
DNN ID	Select the DNN for this flow. The DNNs are configured in the UE Range Settings.

Capture Replay

This page describes the settings required by the capture replay functionality. Ethernet-based packet captures (`.pcap` files) can be filtered and resulting packets can be replayed on top of GTPu tunnels. Packets can be replayed as Ethernet frames over Ethernet PDU sessions or as IPv4 or IPv6 frames over IP-based PDU sessions. The capture replay feature can also be used with SGi client and SGi server (DN) to replay IP and Ethernet frames without any additional encapsulation.

The following table describes the Capture Replay parameters.

Parameter	Description
Application Type	Select the application type. In this case, this parameter must be set to **Capture Replay**.
Label	Set the label name. You can accept the value provided by CoreSIM or overwrite it with your own value.
Capture File	It allows you to upload a capture file, using the **Upload** button. To remove the file, select the **Clear** button.
Iterations	The number of times the capture will be replayed for each subscriber. Set to **0** for no limit. The default value is **1**.
Maximum Packet Rate	The rate at which the test generates uplink packets, measured in packets per second (pps).
Distributed Over (s)	Used to configure procedure rate less than 1/sec. Example: if configured as 3, test will execute one procedure every 3 seconds.
Rx Timeout (ms)	Time the responder waits for packets, after the delay observed in the packet capture. The default value is **1000** miliseconds.
Delayed Tx	Prevent the packets from being sent faster than they appear to be sent in the

Parameter	Description
	capture file, trying to maintain the packet delays. The default value is **true** (option enabled).
Resynchronize	Try to resync responder with initiator by matching incoming packets ahead and behind the current packet. The default value is **true** (option enabled).
Start Delay (s)	The number of seconds to wait from the start of sustain time (i.e. after all UEs have registered).
DNN ID	Select the DNN value for the drop-down list. For more details about DNN configuration, refer to DNN configuration settings.
QoS Flow ID	Select the QoS Flows ID(s) from the drop-down list. For more details about QoS Flow configuration, refer to QoS Flow configuration settings.
Fallback to Default Flow	This option supports use cases in which it is desirable for user traffic to use the default QoS flow if the requested dedicated flow is not available. • When this option is selected, traffic will flow from the start of the test until the end. If the dedicated flow or bearer is not yet activated, it will fall back to the default flow. Once the dedicated bearer becomes active the traffic will move to that flow. If the dedicated bearer is deleted, the traffic will move back to the default flow. • When this option is not selected, traffic will not flow until the designated QoS flow is activated (the flow selected in the *QoS Flow/Bearer ID* field). This option is useful in a test in which you are using more than one traffic type. For example, you may want HTTP traffic to be running throughout the duration of the test while voice traffic is running only when a default flow is activated for it.
Destination IP Address	The destination IP address to place in the IP packet.
Destination IP Count	The destination IP address count value.

The following table describes the Filter object parameters.

Parameter	Description
Filter	
	Select this button to add a new filter to your test configuration.
	Select this button to remove the additional route from your test configuration.
Role	Select the role from the drop-down list. Available options: **Initiator** and **Responder**.

Parameter	Description
	Default value: **Initiator**.
Filter Expression	This field cannot be empty. It selects the packets to be replayed from uploaded capture. The filter string should be in `pcap-filter` format, as described at https://www.tcpdump.org/manpages/pcap-filter.7.html.
Remove Encapsulation	Remove GTPu encapsulation from packets, if present, before trying to match the filter expression and when replaying the packets. The default value is **false** (option disabled).
Overrides	
Override QoS Flow ID	This option is available only if the *Role* is set to **Initiator**. Select the toggle button to enable it.
Qos Flow ID	This option is available only when *Override QoS Flow ID* option is enabled. Select the QoS Flows ID(s) from the drop-down list.
Override IP Address	Select the toggle button to enable it. When enabled, *Destination IP Address* and *Destination IP Address Count* fields become avilable.
Destination IP Address	The destination IP address to place in the IP packet.
Destination IP Address Count	The destination IP address count value.

Synthetic

The following table describes the Synthetic parameters.

Parameter	Description
Application Type	Select the application type. In this case, this parameter must be set to **Synthetic**.
Label	Set the label name. You can accept the value provided by CoreSIM or overwrite it with your own value.
MSS	The desired Maximum Segment Size (MSS) for the user plane traffic that will be generated for this UE range, specified in bytes. The MSS is the largest TCP segment that the IP device can transmit as a single, unfragmented unit. It is typically calculated as the MTU minus the TCP header size minus the IP header size. For example, for traditional Ethernet, the MSS value is 1460 (1500 minus 40).
Delay application traffic start (ms)	The time (in milliseconds) to wait before the application traffic flows start after each PDU Session has been established.

Parameter	Description
IP Preference	Select a value from the drop-down list: **IPv4** or **IPv6**.
TCP Settings	
Min retransmission timeout (ms)	The lowest value that the computed RTO timer value can be set to. Expiry of the RTO timer indicates that the sender has not received an acknowledgment for the transmission, which triggers a retransmission of the segment. Upon each retransmission, the RTO timer value is doubled, up to the Max value.
Max retransmission timeout (ms)	The highest value that the computed RTO timer value can be set to.
Receive buffer size (bytes)	The default size of the receive buffer (in bytes). This parameter affects the TCP receive window size. If you increase the size of the receive buffer, then the receive window is prolonged. If you are experiencing high latency on your test network, increase the size of the receive buffer to improve the throughput.
Transmit buffer size (bytes)	The default size of the transmit buffer (in bytes). This parameter affects the TCP transmit window size. If you increase the size of the transmit buffer, the transmit window is prolonged. If you are experiencing high latency on your test network, increase the size of the transmit buffer to improve the throughput.
Min source port	The source port specifies which ports are used for client connections. The Min value specifies the lower bound (the lowest permissible port number).
Max source port	The Max value specifies the upper bound (the highest permissible port number).
Selective Acknowledgments	If necessary, enable this option.
UDP Settings	
Receive buffer size (bytes)	The default size of the receive buffer (in bytes). This parameter affects the UDP receive window size. If you increase the size of the receive buffer, then the receive window is prolonged. If you are experiencing high latency on your test network, increase the size of the receive buffer to improve the throughput.
Transmit buffer size (bytes)	The default size of the transmit buffer (in bytes). This parameter affects the UDP transmit window size. If you increase the size of the transmit buffer, the transmit window is prolonged. If you are experiencing high latency on your test network, increase the size of the transmit buffer to improve the throughput.
Min source port	The source port specifies which ports are used for client connections. The Min value specifies the lower bound (the lowest permissible port number).

Parameter	Description
Max source port	The Max value specifies the upper bound (the highest permissible port number).

The following table describes the **Traffic Flow** parameters.

Parameter	Description
Flow	
Transport Protocol	Select the transport protocol from the drop-down list. Available options: TCP or UDP.
Destination Hostname	Destination hostname of the server. This value is editable.
Port	This represents the server(destination) port. This value is editable.
Client Burst Interval (ms)	The time interval at which the client sends packet bursts.
Client Burst Size (packets)	This field is available only when Transport Protocol is UDP. The number of packets the client sends in a burst.
Client Burst Size (bytes)	The packet size in bytes.
Client Timeout (ms)	This field is available only when Transport Protocol is UDP. Set the timeout value.
Server Burst Interval (ms)	The time interval at which the server sends packet bursts.
Server Burst Size (packets)	This field is available only when Transport Protocol is UDP. The number of packets the server sends in a burst.
Server Burst Size (bytes)	The packet size in bytes.
Server Timeout (ms)	This field is available only when Transport Protocol is UDP. Set the timeout value.
DNN	Select the DNN from the drop-down list.
QoS Flow ID	Select the QoS Flows ID(s) from the drop-down list.

UDG

The following table describes the **UDG** parameters.

Parameter	Description
Application Type	Select the application type. In this case, this parameter must be set to **UDG**.
Label	Set the label name. You can accept the value provided by CoreSIM or overwrite it with your own value.
Delay application traffic start (ms)	The time (in milliseconds) to wait before the application traffic flows start after each PDU Session has been established.
IP Preference	Select a value from the drop-down list: **IPv4** or **IPv6**.
TCP Settings	
Min retransmission timeout (ms)	The lowest value that the computed RTO timer value can be set to. Expiry of the RTO timer indicates that the sender has not received an acknowledgment for the transmission, which triggers a retransmission of the segment. Upon each retransmission, the RTO timer value is doubled, up to the Max value.
Max retransmission timeout (ms)	The highest value that the computed RTO timer value can be set to.
Receive buffer size (bytes)	The default size of the receive buffer (in bytes). This parameter affects the TCP receive window size. If you increase the size of the receive buffer, then the receive window is prolonged. If you are experiencing high latency on your test network, increase the size of the receive buffer to improve the throughput.
Transmit buffer size (bytes)	The default size of the transmit buffer (in bytes). This parameter affects the TCP transmit window size. If you increase the size of the transmit buffer, the transmit window is prolonged. If you are experiencing high latency on your test network, increase the size of the transmit buffer to improve the throughput.
Min source port	The source port specifies which ports are used for client connections. The Min value specifies the lower bound (the lowest permissible port number).
Max source port	The Max value specifies the upper bound (the highest permissible port number).
MSS	The desired Maximum Segment Size (MSS) for the user plane traffic that will be generated for this UE range, specified in bytes. The MSS is the largest TCP segment that the IP device can transmit as a single, unfragmented unit. It is typically calculated as the MTU minus the TCP header size minus the IP header size. For example, for traditional Ethernet, the MSS value is 1460 (1500 minus 40).
Selective Acknowledgments	If necessary, enable this option.

Parameter	Description
UDP Settings	
Receive buffer size (bytes)	The default size of the receive buffer (in bytes). This parameter affects the UDP receive window size. If you increase the size of the receive buffer, then the receive window is prolonged. If you are experiencing high latency on your test network, increase the size of the receive buffer to improve the throughput.
Transmit buffer size (bytes)	The default size of the transmit buffer (in bytes). This parameter affects the UDP transmit window size. If you increase the size of the transmit buffer, the transmit window is prolonged. If you are experiencing high latency on your test network, increase the size of the transmit buffer to improve the throughput.
Min source port	The source port specifies which ports are used for client connections. The Min value specifies the lower bound (the lowest permissible port number).
Max source port	The Max value specifies the upper bound (the highest permissible port number).

The following table describes the **Traffic Flow** parameters.

Parameter	Description
Flow	
Transport Protocol	Select the transport protocol from the drop-down list. Available options: **TCP** or **UDP**.
Out of Band Signaling	*Select this check-box to enable OOB signaling. More details about the required parameters here.* IMPORTANT *To use the OOB feature, the OOB interface must be set in Agent Management window.*
Destination Hostname	Destination hostname of the server. This value is editable.
Port	This represents the server(destination) port. This value is editable.
Client Source Port	The local port for client data connection.
Reconnect Timeout (ms)	The time interval after which the client attempts to reconnect after the connection was interrupted. 0 means that reconnect is disabled.
DNN	Select the DNN from the drop-down list.
QoS Flow ID	Select the QoS Flows ID(s) from the drop-down list.
UDG Traffic	*Select to enable and configure the UDG Traffic Parameters.*

Parameter	Description
Parameters	
Transaction	*Select to enable and configure the Transaction parameters.*
Status Query Interval	Timeout for keepalive packets on server. The server will wait for the `keepAliveInterval` value multiplied by `keepAliveExpiryCount` value.
Keepalive Interval	The time interval, in milliseconds, between UDG statistics requests (RESULT). A zero value means this feature is disabled.
Keepalive Expiry Count	The time to wait for UUDG to reconnect. A 0 value means the reconnect is disabled (in milliseconds).

The following table describes the **Out of Band Signaling** parameters.

Parameter	Description
Local Address	The local IP address.
IP Prefix Length	The IP address prefix assigned to this range. It specifies the number of leftmost bits in the address, which indicates the network portion of the address.
MAC Address	Hardware MAC address.
MAC Increment	The value to use when incrementing the MAC address (starting with the MAC Address). The default value is 000000000001.
Remote Address	The remote IP address.
Port	Set the used port.

The following table describes the **UDG Traffic Parameters**.

Parameter	Description
UDG Test Type	Select the test type from the drop-down list. Available options: **Transmission**, **Ping-pong** or **Speed-Test**. For each test type, the parameters are described below.
Transmission	
Throughput Tx (kbps)	This value is computed based on the parameters in the test and will be recalculated if one of these parameters change.
Client Burst Interval (ms)	The time interval at which the client sends packet bursts.
Client Burst Interval Unit	The unit in which this burst interval is expressed.

Parameter	Description
Client Burst Size (packets)	The number of packets the client sends in a burst.
Client Burst Size (bytes)	The packet size in bytes.
Throughput Rx (kbps)	This value is computed based on the parameters in the test and will be recalculated if one of these parameters change. A corresponding server is required to achieve the displayed value.
Server Burst Interval (ms)	The time interval at which the server sends packet bursts.
Server Burst Interval Unit	The unit in which this burst interval is expressed.
Server Burst Size (packets)	The number of packets the server sends in a burst.
Server Burst Interval Unit	Select the server burst interval unit. Available options: **Millisecond** or **Microsecond**.
Server Burst Size (bytes)	The packet size in bytes.
Ping-pong	
Ping Direction	Set the ping direction. Available options: **Upstream** or **Downstream**.
Ping Interval	Set the ping time interval.
Ping Interval Unit	Set the ping interval unit. Available options: **Millisecond** or **Microsecond**.
Pong Number	Set the value for the pong number.
Client Packet Size (bytes)	The packet size in bytes.
Server Packet Size (bytes)	The packet size in bytes.
Speed-Test	
Traffic direction	Select the traffic direction for which this filter applies: **Uplink** or **Downlink**.
Client Packet Size (bytes)	The packet size in bytes.
Server Packet Size (bytes)	The packet size in bytes.

The following table describes the **Transaction** parameters.

Parameter	Description
Transaction	*Select the check-box to enable these settings.*
Duration (ms)	Transactions duration, in millisecond.
Idle interval (ms)	Idle interval between transactions, in millisecond.
Resume Mode	Side which triggers transition between the UE idle and the UE connected state. Available options: **User** or **Network**.

REST API Client

The **REST API Client** objective simulates RESTful clients conforming to the design principles of the representational state transfer (REST) architectural style. Simulated clients are designed for one-arm testing, being fully interoperable with real RESTful Servers.

The following table describes the REST API Client parameters.

Parameter	Description
Application Type	Select the type of traffic you want to generate. In this case, this parameter must be set to **REST API Client**.
Label	Set the label name. You can accept the value provided by CoreSIM or overwrite it with your own value.
Objective Type	This field is set to **Simulated Users** and cannot be modified.
Transport Protocol	Select the transport protocol from the drop-down list. Available options: **TCP** or **TLS**
REST API Flow	The name of list of REST API Client sequential operations and transitions emulated by each REST API Client. The REST API Flow is initially loaded into LoadCore's Resource Library, and then added to the test as a Global Playlists. The list is defined in CSV format, following specific rules. Refer to *Keysight Open RAN Simulators, Cloud Edition 5.2 LoadCore User Guide* for further information.
Delay Application Traffic Start (ms)	The time (in milliseconds) to wait before starting the Attacks objective traffic.
IP Preference	Select a value from the drop-down list: **IPv4** or **IPv6**.
Iterations	If is set to **0**, it will be iterated on continuous loop during sustain time. If set to **1**, it will be executed only one time. IMPORTANT Values greater than 1 are not allowed.

Parameter	Description
Max Transactions per Connection	The maximum amount of transactions an application can make on one connection.
Enable DNS Query per Connection	If enabled, will process only one DNS query per TCP connection.
DNN	Select the DNN value for the drop-down list. For more details about DNN configuration, refer to DNN configuration settings.
QoS Flow ID	Select the QoS Flows ID(s) from the drop-down list. For more details about QoS Flow configuration, refer to QoS Flow configuration settings.
TCP Settings	
Min retransmission timeout (ms)	The lowest value that the computed RTO timer value can be set to. Expiry of the RTO timer indicates that the sender has not received an acknowledgment for the transmission, which triggers a retransmission of the segment. Upon each retransmission, the RTO timer value is doubled, up to the Max value. The default Min value is 2000 milliseconds and the permissible range of values is between 50 to 120000 milliseconds.
Max retransmission timeout (ms)	The highest value that the computed RTO timer value can be set to. The default value is 3200 milliseconds and the permissible range of values is between 1000 to 120000 milliseconds.
Receive buffer size (bytes)	The default size of the receive buffer (in bytes). This parameter affects the TCP receive window size. If you increase the size of the receive buffer, then the receive window is prolonged. If you are experiencing high latency on your test network, increase the size of the receive buffer to improve the throughput.
Transmit buffer size (bytes)	The default size of the transmit buffer (in bytes). This parameter affects the TCP transmit window size. If you increase the size of the transmit buffer, the transmit window is prolonged. If you are experiencing high latency on your test network, increase the size of the transmit buffer to improve the throughput.
Min Source Port	The source port specifies which ports are used for client connections. The Min value specifies the lower bound (the lowest permissible port number).
Max Source Port	The Max value specifies the upper bound (the highest permissible port number).
MSS	The desired Maximum Segment Size (MSS) for the user plane traffic that will be generated, specified in bytes. The MSS is the largest TCP segment that the IP device can transmit as a single, unfragmented unit. It is typically calculated as the MTU minus the TCP header size minus the IP header size. For example, for traditional Ethernet, the MSS value is 1460 (1500 minus 40).

Parameter	Description
Selective Acknowledgments	Select the toggle button to enable this option.
TLS Settings	*See TLS Settings table for more details.*
Custom Parameters	*For more details, refer to Custom parameters.*

TLS Settings

Parameter	Description
TLSv1.2	*Select the check box to enable it.* *The following options became available:*
Cipher	Select one or more ciphers from the drop-down list. IMPORTANT This parameter becomes available only if TLSv1.2 is selected.
Session reuse method	Select the Session Reuse Method from the drop-down list: • Disable • Session ticket • Session ID IMPORTANT Session reuse method is available only if TLSv1.2 is selected.
Session reuse count	Specify how many simultaneous connections can share the same Session ID or Ticket. IMPORTANT Session reuse count is available only if TLSv1.2 is selected, and Session reuse method is set to Session Ticket or Session ID.
TLSv1.3	*Select the check box to enable it.* *The following options became available:*
Cipher	Select one or more ciphers from the drop-down list. IMPORTANT This parameter becomes available only if TLSv1.3 is selected.
Middlebox compatibilty	Select the check box to enable it. It allows for compatibility with middleboxes which do not support TLSv1.3. IMPORTANT This parameter becomes available only if TLSv1.3 is selected.
Immediate close	Select the check box to enable it.

Parameter	Description
Send close notify	If enabled, it will send a close notify message.

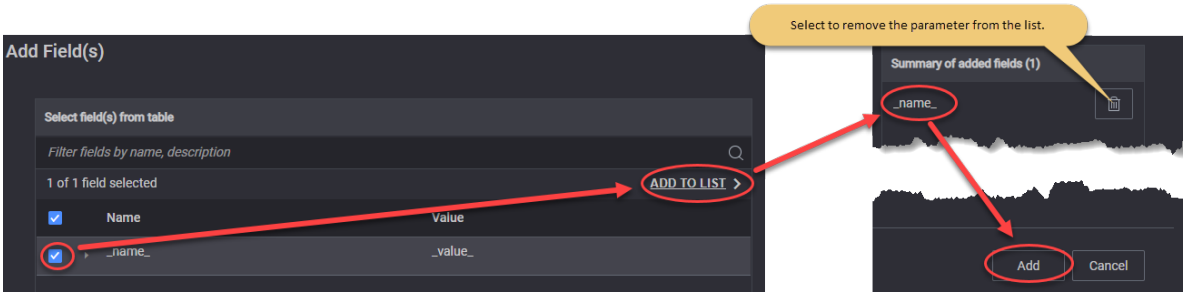
Custom Parameters

From this section you can add custom parameters fields:

- **Custom Parameters**

You can add custom parameters as follows:

1. Select the **Custom Parameters** pane.
   The Custom Parameters panel opens.
2. Select the **Add** button. The Add Field(s) opens.
3. From the Add Field(s), select the fields you want to add and select **ADD TO LIST** to move them to the added fields section. To add the fields to your configuration select **Add**.
   For example ...



Predefined Applications Traffic

The following table describes the Predefined Flows Traffic parameters.

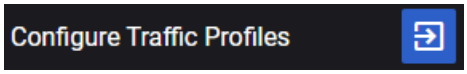
Parameter	Description
Application Type	Select the type of traffic you want to generate. In this case, this parameter must be set to **Predefined Applications**.
Objective Type	Select an option from the drop-down list: • **Simulated Users** • **Throughput** • **Connections Per Second**
Throughput (kbps)	IMPORTANT This parameter is available only when Objective Type is set to **Throughput**. The desired throughput (in kbps) for the combined traffic flows that will be generated.

Parameter	Description
Connections Per Seconds	IMPORTANT This parameter is available only when Objective Type is set to **Connections Per Second**. Set the number of connections.
MSS	The desired Maximum Segment Size (MSS) for the user plane traffic that will be generated for this UE range, specified in bytes. The MSS is the largest TCP segment that the IP device can transmit as a single, unfragmented unit. It is typically calculated as the MTU minus the TCP header size minus the IP header size. For example,for traditional Ethernet, the MSS value is 1460 (1500 minus 40).
Delay application traffic start (ms)	The time (in milliseconds) to wait before the application traffic flows start after each PDU Session has been established.
Configure Traffic Profiles	Each Application Traffic entry requires at least one traffic profile definition, and can support multiple such definitions. Refer to Traffic Profile for a description of the configuration settings for these traffic profiles.

Traffic Profile

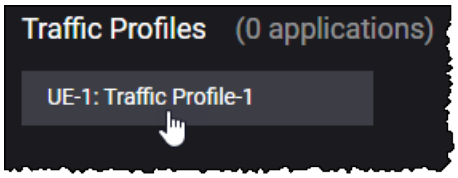
You can configure the traffic profiles as needed to meet your test objectives. You can do this as follows:

1. Select the **Configure Traffic Profiles** button.



   The Traffic Profiles section opens.

2. Select the Traffic Profiles tile.



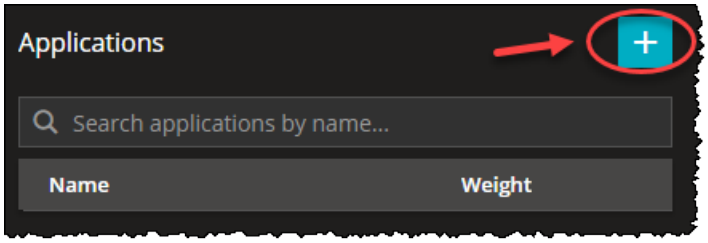
   The Traffic Profile Configuration section opens.

3. From the Predefined Applications sections, you can add and configure applications by selecting the following sections:
   - Applications
   - TCP Settings
   - TLS Settings
   - RTP Settings

Applications

You can add or remove predefined applications from the Applications tab under the Traffic Profile Configuration section, as follows:

1. Select the **Add Application** button.

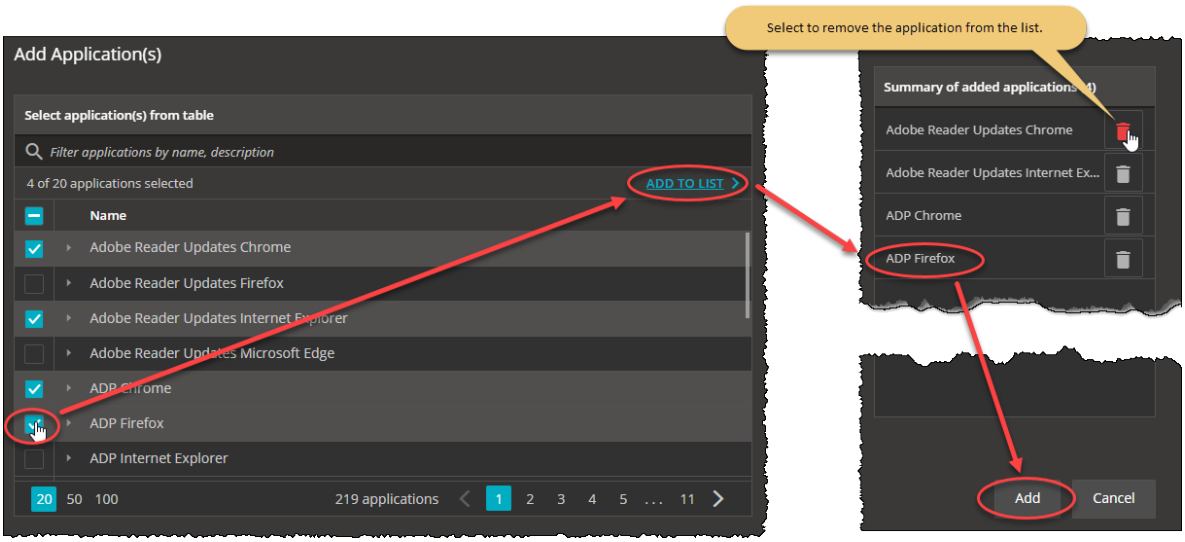


   The Add Application(s) window opens.

2. From the Add Application(s), select the applications you want to add and select **ADD TO LIST** to move them to the added applications section. To add the applications to your configuration select **Add**.

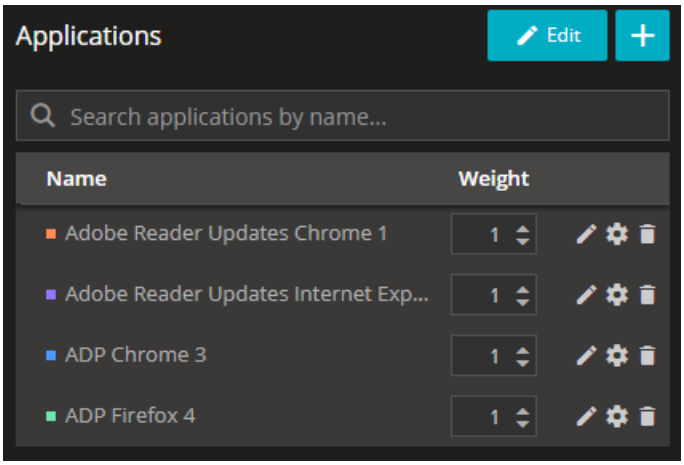
   NOTE For the complete list of predefined applications, refer to Predefined Applications.

   For example ...



The applications are added to your configuration under the Applications section.

For example ...



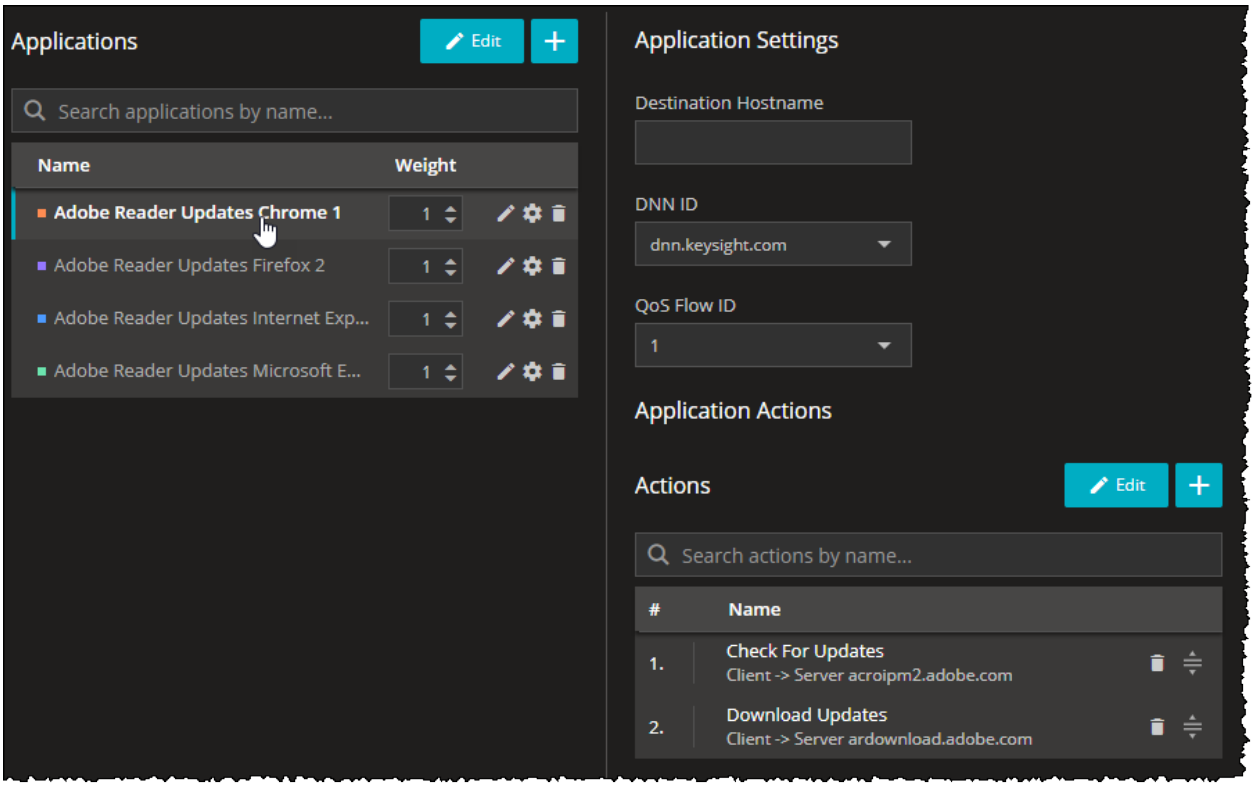
3. If needed, you can select the **Edit** button to enable the bulk selection of the available applications in order to remove them from the list.

For each application added, the following elements are available in the Applications table:

Field	Description
Name	The application name.
Weight	Set the application weight using the adjustment button. If the primary objective of a Traffic Profile is set to **Throughput**, the selected weight distribution time depends on the types and number of applications added to the application list.
Action Buttons 	• **Rename** - Select to rename the application. • **Advanced Settings** - for more information, refer to Advanced Settings. • **Delete** - Select to delete the application.

When an application is selected from the Application table, the Application Settings and Application Actions sections are displayed.

For example ...



Application Settings

Under the Application Settings section, the following fields are displayed:

NOTE These fields under the Application Settings section are common to all predefined applications.

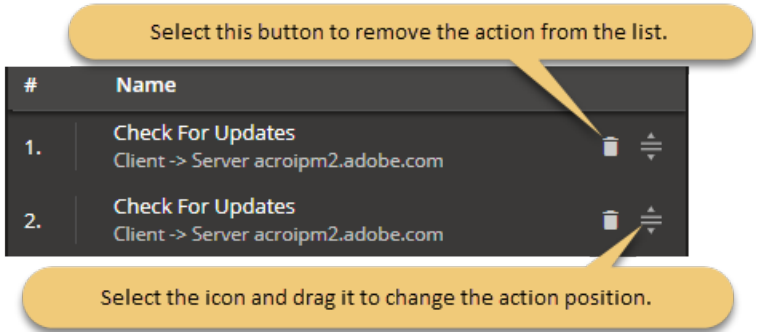
Field	Description
Destination Hostname	The application name.
DNN ID	Select the DNN from the drop-down list.
QoS Flow ID	Select a QoS Flow ID from the drop-down list.

Application Actions

The Application Actions section lists the actions and action parameters available in CoreSIM for each predefined application. For the complete list of actions and parameters, refer to Application Actions.

Under the Application Actions section, you can edit or add new actions for each application:

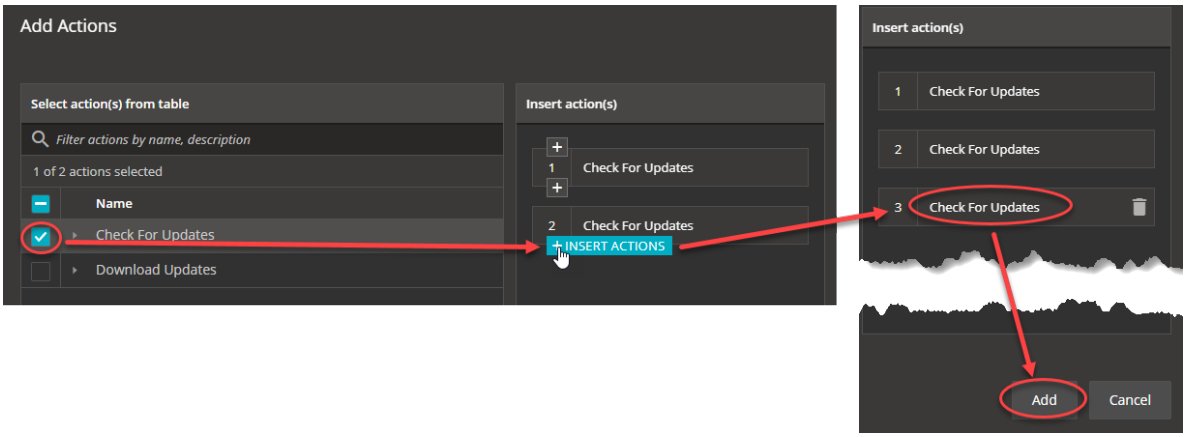
1. Use the icons available for each icon in order to remove it or to change its position in actions list.
   For example ...



2. Select the **Add Actions** button to add new actions to the application. The Add Action(s) window opens.

   Select an action from the list and then use the **Insert Actions** button to add the action in the desired position on the Insert Action(s) table. Select **Add**.

   For example ...



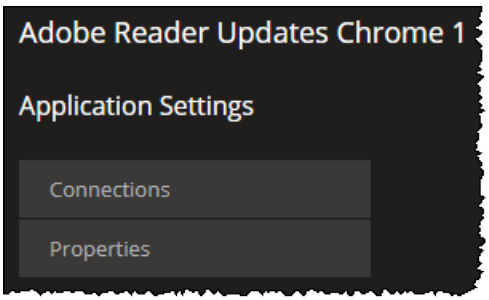
3. If needed, you can select the **Edit** button to enable the bulk selection of the available actions in order to remove them from the list.

Application Advanced Settings

For each predefined application, the Application Settings menu is displayed when the Advanced Settings button is selected. This menu contains two main sections:

- **Connections**
- **Properties**

For example ...



Under the **Connections** section, the Connections table is displayed. When a connection is selected, the Connections Properties fields are displayed, as follows:

Field	Description
Name	The application name.
Client Endpoint	The client endpoint.
Server Endpoint	The server endpoint.
Hostname	The hostname name.
Destination Port	The TCP source port that the client endpoint is initiating connections from.
Server Port	The TCP port that the server endpoint is accepting connections on.
Encryption disabled	Select the check box to enable it this option.

Under the **Properties** section, the application settings Properties fields are displayed, as follows:

Field	Description
Name	The application name.
Iterations	Set the value for the number of iterations.
Max Transactions	The maximum amount of transactions an application can make.
Client HTTP profile	Select the client HTTP profile from the drop-down list. The available options are: • Chrome • Firefox • Opera • Microsoft Edge • Internet Explorer • Safari • Android
Action Timeout (seconds)	Set the action timeout in seconds.
Connection Persistence	Select an option for the connection persistence: • **Standard** - inherits the behavior with respect to the HTTP version (1.0 or 1.1). • **Disabled** - enforces connection closing following every HTTP message. • **Enabled** - enforces connection persistence through explicit keep-alive.

Field	Description
HTTP Version	Select the HTTP version used: • **HTTP/1.0** • **HTTP/1.1**

TCP Settings

These parameters are configurable for both Client and Server settings, as presented in the following table.

Parameter	Description
Min retransmission timeout (ms)	The lowest value that the computed RTO timer value can be set to. Expiry of the RTO timer indicates that the sender has not received an acknowledgment for the transmission, which triggers a retransmission of the segment. Upon each retransmission, the RTO timer value is doubled, up to the Max value. The default Min value is 2000 milliseconds and the permissible range of values is between 50 to 120000 milliseconds.
Max retransmission timeout (ms)	The highest value that the computed RTO timer value can be set to. The default value is 3200 milliseconds and the permissible range of values is between 1000 to 120000 milliseconds.
Min source port	The source port specifies which ports are used for client connections. The Min value specifies the lower bound (the lowest permissible port number). The default value is 1024.
Max source port	The Max value specifies the upper bound (the highest permissible port number). The default value is 65535.
Receive buffer size (bytes)	The default size of the receive buffer (in bytes). This parameter affects the TCP receive window size. If you increase the size of the receive buffer, then the receive window is prolonged. If you are experiencing high latency on your test network, increase the size of the receive buffer to improve the throughput.
Transmit buffer size (bytes)	The default size of the transmit buffer (in bytes). This parameter affects the TCP transmit window size. If you increase the size of the transmit buffer, the transmit window is prolonged. If you are experiencing high latency on your test network, increase the size of the transmit buffer to improve the throughput.
Enable RFC1323 TCP timestamps	Enable or disable the stamp using the toggle button. If enabled, the client or server inserts an RFC 1323 timestamp into each packet. NOTE Enabling the TCP Timestamp option adds 12 bytes to the TCP header. This reduces the effective configured MSS.

TLS Settings

NOTE TLS multi version support is available, you can configure both TLS 1.2 and TLS 1.3 from **Client TLS Settings**. You can choose multiple ciphers for each different version. The Client sends these versions and ciphers in the Client Hello and the Server chooses one of the versions and ciphers and replies back with Server Hello. The Client then proceeds with the handshake.

NOTE Once you select either of the two Session Reuse Methods below for the **Client TLS Settings**, you can specify how many simultaneous connections can share the same Session ID or Ticket through the **Session Reuse Coun**t option for **TLSv1.2**.

These parameters are configurable for both Client and Server settings, as presented in the following tables.

Client TLS Settings

Parameter	Description
TLSv1.2	*Select the check box to enable it.* *The following options became available:*
Cipher	Select one or more ciphers from the drop-down list.
Session reuse method	Select the Session Reuse Method from the drop-down list: • Disable • Session ticket • Session ID NOTE Session reuse method is available only if TLSv1.2 is selected.
Immediate close	Select the check box to enable it.
TLSv1.3	*Select the check box to enable it.* *The following options became available:*
Cipher	Select one or more ciphers from the drop-down list.
Middlebox compatibilty	Select the check box to enable it. It allows for compatibility with middleboxes which do not support TLSv1.3.
Immediate close	Select the check box to enable it.

Server TLS Settings

Parameter	Description
TLSv1.2	*Select the check box to enable it.*

Parameter	Description
	The following options became available:
Cipher	Select one or more ciphers from the drop-down list.
Session reuse method	Select the Session Reuse Method from the drop-down list: • Disable • Session ticket • Session ID NOTE Session reuse method is available only if TLSv1.2 is selected.
Immediate close	Select the check box to enable it.
TLSv1.3	*Select the check box to enable it.* *The following options became available:*
Cipher	Select one or more ciphers from the drop-down list.
Middlebox compatibilty	Select the check box to enable it. It allows for compatibility with middleboxes which do not support TLSv1.3.
Immediate close	Select the check box to enable it.
SNI Enabled	*Select the check box to enable the server name indicator. The following **SNI Settings** become available:*
Certificate file	Select **Upload** to add your certificate file or **Clear** to remove it.
Key file	Select **Upload** to add your key file or **Clear** to remove it.
Key file password	Enter your key file password.
DH file Traffic	Select **Upload** to add your DH file or **Clear** to remove it.
Certificate file	*Select **Upload** to add your certificate file or **Clear** to remove it.*
Key file	*Select **Upload** to add your key file or **Clear** to remove it.*
Key file password	*Enter your key file password.*
DH file Traffic	*Select **Upload** to add your DH file or **Clear** to remove it.*

RTP Settings

The following elements are available on the RTP Settings tab under the Traffic Profile Configuration section.

Settings	Description
Encryption Mode	Select an encryption mode from the drop-down list. Available options: **None**, **XOR**, **ZOOM** or **SRTP**.
MOS Mode	Select the Session Reuse Method from the drop-down list. Available options: **Disable**, **Per interval** or **Per call**.

DN configuration settings

Data Networks (DN) represents one of the entities in the 5G core network architecture. DN interfaces enable access to the public Internet, operator services, and other external data networks.

The configuration settings are described in the topics listed below.

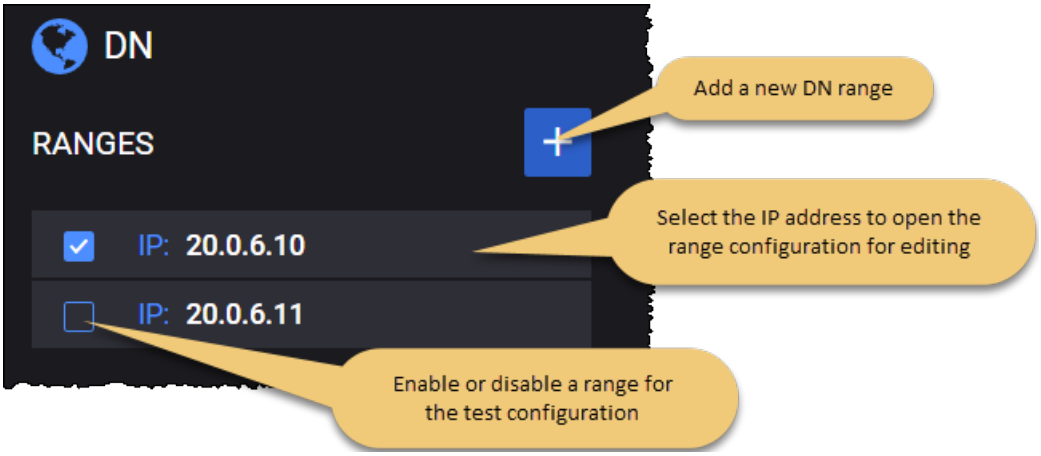
Topics:

DN Ranges panel

The **DN Ranges** panel opens when you select the DN node from the network topology window. You can perform the following tasks from this panel:

- Add a new DN range to your test configuration.
- Open a DN range configuration (for editing or viewing).
- Enable or disable a range for the test configuration.

For example ...



DN Range panel

You add and select DN ranges from the DN Ranges panel. When you select a DN's IP address from the **UDR Ranges** panel, CoreSIM opens the **Range** panel, from which you can:

- Select the **Delete Range** button to delete the DN range from the test configuration.
- Select **Range Settings** to configure the node and connectivity settings for the DN range.
- Select **Routes Settings** to configure the route to an UE or custom range.
- Select **User Plane** to configure the traffic generators.

DN range controls and settings

Each DN range is identified by a unique IP address. You can add and delete DN ranges as necessary to support your test objectives. For example, a test may require a range of UEs to concurrently access multiple data networks (for example, local and central DNs) using a single or multiple PDN sessions. In this case, you would create one DN range for each of those data networks.

The following table describes the available **Range** configuration options for each DN range.

Setting	Description
Range:	
	Select the **Delete Range** button to delete this range from your test configuration.
Range Count	The number of DNs in the DN range.
Range Settings:	

Setting	Description
N6 Interface Settings	Each DN range requires the configuration of N6 interface settings, through which a DN instance enables connectivity and interaction with other functions in the 5G network. These settings are described in DN N6 interface settings.
Routes Settings	These settings are described in DN routes settings.
User Plane	These settings are described in DN User Plane.
Throttling Settings	These settings are described in Throttling settings.

DN N6 interface settings

N6 is the interface between the Data Network (DN) and the UPF.

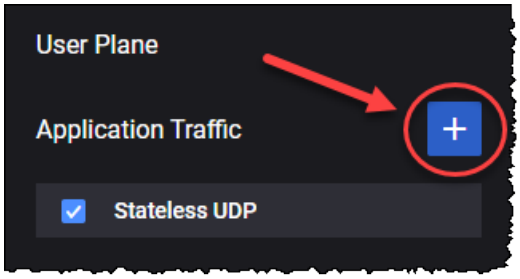
The following table describes the **Connectivity Settings** that you configure for each DN range.

Connectivity Settings	Description
IP	*Select the IP address to open the IP configuration panel for editing.*
IP Address	The IP address from your test network to use for traffic on this interface.
IP Prefix Length	The IP address prefix assigned to this range. It specifies the number of leftmost bits in the address, which indicates the network portion of the address.
Gateway Address	The IP address assigned as gateway address.
Gateway Increment	The value to use when incrementing the Gateway address (starting with the Gateway Address).
MTU	The Maximum Transmission Unit (MTU) for this range. MTU specifies the largest packet that an Ethernet frame can carry.
MSS	The Maximum Segment Size (MSS) for this range. MSS specifies the largest TCP segment that the IP device can transmit as a single, unfragmented unit.
MAC	*Select the MAC address to open the MAC configuration panel for editing*
MAC Address	Hardware MAC address.
MAC Increment	The value to use when incrementing the MAC address (starting with the *MAC Address*). The default value is 000000000001.
Outer VLAN	*Select the check-box to make this option available, and, then, select the Outer VLAN to open the configuration panel for editing.*

Connectivity Settings	Description
VLAN ID	VLAN identifier.
VLAN TPID	VLAN tag protocol ID.
Inner VLAN	IMPORTANT *This option is visible only when the Outer VLAN check-box is selected.* *Select the check-box to make this option available, and, then, select the Inner VLAN to open the configuration panel for editing.*
VLAN ID	VLAN identifier..
VLAN TPID	VLAN tag protocol ID.

DN User Plane

CoreSIM provides multiple traffic application that can be added by selecting the **Add Objective** button.



NOTE Based on your test requirements, the configuration of the User Plane Objectives may involve settings for the traffic generators on the UE and also on the DN. For the UE User Plane settings, refer to UE User Plane.

Parameter	Description
+	Select this button to add a new application traffic objective. The objective can be: • **Stateless UDP** • **Data** • **Voice** • **Video OTT** • **DNS Server** • **Predefined Applications** • **Synthetic** • **UDG**

Parameter	Description
	Select this button to remove the application traffic objective from your test configuration.
Stateless UDP	For the settings required to configure the Stateless UDP traffic objective, refer to DN Stateless UDP Traffic.
Data	For the settings required to configure the Data traffic objective, refer to DN Data Traffic.
Voice	For the settings required to configure the Voice traffic objective, refer to DN Voice Traffic.
Video OTT	For the settings required to configure the Video OTT traffic objective, refer to DN Video OTT Traffic.
DNS Server	For the settings required to configure the DNS Server objective, refer to DN DNS Client Traffic.
Predefined Applications	For the settings required to configure the Predefined Applications objective, refer to DN Predefined Applications Traffic.
Synthetic	For the settings required to configure the Synthetic objective, refer to DN Synthetic.
UDG	For the settings required to configure the UDG objective, refer to DN UDG.

DN Stateless UDP Traffic

Use the **Stateless UDP** generator is you want to generate IP packets that encapsulate UDP payload. The Stateless UDP generator configuration settings for the dowlink traffic are described below.

Parameter	Description
Application Type	Select the type of traffic you want to generate. In this case, this parameter must be set to **Stateless UDP**.
Label	Set the label name. You can accept the value provided by CoreSIM or overwrite it with your own value.
Flow Type	This field is set to **downlink** and can not be modified since on the DN you can only configure the downlink flow.
Packet Rate	The rate at which the test generates downlink packets, measured in packets per second (pps).
Distributed over (s)	Used to configure procedure rate less than 1/sec. Example: if configured as 3, test will execute one procedure every 3 seconds.
Payload Size	The size of the packet payload, in bytes.

Parameter	Description
Destination UDP Port Start	The start destination port number to place in the UDP header.
Destination UDP Port Count	Total number of UDP ports in this range.
Source UDP Port	The source port number to place in the UDP header.
Destination UE Range	Select the destination UE range from the drop-down list.
DNN	Select the DNN value for the drop-down list. For more details about DNN configuration, refer to DNN configuration settings.
QoS Flow ID	Select the QoS Flows ID(s) from the drop-down list. For more details about QoS Flow configuration, refer to QoS Flow configuration settings.
Fallback to Default Flow	This option supports use cases in which it is desirable for user traffic to use the default QoS flow if the requested dedicated flow is not available. • When this option is selected, traffic will flow from the start of the test until the end. If the dedicated flow or bearer is not yet activated, it will fall back to the default flow. Once the dedicated bearer becomes active the traffic will move to that flow. If the dedicated bearer is deleted, the traffic will move back to the default flow. • When this option is not selected, traffic will not flow until the designated QoS flow is activated (the flow selected in the *QoS Flow/Bearer ID* field). This option is useful in a test in which you are using more than one traffic type. For example, you may want HTTP traffic to be running throughout the duration of the test while voice traffic is running only when a default flow is activated for it.

DN Data Traffic

The following table describes the DN Data Traffic parameters.

Parameter	Description
Application Type	Select the type of traffic you want to generate. In this case, this parameter must be set to **Data**.
Label	Set the label name. You can accept the value provided by CoreSIM or overwrite it with your own value.
MSS	The desired Maximum Segment Size (MSS) for the user plane traffic that will be generated, specified in bytes.

Parameter	Description
	The MSS is the largest TCP segment that the IP device can transmit as a single, unfragmented unit. It is typically calculated as the MTU minus the TCP header size minus the IP header size. For example, for traditional Ethernet, the MSS value is 1460 (1500 minus 40).
Application Servers	Each Application Traffic entry requires an application server definition, and can support multiple such definitions. • To select an existing application server definition, click its name to open the Server panel where you can view and modify the server settings. • To add another application server, click the **Add Server** button. CoreSIM will open the Server panel where you will select the server type and configure the server settings. Refer to Server (below) for a description of the configuration settings required by the application server. Also, you can add custom parameters, based on your test configuration requirements.

Server

You can add and delete application servers as needed to meet your test objectives. The **Server** parameters are described in the following table.

Parameter	Description
	Click the **Delete Server** button to remove the application server from your configuration.
Transport Protocol available for Data	Select the transport protocol from the drop-down list. Available options: **TCP**, **TLS**, **QUIC** or **UDP**.
Type	Select the L4/L7 protocol type from the list of pre-defined application servers. The available types include: • For **TCP** transport protocol: **HTTP Get Responder**, **HTTP Put Responder**, **HTTP Post Responder**, **HTTP Server** and **FTP Responder**. • For **TLS** transport protocol: **HTTPS Get Responder**, **HTTPS Put Responder**, **HTTPS Post Responder** and **HTTPS Server**. • For **QUIC** transport protocol: **HTTP3 Server**. • For **UDP** transport protocol: **UDP Bidirectional Responder**.
Port	The port used by the application server.
Page Size (bytes)	The page size represents the size of the web page or data file that will be retrieved from or stored to an HTTP or FTP server.
QoS FlowID	Select a QoS Flow ID for this application server.
Client Tx Count	This parameter is available only when the application server type is set to UDP Bidirectional.
Server Tx Count	This parameter is available only when the application server type is set to UDP Bidirectional.

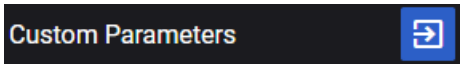
Custom Parameters

From this section you can add custom parameters or custom header fields by selecting the required pane:

- **Custom Parameters** or,
- **Custom Headers**

You can add custom parameters as follows:

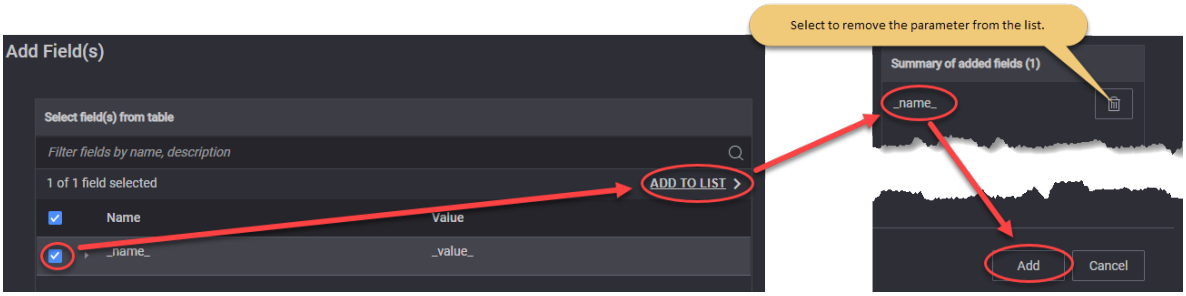
1. Select the **Open Custom Parameters** button.

   The Custom Parameters panel opens.

2. Select the **Add** button. The Add Field(s) opens.
3. From the Add Field(s), select the fields you want to add and select **ADD TO LIST** to move them to the added fields section. To add the fields to your configuration select **Add**.

   For example ...



   To add custom header fields, select the **Custom Headers** pane and follow the steps presented above for custom parameters.

DN Voice Traffic

The following table describes the Voice Traffic parameters.

Parameter	Description
Application Type	Select the type of traffic you want to generate. In this case, this parameter must be set to **Voice**.
Label	Set the label name. You can accept the value provided by CoreSIM or overwrite it with your own value.
Objective Type	By default, this parameter is set to **Simulated Users** and cannot be changed.
Call Type	Select the type of call from the drop-down list.
Dial Plan:	*For the settings required to configure the dial plan, refer to Dial Plan.*
Sip Settings:	
Local Port	Set the local port number. You can accept the value provided by CoreSIM or overwrite it with your own value.
Transport Protocol	Select the transport protocol. The available options are: • **TCP** - Transmission Control Protocol • **TLS** - Transport Layer Security • **UDP** - User Datagram Protocol
Domain	Provide the domain name.
Advanced SIP Settings	For more details about these settings, refer to Advanced SIP Settings.
RTP Settings	

Parameter	Description
Local Port	Set the local port number. You can accept the value provided by CoreSIM or overwrite it with your own value.
Local Port Increment	The value by which the local port number is incremented.
Enable OWD	If selected, one way delay statistics for audio RTP traffic are computed.
Enable RTCP	Select the check box in order to enable this option.
Enable SRTP	Select this option in order to enable Secure Real-time Transport Protocol (SRTP).
RTP Session Duration (ms)	Set the value for the session duration.
Audio settings:	*For the configuration of audio settings, refer to Audio Settings.*
Video Settings:	*For the configuration of video settings, refer to Video Settings.*
MSRP Settings:	*For the configuration of MSRP settings, refer to MSRP Settings.*
MCTTP Settings	*For the configuration of MCTTP settings, refer to MCPTT Settings.*
Advanced Media Settings:	
Custom SDP	*Select this panel to open the custom SDP settings.*
Use Custom SPD	Select the check box to use the custom SDP.
Custom SDP Template	Select the template from the drop-down list: • **None** • **EVS/AMR IPv4** • **NB Codecs IPv6** • **AMR-WB IPv6** • **Multimedia IPv4**
QoE Settings	*Select this panel to open the audio QoE settings.*
Enable MOS	Select this option to enable MOS (Mean Opinion Score).

Dial Plan

The parameters required to configure the dial plan are presented in the table below.

Parameter	Description
Destination Phone	The destination phone number.

Parameter	Description
Destination Phone Increment	The value by which the destination phone number is incremented.
Source Phone	The source phone number.

Audio Settings

The parameters required for audio settings are presented in the table below.

Parameter	Description
Enable Audio	Select to enable this option.
QoS Flow ID for Video	Select the QoS flow used for audio from the drop-down list.
Jitter Buffer Settings:	
Initial Delay (ms)	Set the value of the initial delay until playback starts (ms).
Audio Codecs	
	Select this button to add the audio codec to your test configuration.
	Select this button to remove the audio codec from your test configuration.
Codec Name	Select the audio codec from the drop-down list. The available options are: • **AMR** - The Adaptive Multi-Rate (AMR) is an audio data compression schemes optimized for speech coding, which have been adopted as the standard speech codec by 3GPP. • **AMR-WB** - The Adaptive Multi-Rate Wide Band (AMR-WB) is an audio data compression schemes optimized for speech coding, which have been adopted as the standard speech codec by 3GPP. • **EVS** - The EVS (Enhanced Voice Services) codec specified by 3GPP TS 26.445 compresses 20ms input blocks of audio samples. In addition to the EVS Primary mode, 3GPP TS 26.445 specifies that the codec implement the EVS AMR-WB IO mode for interoperability with AMR WB devices. • **PCMU** • **PCMA** • **iLBC** • **G722** • **G723** • **G729** The parameters of each audio codec are presented below.

AMR/AMR-WB

Parameter	Description
Packet Time (ms)	Length of time in milliseconds represented by the media in a packet. AMR speech encoding is performed on 20 ms speech frames.
Payload Type	Specifies the audio payload type.
Payload Format	For a given session, the payload format can be either bandwidth efficient or octet aligned, depending on the mode of operation that is established for the session via out-of-band means. • **Bandwidth efficient**: In the bandwidth efficient format only the full payload is octet aligned, so fewer padding bits are added. • **Octet aligned**: In the octet-aligned format, all the fields in a payload, including payload header, table of contents entries, and speech frames themselves, are individually aligned to octet boundaries to make implementations efficient. All fields of an AMR payload (payload header, table of contents and speech) are individually octet aligned.
Bitrate	Indicates the mode(bitrate) of the AMR codec. For AMR there are 8 available modes. All these modes can be changed dynamically without negotiation, reflecting the main characteristics of this codec – adaptive rate. For AMR WB there are 9 modes available.

EVS

Parameter	Description
Packet Time (ms)	Length of time in milliseconds represented by the media in a packet.
Payload Type	Specifies the audio payload type.
Payload Format	The following options are available: • **Full header** - In this payload format, the payload consists of one or more coded frame(s). The packet headers contain the Table of Contents (ToC) byte(s) and the Change Mode Request (CMR) byte. • **Compact** - In this payload format a single codec data frame is sent in each RTP packet. The format uses protected payload sizes that uniquely identify the EVS codec bitrates for the EVS Primary or EVS AMR-WB IO mode.
Bitrate	Indicates the mode(bitrate) of the EVS codec. Select the value from the drop-down list.

PCMU/PCMA/iLBC/G722/G723/G729

Parameter	Description
Packet Time (ms)	Length of time in milliseconds represented by the media in a packet.
Payload Type	Specifies the audio payload type.

Video Settings

The parameters required for audio settings are presented in the table below.

Parameter	Description
Enable video	Select to enable this option.
QoS Flow ID for Voice	Select the QoS Flows ID(s) from the drop-down list.
Video Codecs	*This section is available only when **Enable video** is selected*
	Select this button to add the audio codec to your test configuration.
	Select this button to remove the audio codec from your test configuration.
Codec Name	Select the audio codec from the drop-down list. The available options are: **H264** or **H265**.
FPS	Set the FPS value.
Payload Type	Set the payload type value.
Average Bitrate (kbps)	Set the average bit rate value.

MSRP Settings

The parameters required for MSRP settings are presented in the table below.

Parameter	Description
Enable MSRP	Select to enable this option.
QoS Flow ID for MSRP	Select the QoS Flows ID(s) from the drop-down list.
MSRP Port	Provide the MSRP port.
MSRP Local domain	Provide the MSRP local domain.

MCPTT Settings

The parameters required for Mission Critical Push to Talk (MCPTT) settings are presented in the table below.

Parameter	Description
Enable MCPTT	Select to enable this option.
QoS Flow ID for MCPTT	Select the QoS Flows ID(s) from the drop-down list.
MCPTT Message Format	The MCPTT message format defined according to TS 24.380 standard.
MCPTT Group	The first MCPTT Group ID.
MCPTT Group Size	The number of participants per MCPTT group call.
Use CRLF in flow csv	If enabled, it will use the CRLF line terminator in the generated CSV of the configured MCPTT flow. If disabled, it will use LF.

Advanced SIP Settings

The following settings are available under the Advanced SIP Settings section:

- SIP Custom Headers
- SIP Authentication

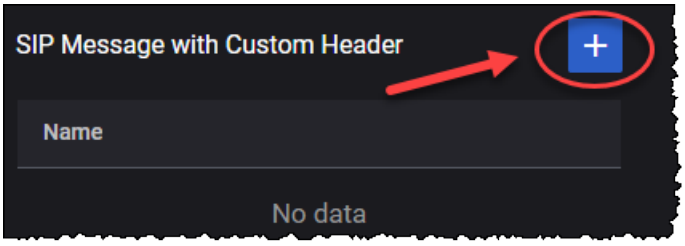
SIP Custom Headers

From the SIP Message with Custom Header pane, select the **Add** button to add a new SIP message.

NOTE The message can be deleted by selecting the corresponding **Delete** for each message. Also, you can use the **Edit** button for bulk selection and, then, delete the message in one action.

For each message, you can:

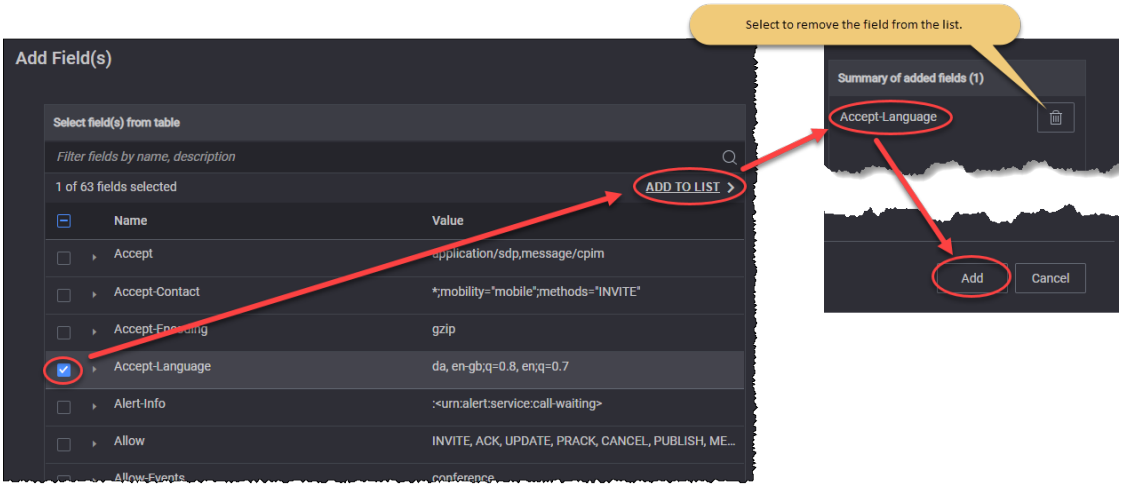
- Edit the custom header by selecting the **Message Type** from the drop-down list: **ANY**, **REGISTER**, **INVITE**, **ACK**, **BYE**, **OPTIONS**, **CANCEL**, **NOTIFY**, **SUBSCRIBE**, **REFER**, **MESSAGE**, **INFO**, **UPDATE**, **PRACK**, **RESPONSE**, **1xx**, **2xx**.
- Add custom header fields:
  - Select the **Add** button.



The Add Field(s) opens.

- From the Add Field(s), select the fields you want to add and select **ADD TO LIST** to move them to the added fields section. To add the fields to your configuration select **Add**.

  For example ...



The following custom header are available:

Parameter	Description	Value
Accept	IETF RFC 3261	application/sdp,message/cpim
Accept-Contact	IETF RFC 3841	*;mobility="mobile";methods="INVITE"
Accept-Encoding	IETF RFC 3261	gzip
Accept-Language	IETF RFC 3261	da, en-gb;q=0.8, en;q=0.7
Alert-Info	IETF RFC 3261	:<urn:alert:service:call-waiting>
Allow	IETF RFC 3261	INVITE, ACK, UPDATE, PRACK, CANCEL, PUBLISH, MESSAGE, OPTIONS, SUBSCRIBE, NOTIFY
Allow-Events	IETF RFC 6665	conference
Authentication-Info	IETF RFC 3261, IETF RFC 3310	nextnonce="47364c23432d2e131a5fb210812c"
Call-Info	IETF RFC 3261	<http://wwww.example.com/alice/photo.jpg> ;purpose=icon

Parameter	Description	Value
Content-Disposition	IETF RFC 3261	session
Content-Encoding	IETF RFC 3261	gzip
Content-ID	IETF RFC 8262	<target123@atlanta.example.com>
Content-Language	IETF RFC 3261	fr
Date	Sat,13 Nov 2010 23:29:00 GMT	IETF RFC 3261
Error-Info	IETF RFC 3261	<sip:announcement10@example.com>
Event	IETF RFC 6665, IETF RFC 6446, IETF RFC 3680	reg
Expires	IETF RFC 3261	3600
Feature-Caps	IETF RFC 6809, 3GPP TS 24.229	+3gpp.trf=sip:trf3.operator3.com
Geolocation	IETF RFC 6442	<user1@operator1.com>
In-Reply-To	IETF RFC 3261	70710@saturn.bell-tel.com, 17320@saturn.bell-tel.com
Max-Forwards	IETF RFC 3261	70
MIME-Version	IETF RFC 3261	1.0

Parameter	Description	Value
Min-Expires	IETF RFC 3261	40
Min-SE	IETF RFC 4028	60
Organization	IETF RFC 3261	Keysight
P-Access-Network-Info	IETF RFC 7315	3GPP-E-UTRAN-FDD;e-utran-cell-id-3gpp=1234
P-Associated-URI	IETF RFC 7315	sip:user2@operator3.com
Path	IETF RFC 3327	<sip:P2.example.com;lr>,<sip:P1.example.com;lr>
P-Called-Party-ID	IETF RFC 7315	sip:user1-business@example.com
P-Charging-Function-Addresses	IETF RFC 7315	ccf=192.0.8.1; ecf=192.0.8.3
P-Charging-Vector	IETF RFC 7315	icid-value=1234bc9876e;icid-generated-at=192.0.6.8;orig-ioi=home1.net
P-Early-Media	IETF RFC 5009	supported
Permission-Missing	IETF RFC 5360	userC@example.com
P-Preferred-Identity	IETF RFC 3325	"Cullen Jennings" <sip:fluffy@cisco.com>
P-Preferred-Service	IETF RFC 6050	urn:urn-7:3gpp-service.ims.icsi.mmtel
Priority	IETF RFC 3261	emergency

Parameter	Description	Value
Proxy-Authenticate	IETF RFC 3261	Digest realm="atlanta.com",domain="sip:ss1.carrier.com", qop="auth",nonce="f84f1cec41e6cbe5aea9c8e88d359",opaque="", stale=FALSE, algorithm=MD5
Proxy-Authorization	IETF RFC 3261	Digest username="Alice", realm="atlanta.com",nonce="c60f3082ee1212b402a21831ae",response="245f23415f11432b3434341c022"
Proxy-Require	IETF RFC 3261	foo
P-Visited-Network-ID	IETF RFC 7315	Visited network number 1
RAck	IETF RFC 3262	10
Reason	IETF RFC 3326	Q.850;cause=16;text="Terminated"
Record-Route	IETF RFC 3261	<sip:server10.biloxi.com;lr>, <sip:bigbox3.site3.atlanta.com;lr>
Refer-To	IETF RFC 3515	<sip:dave@bobster.example.org?Replaces=425928%40bobster.example.com.3%3Bto-tag%3D7743%3Bfrom-tag%3D6472>
Reply-To	IETF RFC 3261	Bob <sip:bob@biloxi.com>
Request-Disposition	IETF RFC 3841	proxy
Require	IETF RFC 3261	Path
Retry-After	IETF RFC 3261	3600
Route	IETF RFC 3261	<sip:bigbox3.site3.atlanta.com;lr>,<sip:server10.biloxi.com;lr>
RSeq	IETF RFC 3262	10
Server	IETF RFC 3261	HomeServer v2

Parameter	Description	Value
Service-Route	IETF RFC 3608	<sip:P2.HOME.EXAMPLE.COM;lr>
Session-Expires	IETF RFC 4028	3600;refresher=uac
Session-ID	IETF RFC 7329	0123456789abcdef123456789abcdef0
SIP-Etag	IETF RFC 3903	12345
SIP-If-Match	IETF RFC 3903	12345
Subject	IETF RFC 3261	Need more boxes
Subscription-State	IETF RFC 6665	active
Supported	IETF RFC 3261	100Rel,timer,precondition
Timestamp	IETF RFC 3261	Timestamp
Unsupported	IETF RFC 3261	100Rel
User-Agent	IETF RFC 3261	LoadCore
Warning	IETF RFC 3261	307 isi.edu "Session parameter `foo` not understood"

SIP Authentication

The parameters required for SIP authentication are presented in the table below.

Parameter	Description
Username	Provide the username.
Password	Provide the password.
Authentication Type	Select the authentication type: • **Digest MD5** • **AKAv1**

Parameter	Description
	• **AKAv2** • **ProxyDefined**
UPDATE	Select this button to update with UE range security settings.
K	The K (Subscriber Authentication Key) value used for authentication of the UEs in this range. The key is a string with a maximum length of 34 characters. You can accept the value generated by CoreSIM, or enter of a K value of your own choosing.
K Increment	The number used to increment the K value for each subsequent UE in the range. A value of zero indicates that each UE in the range uses the same K value.
Configure OP or OPc	Select the operator-specific authentication value.
Op	The Auth OP value specifies the operator-specific authentication value to use for the UEs in this range. It is a string with a maximum length of 34 characters. It remains fix for all Subscriber/SIM of an operator. You can accept the value generated by CoreSIM, or enter of an OP value of your own choosing.
Opc	The OPc value is derived from the subscriber key K and the operator dependent value OP. You can accept the value generated by CoreSIM, or enter of an OP value of your own choosing.
Opc Increment	The number used to increment the OPc value for each subsequent UE in the range. A value of zero indicates that each UE in the range uses the same OPc value.

DN Video OTT Traffic

The following table describes the Video OTT Traffic parameters.

Parameter	Description
Application Type	Select the type of traffic you want to generate. In this case, this parameter must be set to **Video OTT**.
Label	Set the label name. You can accept the value provided by CoreSIM or overwrite it with your own value.
MSS	The desired Maximum Segment Size (MSS) for the user plane traffic that will be generated, specified in bytes. The MSS is the largest TCP segment that the IP device can transmit as a single, unfragmented unit. It is typically calculated as the MTU minus the TCP header size minus the IP header size. For example,for traditional Ethernet, the MSS value is 1460 (1500 minus 40).

Parameter	Description
OTT Servers:	
+	Select this button to add an OTT server to your test configuration.
🗑	Select this button to remove the OTT server from the test configuration.
Server Name	Set the server name. Each server is identified by a unique name. You can accept the value provided by CoreSIM or overwrite it with your own value.
Transport	Select the transport protocol. The available options are: • **HTTP** • **HTTPS** • **HTTP/QUIC**
Port	Set the port number. You can accept the value provided by CoreSIM or overwrite it with your own value.
QoS Flow ID	Select the QoS Flows ID(s) from the drop-down list.
Streams	*Refer to Streams (below) for descriptions of the OTT server streams settings.*
Custom Parameters	*You can add custom parameters, based on your test configuration requirements.*

Streams

To open the OTT Server Streams panel, select the **Open Streams** button.

The OTT Server Streams parameters are described in the following table.

Parameter	Description
+	Select this button to add a stream to your test configuration.
🗑	Select this button to remove the stream from the test configuration.
Stream Name	Set the stream name. Each server is identified by a unique name. You can accept the value provided by CoreSIM or overwrite it with your own value.
URL	Set the URL path.
Type	Select the stream type from the drop-down list:

Parameter	Description
	• **Real** • **Synthetic**
Protocol	Select the protocol from the drop-down list: • **Apple HLS** • **DASH**. If the stream type is set to **Synthetic**, you can choose one protocol from list. If the stream type is set to **Real**, you will see the protocol of real stream loaded.
Stream Duration	If the stream type is set to **Synthetic**, you can configure the stream duration in seconds. If the stream type is set to **Real**, you will see the real stream duration.
Segment Duration	If the stream type is set to **Synthetic**, you can configure the segment duration in seconds. If the stream type is set to **Real**, you will see the real segment duration.
Quality Levels:	*Set the quality value for each level.*
	Select this button to add a quality level to your test configuration.
	Select this button to remove the quality level from the test configuration.
Bitrate (kbps)	Set the value of the bitrate.
Resolution	Select the resolution from the drop-down list. Available options: **QCIF**, **240p**, **nHD**, **480**, **WXGA**, **FHD**, **QHD**, **4K**, **8K**.
Frames per second	Set the number of frames per second.

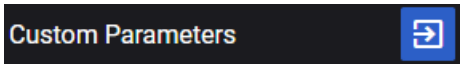
Custom Parameters

rom this section you can add custom parameters or custom header fields by selecting the required pane:

- **Custom Parameters** or,
- **Custom Headers**

You can add custom parameters as follows:

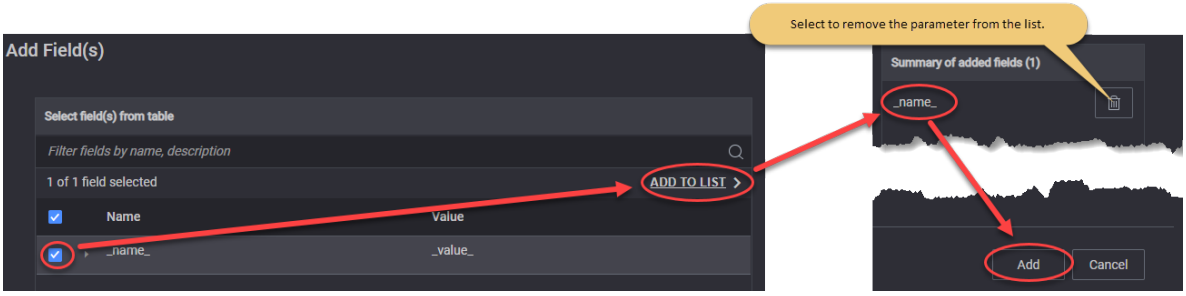
1. Select the **Open Custom Parameters** button.



The Custom Parameters panel opens.

2. Select the **Add** button. The Add Field(s) opens.
3. From the Add Field(s), select the fields you want to add and select **ADD TO LIST** to move them to the added fields section. To add the fields to your configuration select **Add**.

   For example ...



To add custom header fields, select the **Custom Headers** pane and follow the steps presented above for custom parameters.

DN DNS Server Traffic

The following table describes the DNS Server Traffic parameters.

Parameter	Description
Application Type	Select the type of traffic you want to generate. In this case, this parameter must be set to **DNS Server**.
Label	Set the label name. You can accept the value provided by CoreSIM or overwrite it with your own value.
MSS	The desired Maximum Segment Size (MSS) for the user plane traffic that will be generated, specified in bytes. The MSS is the largest TCP segment that the IP device can transmit as a single, unfragmented unit. It is typically calculated as the MTU minus the TCP header size minus the IP header size. For example,for traditional Ethernet, the MSS value is 1460 (1500 minus 40).
DNS Servers:	
+	Select this button to add an DNS server to your test configuration.
🗑	Select this button to remove the DNS server from the test configuration.
Type	Select the type from the available options.
Port	Set the port number. You can accept the value provided by CoreSIM or overwrite it

Parameter	Description
	with your own value.
QoS Flow ID	Select the QoS Flows ID(s) from the drop-down list.
Zone Manager	*Refer to Zone Manager for descriptions of the DNS server zones settings.*
Custom Parameters	*You can add custom parameters, based on your test configuration requirements.*

Zone Manager

To open the DNS Server Zones panel, select the **Open Zones** button.

The DNS Server Zones parameters are described in the following table.

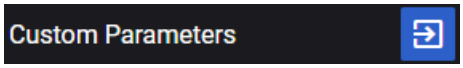
Parameter	Description
+	Select this button to add a zone to your test configuration.
🗑	Select this button to remove the zone from the test configuration.
Zone Name	Set the zone name. Each zone is identified by a unique name. You can accept the value provided by CoreSIM or overwrite it with your own value.
Master Server	Provide the value for the master server.
Resource Records (RRs)	
+	Select this button to add a resource record to your test configuration.
🗑	Select this button to remove the resource record from the test configuration.
Type	Select the type from the drop-down list. The available options are: • **A** • **AAAA** • **CNAME** • **TXT** • **PTR**

Parameter	Description
	• **NS**
Hostname	Set the hostname.
Adress	Provide the address.

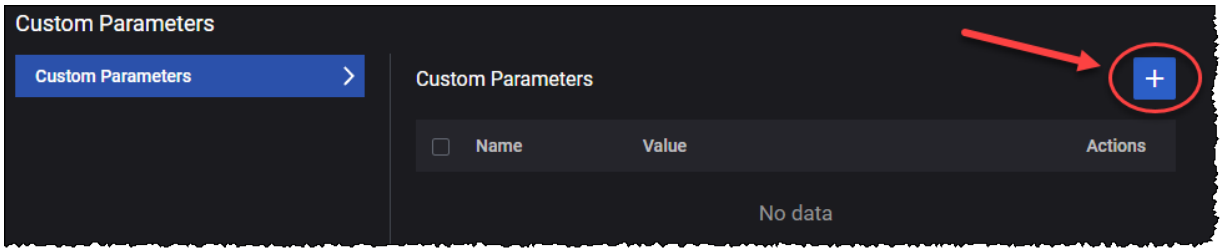
Custom Parameters

You can add custom parameters as follows:

1. Select the **Open Custom Parameters** button.

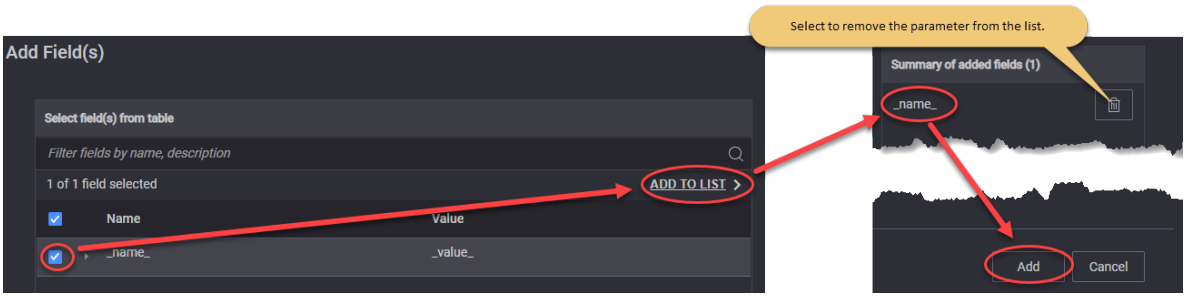
   

   The Custom Parameters panel opens.
2. Select the **Add** button.

   The Add Field(s) opens.
3. From the Add Field(s), select the fields you want to add and select **ADD TO LIST** to move them to the added fields section. To add the fields to your configuration select **Add**.

   For example ...

DN Predefined Applications Traffic

The following table describes the Predefined Applications parameters.

Parameter	Description
Application Type	Select the type of traffic you want to generate. In this case, this parameter must be set to **Predefined Applications**.
Label	Set the label name. You can accept the value provided by CoreSIM or overwrite it with your own value.

Parameter	Description
MSS	The desired Maximum Segment Size (MSS) for the user plane traffic that will be generated, specified in bytes. The MSS is the largest TCP segment that the IP device can transmit as a single, unfragmented unit. It is typically calculated as the MTU minus the TCP header size minus the IP header size. For example,for traditional Ethernet, the MSS value is 1460 (1500 minus 40).
Predefined Traffic Profiles	Select the traffic profile from the available options.

DN Capture Replay

The following table describes the Capture Replay parameters.

Parameter	Description
Application Type	Select the application type. In this case, this parameter must be set to **Capture Replay**.
Label	Set the label name. You can accept the value provided by CoreSIM or overwrite it with your own value.
Capture File	It allows you to upload a capture file, using the **Upload** button. To remove the file, select the **Clear** button.
Iterations	The number of times the capture will be replayed for each subscriber. Set to **0** for no limit. The default value is **1**.
Maximum Packet Rate	The rate at which the test generates uplink packets, measured in packets per second (pps).
Distributed Over (s)	Used to configure procedure rate less than 1/sec. Example: if configured as 3, test will execute one procedure every 3 seconds.
Rx Timeout (ms)	Time the responder waits for packets, after the delay observed in the packet capture. The default value is **1000** miliseconds.
Delayed Tx	Prevent the packets from being sent faster than they appear to be sent in the capture file, trying to maintain the packet delays. The default value is **true** (option enabled).
Resynchronize	Try to resync responder with initiator by matching incoming packets ahead and behind the current packet. The default value is **true** (option enabled).
Start Delay (s)	The number of seconds to wait from the start of sustain time (i.e. after all UEs have registered).
DNN ID	Select the DNN value for the drop-down list. For more details about DNN

Parameter	Description
	configuration, refer to DNN configuration settings.
QoS Flow ID	Select the QoS Flows ID(s) from the drop-down list. For more details about QoS Flow configuration, refer to QoS Flow configuration settings.
Fallback to Default Flow	This option supports use cases in which it is desirable for user traffic to use the default QoS flow if the requested dedicated flow is not available. • When this option is selected, traffic will flow from the start of the test until the end. If the dedicated flow or bearer is not yet activated, it will fall back to the default flow. Once the dedicated bearer becomes active the traffic will move to that flow. If the dedicated bearer is deleted, the traffic will move back to the default flow. • When this option is not selected, traffic will not flow until the designated QoS flow is activated (the flow selected in the *QoS Flow/Bearer ID* field). This option is useful in a test in which you are using more than one traffic type. For example, you may want HTTP traffic to be running throughout the duration of the test while voice traffic is running only when a default flow is activated for it.
Destination IP Address	The destination IP address to place in the IP packet.
Destination IP Count	The destination IP address count value.

The following table describes the Filter object parameters.

Parameter	Description
Filter	
	Select this button to add a new filter to your test configuration.
	Select this button to remove the additional route from your test configuration.
Role	Select the role from the drop-down list. Available options: **Initiator** and **Responder**. Default value: **Initiator**.
Filter Expression	This field cannot be empty. It selects the packets to be replayed from uploaded capture. The filter string should be in `pcap-filter` format, as described at https://www.tcpdump.org/manpages/pcap-filter.7.html.
Remove Encapsulation	Remove GTPu encapsulation from packets, if present, before trying to match the filter expression and when replaying the packets. The default value is **false** (option disabled).

Parameter	Description
Overrides	
Override QoS Flow ID	This option is available only if the *Role* is set to **Initiator**. Select the toggle button to enable it.
Qos Flow ID	This option is available only when *Override QoS Flow ID* option is enabled. Select the QoS Flows ID(s) from the drop-down list.
Override IP Address	Select the toggle button to enable it. When enabled, *Destination IP Address* and *Destination IP Address Count* fields become avilable.
Destination IP Address	The destination IP address to place in the IP packet.
Destination IP Address Count	The destination IP address count value.

DN Synthetic

The following table describes the Synthetic parameters.

Parameter	Description
Application Type	Select the application type. In this case, this parameter must be set to **Synthetic**.
Label	Set the label name. You can accept the value provided by CoreSIM or overwrite it with your own value.
MSS	The desired Maximum Segment Size (MSS) for the user plane traffic that will be generated for this UE range, specified in bytes. The MSS is the largest TCP segment that the IP device can transmit as a single, unfragmented unit. It is typically calculated as the MTU minus the TCP header size minus the IP header size. For example, for traditional Ethernet, the MSS value is 1460 (1500 minus 40).
TCP Settings	
Min retransmission timeout (ms)	The lowest value that the computed RTO timer value can be set to. Expiry of the RTO timer indicates that the sender has not received an acknowledgment for the transmission, which triggers a retransmission of the segment. Upon each retransmission, the RTO timer value is doubled, up to the Max value.
Max retransmission timeout (ms)	The highest value that the computed RTO timer value can be set to.
Receive buffer size (bytes)	The default size of the receive buffer (in bytes). This parameter affects the TCP receive window size. If you increase the size of the receive buffer, then

Parameter	Description
	the receive window is prolonged. If you are experiencing high latency on your test network, increase the size of the receive buffer to improve the throughput.
Transmit buffer size (bytes)	The default size of the transmit buffer (in bytes). This parameter affects the TCP transmit window size. If you increase the size of the transmit buffer, the transmit window is prolonged. If you are experiencing high latency on your test network, increase the size of the transmit buffer to improve the throughput.
Min source port	The source port specifies which ports are used for client connections. The Min value specifies the lower bound (the lowest permissible port number).
Max source port	The Max value specifies the upper bound (the highest permissible port number).
Selective Acknowledgments	If necessary, enable this option.
UDP Settings	
Receive buffer size (bytes)	The default size of the receive buffer (in bytes). This parameter affects the UDP receive window size. If you increase the size of the receive buffer, then the receive window is prolonged. If you are experiencing high latency on your test network, increase the size of the receive buffer to improve the throughput.
Transmit buffer size (bytes)	The default size of the transmit buffer (in bytes). This parameter affects the UDP transmit window size. If you increase the size of the transmit buffer, the transmit window is prolonged. If you are experiencing high latency on your test network, increase the size of the transmit buffer to improve the throughput.
Min source port	The source port specifies which ports are used for client connections. The Min value specifies the lower bound (the lowest permissible port number).
Max source port	The Max value specifies the upper bound (the highest permissible port number).

The following table describes the Traffic Flow parameters.

Parameter	Description
Flow	
Transport Protocol	Select the transport protocol from the drop-down list. Available options: **TCP** or **UDP**.
Port	This represents the server(destination) port. This value is editable.

Parameter	Description
QoS Flow ID	Select the QoS Flows ID(s) from the drop-down list.

DN UDG

The following table describes the **UDG** parameters.

Parameter	Description
Application Type	Select the application type. In this case, this parameter must be set to **UDG**.
Label	Set the label name. You can accept the value provided by CoreSIM or overwrite it with your own value.
MSS	The desired Maximum Segment Size (MSS) for the user plane traffic that will be generated for this UE range, specified in bytes. The MSS is the largest TCP segment that the IP device can transmit as a single, unfragmented unit. It is typically calculated as the MTU minus the TCP header size minus the IP header size. For example,for traditional Ethernet, the MSS value is 1460 (1500 minus 40).
TCP Settings	
Min retransmission timeout (ms)	The lowest value that the computed RTO timer value can be set to. Expiry of the RTO timer indicates that the sender has not received an acknowledgment for the transmission, which triggers a retransmission of the segment. Upon each retransmission, the RTO timer value is doubled, up to the Max value.
Max retransmission timeout (ms)	The highest value that the computed RTO timer value can be set to.
Receive buffer size (bytes)	The default size of the receive buffer (in bytes). This parameter affects the TCP receive window size. If you increase the size of the receive buffer, then the receive window is prolonged. If you are experiencing high latency on your test network, increase the size of the receive buffer to improve the throughput.
Transmit buffer size (bytes)	The default size of the transmit buffer (in bytes). This parameter affects the TCP transmit window size. If you increase the size of the transmit buffer, the transmit window is prolonged. If you are experiencing high latency on your test network, increase the size of the transmit buffer to improve the throughput.
Min source port	The source port specifies which ports are used for client connections. The Min value specifies the lower bound (the lowest permissible port number).
Max source port	The Max value specifies the upper bound (the highest permissible port number).

Parameter	Description
Selective Acknowledgments	If necessary, enable this option.
UDP Settings	
Receive buffer size (bytes)	The default size of the receive buffer (in bytes). This parameter affects the UDP receive window size. If you increase the size of the receive buffer, then the receive window is prolonged. If you are experiencing high latency on your test network, increase the size of the receive buffer to improve the throughput.
Transmit buffer size (bytes)	The default size of the transmit buffer (in bytes). This parameter affects the UDP transmit window size. If you increase the size of the transmit buffer, the transmit window is prolonged. If you are experiencing high latency on your test network, increase the size of the transmit buffer to improve the throughput.
Min source port	The source port specifies which ports are used for client connections. The Min value specifies the lower bound (the lowest permissible port number).
Max source port	The Max value specifies the upper bound (the highest permissible port number).

The following table describes the **Traffic Flow** parameters.

Parameter	Description
Flow	
Transport Protocol	Select the transport protocol from the drop-down list. Available options: **TCP** or **UDP**.
Out of Band Signaling	*Select this check-box to enable OOB signaling. More details about the required parameters here.* IMPORTANT *To use the OOB feature, the OOB interface must be set in Agent Management window.*
Port	This represents the server(destination) port. This value is editable.
QoS Flow ID	Select the QoS Flows ID(s) from the drop-down list.

The following table describes the **Out of Band Signaling** parameters.

Parameter	Description
Local Address	The local IP address.
IP Prefix Length	The IP address prefix assigned to this range. It specifies the number of leftmost bits in the address, which indicates the network portion of the address.

Parameter	Description
MAC Address	Hardware MAC address.
MAC Increment	The value to use when incrementing the MAC address (starting with the MAC Address). The default value is 000000000001.
Remote Address	The remote IP address.
Port	Set the used port.

DN Throttling settings

Throttling can be enabled from this menu per DN range (by selecting the corresponding check box), and matching user plane traffic over TCP, UDP or both.

Throttling can be useful, for example, when the local network interface that is generating downlink traffic has a higher speed than the radio interface between the UE and the GNB. If the traffic generated from either direction is bursty, the throttling mechanism will, instead of dropping packets, add them in a queue and spread them throughout a second according to the configured bit rate.

NOTE The throttling options only work for interfaces that are running IxStack, either over DPDK or over raw sockets, depending on where the traffic is terminated (if agent is present on DN/SGi server then its N6 interface should be IxStack; if there is no agent on DN/SGi, than N3 interface should be IxStack on UPF/CoreSim agent).

The following table describes the **Throttling Settings** that you can configure for each DN range.

Settings	Description
Bit Rate (mbps)	Can be set between 10 and 10000. Represents the value at which the traffic will be throttled, and it will become the enforced maximum bit rate.
Throttle TCP Traffic	Select the check box to throttle UP traffic over TCP.
Throttle UDP Traffic	Select the check box to throttle UP traffic over UDP.

IMS configuration settings

The IP Multimedia Subsystem (IMS) is a standards-based architectural framework for delivering multimedia communications services such as voice, video and text messaging over IP networks. IMS enables secure and reliable multimedia communications between diverse devices across diverse networks.

In CoreSIM, IMS has two important components:

- Call Session Control Function (CSCF) – the core of the IMS architecture, responsible for controlling sessions between endpoints (referred to as terminals in the IMS specifications) and

applications.

- Media Function

The configuration settings for these two components are are described in the topics listed below.

Topics:

CSCF Range panel

When you select the CSCF's IP address from the **CSCF Ranges** panel, CoreSIM opens the **Range** panel, from which you can select **CSCF Settings** to configure the node and connectivity settings for the CSCF range.

CSCF range controls and settings

The following table describes the available **Range** configuration options for the CSCF range.

Setting	Description
P-CSCF Node Settings	
Domain	Set the domain name.
Port	Set the port number. You can accept the value provided by CoreSIM or overwrite it with your own value.
Force IPsec Null Encryption	If enabled, it forces IPsec null encryption, therefore not encrypting the ESP traffic.
SIP Settings	
Enable Retransmission	If enabled, it will allow the independent message exchanges. A SIP transaction consists of a single request and any responses to that request. The transaction layer handles application-layer retransmissions, matching of responses to requests, and application-layer timeouts.
Enable Retransmission for TCP Transport	IMPORTANT This parameter can be enabled only if Enable Retransmission is on. If enabled, it will allow the message exchange for TCP transport.
Timer T1 Value (ms)	T1 is an estimate of the RTT between the client and server transactions. A larger value is possible (recommended on high latency access links) if you know the RTT is larger. Default value is 500 ms.
Timer T2 Value (ms)	T2 is the maximum retransmit interval for non-INVITE requests and INVITE responses. If a provisional response is received, retransmissions continue for unreliable transports, but at an interval of T2. The default value is 4000 ms.

Setting	Description
Timer T4 Value (ms)	T4 represents the maximum duration a message will remain in the network. The default value is 5000 ms.
Timer C Value (ms)	Time C is the proxy INVITE transaction timeout. The value must be larger than 3 minutes.
Timer D Value (ms)	Timer D represents the wait time for response retransmit.
Authentication Settings	
Enable Authentication	Select this option to enable authentication.
Realm	Set the realm. Default value: ***keysight.com***.
Algorithm Type	Select the algorithm type from the drop-down list. Available options: **Digest**, **AKAv2** or **AKAv1**.
Algorithm	Select the algorithm from the drop-down list. Available options: **MD5**, **MD5-Sess**, **SHA256** or **SHA256-Sess**.
Quality of Protection	Select an option from the drop-down list: **auth** or **auth-init**.
Connectivity Settings	
IP Address	Set the IP address.

Media Function Range panel

When you select the Media Function's IP address from the **Media Function Ranges** panel, CoreSIM opens the **Range** panel, from which you can configure the connectivity settings for the Media Function range.

Media Function range controls and settings

The following **Connectivity Settings** enable the necessary connectivity and service interaction.

Connectivity Settings	Description
IP	*Select the IP address to open the IP configuration panel for editing.*
IP Address	The IP address from your test network to use for traffic on this interface.

RAN/Untrusted AP configuration settings

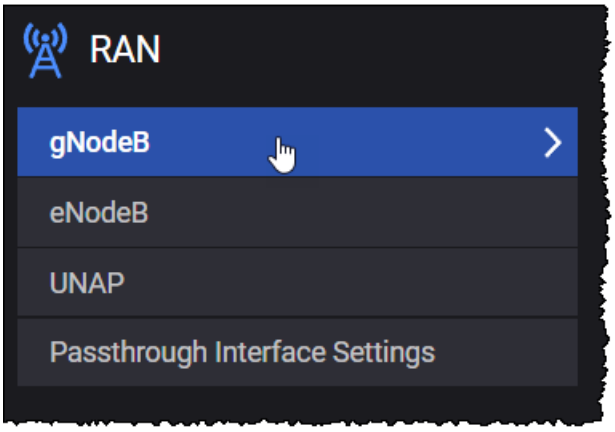
In wireless networks, a Radio Access Network (RAN) is the network that enables user endpoints, such as mobile phones, to communicate and access core network resources. The test topology supports both the 5G gNodeB and the 4G eNodeB. In each case, the RAN provides access and coordinates the management of resources across the radio sites. Multiple instances of RAN may be deployed. In 5G topology, an *untrusted AP* refers to an Access Point that is considered unsecure or not fully trusted by the cellular network operator.

The configuration settings are described in the topics listed below.

Topics:

gNodeB

To configure one or more gNodeB ranges for a test, select gNodeB from the RAN panel.



The following topics describe the gNodeB configuration settings:

gNodeB Ranges panel

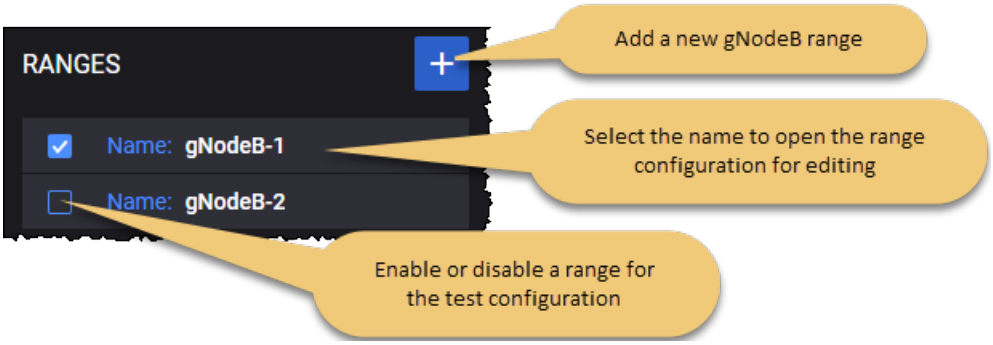
The **gNodeB Ranges** panel opens when you select **gNodeB** from the RAN pane. It consists of two main section: Ranges and Ranges Connectivity.

Ranges

On the Ranges section, you can perform the following task:

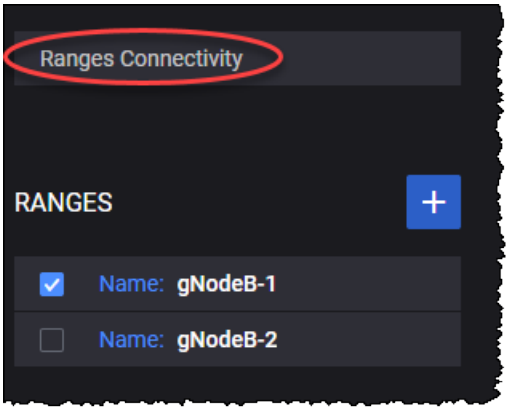
- Add a new gNodeB range to your test configuration.
- Open a gNodeB range configuration (for editing or viewing).
- Enable or disable a range for the test configuration.

For example ...



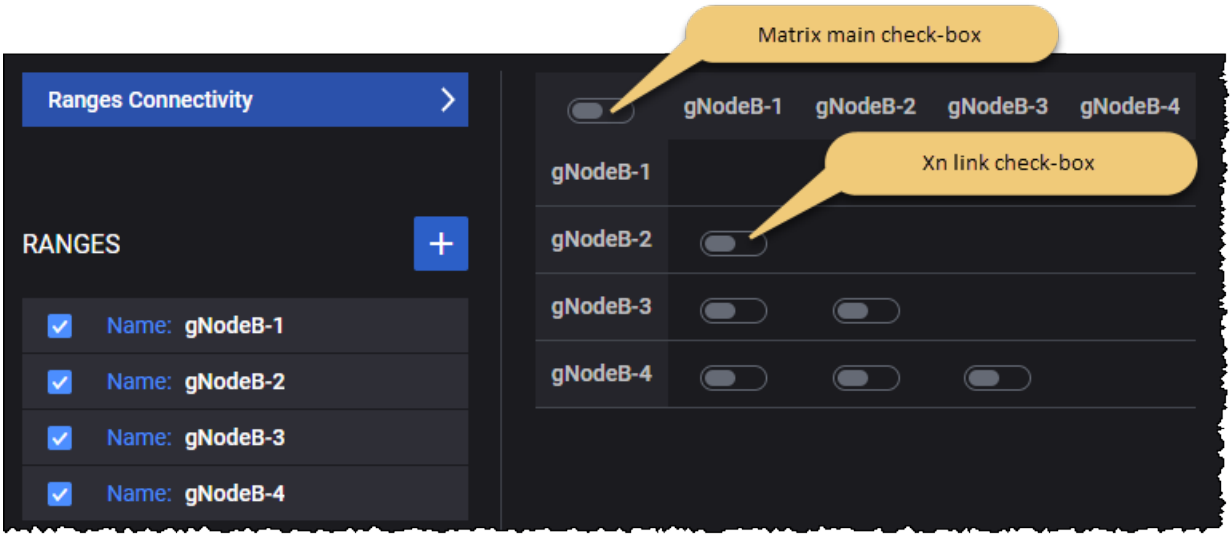
Ranges Connectivity

The Ranges Connectivity section allows you to configure Xn links between gNodeB ranges for handovers. This section is displayed as a matrix of check-boxes, each selected check-box represents an Xn link between ranges on the line and the range on the column.



Note that to configure the Xn links between gNodeB ranges, you need to add at least two gNodeB ranges. If there are fewer than two gNodeB ranges, CoreSIM displays the following message: "Two or more ranges are required to configure Xn links".

Due to the fact that the Xn links are bidirectional the Range Connectivity matrix is only half full of check-boxes.



Each Xn link check-box can have one of the following states:

State	Description
Selected and blue color	An Xn link connection is established between enabled gNodeB ranges.
Selected and grey color	An Xn link connection is established between disabled gNodeB ranges.
Unselected	No Xn link connection between gNodeB ranges.

To see all the Xn links for a particular gNodeB range, you need to read the line of that range and then the column of that range.

If none of the links is marked as an Xn link then only N2 handovers will be performed.

Hovering over a specific gNodeB range from the Ranges Connectivity matrix highlights the row and displays more details about the connectivity/range status.

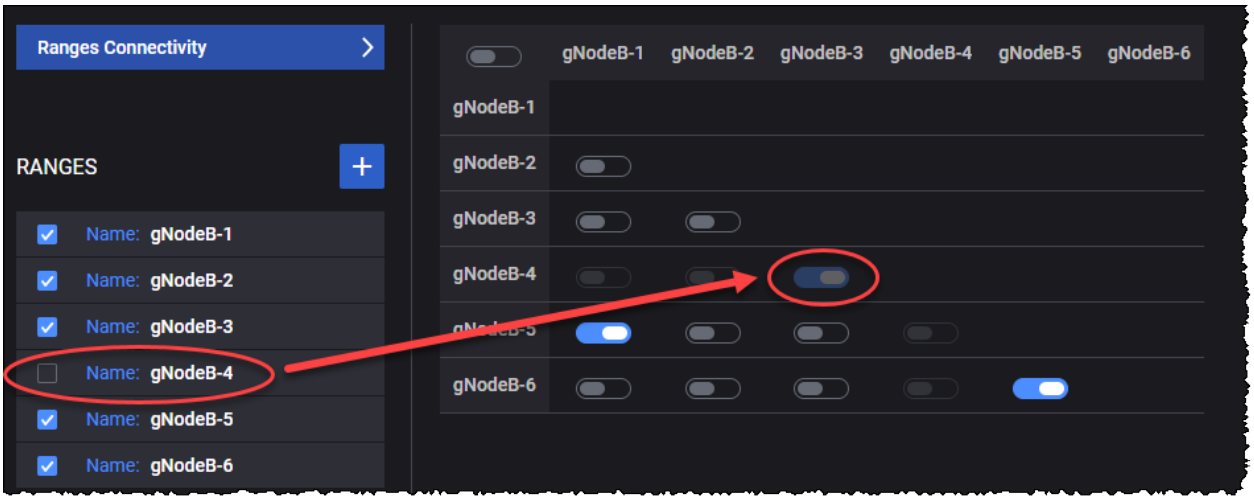
When a gNodeB range is disabled you are not able to select any Xn link for that specific gNodeB range.

If there was an Xn link between two gNodeB ranges and now one of them is disabled, the check-box will become greyed out and cannot be unselected.

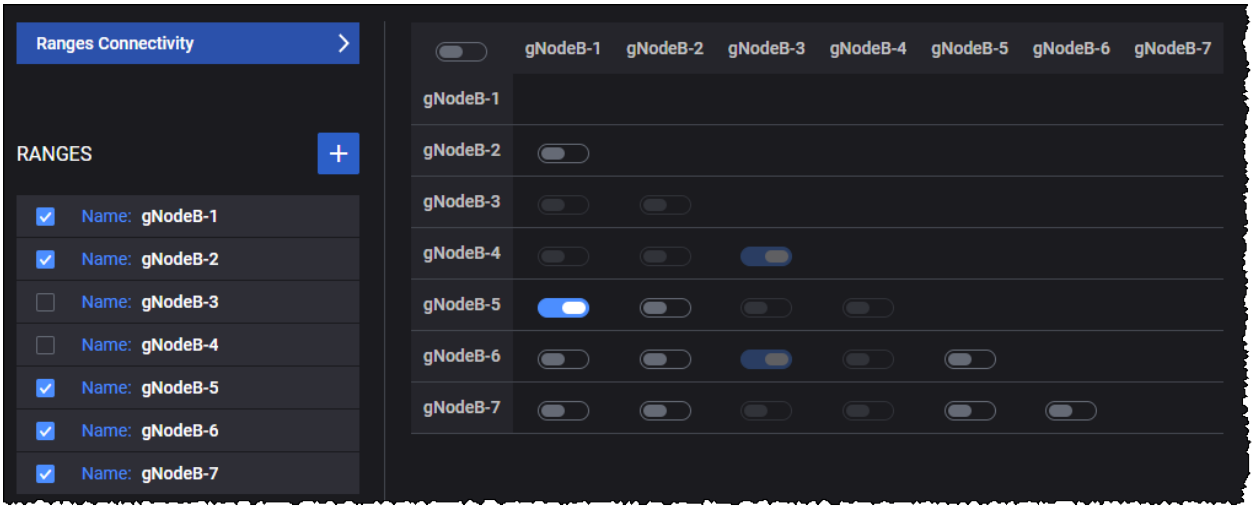
NOTE None of the Xn links that are part of disabled gNodeB ranges are sent to the traffic agent.

For example ...

1. The disabled range gNodeB-4 had an Xn link with gNodeB-3. The selected check-box is greyed out. This Xn link will not be sent to the traffic agent.



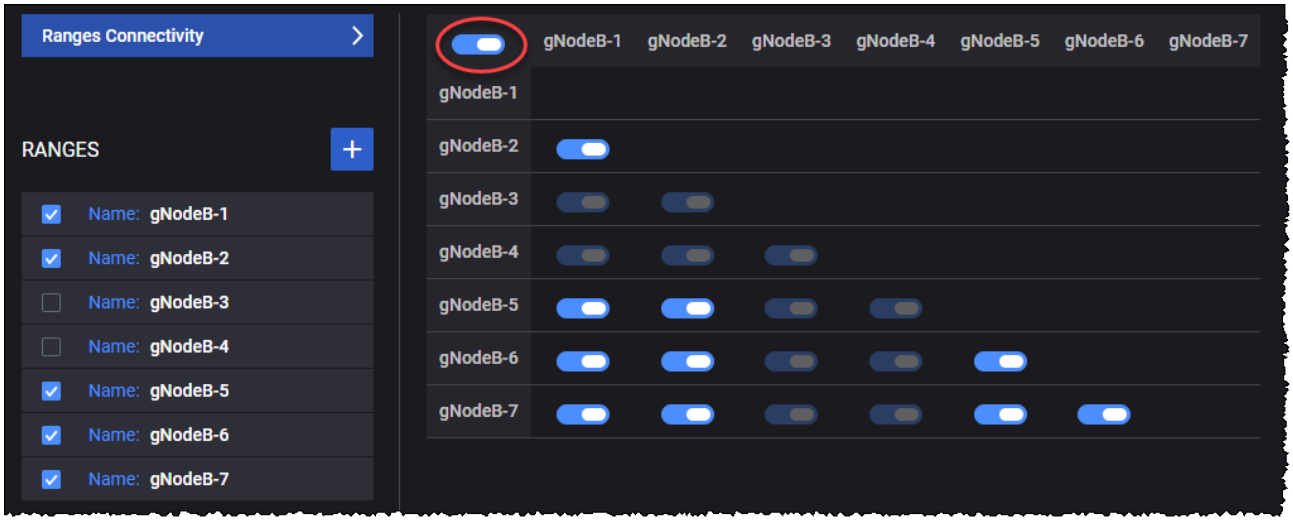
2. The gNodeB-3 range was enabled on previous step and there were selected Xn links between gNodeB-3/gNodeB-4 and gNodeB-3/gNodeB-6. Due to the fact that gNodeB-3 is now disabled, the check-box for Xn links between gNodeB-3 and gNodeB-6 have become greyed out.



The first cell of matrix contains a main check-box that displays the state of the matrix and perform operations.

State	Description	Operation
Selected	All connected.	If the main check-box is Selected, you can undo the selection to change the state to Unselected and all Xn links from the connectivity matrix will become unselected (none connected).
Unselected	None connected.	If the main check-box is Unselected, you can select it to change the state to Checked and all Xn links from the connectivity matrix will become selected (all connected).

When the main matrix check-box is selected all the Xn link check-boxes from the matrix become selected.



Even the Xn link check-boxes for disabled gNodeB ranges are selected since the Xn links for disabled gNodeB ranges are not sent to the traffic agent. This way, when the disabled gNodeB range is enabled, you will not have to manually select the Xn link check-boxes for that particular gNodeB range.

gNodeB Range settings

You add and select gNodeB ranges from the gNodeB Ranges panel. When you select the name of an gNodeB range, CoreSIM opens the **Range** panel, from which you can:

- Delete the gNodeB range from the test configuration.
- Designate the range as a **Device Under Test**.
- Specify the number of gNodeB nodes to configure for the range.
- Select **Range Settings** to configure the node and connectivity settings for the gNodeB range.

gNodeB range controls and settings

Each gNodeB range is identified by a unique name. You can add and delete ranges as necessary to support your test objectives.

The following table describes the **Range Settings** that you configure for each gNodeB range.

Setting	Description
Range:	
	Select the **Delete Range** button to delete this range from your test configuration.
Device Under Test	Enable this option if your gNodeB is a DUT in this test configuration. When this option is not enabled, the CoreSIM will simulate the gNodeB functionality (if it is selected in the Topology window).
Range Count	The number of gNodeBs in the gNodeB range.
Range Settings:	
Node Settings	Each gNodeB range requires the configuration of an associated set of Node Settings, which are describe in gNodeB node settings.
NSSAI	Each gNodeB range requires the configuration of at least one NSSAI, and may specify multiple NSSAIs. These settings are described in gNodeB NSSAI settings.
N2 Interface Settings	Each gNodeB range requires the configuration of N2 interface settings, through which a gNodeB instance enables connectivity and interaction with the AMF component in the 5G network. These settings are described in gNodeB N2 interface settings.
N3 Interface Settings	Each gNodeB range requires the configuration of N3 interface settings, through which a gNodeB instance enables connectivity and interaction with the UPF component in the 5G network. These settings are described in gNodeB N3

Setting	Description
	interface settings.

gNodeB node settings

Each gNodeB range includes a set of Node Settings.

Node Settings

Each gNodeB instance (that is, each range) is identified by the following node settings.

Setting	Description
Name	Multiple gNodeB instances may be deployed in the 5G network. Each gNodeB instance is uniquely identified by an *Instance ID*. You can accept the value provided by CoreSIM or overwrite it with your own value.
PLMN MCC	The PLMN MCC for this gNodeB range.
PLMN MNC	The PLMN MNC for this gNodeB range.
Tracking area code	The Tracking Area Code to use for the nodes in this range.
gNodeB ID	The gNodeB Identifier. It is used to uniquely identify each gNodeB within a PLMN. The gNodeB ID is contained within the NCI of its cells. When the gNodeB *Range Count* setting is greater than 1, CoreSIM increments the *gNodeB ID* setting for each gNodeB.
gNodeB ID Length	The number of bits from the Cell Identity to use as the gNodeB ID.
Cell ID	The NR Cell Identity (NCI) for the cell associated with this node range.
Connection Timeout (ms)	The S1AP connection timeout.
Perform Load Balancing	Select the option to enable it. Performs load balancing bewteen MMEs from the same MME group for initial attach.
Dynamic RAN UE NGAP/S1AP ID	If enabled, it will allocate dynamic RAN UE NGAP/S1AP ID values at Service Request.

EPS Fallback Settings

The **Enable EPS Fallback** check box enables the UE to switch from the 5G core network (5GC) to a LTE/EPS connection in order to avoid bad connection quality. This is done using a 5G to 4G inter-RAT

handover (during which the session management and user plane tunnels in the core network are handed over from SMF/UPF to MME/S-GW).

The following parameters are required to configure the EPS fallback:

Setting	Description
Enable EPS Fallback	Select the check box to enable this option.
5QI	Select the 5G QoS identifier that will trigger the EPS fallback procedure. (The 5QI must be defined on the QoS Flow configuration settings panel in the **Global Settings**.) When a request is received for this 5QI to create a dedicated QoS flow, the RAN will reject the request, which will trigger the EPS fallback procedure.
Associated ENB	Select the eNodeB used for handover.
Secondary Node	Select the secondary node from the drop-down list. This option is used for EPS fallback to an eNodeB associated to a gNodeB using Option 3x.
EPS Fallback Mobility	Type of mobility to EPS during EPS fallback. Select an option from the drop down list: • **Handover to 4G** • **Inter-System Redirection to 4G**
EPS Fallback Return Mobility	Type of mobility that occurs after the deletion of the dedicated bearer that triggered EPS fallback. Select an option from the drop down list: • **None** - After the dedicated bearer is deleted in 4G, the UE will not initiate any procedure. • **Connected Mode Handover to 5G** (default value) - After the dedicated bearer is deleted in 4G, the UE will initiate a 4G to 5G Connected Mode Handover. • **Idle Mode Mobility to 5G** - After the dedicated bearer is deleted in 4G, the UE will perform an Enter Idle procedure in 4G, followed by a 4G to 5G iRAT Idle Mode Mobility.
Send Service Request After EPS Fallback Return Mobility	By default, this option is disabled. Send Service Request immediately after returning to 5G when Idle Mode Mobility to 5G was performed.

The following options can be enabled under the **User Plane Security** pane:

- Enable Integrity (by default, this option is disabled)
- Enable Confidentiality (by default, this option is disabled)

NOTE User Plane Security settings are not taken into account for N2 Handover procedure.

The following parameters are required under the **Public Warning System** pane:

Setting	Description
Public Warning System	*Select the check box to enable this option.*
PWS Restart Timer (s)	Duration in seconds after which PWS Restart Indication is sent. The timer starts after the PWS Write-Replace message exchange. **0** indicates that no message is sent. For more details, refer to *TS 38413 , 8.9.3 PWS Restart Indication*. Values should be in range 0-86400. Default value: **0**.
PWS Failure Timer (s)	Duration in seconds after which PWS Failure Indication is sent. The timer starts after the PWS Write-Replace message exchange. **0** indicates that no message is sent. For more details, refer to *TS 38413 , 8.9.4 PWS Failure Indication*. Values should be in range 0-86400. Default value: **0**.

NOTE If the *Public Warning System* option is enabled and both PWS Restart and PWS Failure procedures are configured to be initiated (non-zero timers), the timers should be different.

gNodeB NSSAI settings

Each UE range requires at least one NSSAI range.

NSSAI (Network Slice Selection Assistance Information) includes one or more NSAAIs. Each network slice is uniquely identified by a specific NSSAI.

The slice assistance information comprises a list of one or more NSSAIs, where an NSSAI is a combination of:

- An 8-bit mandatory SST (Slice/Service Type) field, which identifies the slice type.
- An SD (Slice Differentiator) field, which differentiates among Slices that have the same SST field and consist of 24 bits.

An NSSAI information element identifies a network slice. In addition to the SST and SD, it can also include an optional Mapped Configured SST and an optional Mapped Configured SD.

For each gNodeB range in your test configuration, you can add and delete NSSAIs (NASSAI 1, NSSAI 2,...NSSAI X) as required to meet your test objectives.

The gNodeB NSSAI slices are the ones supported per TA level, that will be sent in NGAP messages (for example NG Setup).

The following table describes the configuration settings that are required for each NSSAI.

Setting	Description
NSSAI:	

<table>
<tr><th>Setting</th><th>Description</th></tr>
<tr><td>  </td><td>Select the Add NSSAI button to add a new NSSAI to your test configuration.</td></tr>
<tr><td colspan="2">NSSAI settings:</td></tr>
<tr><td>  </td><td>Select the Delete NSSAI button to delete this NSSAI from your test configuration.</td></tr>
<tr><td>SST</td><td>The value that identifies the SST (Slice/Service Type) for this NSSAI. SST comprises octet 3 in the NSSAI information element. The standardized SST values are:
<table>
<tr><th>SST</th><th>Value</th><th>Suitable for handling:</th></tr>
<tr><td>eMBB</td><td>1</td><td>5G enhanced Mobile Broadband</td></tr>
<tr><td>URLCC</td><td>2</td><td>ultra-reliable low-latency communications</td></tr>
<tr><td>MIoT</td><td>3</td><td>massive IoT</td></tr>
</table></td></tr>
<tr><td>SD</td><td>The Slice Differentiator (SD) value for this S-NSSAI. SD is an optional information that differentiates amongst multiple Network Slices of the same Slice/Service type. The SD field comprises octets 4 through 6 in the NSSAI.</td></tr>
<tr><td>Mapped SST</td><td>The Mapped configure Slice/Service Type (SST) value for this specific NSSAI.</td></tr>
<tr><td>Mapped SD</td><td>The Mapped configured Slice Differentiator (SD) value for this specific NSSAI.</td></tr>
</table>

gNodeB N2 interface settings

N2 is the user plane interface between the gNodeB and the AMF.

When the gNodeB node is used as secondary node on a UE Range (either in the Parent RAN > Secondary Node section or in the Handover objective), the option to enable/disable the N2 interface is displayed.

By default, the N2 interface check box is enabled.

When the gNodeB node is used only as secondary node on a UE Range ((either in the Parent RAN > Secondary Node section or in the Handover objective), the option to enable/disable the N2 interface is displayed.

The following configuration settings are required by each gNodeB N2 range.

N2 Interface Settings

Settings	Description
Peer AMF	The IP address of the AMF node connected to gNodeB over the N2 interface.
Destination port	The destination Stream Control Transmission Protocol (SCTP) port for control plane messages (NG-AP signaling messages) on the N2 interface.
SCTP source port	The source SCTP port for control plane messages (NG-AP signaling messages). Each SCTP endpoint provides the other endpoint with a list of transport addresses through which that endpoint can be reached and from which it will originate SCTP packets. These transport addresses are composed of multiple IP addresses in combination with an SCTP port. The default port number is 36412, but you can change it.
SCTP Parameters	
Avoid Bundling of Data Chunks	Select this option to enable it. It turns on/off any Nagle-like algorithm. This means that packets are generally sent as soon as possible and no unnecessary delays are introduced, at the cost of more packets in the network.
Minimum Retransmission Timeout (ms)	Set the minimum retransmission timeout value, in milliseconds.
Maximum Retransmission Timeout (ms)	Set the maximum retransmission timeout value, in milliseconds.
Initial Retransmission Timeout (ms)	Set the initial retransmission timeout value, in milliseconds.
Maximum Retransmission per Association	Set the maximum retransmissions value per association.
Maximum Retransmission per Path	Set the maximum retransmissions value per path.
Heartbeat Interval (ms)	Set the heartbeat interval value, in milliseconds.
SACK Delay (ms)	Set the delayed selective ACK timeout value.
SACK Frequency	Set the delayed selective ACK frequency value.
SCTP Retry	*Select the check box to enable this option.*
Delay	The delay time (in milliseconds) for triggering a new SCTP retry, after a SCTP disconnect or a failed retry. For subsequent SCTP retriesconsider the

Settings	Description
	Connection Timeout value that will be added as well. Default value: **0**. Allowed integer value: minimum of 0.
Number of Retries	The maximum number of SCTP retries sent by RAN to reestablish the SCTP connection. Default value: **3**. Allowed integer value: minimum of 1.

Connectivity Settings

Settings	Description
IPSec: Select the check box to enable IPsec option.	
Peer SEG	Select the peer SEG range from the drop-down list.
Destination Port	By default, the destination port is set to **500** and cannot be changed.
Source Port	Set the source port number.
Enable NAT-T	Select to enable the NAT Traversal keepalive.
Inner IP Type	Select the IP type: **IPv4** or **IPv6**.
Authentication	
Authentication Method	By default, the authentication method is set to **Certificates** and cannot be changed.
CA Certificate	Select the CA certificate from the drop-down list.
Certificates and Private Keys (zip)	It allows you to upload an archive that contains the certificates and keys for the gNodeB range, using the **Upload** button. To remove the archive , select the **Clear** button. The `.key` and `.crt` files need to have the same name before extensions.
Use Same Certificates and Private Key For All Tunnels	By default, this option is disabled. Select the toggle button to enable it.
IKE Phase 1	
Encryption Algorithm	Select the encryption algorithm from the drop-down list. Default value: **AES-128-GCM-16**. Available options: **AES-128-CBC**, **AES-192-CBC**, **AES-256-CBC**, **AES-128-GCM-16**, **AES-192-GCM-16**, **AES-256-GCM-16**.
Hash Algorithm	Select the hash algorithm from the drop-down list.

Settings	Description
	Default value: **NONE**. Available options: **NONE**, **HMAC-MD5-96**, **HMAC-SHA1-96**, **HMAC-MD5-128**, **HMAC-SHA1-160**, **HMAC-SHA2-256-128**, **HMAC-SHA2-384-192**, **HMAC-SHA2-512-256**. Restrictions: • When *Encryption Algorithm* is set to one of **AES-128-GCM-16**, **AES-192-GCM-16** or **AES-256-GCM-16**, the only available *Hash Algorithm* is **NONE**. • If **Encryption Algorithm** is set to a value other than one of **AES-128-GCM-16**, **AES-192-GCM-16** or **AES-256-GCM-16**, the **NONE** hash algorithm is not available.
DH Group	Select an option from the drop-down list. Default value: **prime256v1(19)**. Available options: **prime256v1(19)**, **secp384r1(20)**, **secp521r1(21)**, **prime192v1(25)**, **secp224r1(26)**, **x25519(31)**, **x448(32)**.
PRF Algorithm	Select an option from the drop-down list. Default value: **HMAC-SHA256**. Available options: **HMAC-MD5**, **HMAC-SHA1**, **HMAC-SHA256**, **HMAC-SHA384**, **HMAC-SHA512**.
IKE Phase 2	
Encryption Algorithm	Select the encryption algorithm from the drop-down list. Default value: **AES-128-GCM-16**. Available options: **AES-128-CBC**, **AES-192-CBC**, **AES-256-CBC**, **AES-128-GCM-16**, **AES-192-GCM-16**, **AES-256-GCM-16**.
Hash Algorithm	Select the hash algorithm from the drop-down list. Default value: **NONE**. Available options: **NONE**, **HMAC-MD5-96**, **HMAC-SHA1-96**, **HMAC-MD5-128**, **HMAC-SHA1-160**, **HMAC-SHA2-256-128**, **HMAC-SHA2-384-192**, **HMAC-SHA2-512-256**. Restrictions: • When *Encryption Algorithm* is set to one of **AES-128-GCM-16**, **AES-192-GCM-16** or **AES-256-GCM-16**, the only available *Hash Algorithm* is **NONE**. • If **Encryption Algorithm** is set to a value other than one of **AES-128-GCM-16**, **AES-192-GCM-16** or **AES-256-GCM-16**, the **NONE** hash algorithm is not available.
Identification	
Local Identification Type	Select an option from the drop-down list. Default value: **ID_DER_ASN1_DN**. Available options: **ID_IPV4_ADDR**, **ID_FQDN**, **ID_USER_FQDN**, **ID_IPV6_ADDR**, **ID_DER_ASN1_DN**, **ID_KEY_ID**.

Settings	Description
Local Identification Value	Set the value for this parameter. This field is mandatory if the *Local Identification Type* is set to: **ID_FQDN**, **ID_KEY_ID** or **ID_RFC822_ADDR**.
Timers	
Enable Rekey	By default, this option is disabled. Select the toggle button to enable it.
IKE Phase 1 (IKE) Lifetime (s)	Set a value for this parameter. Default value: **0** (disabled).
IKE Phase 1 (IKE) Lifetime (s)	Set a value for this parameter. Default value: **0** (disabled).
DPD Interval (s)	Set a value for this parameter. Default value: **0** (disabled).
IP	*Select the IP address to open the IP configuration panel for editing.*
IP Address	The IP address from your test network to use for traffic on this interface.
IP Prefix Length	The IP address prefix assigned to this range. It specifies the number of leftmost bits in the address, which indicates the network portion of the address.
Gateway Address	The IP address assigned as gateway address.
Gateway Increment	The value to use when incrementing the Gateway address (starting with the Gateway Address).
Emulated Router Address	Set the IPv4 or IPv6 address for the emulated router. This allows to hide all messages from the interface behind a MAC address. NOTE This option can be used only with IxStack stack.
Emulated Router Address Prefix Length	Set the IP network mask for the emulated router.
MTU	The Maximum Transmission Unit (MTU) for this range. MTU specifies the largest packet that an Ethernet frame can carry.
MSS	The Maximum Segment Size (MSS) for this range. MSS specifies the largest TCP segment that the IP device can transmit as a single, unfragmented unit.
MAC	*Select the MAC address to open the MAC configuration panel for editing*
MAC Address	Hardware MAC address.

Settings	Description
MAC Increment	The value to use when incrementing the MAC address (starting with the *MAC Address*). The default value is 000000000001.
Outer VLAN	*Select the check-box to make this option available, and, then, select the Outer VLAN to open the configuration panel for editing.*
VLAN ID	VLAN identifier.
VLAN TPID	VLAN tag protocol ID.
Inner VLAN	IMPORTANT *This option is visible only when the Outer VLAN check-box is selected.* *Select the check-box to make this option available, and, then, select the Inner VLAN to open the configuration panel for editing.*
VLAN ID	VLAN identifier.
VLAN TPID	VLAN tag protocol ID..

gNodeB N3 interface settings

N3 is the user plane interface between the gNodeB and the UPF.

The following configuration settings are required by each gNodeB N3 range.

Connectivity Settings	Description
IPSec: Select the check box to enable IPsec option.	
Use N2 IPsec Tunnel	This option is available only if IPsec check box is selected on the N2 interface. When this option is selected, the IPSec configuration from the N2 interface will be used for the N3 interface. Otherwise, N3 IPsec configuration is required.
Peer SEG	Select the peer SEG range from the drop-down list.
Destination Port	By default, the destination port is set to **500** and cannot be changed.
Source Port	Set the source port number.
Enable NAT-T	Select to enable the NAT Traversal keepalive.
Inner IP Type	Select the IP type: **IPv4** or **IPv6**.
Authentication	
Authentication Method	By default, the authentication method is set to **Certificates** and cannot be changed.

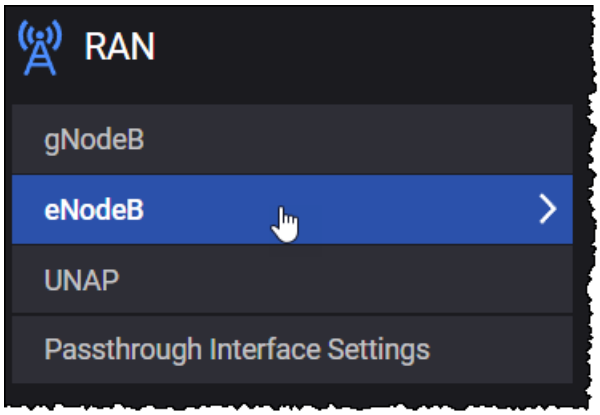
Connectivity Settings	Description
CA Certificate	Select the CA certificate from the drop-down list.
Certificates and Private Keys (zip)	It allows you to upload an archive that contains the certificates and keys for the gNodeB range, using the **Upload** button. To remove the archive , select the **Clear** button. The `.key` and `.crt` files need to have the same name before extensions.
Use Same Certificates and Private Key For All Tunnels	By default, this option is disabled. Select the toggle button to enable it.
IKE Phase 1	
Encryption Algorithm	Select the encryption algorithm from the drop-down list. Default value: **AES-128-GCM-16**. Available options: **AES-128-CBC**, **AES-192-CBC**, **AES-256-CBC**, **AES-128-GCM-16**, **AES-192-GCM-16**, **AES-256-GCM-16**.
Hash Algorithm	Select the hash algorithm from the drop-down list. Default value: **NONE**. Available options: **NONE**, **HMAC-MD5-96**, **HMAC-SHA1-96**, **HMAC-MD5-128**, **HMAC-SHA1-160**, **HMAC-SHA2-256-128**, **HMAC-SHA2-384-192**, **HMAC-SHA2-512-256**. Restrictions: • When *Encryption Algorithm* is set to one of **AES-128-GCM-16**, **AES-192-GCM-16** or **AES-256-GCM-16**, the only available *Hash Algorithm* is **NONE**. • If **Encryption Algorithm** is set to a value other than one of **AES-128-GCM-16**, **AES-192-GCM-16** or **AES-256-GCM-16**, the **NONE** hash algorithm is not available.
DH Group	Select an option from the drop-down list. Default value: **prime256v1(19)**. Available options: **prime256v1(19)**, **secp384r1(20)**, **secp521r1(21)**, **prime192v1(25)**, **secp224r1(26)**, **x25519(31)**, **x448(32)**.
PRF Algorithm	Select an option from the drop-down list. Default value: **HMAC-SHA256**. Available options: **HMAC-MD5**, **HMAC-SHA1**, **HMAC-SHA256**, **HMAC-SHA384**, **HMAC-SHA512**.
IKE Phase 2	
Encryption Algorithm	Select the encryption algorithm from the drop-down list. Default value: **AES-128-GCM-16**. Available options: **AES-128-CBC**, **AES-192-CBC**, **AES-256-CBC**, **AES-128-GCM-16**, **AES-192-GCM-16**, **AES-**

Connectivity Settings	Description
	256-GCM-16.
Hash Algorithm	Select the hash algorithm from the drop-down list. Default value: **NONE**. Available options: **NONE**, **HMAC-MD5-96**, **HMAC-SHA1-96**, **HMAC-MD5-128**, **HMAC-SHA1-160**, **HMAC-SHA2-256-128**, **HMAC-SHA2-384-192**, **HMAC-SHA2-512-256**. Restrictions: • When *Encryption Algorithm* is set to one of **AES-128-GCM-16**, **AES-192-GCM-16** or **AES-256-GCM-16**, the only available *Hash Algorithm* is **NONE**. • If **Encryption Algorithm** is set to a value other than one of **AES-128-GCM-16**, **AES-192-GCM-16** or **AES-256-GCM-16**, the **NONE** hash algorithm is not available.
Identification	
Local Identification Type	Select an option from the drop-down list. Default value: **ID_DER_ASN1_DN**. Available options: **ID_IPV4_ADDR**, **ID_FQDN**, **ID_USER_FQDN**, **ID_IPV6_ADDR**, **ID_DER_ASN1_DN**, **ID_KEY_ID**.
Local Identification Value	Set the value for this parameter. This field is mandatory if the *Local Identification Type* is set to: **ID_FQDN**, **ID_KEY_ID** or **ID_RFC822_ADDR**.
Timers	
Enable Rekey	By default, this option is disabled. Select the toggle button to enable it.
IKE Phase 1 (IKE) Lifetime (s)	Set a value for this parameter. Default value: **0** (disabled).
IKE Phase 1 (IKE) Lifetime (s)	Set a value for this parameter. Default value: **0** (disabled).
DPD Interval (s)	Set a value for this parameter. Default value: **0** (disabled).
IP	*Select the IP address to open the IP configuration panel for editing.*
IP Address	The IP address from your test network to use for traffic on this interface.
IP Prefix Length	The IP address prefix assigned to this range. It specifies the number of leftmost bits in the address, which indicates the network portion of the address.

Connectivity Settings	Description
Gateway Address	The IP address assigned as gateway address.
Gateway Increment	The value to use when incrementing the Gateway address (starting with the Gateway Address).
Emulated Router Address	Set the IPv4 or IPv6 address for the emulated router. This allows to hide all messages from the interface behind a MAC address. NOTE This option can be used only with IxStack stack.
Emulated Router Address Prefix Length	Set the IP network mask for the emulated router.
MTU	The Maximum Transmission Unit (MTU) for this range. MTU specifies the largest packet that an Ethernet frame can carry.
MSS	The Maximum Segment Size (MSS) for this range. MSS specifies the largest TCP segment that the IP device can transmit as a single, unfragmented unit.
MAC	*Select the MAC address to open the MAC configuration panel for editing*
MAC Address	Hardware MAC address.
MAC Increment	The value to use when incrementing the MAC address (starting with the *MAC Address*). The default value is 000000000001.
Outer VLAN	*Select the check-box to make this option available, and, then, select the Outer VLAN to open the configuration panel for editing.*
VLAN ID	VLAN identifier.
VLAN TPID	VLAN tag protocol ID.
Inner VLAN	IMPORTANT *This option is visible only when the Outer VLAN check-box is selected.* *Select the check-box to make this option available, and, then, select the Inner VLAN to open the configuration panel for editing.*
VLAN ID	VLAN identifier.
VLAN TPID	VLAN tag protocol ID..

eNodeB

To configure one or more eNodeB ranges for a test, select **eNodeB** from the RAN panel.



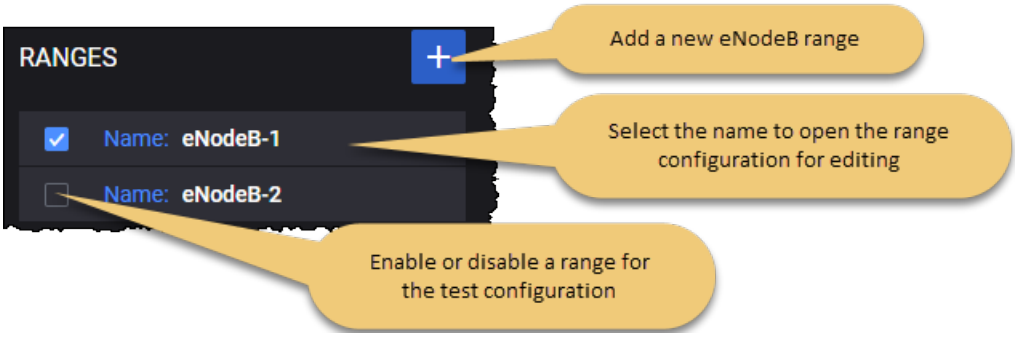
The following topics describe the eNodeB configuration settings:

eNodeB Ranges panel

The **eNodeB Ranges** panel opens when you select the **eNodeB** node from the **RAN** pane. On the Ranges panel, you can perform the following task:

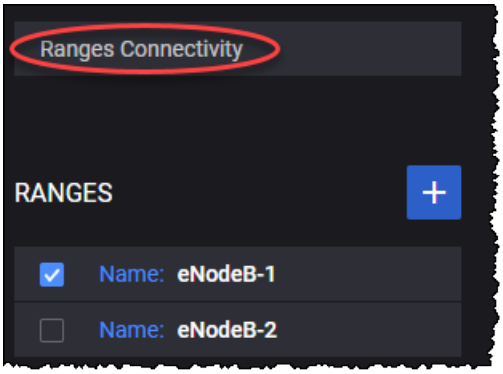
- Add a new eNodeB range to your test configuration.
- Open a eNodeB range configuration (for editing or viewing).
- Enable or disable a range for the test configuration.

For example ...



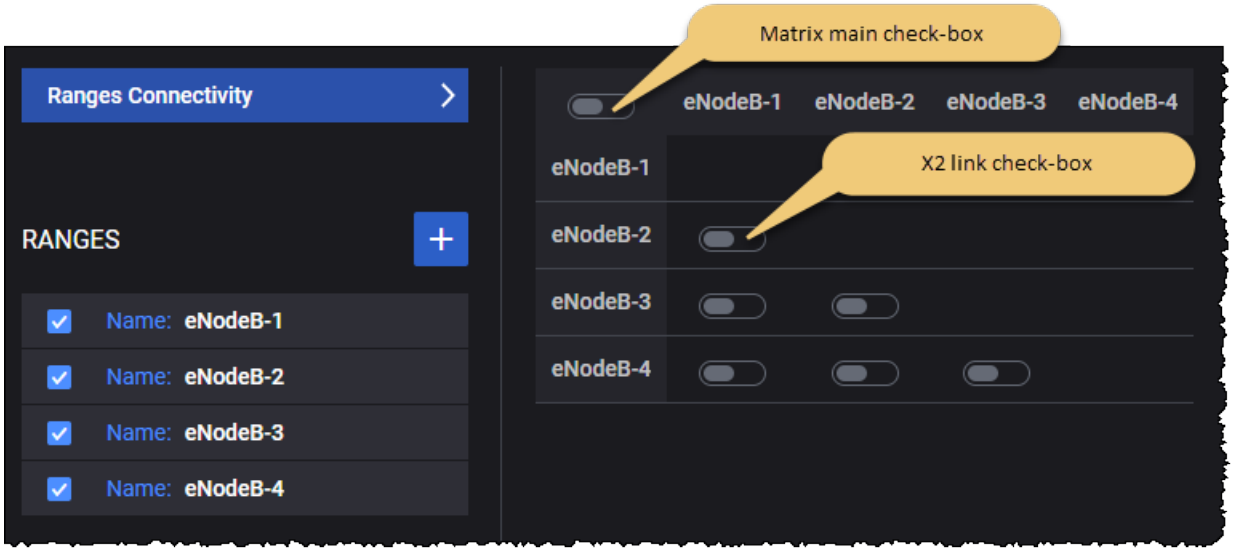
Ranges Connectivity

The Ranges Connectivity section allows you to configure X2 links between eNodeB ranges for handovers. This section is displayed as a matrix of check-boxes, each selected check-box represents an X2 link between ranges on the line and the range on the column.



Note that to configure the X2 links between eNodeB ranges, you need to add at least two eNodeB ranges. If there are fewer than two eNodeB ranges, CoreSIM displays the following message: "Two or more ranges are required to configure X2 links".

Due to the fact that the X2 links are bidirectional the Range Connectivity matrix is only half full of check-boxes.



Each X2 link check-box can have one of the following states:

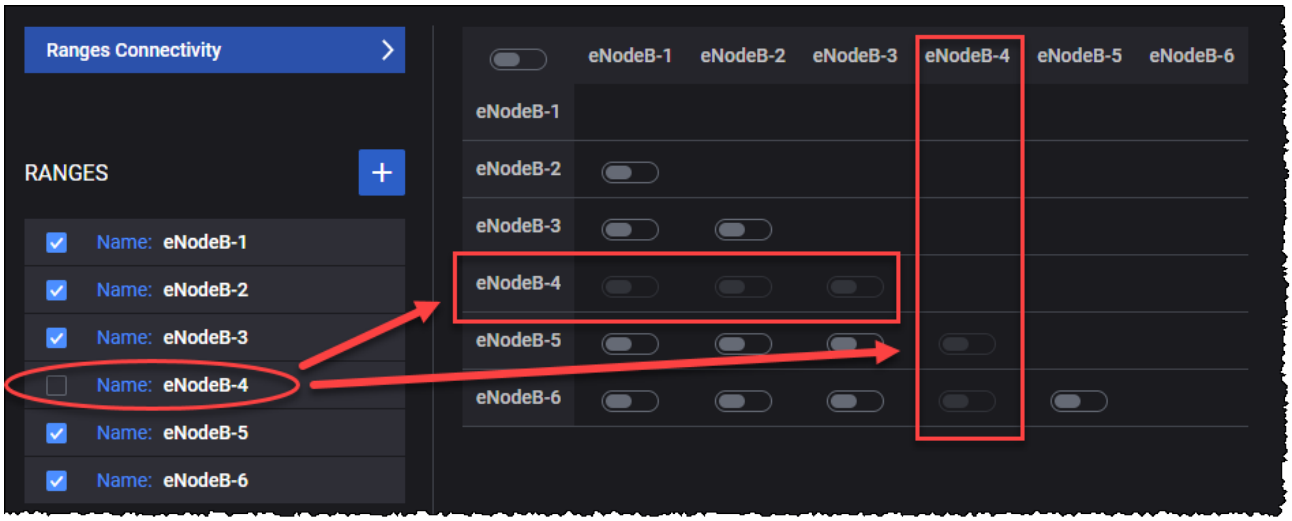
State	Description
Selected and blue color	An X2 link connection is established between enabled eNodeB ranges.
Selected and grey color	An X2 link connection is established between disabled eNodeB ranges.
Unselected	No X2 link connection between eNodeB ranges.

To see all the X2 links for a particular eNodeB range, you need to read the line of that range and then the column of that range.

If none of the links is marked as an X2 link then only S1 handovers will be performed.

Hovering over a specific eNodeB range from the Ranges Connectivity matrix highlights the row and displays more details about the connectivity/range status.

When a eNodeB range is disabled you are not able to select any X2 link for that specific eNodeB range.

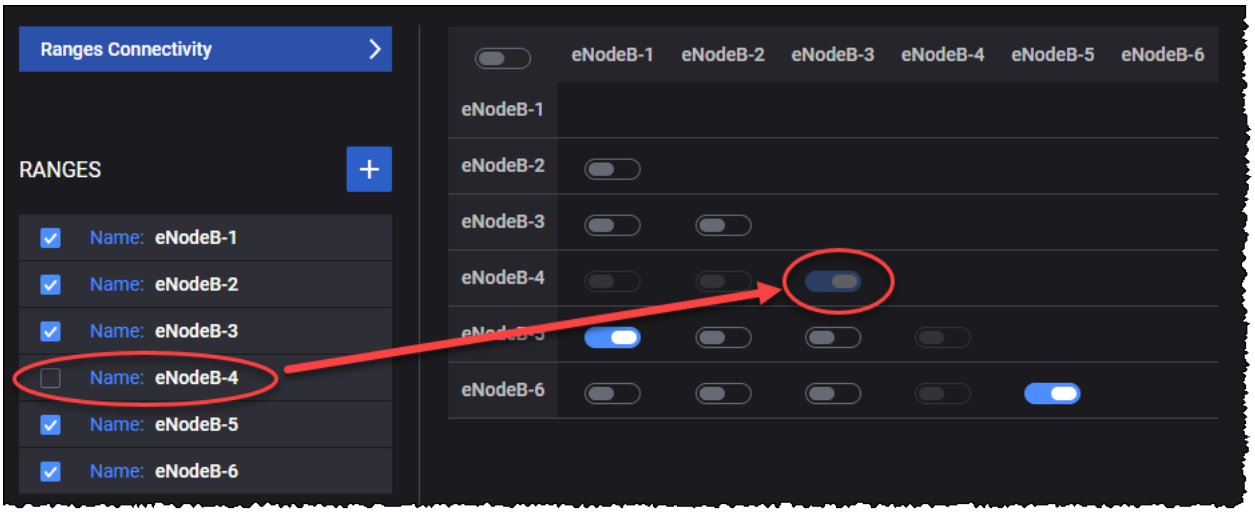


If there was an X2 link between two eNodeB ranges and now one of them is disabled, the check-box will become greyed out and cannot be unselected.

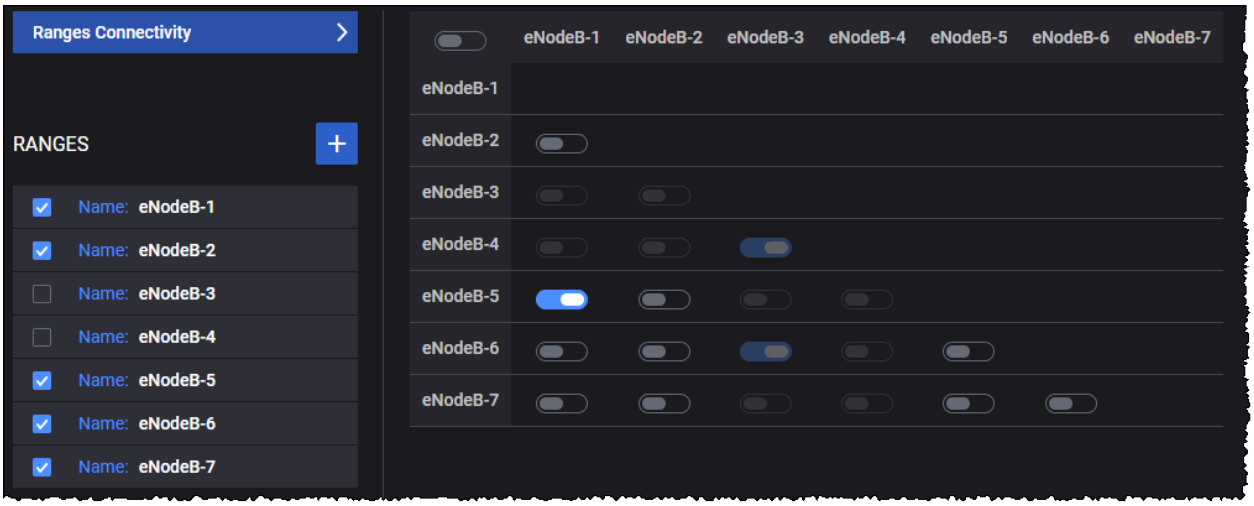
NOTE None of the X2 links that are part of disabled eNodeB ranges are sent to the traffic agent.

For example ...

1. The disabled range eNodeB-4 had an X2 link with eNodeB-3. The selected check-box is greyed out. This X2 link will not be sent to the traffic agent.



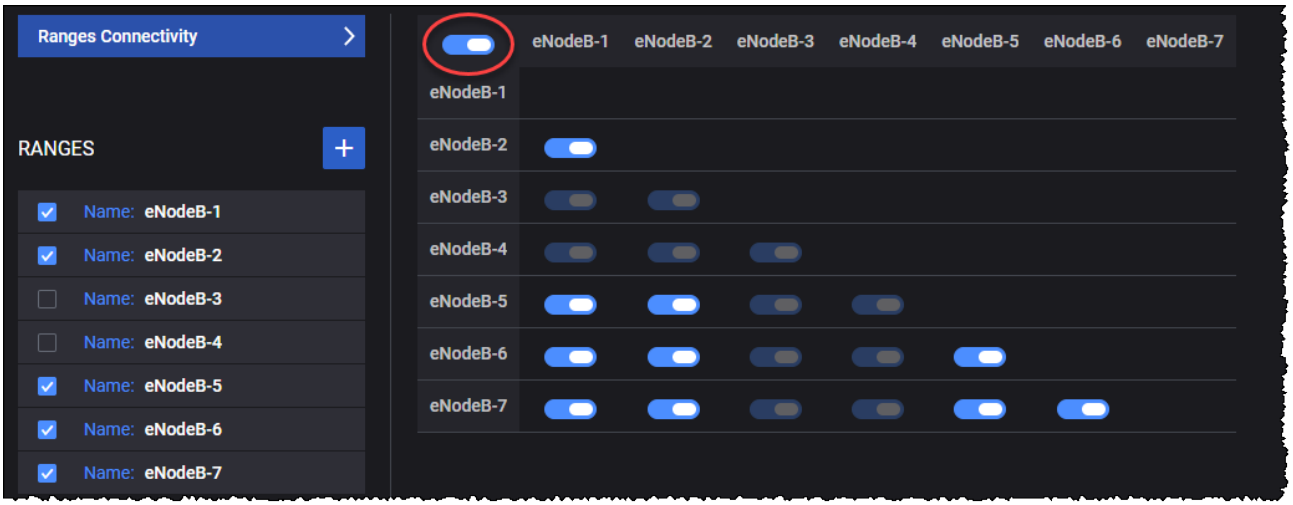
2. The eNodeB-3 range was enabled on previous step and there were selected X2 links between eNodeB-3/eNodeB-4 and eNodeB-3/eNodeB-6. Due to the fact that eNodeB-3 is now disabled, the check-box for X2 links between eNodeB-3 and eNodeB-6 have become greyed out.



The first cell of matrix contains a main check-box that displays the state of the matrix and perform operations.

State	Description	Operation
Selected	All connected.	If the main check-box is Selected, you can undo the selection to change the state to Unselected and all X2 links from the connectivity matrix will become unselected (none connected).
Unselected	None connected.	If the main check-box is Unselected, you can select it to change the state to Checked and all X2 links from the connectivity matrix will become selected (all connected).

When the main matrix check-box is selected all the X2 link check-boxes from the matrix become selected.



Even the X2 link check-boxes for disabled eNodeB ranges are selected since the X2 links for disabled eNodeB ranges are not sent to the traffic agent. This way, when the disabled eNodeB range is

enabled, you will not have to manually select the X2 link check-boxes for that particular eNodeB range.

eNodeB Range Settings

Each eNodeB range is identified by a unique name. You can add and delete ranges as necessary to support your test objectives.

The following table describes the **Range Settings** that you configure for each eNodeB range.

Setting	Description
Range:	
	Select the **Delete Range** button to delete this range from your test configuration.
Range Count	The number of eNodeBs in the range.
Range Settings:	
Node Settings	Each eNodeB range requires the configuration of an associated set of Node Settings, which are described in eNodeB node settings.
S1-U Interface Settings	Each eNodeB range requires the configuration of an associated set of S1-U Interface Settings, which are described in S1-U interface settings.
S1-MME Interface Settings	Each eNodeB range requires the configuration of an associated set of S1 Interface Settings, which are described in S1-MME interface settings.

eNodeB Node Settings

Each eNodeB instance (that is, each range) is identified by the following node settings.

Setting	Description
Name	The name of this eNodeB range. Multiple eNodeB instances (ranges) may be deployed in the test network. Each eNodeB instance is uniquely identified by an *Instance ID*. You can accept the value provided by CoreSIM or overwrite it with your own value.
PLMN MCC	The PLMN MCC for this eNodeB range.
PLMN MNC	The PLMN MNC for this eNodeB range.
Tracking area code	The Tracking Area Code to use for the nodes in this range.
eNodeB ID	The eNodeB ID uniquely identifies an eNodeB within a Public Land Mobile Network (PLMN).

Setting	Description
	When the eNodeB *Range Count* setting is greater than 1, CoreSIM increments the *eNodeB ID* setting for each eNodeB.
eNodeB ID Length	The number of bits to use for the eNodeB ID. It can have either 20 bits or 28 bits.
Cell ID	The Cell Identifier for this eNodeB range. The Cell Identifier is an 8-bit value that identifies a cell within the eNodeB. The same Cell Identifier is used for each eNodeB defined in a range.
Connection Timeout (ms)	The S1AP connection timeout.
Perform Load Balancing	Select the option to enable it. Performs load balancing bewteen MMEs from the same MME group for initial attach.
Dynamic RAN UE NGAP/S1AP ID	If enabled, it will allocate dynamic RAN UE NGAP/S1AP ID values at Service Request.
Public Warning System	*Select the check box to enable this option.* IMPORTANT *If the Public Warning System option is enabled and both PWS Restart and PWS Failure procedures are configured to be initiated (non-zero timers), the timers should be different.*
PWS Restart Timer (s)	Duration in seconds after which PWS Restart Indication is sent. The timer starts after the PWS Write-Replace message exchange. **0** indicates that no message is sent. For more details, refer to *TS 38413 , 8.9.3 PWS Restart Indication*.
PWS Failure Timer (s)	Duration in seconds after which PWS Failure Indication is sent. The timer starts after the PWS Write-Replace message exchange. **0** indicates that no message is sent. For more details, refer to *TS 38413 , 8.9.4 PWS Failure Indication*.

S1-U Interface Settings

The **S1-U Interface Settings** should be enabled and configured when the test is simulating the MME and the DUT is an SGW. When CoreSIM simulates the MME and the SGW, these settings should be disabled.

In 4G networks, S1-U is the reference point between the LTE eNodeB and the LTE S-GW. It uses the GTP-U protocol running on top of UDP to provides best-effort data delivery of user datagrams. One GTP tunnel is established for each radio bearer to carry user traffic between the eNodeB and the selected SGW.

Connectivity Settings

Connectivity Settings	Description
IP	*Select the IP address to open the IP configuration panel for editing.*
IP Address	The IP address in your test network to use for traffic on this interface.
IP Prefix Length	The IP address prefix assigned to this range. It specifies the number of leftmost bits in the address, which indicates the network portion of the address.
Gateway Address	The IP address assigned as gateway address.
Gateway Increment	The value to use when incrementing the Gateway address (starting with the Gateway Address).
Emulated Router Address	Set the IPv4 or IPv6 address for the emulated router. This allows to hide all messages from the interface behind a MAC address. NOTE This option can be used only with IxStack stack.
Emulated Router Address Prefix Length	Set the IP network mask for the emulated router.
MTU	The Maximum Transmission Unit (MTU) for this range. MTU specifies the largest packet that an Ethernet frame can carry.
MSS	The Maximum Segment Size (MSS) for this range. MSS specifies the largest TCP segment that the IP device can transmit as a single, unfragmented unit.
MAC	*Select the MAC address to open the MAC configuration panel for editing*
MAC Address	Hardware MAC address.
MAC Increment	The value to use when incrementing the MAC address (starting with the *MAC Address*). The default value is 000000000001.
Outer VLAN	*Select the check-box to make this option available, and, then, select the Outer VLAN to open the configuration panel for editing.*
VLAN ID	VLAN identifier.
VLAN TPID	VLAN tag protocol ID.
Inner VLAN	IMPORTANT *This option is visible only when the Outer VLAN check-box is selected.* *Select the check-box to make this option available, and, then, select the Inner VLAN to open the configuration panel for editing.*

Connectivity Settings	Description
VLAN ID	VLAN identifier.
VLAN TPID	VLAN tag protocol ID.

S1-MME Interface Settings

The **S1-MME Interface Settings** should be enabled and configured when the test is not simulating the MME. When CoreSIM simulates the MME, these settings should be disabled.

In 4G networks, S1 is the interface from the LTE access network (E-UTRAN) to the core network (EPC). It supports a multi-point connection among MMEs/SGWs and eNBs, and comprises two reference points:

- S1-MME: Reference point for the control plane protocol between E-UTRAN and MME.
- S1-U: Reference point between E-UTRAN and SGW for the per bearer user plane tunneling and inter-eNodeB path switching during handover.

S1-MME Interface Settings

In order to run a test using the S1 interface, the eNodeB range must be enabled and configured with a Peer MME.

S1 Interface Settings	Description
Peer MME	Select the name of the peer MME node from the drop-down list.
SCTP Source port	The source SCTP port for control plane messages (NG-AP signaling messages). Each SCTP endpoint provides the other endpoint with a list of transport addresses through which that endpoint can be reached and from which it will originate SCTP packets. These transport addresses are composed of multiple IP addresses in combination with an SCTP port. The default port number is 36412, but you can change it.
SCTP Parameters	
Avoid Bundling of Data Chunks	Select this option to enable it. It turns on/off any Nagle-like algorithm. This means that packets are generally sent as soon as possible and no unnecessary delays are introduced, at the cost of more packets in the network.
Minimum Retransmission Timeout (ms)	Set the minimum retransmission timeout value, in milliseconds.
Maximum Retransmission Timeout (ms)	Set the maximum retransmission timeout value, in milliseconds.
Initial	Set the initial retransmission timeout value, in milliseconds.

S1 Interface Settings	Description
Retransmission Timeout (ms)	
Maximum Retransmission per Association	Set the maximum retransmissions value per association.
Maximum Retransmission per Path	Set the maximum retransmissions value per path.
Heartbeat Interval (ms)	Set the heartbeat interval value, in milliseconds.
SACK Delay (ms)	Set the delayed selective ACK timeout value.
SACK Frequency	Set the delayed selective ACK frequency value.
SCTP Retry	*Select the check box to enable this option.*
Delay	The delay time (in milliseconds) for triggering a new SCTP retry, after a SCTP disconnect or a failed retry. For subsequent SCTP retriesconsider the Connection Timeout value that will be added as well. Default value: **0**. Allowed integer value: minimum of 0.
Number of Retries	The maximum number of SCTP retries sent by RAN to reestablish the SCTP connection. Default value: **3**. Allowed integer value: minimum of 1.

Connectivity Settings

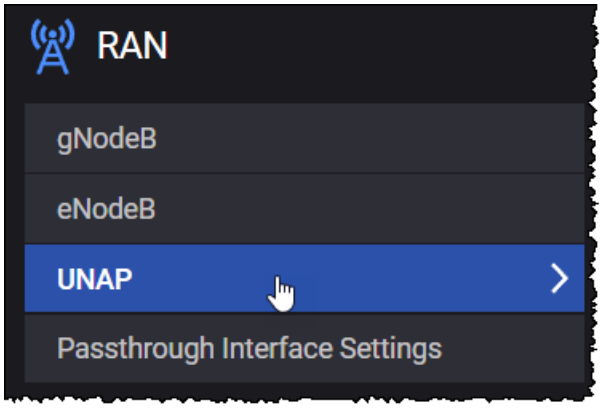
The following table describes the parameters that you need to configure for the connectivity settings:

Connectivity Settings	Description
IP	*Select the IP address to open the IP configuration panel for editing.*
IP Address	The IP address in your test network to use for traffic on this interface. If the *Range Count* is greater than 1, then this IP Address value is assigned to the first range and is incremented by 1 for each additional range.
IP Prefix Length	The IP address prefix assigned to this range. It specifies the number of leftmost bits in the address, which indicates the network portion of the address.
Gateway Address	The IP address assigned as gateway address.

Connectivity Settings	Description
Gateway Increment	The value to use when incrementing the Gateway address (starting with the Gateway Address).
MTU	The Maximum Transmission Unit (MTU) for this range. MTU specifies the largest packet that an Ethernet frame can carry.
MSS	The Maximum Segment Size (MSS) for this range. MSS specifies the largest TCP segment that the IP device can transmit as a single, unfragmented unit.
MAC	*Select the MAC address to open the MAC configuration panel for editing.*
MAC Address	Hardware MAC address.
MAC Increment	The value to use when incrementing the MAC address (starting with the *MAC Address*). The default value is 000000000001.
Outer VLAN	*Select the check-box to make this option available, and, then, select the Outer VLAN to open the configuration panel for editing.*
VLAN ID	VLAN identifier.
VLAN TPID	VLAN tag protocol ID.
Inner VLAN	IMPORTANT *This option is visible only when the Outer VLAN check-box is selected.* *Select the check-box to make this option available, and, then, select the Inner VLAN to open the configuration panel for editing.*
VLAN ID	VLAN identifier.
VLAN TPID	VLAN tag protocol ID.

UNAP

To configure one or more UNAP ranges for a test, select **UNAP** from the RAN panel.



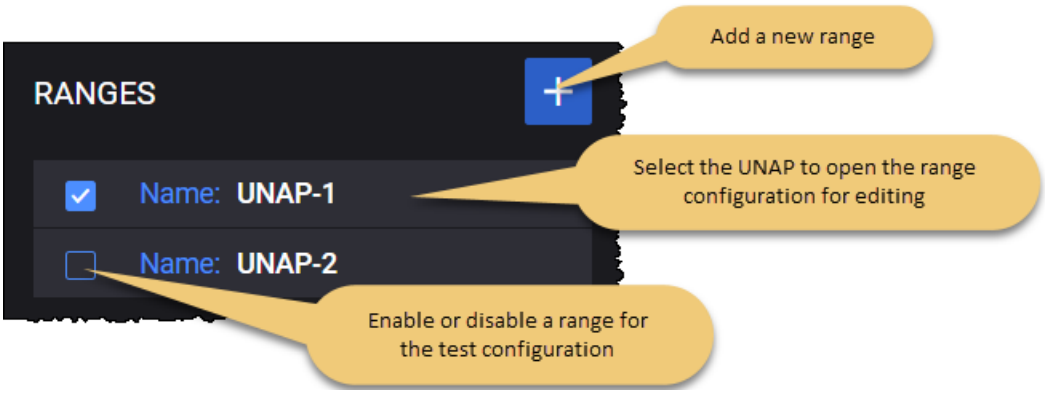
The following topics describe the UNAP configuration settings:

UNAP Ranges panel

The **UNAP Ranges** panel opens when you select the **UNAP** node from the **RAN** pane. On the Ranges panel, you can perform the following task:

- Add a new UNAP range to your test configuration.
- Open a UNAP range configuration (for editing or viewing).
- Enable or disable a range for the test configuration.

For example ...



UNAP Range Settings

Each UNAP range is identified by a unique name. You can add and delete ranges as necessary to support your test objectives.

The following table describes the **Range Settings** that you configure for each UNAP range.

Setting	Description
Range:	
	Select the **Delete Range** button to delete this range from your test configuration.
Range Count	Enter the number of simulated UNAPs required for the range. Default value is **1**.
Range Settings:	
Node Settings	*Each UNAP range requires the configuration of an associated set of Node Settings.*
Name	The name of this UNAP range. Multiple UNAP instances (ranges) may be deployed in the test network. Each UNAP instance is uniquely identified by its name. You can accept the value

Setting	Description
	provided by CoreSIM or overwrite it with your own value.
UNAP ID	Provide the UNAP identifier value.
UNAP ID Increment	Set the UNAP identifier increment value.
WLAN IP Pool	*Each UNAP range requires connectivity settings configuration, which is described below.*

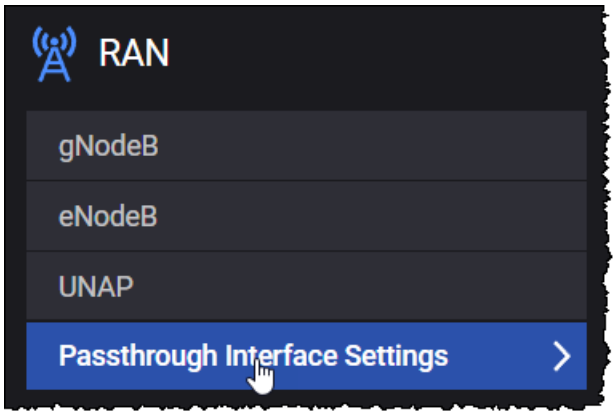
Connectivity Settings

Connectivity Settings	Description
IP	*Select the IP address to open the IP configuration panel for editing.*
IP Address	The IP address in your test network to use for traffic on this interface.
IP Prefix Length	The IP address prefix assigned to this range. It specifies the number of leftmost bits in the address, which indicates the network portion of the address.
IP Address Increment	Set the IP address increment value.
Gateway Address	The IP address assigned as gateway address.
Gateway Increment	The value to use when incrementing the Gateway address (starting with the Gateway Address).
MTU	The Maximum Transmission Unit (MTU) for this range. MTU specifies the largest packet that an Ethernet frame can carry.
MSS	The Maximum Segment Size (MSS) for this range. MSS specifies the largest TCP segment that the IP device can transmit as a single, unfragmented unit.
Additional Routes	*The additional routes will use the gateway defined in the IP information below.*
	Select this button to add a new additional route to your test configuration, if needed.
	Select this button to remove the additional route to your test configuration.
IP Address	The IP address from your test network to use for traffic on this interface.
IP Prefix Length	The IP address prefix assigned to this range. It specifies the number of leftmost bits in the address, which indicates the network portion of the address.

Connectivity Settings	Description
MAC	*Select the MAC address to open the MAC configuration panel for editing*
MAC Address	Hardware MAC address.
MAC Increment	The value to use when incrementing the MAC address (starting with the *MAC Address*). The default value is 0.0.0.1.
Outer VLAN	*Select the check-box to make this option available, and, then, select the Outer VLAN to open the configuration panel for editing.*
VLAN ID	VLAN identifier.
VLAN TPID	VLAN tag protocol ID.
Inner VLAN	IMPORTANT *This option is visible only when the Outer VLAN check-box is selected.* *Select the check-box to make this option available, and, then, select the Inner VLAN to open the configuration panel for editing.*
VLAN ID	VLAN identifier.
VLAN TPID	VLAN tag protocol ID.

Passthrough interface settings

To configure the passthrough interface settings, select **Passthrough Interface Settings** from the RAN panel.



The configuration of the passthrough interface is required when passthrough is enabled in the UE settings. This interface will wait for an external traffic source.

The following settings are required for the passthrough interface configuration.

Connectivity Settings	Description
Stack Type	Select the stack type from the drop-dpwn list. Available options: **Single Stack** or **Dual Stack.**
IP	*Select the IP address to open the IP configuration panel for editing.*
IP Address	The IP address assigned as the gateway address for the external traffic source.
IP Prefix Length	The IP address prefix assigned to this range. It specifies the number of leftmost bits in the address, which indicates the network portion of the address.
Gateway Address	The IP address assigned as gateway address.
Gateway Increment	The value to use when incrementing the Gateway address (starting with the Gateway Address).
MTU	The Maximum Transmission Unit (MTU) for this range. MTU specifies the largest packet that an Ethernet frame can carry.
MSS	The Maximum Segment Size (MSS) for this range. MSS specifies the largest TCP segment that the IP device can transmit as a single, unfragmented unit.
Secondary IP	*Select the IP address to open the secondary IP configuration panel for editing.* *This panel is available only when the stack type is set to **Dual Stack**.*
IP Address	The IP address assigned as the gateway address for the external traffic source.
IP Prefix Length	The IP address prefix assigned to this range. It specifies the number of leftmost bits in the address, which indicates the network portion of the address.
Gateway Address	The IP address assigned as gateway address.
Gateway Increment	The value to use when incrementing the Gateway address (starting with the Gateway Address).
MSS	The Maximum Segment Size (MSS) for this range. MSS specifies the largest TCP segment that the IP device can transmit as a single, unfragmented unit.
MAC	*Select the MAC address to open the MAC configuration panel for editing.*
MAC Address	Hardware MAC address.
MAC Increment	The value to use when incrementing the MAC address (starting with the *MAC Address*). The default value is 000000000001.
Outer VLAN	*Select the check-box to make this option available, and, then, select the Outer VLAN to open the configuration panel for editing.*

Connectivity Settings	Description
VLAN ID	VLAN identifier.
VLAN TPID	VLAN tag protocol ID.
Inner VLAN	IMPORTANT *This option is visible only when the Outer VLAN check-box is selected.* *Select the check-box to make this option available, and, then, select the Inner VLAN to open the configuration panel for editing.*
VLAN ID	VLAN identifier.
VLAN TPID	VLAN tag protocol ID.

SEG/N3IWF & CoreSim configuration settings

In the 5G standalone (SA) topology, CoreSim simulates control plane traffic from the AMF over the N1 and N2 interfaces, and user plane traffic from the UPF over the N3 interface towards the NG-RAN.

The configuration settings are described in the topics listed below.

Topics:

Core Distribution Mode

The **Core** panel opens when you select the Core node from the network topology window.

You can perform the following tasks from this panel:

- Set the distribution mode for ranges and agents.
- Configure all settings for Core node.

If one or multiple agents are assigned to the Core node, the **Distribution Mode** parameter (see Distribution Mode feature) displays the available options in the drop-down:

- **All Ranges on All Agents** - This setting will configure all Core ranges on all agents.

Core settings

To configure the core settings, select **Core Settings** from the CoreSim panel.

The following table describes the parameters required for core settings configuration.

Setting	Description
Home Network Private Key	The Home Network Private key that is used for subscriber privacy.
Interworking without N26 interface	When enabled, Core indicates that it supports interworking without N26 interface.
Routing Indicators	*The Routing Indicator is used in combination with the MCC and MNC to route network signaling to AUSF and UDM instances that are capable of serving the subscriber. It contains four decimal digits, is assigned by the home network operator, and provisioned in the USIM.* *You can add as many Routing Indicators as necessary to support your test objectives.*
	Select the **Add Routing Indicator** button to add a Routing Indicator.
	Select the **Delete** button to remove the routing indicator.

N6/SGi interface settings

N6 is the interface between the UPF session anchor and the DN. It is the interconnection point at which user plane packet encapsulation and decapsulation is performed.

The following **Connectivity Settings** enable the necessaryN6/SGi connectivity and service interaction.

Connectivity Settings	Description
Stack Type	Select the stack type from the drop-dpwn list. Available options: **Single Stack** or **Dual Stack.**
IP	*Select the IP address to open the IP configuration panel for editing.*
IP Address	The IP address from your test network to use for traffic on this interface.
IP Prefix Length	The IP address prefix assigned to this range. It specifies the number of leftmost bits in the address, which indicates the network portion of the address.
Gateway Address	The IP address assigned as gateway address.
Gateway Increment	The value to use when incrementing the Gateway address (starting with the Gateway Address).
MTU	Maximum transmission unit.
MSS	Maximum segment size.
Secondary IP	*Select the IP address to open the secondary IP configuration panel for editing.* *This panel is available only when the stack type is set to **Dual Stack**.*
IP Address	The IP address assigned as the gateway address for the external traffic source.
IP Prefix Length	The IP address prefix assigned to this range. It specifies the number of leftmost bits in the address, which indicates the network portion of the address.
Gateway Address	The IP address assigned as gateway address.
Gateway Increment	The value to use when incrementing the Gateway address (starting with the Gateway Address).
MSS	The Maximum Segment Size (MSS) for this range. MSS specifies the largest TCP segment that the IP device can transmit as a single, unfragmented unit.
MAC	*Select the MAC address to open the MAC configuration panel for editing*
MAC Address	Hardware MAC address.
MAC Increment	The value to use when incrementing the MAC address (starting with the *MAC Address*). The default value is 000000000001.
Outer VLAN	*Select the check-box to make this option available, and, then, select the Outer VLAN to open the configuration panel for editing.*
VLAN ID	VLAN identifier.
VLAN TPID	VLAN tag protocol ID.

Connectivity Settings	Description
Inner VLAN	IMPORTANT *This option is visible only when the Outer VLAN check-box is selected.* *Select the check-box to make this option available, and, then, select the Inner VLAN to open the configuration panel for editing.*
VLAN ID	VLAN identifier.
VLAN TPID	VLAN tag protocol ID.

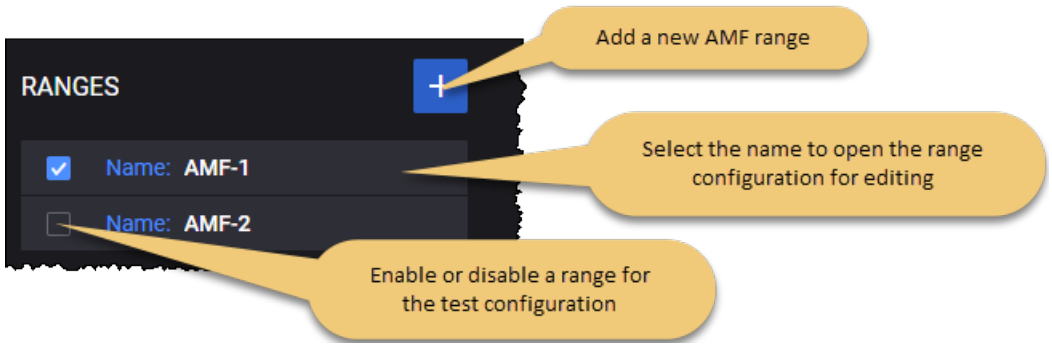
AMF Ranges configuration settings

To access and configure the AMF ranges settings, select **AMF Ranges** from the CoreSim panel.

You can perform the following tasks from the **AMF Ranges** panel:

- Add a new AMF range to your test configuration.
- Open an AMF range configuration (for editing or viewing).
- Enable or disable a range for the test configuration.

For example ...



You add and select AMF ranges from the AMF Ranges panel. When you select the name of an AMF, CoreSIM opens the **Range** panel, from which you can:

- Delete the AMF range from the test configuration.
- Configure the node and connectivity settings for the AMF range.

AMF range controls and settings

Each AMF range is identified by a unique name. You can add and delete AMF ranges as necessary to support your test objectives.

The following table describes the **Range Settings** that you configure for each AMF range.

Setting	Description
Range:	

Setting	Description
	Select the **Delete Range** button to delete this range from your test configuration.
Range Settings:	
Node Settings	Each AMF range requires the configuration of an associated set of Node Settings, which are described in AMF node settings.
N2 Interface Settings	Each AMF range requires the configuration of N2 interface settings, through which a AMF instance interacts with RAN in a 5G network. These settings are described in AMF N2 interface settings.

AMF node settings

Each AMF range includes a set of Node Settings.

Node Settings

Each AMF instance (that is, each range) is identified by the following node settings.

Setting	Description
Node Settings:	
Instance ID	Multiple AMF instances may be deployed in the 5G network. Each AMF instance is uniquely identified by an *Instance ID*. You can accept the value provided by CoreSIM or overwrite it with your own value.
Name	The name uniquely identifies each AMF instance. You can accept the value provided by CoreSIM or overwrite it with your own value.
PLMN MCC	The PLMN MCC for this AMF range. **About PLMN MCC ...** A Public Land Mobile Network (PLMN) is a telecommunications network that provides wireless communication services offered by a specific operator in a specific country. A PLMN is identified by a globally unique PLMN code, which consists of a MCC (Mobile Country Code) and MNC (Mobile Network Code). It is a five- to six-digit number identifying a country, and a mobile network operator in that country, usually represented in the form 001-01 or 001-001. The Mobile Country Code (MCC) is a three-digit code that uniquely identifies the country of domicile of the mobile subscriber.
PLMN MNC	The PLMN MNC for this AMF range. **About PLMN MNC ...** The Mobile Network Code (MNC) is a two-digit (North America) or three-digit (European Standard) code that is used in combination with a Mobile Country Code (MCC) to uniquely identify a mobile network operator. The MCC-MNC tuple is stored within the first five or six digits of the IMSI (International

Setting	Description
	Mobile Subscriber Identity), and is also used in combination with the MCC to identify a PLMN.
Region ID	An AMF Region consists of one or multiple AMF Sets. The AMF Region ID to use for this simulated AMF node. This ID identifies the region in which the node resides. The AMF Region ID addresses the case that there are more AMFs in the network than the number of AMFs that can be supported by AMF Set ID and AMF Pointer. It allows operators to re-use the same AMF Set IDs and AMF Pointers in different regions.
Set ID	An AMF Set consists of some AMFs that serve a given area and Network Slice. Multiple AMF Sets may be defined per AMF Region and Network Slice(s). The AMF Set ID to use for this simulated AMF node. The Set ID uniquely identifies the AMF Set within the AMF Region.
Pointer	The AMF Pointer to use for this simulated AMF node. The AMF Pointer identifies one or more AMFs within the AMF Set.
Relative Capacity	Set the relative capacity value.
Ciphering Algorithm	Allows to select the supported 5G ciphering algorithm: • NEA0 - Null ciphering algorithm • NEA1 - 128-bit SNOW 3G based algorithm • NEA2 - 128-bit AES based algorithm • NEA3 - 128-bit ZUC based algorithm
Integrity Algorithm	Allows to select the supported 5G integrity protection algorithm: • NIA0 - Null Integrity Protection algorithm • NIA1 - 128-bit SNOW 3G based algorithm • NIA2 - 128-bit AES based algorithm • NIA3 - 128-bit ZUC based algorithm
Request N2 SM Information	Enable this option to request N2 SM Information again instead of using the existing one.
Prefer AMF Change	Enable this option to change the AMF for an N2 handover even when the target RAN(T-RAN) is connected to the serving AMF.
Skip MT SMS	Enable this option to skip the initiation of MT SMS procedure ends.
T3512: Select the check box to open T3512 Settings and configure the T3512 timer. NOTE *If disabled, a value of 50 minutes (Value 5 X Unit 10 minutes) is sent for T3512.*	

Setting	Description
Value	Set the value for this parameter. The accepted values are between 0-31.
Unit	Select the unit size for this parameter from the drop-down list. The available options are: 2s, 30s, 1m, 10m, 1h, 10h and Deactivated.
NSSAI	*These settings are described below.*
TAI	*These settings are described below.*
Public Warning System	*These settings are described below.*
AMF Configuration Update	*AMF Configuration Updates can modify AMF name, AMF Relative Capacity, or the Supplementary GUAMI and PLMN List. After an AMF Configuration Update procedure, the newly advertised values are not applied further in the test..* *These settings are described below.*
Emergency Settings	*These settings are described below.*
Overload Configuration	*Select the check box to enable this option. This option allows you to configure the 4G and 5G overload.*
Delay	The time to wait (in seconds), to send the Overload Start after each successful S1 Setup. A ***0*** value means the procedure is not initiated.
Duration	The duration of the overload, in seconds, after which the Overload Stop is sent.
Overload Action	Select the overload action to be taken: • **None** (default) - means the action is note taken • **Reject RRC connection establishments for non-emergency MO DT** • **Reject RRC connection establishments for Signalling** • **Permit Emergency Sessions and mobile terminated services only** • **Permit High Priority Sessions and mobile terminated services only**
Traffic Load Reduction Indication	This option may be included only if the overload action is present. A ***0*** value indicates the IE will not be included.
Reset Configuration	*Select the check box to enable this option.*
Delay (s)	Time to wait, in seconds, to initiate the NG Reset procedure after the NG Setup was performed. The reset is scheduled for each NG RAN connection.

NSSAI

The following table describes the configuration settings that are required for NSSAI.

Setting	Description
NSSAI:	
+	Select the Add NSSAI button to add a new NSSAI to your test configuration.
NSSAI settings:	
🗑	Select the Delete NSSAI button to delete this NSSAI from your test configuration.
SST	The value that identifies the SST (Slice/Service Type) for this NSSAI. SST comprises octet 3 in the NSSAI information element. The standardized SST values are:
SD	The Slice Differentiator (SD) value for this S-NSSAI. SD is an optional information that differentiates amongst multiple Network Slices of the same Slice/Service type. The SD field comprises octets 4 through 6 in the NSSAI.

SST	Value	Suitable for handling:
eMBB	1	5G enhanced Mobile Broadband
URLCC	2	ultra-reliable low-latency communications
MIoT	3	massive IoT

TAI

The following table describes the configuration settings that are required for TAI.

Setting	Description
TAI:	
+	Select the Add TAI button to add a new TAI (Tracking Area Identity) to your test configuration.
TAI settings:	
🗑	Select the Delete TAI button to delete this TAI from your test configuration.
PLMN ID: Set the values for the PLMN identifier.	
PLMN MCC	The PLMN Mobile Country Code (MCC) used in the construction of the TAI.
PLMN MNC	The PLMN Mobile Network Code (MNC) used in the construction of the TAI.
TAC:	

Setting	Description
	Select the Add TAC button to add a new TAC (Tracking Area Code) to your test configuration.
Settings:	
	Select the Delete TAC button to delete this TAC from your test configuration.
TAC	The Tracking Area Code (TAC) used in the construction of the TAI.

Public Warning System

The following table describes the configuration settings that are required for public warning system.

Setting	Description
Message ID	Set the public warning system message ID.
Repetition Period	Set the public warning system message repetition period.
Number of Broadcasts Requested	Set the public warning system message number of requested broadcasts.
Time to Wail Before Triggering PWS after NG Setup (s)	Set the number of seconds to wait before triggering PWS after NG setup.
PWS Cancel Timer (s)	Duration in seconds after which PWS cancel warning is sent. 0 indicates no cancellation.
Write Replace Warning Area List	Select one of the drop-down options to configure the areas where the warning message needs to be broadcast: • **None** (default), the Warning Area List IE will be omitted. • **TAI List**- this enables the **TAI List** parameter, to add the TAIs that will receive the warnings; refer to TAI table above for the configuration of Tracking Area Identities required. • **NR Cell ID List**- this enables the **NR Cell ID List** parameter, to add the NR Cell IDs that will receive the warnings; refer to NR Cell ID List table below for further configuration.
Cancel Warning Area List	Select one of the drop-down options to configure the areas where the warning message needs to be canceled: • **None** (default), the Warning Area List IE will be omitted. • **TAI List**- this enables the **TAI List** parameter, to add the TAIs that will receive the PWS cancel; refer to TAI table above for the configuration of Tracking Area Identities required. • **NR Cell ID List**- this enables the **NR Cell ID List** parameter, to

Setting	Description
	add the NR Cell IDs that will receive the PWS cancel; refer to NR Cell ID List table below for further configuration.
Popup	If enabled, it will activate a pop-up on the UE when receiving an ETWS message.
Emergency User Alert	If enabled, it will activate the emergency user alert on the UE when receiving an ETWS message.
Data Coding scheme	Select an option from the drop-down to set the data coding scheme for PWS/ETWS messages.
Warning Message Contents	Add the content of the warning message that will be broadcasted to the UEs.

AMF Configuration Update(s)

The following table describes the configuration settings that are required for AMF Configuration Update.

Setting	Description
AMF Configuration Update(s):	
+	Select the Add AMF Configuration Update(s) button to configure a new AMF Configuration Update message.
AMF Configuration Update:	
🗑	Select the Delete AMF Configuration Update button to delete the AMF Configuration Update message configuration.
Delay (ms)	The delay between NG setup and the first AMF Configuration Update, or between subsequent AMF Configuration Update procedures.
Updated Item(s):	
+	Select the Add Updated Item button to add a new item to be updated.
Updated Item:	
🗑	Select the Delete Updated Item button to delete this item from your test configuration.
Type	Select one of the update options: • **Updated AMF Name** - refers to the AMF instance name (see **Value**) • **Updated Relative Capacity** - refers to the AMF instance relative capacity (see **Value**)

Setting	Description
	• **Supplementary GUAMI** - AMF Configuration Update messages for Supplementary GUAMI/PLMN Support List always include the GUAMI/PLMN Support List original values (at NG setup), besides the ones in the update, to avoid impact on the current test.
Value	If **Type** is set as: • **Updated AMF Name** - it will allow you to update the unique name that identifies the selected AMF instance. • **Updated Relative Capacity** - will allow to update the relative capacity value, which should be between 0 and 255.
MCC	NOTE This parameter appears when **Type** is set as ***Supplementary GUAMI***. The MCC for this AMF range.
MNC	NOTE This parameter appears when **Type** is set as ***Supplementary GUAMI***. The MNC for this AMF range.
Region ID	NOTE This parameter appears when **Type** is set as ***Supplementary GUAMI***. An AMF Region consists of one or multiple AMF Sets. The AMF Region ID to use for this simulated AMF node. This ID identifies the region in which the node resides. The AMF Region ID addresses the case that there are more AMFs in the network than the number of AMFs that can be supported by AMF Set ID and AMF Pointer. It allows operators to re-use the same AMF Set IDs and AMF Pointers in different regions.
Set ID	NOTE This parameter appears when **Type** is set as ***Supplementary GUAMI***. An AMF Set consists of some AMFs that serve a given area and Network Slice. Multiple AMF Sets may be defined per AMF Region and Network Slice(s). The AMF Set ID to use for this simulated AMF node. The Set ID uniquely identifies the AMF Set within the AMF Region.
Pointer	NOTE This parameter appears when **Type** is set as ***Supplementary GUAMI***. The AMF Pointer to use for this simulated AMF node. The AMF Pointer identifies one or more AMFs within the AMF Set.

Emergency Settings

The following table describes the emergency settings configuration.

Setting	Description
Authentication Behaviour	The authentication procedure behaviour during an Emergency Registration. Select an option from the drop-down list: • Normal Authentication (default value) • Allow Authentication Failure • Skip Authentication
Emergency Services Support Value	Select an option from the drop-down list: • Not Supported (default value) • In NR connected to 5GC only • In EUTRA connected to 5GC only • In NR connected to 5GC and EUTRA connected to 5GC
Emergency Services Fallback Support Value	Select an option from the drop-down list: • Not Supported (default value) • In NR connected to 5GC only • In EUTRA connected to 5GC only • In NR connected to 5GC and EUTRA connected to 5GC

NR Cell ID List

The following table describes the configuration settings that are required for NR Cell ID.

Setting	Description
NR Cell ID:	
	Select the Add NR Cell ID button to add a new UE ID to your test configuration.
NR Cell ID settings:	
	Select the Delete NR Cell ID button to delete this UE ID from your test configuration.
PLMN ID: Set the values for the PLMN identifier.	
PLMN MCC	The PLMN Mobile Country Code (MCC) used in the construction of the NR Cell ID.
PLMN MNC	The PLMN Mobile Network Code (MNC) used in the construction of the NR Cell ID.
NR Cell ID	The cell identifier of the UE.

AMF N2 interface settings

N2 is the service-based interface through which a AMF instance interacts with RAN in a 5G network.

The following **Connectivity Settings** enable the necessary N2 connectivity and service interaction.

Connectivity Settings	Description
IP	*Select the IP address to open the IP configuration panel for editing.*
IP Address	The IP address from your test network to use for traffic on this interface.
IP Prefix Length	The IP address prefix that has been assigned to this node.
Gateway Address	The IP address assigned as gateway address.
Gateway Increment	The value to use when incrementing the Gateway address (starting with the Gateway Address).
MAC	*Select the MAC address to open the MAC configuration panel for editing.*
MAC Address	Hardware MAC address.
MAC Increment	The value to use when incrementing the MAC address (starting with the MAC Address). The default value is 000000000001.
Outer VLAN	*Select the check-box to make this option available, and, then, select the Outer VLAN to open the configuration panel for editing.*
VLAN ID	VLAN identifier.
VLAN TPID	VLAN tag protocol ID.
Inner VLAN	IMPORTANT *This option is visible only when the Outer VLAN check-box is selected.* *Select the check-box to make this option available, and, then, select the Inner VLAN to open the configuration panel for editing.*
VLAN ID	VLAN identifier.

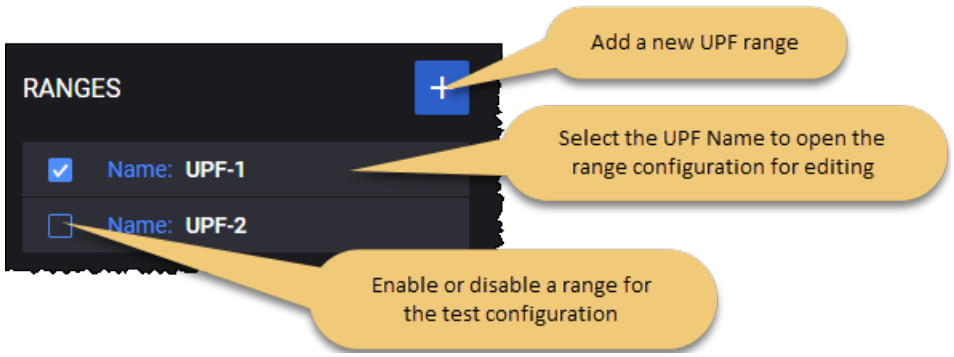
UPF Ranges configuration settings

To access and configure the UPF ranges settings, select **UPF Ranges** from the CoreSim panel.

You can perform the following tasks from the **UPF Ranges** panel:

- Add a new UPF range to your test configuration.
- Open a UPF range configuration (for editing or viewing).
- Enable or disable a range for the test configuration.

For example ...



You add and select UPF ranges from the UPF Ranges panel. When you select an UPF range *Name*, CoreSIM opens the **Range** panel, from which you can:

- Delete the UPF range from the test configuration.
- Modify the UPF range name.
- Configure interface settings for the UPF range.

The following table describes the **Range Settings** that you configure for each UPF range.

Setting	Description
Range:	
	Select the **Delete Range** button to delete this range from your test configuration.
Name	The name of the UPF range. You can accept the name provided by the CoreSIM, or you can replace it with a name of your own choosing.
Range Settings:	
N3 Interface Settings	N3 is the interface between the RAN and the UPF. These interface settings are described in UPF N3 interface settings.

UPF N3 interface settings

The following configuration settings are required by each UPF N3 range.

Connectivity Settings	Description
IP	*Select the IP address to open the IP configuration panel for editing.*
IP Address	The IP address from your test network to use for traffic on this interface.
IP Prefix Length	The IP address prefix assigned to this range. It specifies the number of leftmost bits in the address, which indicates the network portion of the address.
Gateway Address	The IP address assigned as gateway address.

Connectivity Settings	Description
Gateway Increment	The value to use when incrementing the Gateway address (starting with the Gateway Address).
MTU	Maximum transmission unit.
MSS	Maximum segment size.
MAC	*Select the MAC address to open the MAC configuration panel for editing*
MAC Address	Hardware MAC address.
MAC Increment	The value to use when incrementing the MAC address (starting with the *MAC Address*). The default value is 000000000001.
Outer VLAN	*Select the check-box to make this option available, and, then, select the Outer VLAN to open the configuration panel for editing.*
VLAN ID	VLAN identifier.
VLAN TPID	VLAN tag protocol ID.
Inner VLAN	IMPORTANT *This option is visible only when the Outer VLAN check-box is selected.* *Select the check-box to make this option available, and, then, select the Inner VLAN to open the configuration panel for editing.*
VLAN ID	VLAN identifier.
VLAN TPID	VLAN tag protocol ID.

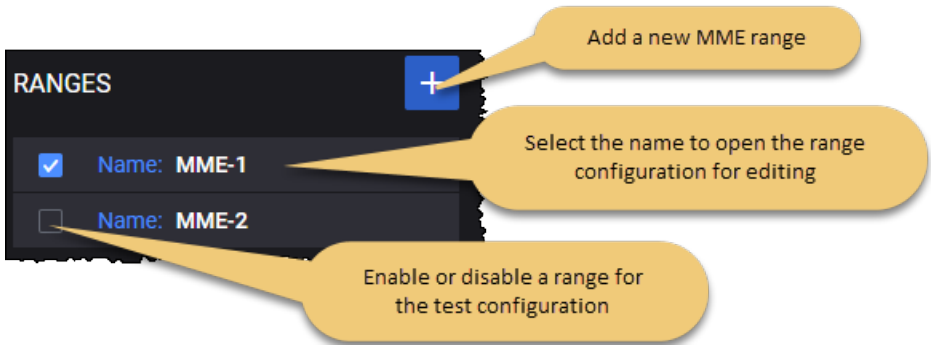
MME Ranges configuration settings

To access and configure the MME ranges settings, select **MME Ranges** from the CoreSim panel.

You can perform the following tasks from the **MME Ranges** panel:

- Add a new MME range to your test configuration.
- Open an MME range configuration (for editing or viewing).
- Enable or disable a range for the test configuration.

For example ...



You add and select MME ranges from the MME Ranges panel. When you select the name of an MME , CoreSIM opens the **Range** panel, from which you can:

- Delete the MME range from the test configuration.
- Configure the node and connectivity settings for the MME range.

MME range controls and settings

Each MME range is identified by a unique name. You can add and delete MME ranges as necessary to support your test objectives.

The following table describes the **Range Settings** that you configure for each MME range.

Setting	Description
Range:	
	Select the **Delete Range** button to delete this range from your test configuration.
Range Settings:	
Node Settings	Each MME range requires the configuration of an associated set of Node Settings, which are described in MME node settings.
S1 Interface Settings	These settings are described in MME S1 interface settings.

MME node settings

Each MME range includes a set of Node Settings.

Node Settings

Each MME instance (that is, each range) is identified by the following node settings.

Setting	Description
Node Settings:	
Name	The name uniquely identifies each MME instance. You can accept the value provided by CoreSIM or overwrite it with your own value.
Group ID	Set the MME group ID value.
Code	Set the MME code value.
PLMN MCC	The PLMN MCC for this MME range. **About PLMN MCC ...** A Public Land Mobile Network (PLMN) is a telecommunications network that provides wireless communication services offered by a specific operator in a specific country. A PLMN is identified by a globally unique PLMN code, which consists of a MCC (Mobile Country Code) and MNC (Mobile Network Code). It is a five- to six-digit number identifying a country, and a mobile network operator in that country, usually represented in the form 001-01 or 001-001. The Mobile Country Code (MCC) is a three-digit code that uniquely identifies the country of domicile of the mobile subscriber.
PLMN MNC	The PLMN MNC for this MME range. **About PLMN MNC ...** The Mobile Network Code (MNC) is a two-digit (North America) or three-digit (European Standard) code that is used in combination with a Mobile Country Code (MCC) to uniquely identify a mobile network operator. The MCC-MNC tuple is stored within the first five or six digits of the IMSI (International Mobile Subscriber Identity), and is also used in combination with the MCC to identify a PLMN.
Ciphering Algorithm	Allows to select the supported 5G ciphering algorithm: • **EEA0** - Null ciphering algorithm • **EEA1** - 128-bit SNOW 3G based algorithm • **EEA2** - 128-bit AES based algorithm • **EEA3** - 128-bit ZUC based algorithm
Integrity Algorithm	Allows to select the supported 5G integrity protection algorithm: • **EIA0** - Null Integrity Protection algorithm

Setting	Description
	• **EIA1** - 128-bit SNOW 3G based algorithm • **EIA2** - 128-bit AES based algorithm • **EIA3** - 128-bit ZUC based algorithm
Relative Capacity	Set the relative capacity value.
Public Warning System	*Select the check box to enable this option.*
Message ID	Set the public warning system message ID. Values should be in range 0-65535. Default value: **4352**.
Repetition Period	Set the public warning system message repetition period. Values should be in range 1-131071. Default value: **1**.
Number of Broadcasts Requested	Set the public warning system message number of requested broadcasts. Values should be in range 0-65535. Default value: **1**.
Time to Wail Before Triggering PWS after NG Setup (s)	Set the number of seconds to wait before triggering PWS after S1 setup. Values should be in range 0-86400. Default value: **1**.
PWS Kill Timer (s)	Duration in seconds after which PWS Kill Request is sent. Values should be in range 0-86400. Default value: **0**.
Write Replace Warning Area List	Select one of the drop-down options to configure the areas where the warning message needs to be broadcast: • **None** (default), the Warning Area List IE will be omitted. • **TAI List**- this enables the **TAI List** parameter, to add the TAIs that will receive the warnings; refer to TAI table below for the configuration of Tracking Area Identities required. • **Cell ID List**- this enables the **Cell ID List** parameter, to add the Cell IDs that will receive the warnings; refer to Cell ID List table below for further configuration.
Kill Warning Area List	Select one of the drop-down options to configure the areas where the warning message needs to be killed: • **None** (default), the Warning Area List IE will be omitted. • **TAI List**- this enables the **TAI List** parameter, to add the TAIs that will receive the PWS kill; refer to TAI table below for the configuration of Tracking Area Identities required.

Setting	Description
	• **Cell ID List**- this enables the**Cell ID List** parameter, to add the Cell IDs that will receive the PWS kill; refer to Cell ID List table below for further configuration.
Popup	If enabled, it will activate a pop-up on the UE when receiving an ETWS message.
Emergency User Alert	If enabled, it will activate the emergency user alert on the UE when receiving an ETWS message.
Data Coding scheme	Select an option from the drop-down to set the data coding scheme for PWS/ETWS messages.
Warning Message Contents	Add the content of the warning message that will be broadcasted to the UEs.
T3412	*Select the check box to enable this option.* NOTE *If enabled, it allows the configuration of the T3412 timer. If disabled, a value of 50 minutes (Value 5 x Unit 10 minutes) is sent for T3412.*
Value	Set the value for this parameter. Accepted values are between **0** and **31**.
Unit	Select from the drop-down the unit to use for T3412 timer calculation. Supported values are: • if *Support Extended Timer* is **enabled**, units are **2 seconds**, **30 seconds**, **1 minute**, **10 minutes**, **1 hour**, **10 hours**, **320 hours**, **Deactivated**. • if *Support Extended Timer* is **disabled**, units are **2 seconds**, **30 seconds**, **1 minute**, **1 decihour**, **10 minutes**, **1 hour**, **10 hours**, **Deactivated**.
Support Extended Time	If enabled (default), it sets the T3412 extended value as described in the TS 24301, chapter 8.2.1.12.
MME Configuration Update	*MME Configuration Updates can modify MME name, MME Relative Capacity, or the Supplementary GUMMEI List. After an MME Configuration Update procedure, the newly advertised values are not applied further in the test.* *These settings are described below.*
Emergency Settings	*This option allows you to configure the Emergency support and MME behavior for Authentication procedure.*
Allow Emergency Attach	This parameter is enabled by default; the MME will allow the UEs to use emergency attach.
Authentication Behaviour	Select one of the following behaviors to apply during Emergency Registration:

Setting	Description
	• **Normal Authentication** • **Allow Authentication Failure** • **Skip Authentication**
Overload Configuration	*Select the check box to enable this option. This option allows you to configure the 4G and 5G overload.*
Delay	The time to wait (in seconds), to send the Overload Start after each successful S1 Setup. A ***0*** value means the procedure is not initiated.
Duration	The duration of the overload, in seconds, after which the Overload Stop is sent.
Overload Action	Select the overload action to be taken: • **Reject RRC connection establishments for non-emergency MO DT** (default) • **Reject RRC connection establishments for Signalling** • **Permit Emergency Sessions and mobile terminated services only** • **Permit High Priority Sessions and mobile terminated services only** • **Reject delay tolerant access** • **Permit high priority sessions and exception reporting and mobile terminated services only** • **Not accept mo-data or delay tolerant access from CP CIoT**
Traffic Load Reduction Indication	This option may be included only if the overload action is present. A ***0*** value indicates the IE will not be included.
Reset Configuration	*Select the check box to enable this option.*
Delay (s)	Time to wait, in seconds, to initiate the S1 Reset procedure after the S1 Setup was performed. The reset is scheduled for each S1 RAN connection.

TAI

The following table describes the configuration settings that are required for TAI.

Setting	Description
TAI:	
+	Select the Add TAI button to add a new TAI (Tracking Area Identity) to your test configuration.

Setting	Description
TAI settings:	
	Select the Delete TAI button to delete this TAI from your test configuration.
PLMN ID: Set the values for the PLMN identifier.	
PLMN MCC	The PLMN Mobile Country Code (MCC) used in the construction of the TAI.
PLMN MNC	The PLMN Mobile Network Code (MNC) used in the construction of the TAI.
TAC:	
	Select the Add TAC button to add a new TAC (Tracking Area Code) to your test configuration.
Settings:	
	Select the Delete TAC button to delete this TAC from your test configuration.
TAC	The Tracking Area Code (TAC) used in the construction of the TAI.

Cell ID List

The following table describes the configuration settings that are required for Cell ID.

Setting	Description
Cell ID:	
	Select the Add Cell ID button to add a new service provider to your test configuration.
Cell ID settings:	
	Select the Delete Cell ID button to delete this provider from your test configuration.
PLMN ID: Set the values for the PLMN identifier.	
PLMN MCC	The PLMN Mobile Country Code (MCC) used in the construction of the Cell ID.
PLMN MNC	The PLMN Mobile Network Code (MNC) used in the construction of the Cell ID.
Cell ID	The cell identifier of the UE.

MME Configuration Update

The following table describes the configuration settings that are required for MME Configuration Update.

Setting	Description
MME Configuration Update(s):	
	Select the Add MME Configuration Update(s) button to configure a new MME Configuration Update message.
MME Configuration Update:	
	Select the Delete MME Configuration Update button to delete the MME Configuration Update message configuration.
Delay (ms)	The delay between S1 setup and the first MME Configuration Update, or between subsequent MME Configuration Update procedures.
Updated Item(s):	
	Select the Add Updated Item button to add a new item to be updated.
Updated Item:	
	Select the Delete Updated Item button to delete this item from your test configuration.
Type	Select one of the update options: • **Updated MME Name** - refers to the MME instance name (see **Value**) • **Updated Relative Capacity** - refers to the MME instance relative capacity (see **Value**) • **Supplementary GUMMEI** - the MME Configuration Update messages for Supplementary GUMMEI will always include the GUMMEI original values (at S1 setup), besides the ones in the update, to avoid impact on the current test.
Value	If **Type** is set as: • **Updated MME Name** - it will allow you to update the unique name that identifies the selected MME instance. • **Updated Relative Capacity** - will allow to update the relative capacity value, which should be between 0 and 255.
MCC	NOTE This parameter appears when **Type** is set as ***Supplementary GUMMEI***. The MCC for this MME range.
MNC	NOTE This parameter appears when **Type** is set as ***Supplementary GUMMEI***. The MNC for this MME range.

Setting	Description
Group ID	NOTE This parameter appears when **Type** is set as ***Supplementary GUMMEI***. Set the MME group ID value.
Code	NOTE This parameter appears when **Type** is set as ***Supplementary GUMMEI***. Set the MME code value.

MME S1 interface settings

The following **Connectivity Settings** enable the necessary S1 connectivity and service interaction.

S1 Interface Settings	Description
Local STCP Port	Set the local STCP port number.
Connectivity Settings	
IP	*Select the IP address to open the IP configuration panel for editing.*
IP Address	The IP address in your test network to use for traffic on this interface.
IP Prefix Length	The IP address prefix assigned to this range. It specifies the number of leftmost bits in the address, which indicates the network portion of the address.
Gateway Address	The IP address assigned as gateway address.
Gateway Increment	The value to use when incrementing the Gateway address (starting with the Gateway Address).
MTU	The Maximum Transmission Unit (MTU) for this range. MTU specifies the largest packet that an Ethernet frame can carry.
MSS	The Maximum Segment Size (MSS) for this range. MSS specifies the largest TCP segment that the IP device can transmit as a single, unfragmented unit.
MAC	*Select the MAC address to open the MAC configuration panel for editing.*
MAC Address	Hardware MAC address.
MAC Increment	The value to use when incrementing the MAC address (starting with the *MAC Address*). The default value is 000000000001.
Outer VLAN	*Select the check-box to make this option available, and, then, select the Outer*

S1 Interface Settings	Description
	VLAN to open the configuration panel for editing.
VLAN ID	VLAN identifier.
VLAN TPID	VLAN tag protocol ID.
Inner VLAN	IMPORTANT *This option is visible only when the Outer VLAN check-box is selected.* *Select the check-box to make this option available, and, then, select the Inner VLAN to open the configuration panel for editing.*
VLAN ID	VLAN identifier.
VLAN TPID	VLAN tag protocol ID.

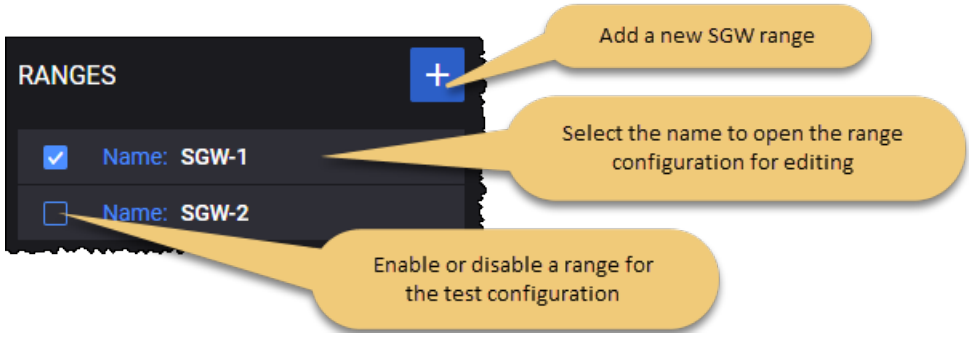
SGW Ranges configuration settings

To access and configure the SGW ranges settings, select **SGW Ranges** from the CoreSim panel.

You can perform the following tasks from the **SGW Ranges** panel:

- Add a new SGW range to your test configuration.
- Open a SGW range configuration (for editing or viewing).
- Enable or disable a range for the test configuration.

For example ...



You add and select SGW ranges from the SGW Ranges panel. When you select the name of a SGW, CoreSIM opens the **Range** panel, from which you can:

- Delete the SGW range from the test configuration.
- Modify the SGW range name.
- Configure the range and connectivity settings for the SGW range.

SGW range controls and settings

Each SGW range is identified by a unique name. You can add and delete SGW ranges as necessary to support your test objectives.

The following table describes the **Range Settings** that you configure for each SGW range.

Setting	Description
Range:	
	Select the **Delete Range** button to delete this range from your test configuration.
Name	The name uniquely identifies each SGW instance. You can accept the value provided by CoreSIM or overwrite it with your own value.
Range Settings:	
UDP Rx Buffer (bytes)	Size of receive buffers for UDP sockets: • minimum: 212992 #The default Linux buffer size • maximum: 134217728 #128MB • default: 12582912 #12MB
UDP Tx Buffer (bytes)	Size of transmit buffers for UDP sockets: • minimum: 212992 # The default Linux buffer size • maximum: 134217728 #128MB • default: 2097152 #2MB
S1-u Interface Settings	These settings are described in SGW S1-u interface settings.

SGW S1-u interface settings

The following **Connectivity Settings** enable the necessary S1-u connectivity and service interaction.

S1-u Interface Settings	Description
IP	*Select the IP address to open the IP configuration panel for editing.*
IP Address	The IP address in your test network to use for traffic on this interface.
IP Prefix Length	The IP address prefix assigned to this range. It specifies the number of leftmost bits in the address, which indicates the network portion of the address.
Gateway	The IP address assigned as gateway address.

S1-u Interface Settings	Description
Address	
Gateway Increment	The value to use when incrementing the Gateway address (starting with the Gateway Address).
MAC	*Select the MAC address to open the MAC configuration panel for editing.*
MAC Address	Hardware MAC address.
MAC Increment	The value to use when incrementing the MAC address (starting with the *MAC Address*). The default value is 000000000001.
Outer VLAN	*Select the check-box to make this option available, and, then, select the Outer VLAN to open the configuration panel for editing.*
VLAN ID	VLAN identifier.
VLAN TPID	VLAN tag protocol ID.
Inner VLAN	IMPORTANT *This option is visible only when the Outer VLAN check-box is selected.* *Select the check-box to make this option available, and, then, select the Inner VLAN to open the configuration panel for editing.*
VLAN ID	VLAN identifier.
VLAN TPID	VLAN tag protocol ID.

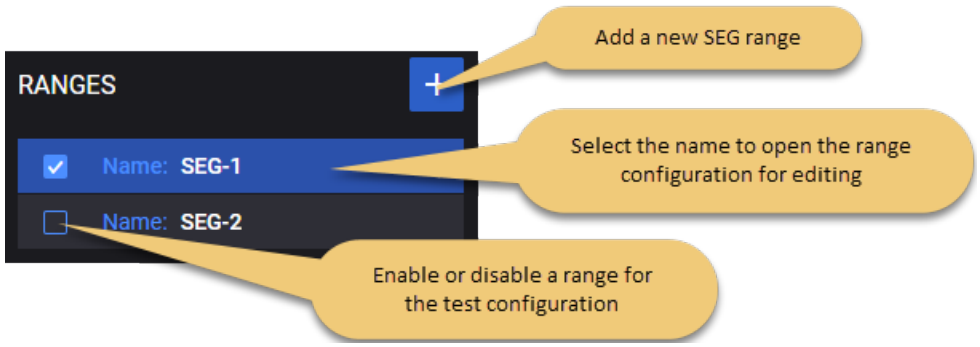
SEG Ranges configuration settings

To access and configure the SEG ranges settings, select **SEG Ranges** from the CoreSim panel.

You can perform the following tasks from the **SEG Ranges** panel:

- Add a new SEG range to your test configuration.
- Open a SEG range configuration (for editing or viewing).
- Enable or disable a range for the test configuration.

For example ...



You add and select SEG ranges from the SEG Ranges panel. When you select the name of a SEG , CoreSIM opens the **Range** panel, from which you can:

- Delete the SEG range from the test configuration.
- Designate the range as a **Device Under Test**.
- Modify the SEG range name.
- Configure the range and connectivity settings for the SEG range.

SEG range controls and settings

Each SEG range is identified by a unique name. You can add and delete SEG ranges as necessary to support your test objectives.

The following table describes the **Range Settings** that you configure for each SEG range.

Setting	Description
Range:	
Device Under Test	Enable this option if your SEG is a DUT in this test configuration. When this option is not enabled, the CoreSIM will simulate the SEG functionality (if it is selected in the Topology window).
	Select the **Delete Range** button to delete this range from your test configuration.
Range Settings:	
Node Settings	
Name	The name uniquely identifies each SGW instance. You can accept the value provided by CoreSIM or overwrite it with your own value.
Role	By default, the role is set to **Responder (Remote Access)** and cannot be changed.
UDP Rx Buffer (bytes)	Size of receive buffers for UDP sockets: • minimum: 212992 • maximum: 134217728

Setting	Description
	• default: 12582912
UDP Tx Buffer (bytes)	Size of transmit buffers for UDP sockets: • minimum: 212992 • maximum: 134217728 • default: 2097152
Interface Settings	*These settings are described in SEG interface settings.*
Remore Access IP Pool	
Start IP	Set the start IP address.
IP Increment	Set the IP address increment value.
IPs count	Set the IP count value.
IP Prefix Length	Set the IP prefix length value.
Local Protected Subnet	*Selects which node(s) are protected by SEG: AMF and/or UPF . AMF and UPF could be protected by the same SEG when running with Linux stack.*
N2 Host(s)	Select an entry from the drop-down list: you can either *Select All* or select a specific AMF range from the list.
N3 Host(s)	Select an entry from the drop-down list: you can either *Select All* or select a specific UPF range from the list.
Authentication	
Authentication Method	By default, the authentication method is set to **Certificates** and cannot be changed.
CA Certificate	Select the CA certificate from the drop-down list.
Certificates and Private Keys (zip)	It allows you to upload an archive that contains the certificates and keys for the SEG range, using the **Upload** button. To remove the archive , select the **Clear** button. The `.key` and `.crt` files need to have the same name before extensions.
Use Same Certificates and Private Key For All Tunnels	By default, this option is disabled. Select the toggle button to enable it.
IKE Phase 1	
Encryption	Select the encryption algorithm from the drop-down list.

Setting	Description
Algorithm	Default value: **AES-128-GCM-16**. Available options: **AES-128-CBC**, **AES-192-CBC**, **AES-256-CBC**, **AES-128-GCM-16**, **AES-192-GCM-16**, **AES-256-GCM-16**.
Hash Algorithm	Select the hash algorithm from the drop-down list. Default value: **NONE**. Available options: **NONE**, **HMAC-MD5-96**, **HMAC-SHA1-96**, **HMAC-MD5-128**, **HMAC-SHA1-160**, **HMAC-SHA2-256-128**, **HMAC-SHA2-384-192**, **HMAC-SHA2-512-256**. Restrictions: • When *Encryption Algorithm* is set to one of **AES-128-GCM-16**, **AES-192-GCM-16** or **AES-256-GCM-16**, the only available *Hash Algorithm* is **NONE**. • If **Encryption Algorithm** is set to a value other than one of **AES-128-GCM-16**, **AES-192-GCM-16** or **AES-256-GCM-16**, the **NONE** hash algorithm is not available.
DH Group	Select an option from the drop-down list. Default value: **prime256v1(19)**. Available options: **prime256v1(19)**, **secp384r1(20)**, **secp521r1(21)**, **prime192v1(25)**, **secp224r1(26)**, **x25519(31)**, **x448(32)**.
PRF Algorithm	Select an option from the drop-down list. Default value: **HMAC-SHA256**. Available options: **HMAC-MD5**, **HMAC-SHA1**, **HMAC-SHA256**, **HMAC-SHA384**, **HMAC-SHA512**.
IKE Phase 2	
Encryption Algorithm	Select the encryption algorithm from the drop-down list. Default value: **AES-128-GCM-16**. Available options: **AES-128-CBC**, **AES-192-CBC**, **AES-256-CBC**, **AES-128-GCM-16**, **AES-192-GCM-16**, **AES-256-GCM-16**.
Hash Algorithm	Select the hash algorithm from the drop-down list. Default value: **NONE**. Available options: **NONE**, **HMAC-MD5-96**, **HMAC-SHA1-96**, **HMAC-MD5-128**, **HMAC-SHA1-160**, **HMAC-SHA2-256-128**, **HMAC-SHA2-384-192**, **HMAC-SHA2-512-256**. Restrictions: • When *Encryption Algorithm* is set to one of **AES-128-GCM-16**, **AES-192-GCM-16** or **AES-256-GCM-16**, the only available *Hash Algorithm* is **NONE**. • If **Encryption Algorithm** is set to a value other than one of **AES-128-GCM-16**, **AES-192-GCM-16** or **AES-256-GCM-16**, the **NONE** hash algorithm is not available.

Setting	Description
Identification	
Local Identification Type	Select an option from the drop-down list. Default value: **ID_DER_ASN1_DN**. Available options: **ID_IPV4_ADDR**, **ID_FQDN**, **ID_USER_FQDN**, **ID_IPV6_ADDR**, **ID_DER_ASN1_DN**, **ID_KEY_ID**.
Local Identification Value	Set the value for this parameter. This field is mandatory if the *Local Identification Type* is set to: **ID_FQDN**, **ID_KEY_ID** or **ID_RFC822_ADDR**.
Timers	
Enable Rekey	By default, this option is disabled. Select the toggle button to enable it.
IKE Phase 1 (IKE) Lifetime (s)	Set a value for this parameter. Default value: **0** (disabled).
IKE Phase 1 (IKE) Lifetime (s)	Set a value for this parameter. Default value: **0** (disabled).
DPD Interval (s)	Set a value for this parameter. Default value: **0** (disabled).

SEG interface settings

The following **Connectivity Settings** enable connectivity and service interaction.

SEG Interface Settings	Description
Source Port	Set the source port number.
IP	*Select the IP address to open the IP configuration panel for editing.*
IP Address	The IP address in your test network to use for traffic on this interface.
IP Prefix Length	The IP address prefix assigned to this range. It specifies the number of leftmost bits in the address, which indicates the network portion of the address.
Gateway Address	The IP address assigned as gateway address.
Gateway Increment	The value to use when incrementing the Gateway address (starting with the Gateway Address).
MAC	*Select the MAC address to open the MAC configuration panel for editing.*

SEG Interface Settings	Description
MAC Address	Hardware MAC address.
MAC Increment	The value to use when incrementing the MAC address (starting with the *MAC Address*). The default value is 000000000001.
Outer VLAN	*Select the check-box to make this option available, and, then, select the Outer VLAN to open the configuration panel for editing.*
VLAN ID	VLAN identifier.
VLAN TPID	VLAN tag protocol ID.
Inner VLAN	IMPORTANT *This option is visible only when the Outer VLAN check-box is selected.* *Select the check-box to make this option available, and, then, select the Inner VLAN to open the configuration panel for editing.*
VLAN ID	VLAN identifier.
VLAN TPID	VLAN tag protocol ID.

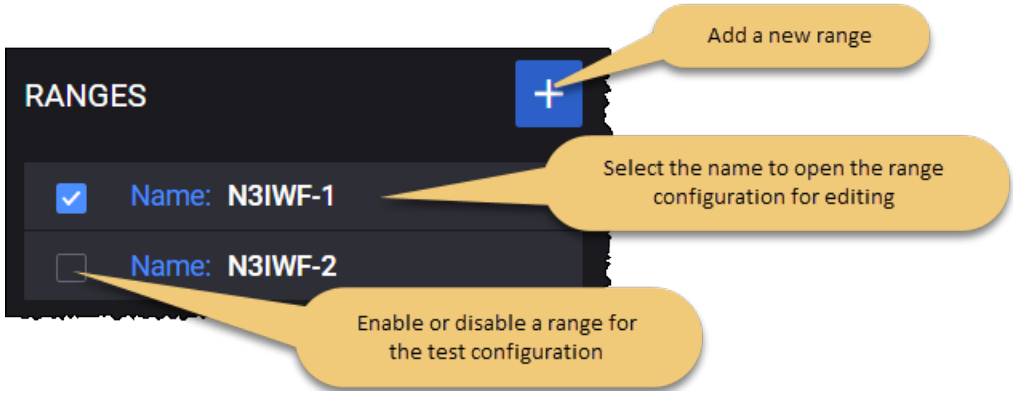
N3IWF Ranges configuration settings

To access and configure the N3IWF ranges settings, select **N3IWF Ranges** from the CoreSim panel.

You can perform the following tasks from the **N3IWF Ranges** panel:

- Add a new N3IWF range to your test configuration.
- Open a N3IWF range configuration (for editing or viewing).
- Enable or disable a range for the test configuration.

For example ...



You add and select N3IWF ranges from the N3IWF Ranges panel. When you select the name of a N3IWF, CoreSIM opens the **Range** panel, from which you can:

- Delete the N3IWF range from the test configuration.
- Designate the range as a **Device Under Test**.
- Modify the N3IWF range name.
- Configure the range and connectivity settings for the N3IWF range.

N3IWF range controls and settings

Each N3IWF range is identified by a unique name. You can add and delete N3IWF ranges as necessary to support your test objectives.

The following table describes the **Range Settings** that you configure for each N3IWF range.

Setting	Description
Range:	
Device Under Test	Enable this option if your N3IWF is a DUT in this test configuration. When this option is not enabled, the CoreSIM will simulate the N3IWF functionality (if it is selected in the Topology window).
	Select the **Delete Range** button to delete this range from your test configuration.
Range Settings:	
Node Settings	
Name	The name uniquely identifies each N3IWF instance. You can accept the value provided by CoreSIM or overwrite it with your own value.
Role	By default, the role is set to **Responder (Remote Access)** and cannot be changed.
PLMN MCC	The PLMN MCC for this N3IWF range. **About PLMN MCC ...** A Public Land Mobile Network (PLMN) is a telecommunications network that provides wireless communication services offered by a specific operator in a specific country. A PLMN is identified by a globally unique PLMN code, which consists of a MCC (Mobile Country Code) and MNC (Mobile Network Code). It is a five- to six-digit number identifying a country, and a mobile network operator in that country, usually represented in the form 001-01 or 001-001. The Mobile Country Code (MCC) is a three-digit code that uniquely identifies the country of domicile of the mobile subscriber.
PLMN MNC	The PLMN MNC for this N3IWF range. **About PLMN MNC ...** The Mobile Network Code (MNC) is a two-digit (North America) or three-digit (European Standard) code that is used in combination with a Mobile Country Code (MCC) to uniquely identify a mobile network operator. The MCC-MNC

Setting	Description
	tuple is stored within the first five or six digits of the IMSI (International Mobile Subscriber Identity), and is also used in combination with the MCC to identify a PLMN.
Tracking Area Code	Provide the Tracking Area Code (TAC) value
N3IWF ID	Set the value for this field.
N3IWF ID Increment	Set the increment value for this field.
SCTP Tx Buffer (bytes)	Set the size of SCTP Tx Buffer.
SCTP Rx Buffer (bytes)	Set the size of SCTP Rx Buffer.
UDP Rx Buffer (bytes)	Size of receive buffers for UDP sockets: • minimum: 212992 • maximum: 134217728 • default: 12582912
UDP Tx Buffer (bytes)	Size of transmit buffers for UDP sockets: • minimum: 212992 • maximum: 134217728 • default: 2097152
Traffic Profiles	*These settings are described in Traffic Profiles settings.*
NSSAI	*These settings are described in NSSAI settings.*
NWu Interface Settings	*These settings are described in N3IWF interface settings.*
N2 Interface Settings	*These settings are described in N3IWF interface settings.*
N3 Interface Settings	*These settings are described in N3IWF interface settings.*
Authentication	
Configure Certificates	By default, this option is disabled. When enabled, the following fields become available: *Certificates(.zip)* and *Use Same Certificate For All Instances*.
Certificates (.zip)	It allows you to upload an archive that contains the certificates for the N3IWF range, using the **Upload** button. To remove the archive , select the **Clear**

Setting	Description
	button.
Use Same Certificates For All Instances	By default, this option is disabled. Select the toggle button to enable it.
IKE Phase 1	
Encryption Algorithm	Select the encryption algorithm from the drop-down list. Default value: **AES-128-GCM-16**. Available options: **AES-128-CBC**, **AES-192-CBC**, **AES-256-CBC**, **AES-128-GCM-16**, **AES-192-GCM-16**, **AES-256-GCM-16**.
Hash Algorithm	Select the hash algorithm from the drop-down list. Default value: **NONE**. Available options: **NONE**, **HMAC-MD5-96**, **HMAC-SHA1-96**, **HMAC-MD5-128**, **HMAC-SHA1-160**, **HMAC-SHA2-256-128**, **HMAC-SHA2-384-192**, **HMAC-SHA2-512-256**. Restrictions: • When *Encryption Algorithm* is set to one of **AES-128-GCM-16**, **AES-192-GCM-16** or **AES-256-GCM-16**, the only available *Hash Algorithm* is **NONE**. • If **Encryption Algorithm** is set to a value other than one of **AES-128-GCM-16**, **AES-192-GCM-16** or **AES-256-GCM-16**, the **NONE** hash algorithm is not available.
DH Group	Select an option from the drop-down list. Available options are: **modp768(1)**, **modp1024(2)**, **modp1536(5)**, **modp2048(14)**, **modp3072(15)**, **modp4096(16)**, **modp6144(17)**, **modp8192(18)**, **prime256v1(19)**, **secp384r1(20)**, **secp521r1(21)**, **prime192v1(25)**, **secp224r1(26)**, **x25519(31)**, **x448(32)**. Default value: **prime256v1(19)**.
PRF Algorithm	Select an option from the drop-down list. Default value: **HMAC-SHA256**. Available options: **HMAC-MD5**, **HMAC-SHA1**, **HMAC-SHA256**, **HMAC-SHA384**, **HMAC-SHA512**.
IKE Phase 2	
Encryption Algorithm	Select the encryption algorithm from the drop-down list. Default value: **AES-128-GCM-16**. Available options: **AES-128-CBC**, **AES-192-CBC**, **AES-256-CBC**, **AES-128-GCM-16**, **AES-192-GCM-16**, **AES-256-GCM-16**.
Hash Algorithm	Select the hash algorithm from the drop-down list. Default value: **NONE**. Available options: **NONE**, **HMAC-MD5-96**, **HMAC-SHA1-96**, **HMAC-MD5-128**, **HMAC-SHA1-160**, **HMAC-SHA2-256-128**,

Setting	Description
	HMAC-SHA2-384-192, **HMAC-SHA2-512-256**. Restrictions: • When *Encryption Algorithm* is set to one of **AES-128-GCM-16**, **AES-192-GCM-16** or **AES-256-GCM-16**, the only available *Hash Algorithm* is **NONE**. • If **Encryption Algorithm** is set to a value other than one of **AES-128-GCM-16**, **AES-192-GCM-16** or **AES-256-GCM-16**, the **NONE** hash algorithm is not available.
Identification	
Local Identification Type	Select an option from the drop-down list. Default value: **ID_DER_ASN1_DN**. Available options: **ID_IPV4_ADDR**, **ID_FQDN**, **ID_USER_FQDN**, **ID_IPV6_ADDR**, **ID_DER_ASN1_DN**, **ID_KEY_ID**.
Local Identification Value	Set the value for this parameter. This field is mandatory if the *Local Identification Type* is set to: **ID_FQDN**, **ID_KEY_ID** or **ID_RFC822_ADDR**.
Timers	
Enable Rekey	By default, this option is disabled. Select the toggle button to enable it.
IKE Phase 1 (IKE) Lifetime (s)	Set a value for this parameter. Default value: **0** (disabled).
IKE Phase 1 (IKE) Lifetime (s)	Set a value for this parameter. Default value: **0** (disabled).
DPD Interval (s)	Set a value for this parameter. Default value: **0** (disabled).

Traffic Profiles

The following table describes the configuration settings that are required for Control Plane.

NOTE Only one Control Plane Profile is accepted.

Setting	Description
TCP Port	The TCP port for N3IWF: • default value: **20000**. • minimum value: **1024**.

Setting	Description
	• maximum value: **65535**.
IP Type	Select the IP type from the drop-down list: **IPv4** (default) or **IPv6**.
Local Protected Subnet IP Address	The IP address for N3IWF TCP server. Default value: **150.0.2.1**.
Local Protected Subnet IP Prefix Length	The only accepted options are **32** for IPv4 and **128** for IPv6.
Remote Inner IP Address	Per UE IP Address used for TCP Control Plane connection. Address increment is 1. Default value: **150.0.100.1**.

The following table describes the configuration settings that are required for User Plane.

NOTE A maximum of 15 User Plane Profile can be configured.

Setting	Description
	Select the Add User Plane button to add a new profile to your test configuration.
	Select the Delete User Plane button to delete this profile from your test configuration.
DNN	Select the DNN value for the drop-down list.
IP Type	Select the IP type from the drop-down list: **IPv4** (default) or **IPv6**.
Local Protected Subnet IP Address	The IP address for N3IWF GRE endpoint. Default value: **150.1.2.1**.
Local Protected Subnet IP Prefix Length	The only accepted options are **32** for IPv4 and **128** for IPv6.
Remote Inner IP Address	Per PDU Session IP Address used for GRE User Plane connection. Address increment is 1. Default value: **150.1.100.1**.

NSSAI

The following table describes the configuration settings that are required for NSSAI.

Setting	Description
NSSAI:	

Setting	Description
+	Select the Add NSSAI button to add a new NSSAI to your test configuration.
NSSAI settings:	
	Select the Delete NSSAI button to delete this NSSAI from your test configuration.
SST	The value that identifies the SST (Slice/Service Type) for this NSSAI. SST comprises octet 3 in the NSSAI information element. The standardized SST values are: **SST** / **Value** / **Suitable for handling:** eMBB / 1 / 5G enhanced Mobile Broadband URLCC / 2 / ultra-reliable low-latency communications MIoT / 3 / massive IoT
SD	The Slice Differentiator (SD) value for this S-NSSAI. SD is an optional information that differentiates amongst multiple Network Slices of the same Slice/Service type. The SD field comprises octets 4 through 6 in the NSSAI.

N3IWF interface settings

NWu interface settings

The following settings enable connectivity and service interaction.

Interface Settings	Description
Source Port	Set the source port number.
Enable NAT-T	Select to enable the NAT Traversal keepalive.

Connectivity Settings	Description
IP	*Select the IP address to open the IP configuration panel for editing.*
IP Address	The IP address in your test network to use for traffic on this interface.
IP Prefix Length	The IP address prefix assigned to this range. It specifies the number of leftmost bits in the address, which indicates the network portion of the address.
Gateway Address	The IP address assigned as gateway address.
Gateway Increment	The value to use when incrementing the Gateway address (starting with the Gateway Address).

Connectivity Settings	Description
Additional Routes	*The additional routes will use the gateway defined in the IP information below.*
	Select this button to add a new additional route to your test configuration, if needed.
	Select this button to remove the additional route to your test configuration.
IP Address	The IP address from your test network to use for traffic on this interface.
IP Prefix Length	The IP address prefix assigned to this range. It specifies the number of leftmost bits in the address, which indicates the network portion of the address.
MAC	*Select the MAC address to open the MAC configuration panel for editing.*
MAC Address	Hardware MAC address.
MAC Increment	The value to use when incrementing the MAC address (starting with the *MAC Address*). The default value is 000000000001.
Outer VLAN	*Select the check-box to make this option available, and, then, select the Outer VLAN to open the configuration panel for editing.*
VLAN ID	VLAN identifier.
VLAN TPID	VLAN tag protocol ID.
Inner VLAN	IMPORTANT *This option is visible only when the Outer VLAN check-box is selected.* *Select the check-box to make this option available, and, then, select the Inner VLAN to open the configuration panel for editing.*
VLAN ID	VLAN identifier.
VLAN TPID	VLAN tag protocol ID.

N2 interface settings

The following settings enable connectivity and service interaction.

Interface Settings	Description
Peer AMF	The IP address of the AMF node connected over the N2 interface.
Destination port	The destination Stream Control Transmission Protocol (SCTP) port for control plane messages (NG-AP signaling messages) on the N2 interface.

Interface Settings	Description
SCTP source port	The source SCTP port for control plane messages (NG-AP signaling messages). Each SCTP endpoint provides the other endpoint with a list of transport addresses through which that endpoint can be reached and from which it will originate SCTP packets. These transport addresses are composed of multiple IP addresses in combination with an SCTP port. The default port number is 36412, but you can change it.
Connection Timeout (ms)	Set the connection timeout value.
SCTP Parameters	
Avoid Bundling of Data Chunks	Select this option to enable it. It turns on/off any Nagle-like algorithm. This means that packets are generally sent as soon as possible and no unnecessary delays are introduced, at the cost of more packets in the network.
Minimum Retransmission Timeout (ms)	Set the minimum retransmission timeout value, in milliseconds.
Maximum Retransmission Timeout (ms)	Set the maximum retransmission timeout value, in milliseconds.
Initial Retransmission Timeout (ms)	Set the initial retransmission timeout value, in milliseconds.
Maximum Retransmission per Association	Set the maximum retransmissions value per association.
Maximum Retransmission per Path	Set the maximum retransmissions value per path.
Heartbeat Interval (ms)	Set the heartbeat interval value, in milliseconds.
SACK Delay (ms)	Set the delayed selective ACK timeout value.
SACK Frequency	Set the delayed selective ACK frequency value.

Connectivity Settings	Description
IP	*Select the IP address to open the IP configuration panel for editing.*

Connectivity Settings	Description
IP Address	The IP address in your test network to use for traffic on this interface.
IP Prefix Length	The IP address prefix assigned to this range. It specifies the number of leftmost bits in the address, which indicates the network portion of the address.
Gateway Address	The IP address assigned as gateway address.
Gateway Increment	The value to use when incrementing the Gateway address (starting with the Gateway Address).
Emulated Router Address	Set the IPv4 or IPv6 address for the emulated router. This allows to hide all messages from the interface behind a MAC address. NOTE This option can be used only with IxStack stack.
Emulated Router Address Prefix Length	Set the IP network mask for the emulated router.
MTU	The Maximum Transmission Unit (MTU) for this range. MTU specifies the largest packet that an Ethernet frame can carry.
MSS	The Maximum Segment Size (MSS) for this range. MSS specifies the largest TCP segment that the IP device can transmit as a single, unfragmented unit.
Additional Routes	*The additional routes will use the gateway defined in the IP information below.*
+	Select this button to add a new additional route to your test configuration, if needed.
🗑	Select this button to remove the additional route to your test configuration.
IP Address	The IP address from your test network to use for traffic on this interface.
IP Prefix Length	The IP address prefix assigned to this range. It specifies the number of leftmost bits in the address, which indicates the network portion of the address.
MAC	*Select the MAC address to open the MAC configuration panel for editing.*
MAC Address	Hardware MAC address.
MAC Increment	The value to use when incrementing the MAC address (starting with the *MAC Address*). The default value is 000000000001.
Outer VLAN	*Select the check-box to make this option available, and, then, select the*

Connectivity Settings	Description
	Outer VLAN to open the configuration panel for editing.
VLAN ID	VLAN identifier.
VLAN TPID	VLAN tag protocol ID.
Inner VLAN	IMPORTANT *This option is visible only when the Outer VLAN check-box is selected.* *Select the check-box to make this option available, and, then, select the Inner VLAN to open the configuration panel for editing.*
VLAN ID	VLAN identifier.
VLAN TPID	VLAN tag protocol ID.

N3 interface settings

The following **Connectivity Settings** enable connectivity and service interaction.

SEG Interface Settings	Description
IP	*Select the IP address to open the IP configuration panel for editing.*
IP Address	The IP address in your test network to use for traffic on this interface.
IP Prefix Length	The IP address prefix assigned to this range. It specifies the number of leftmost bits in the address, which indicates the network portion of the address.
Gateway Address	The IP address assigned as gateway address.
Gateway Increment	The value to use when incrementing the Gateway address (starting with the Gateway Address).
Additional Routes	*The additional routes will use the gateway defined in the IP information below.*
+	Select this button to add a new additional route to your test configuration, if needed.
🗑	Select this button to remove the additional route to your test configuration.
IP Address	The IP address from your test network to use for traffic on this interface.
IP Prefix Length	The IP address prefix assigned to this range. It specifies the number of leftmost bits in the address, which indicates the network portion of the address.

SEG Interface Settings	Description
MAC	*Select the MAC address to open the MAC configuration panel for editing.*
MAC Address	Hardware MAC address.
MAC Increment	The value to use when incrementing the MAC address (starting with the *MAC Address*). The default value is 000000000001.
Outer VLAN	*Select the check-box to make this option available, and, then, select the Outer VLAN to open the configuration panel for editing.*
VLAN ID	VLAN identifier.
VLAN TPID	VLAN tag protocol ID.
Inner VLAN	IMPORTANT *This option is visible only when the Outer VLAN check-box is selected.* *Select the check-box to make this option available, and, then, select the Inner VLAN to open the configuration panel for editing.*
VLAN ID	VLAN identifier.
VLAN TPID	VLAN tag protocol ID.

CHAPTER 7

Manage and use test sessions

When you create a new test, CoreSIM establishes a *test session* which remains available until such time as you decide to delete it (if ever). This way, you can access existing test configurations to change the settings and to view details, or to re-run a test session.

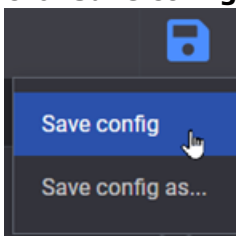
Chapter contents:

Save test sessions

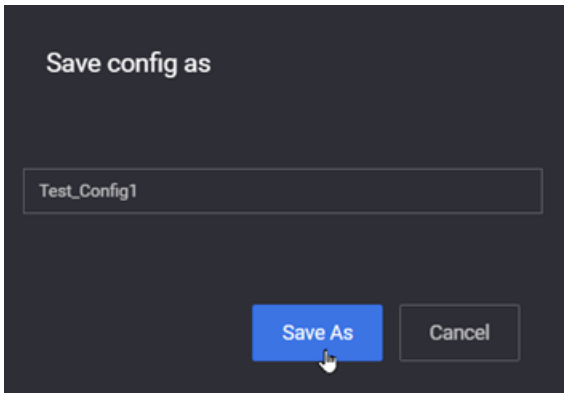
Once a test is configured, you can record its configuration as a session, edit and save it for future use.

To save a configuration file, do the following:

1. Click the **Save** icon from the upper-right corner of the **Test Overview** page.
2. Click **Save config** to quickly save your test configuration.

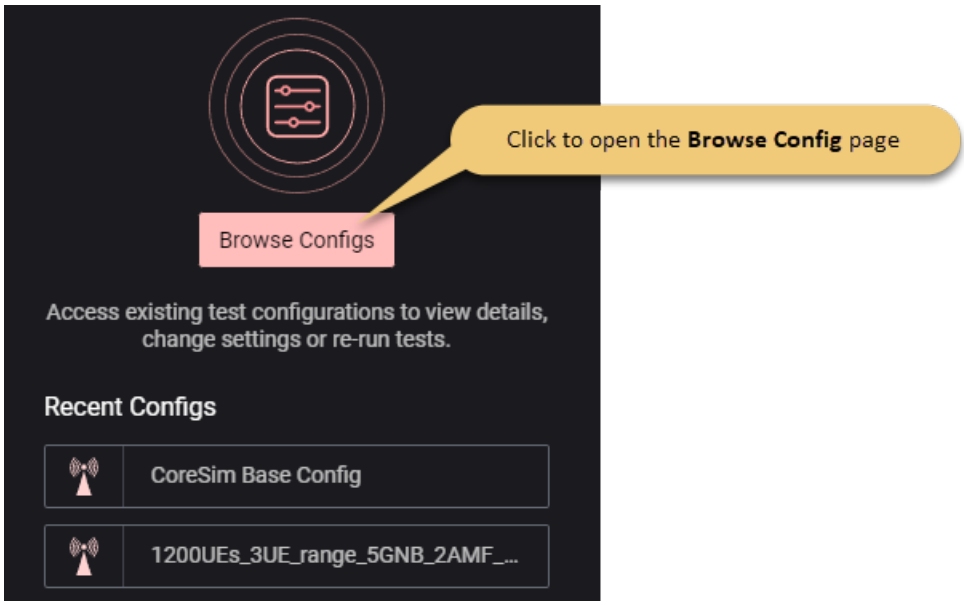


3. Click **Save config as** to save your test configuration with a specific name.
4. Provide the name for the test configuration in the **Save config as** window and click the **Save as** button.



Manage test sessions

Managing saved tests is done on the **Browse Configs** page. To access the page, click the **Browse Configs** button from the main CoreSIMDashboard.



The **Recent Configs** list contains default configurations plus previously loaded configurations. If you select one of the configurations (by clicking it) a new session is created with this configuration loaded inside of it.

NOTE If the selected configuration is already opened in an existing session, a message is displayed allowing you to open that session or to create a new session based on the selected test configuration.

The **Browse Configs** page is split into two main sections, each one having a specific role in handling your tests configurations:

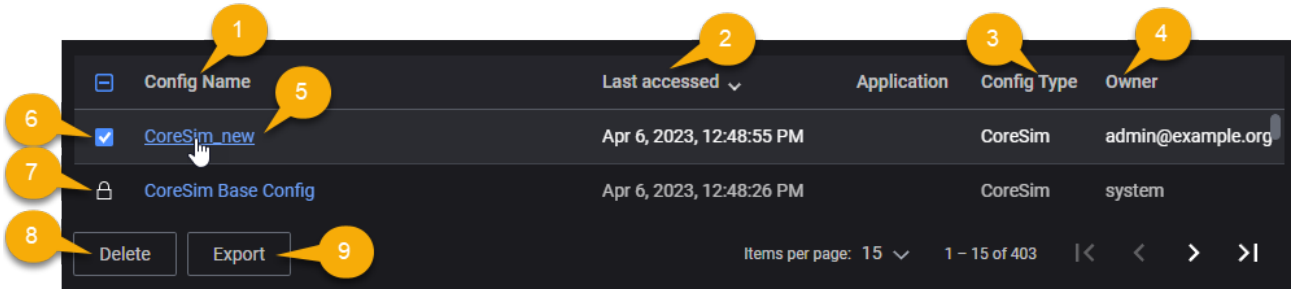
- View configuration categories on the facing page
- Manage configurations on the facing page

View configuration categories

The **Config Categories** area allows you to switch between displaying your recent test configurations or displaying them based on their category.

Manage configurations

On this section,CoreSIM displays your test configurations suite, offering you details on the specific test configuration and allowing you search for a specific configuration, delete it or to export it.



1	Details on the test name.
2	Timestamp of the last test session.
3	Indicates the test type.
4	Indicates the test owner.
5	Click the name link. You can open the current session from here or can create a new session based on this configuration.
6	Use to select a test configuration.
7	Indicates a base configuration NOTE For the base configurations, the test owner is *system*.
8	Click the button to delete the test configuration.
9	Click the button to export the test configuration.

Import and export sessions

You can import and export test configurations by clicking the **Import** or **Export all** buttons which are found on the **Config Categories** area of the **Browse Configs** page.

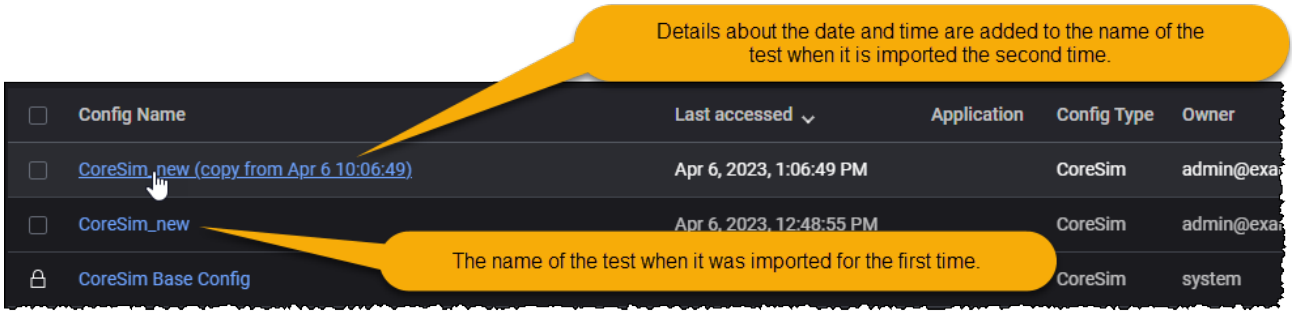
If you want to export only a specific configuration, select it from the configuration list and select Export.

Import test configurations

To import a saved test configuration from disk, do the following:

1. From the **Dashboard** page, click the **Browse Configs** button. The **Browse Configs** page appears.
2. From the **Test Categories** section, click the **Import** button.
3. Select the test configuration you want to import from the ones available at your download location.
4. Click **Open** to add the test configuration to the dashboard.

If a test is imported twice with the same name, the second time the test name will be displayed with details about the date and time of the import.



NOTE By default, when you import a new test, the displayed name is the name you have in the JSON file under `displayName` - in this case, the `displayName` is CoreSIM Standalone Base Config. The second time it is imported, the test name is concatenated with *Imported* `<date>` `<time>`.

Export a saved test configuration

To export a saved configuration, do the following:

1. From the **Dashboard** page, click the **Browse Configs** button. The **Browse Configs** page appears.
2. From the **Test Categories** section, select the category containing the test to be downloaded.
3. Select the test configuration you want to download and click the **Export** button. When in tile view mode, click the **Download** button from the test tile.
4. Specify the download file name and select the download location.
5. Click **OK** to download the test configuration.

   NOTE The configuration file is exported as a JSON file.

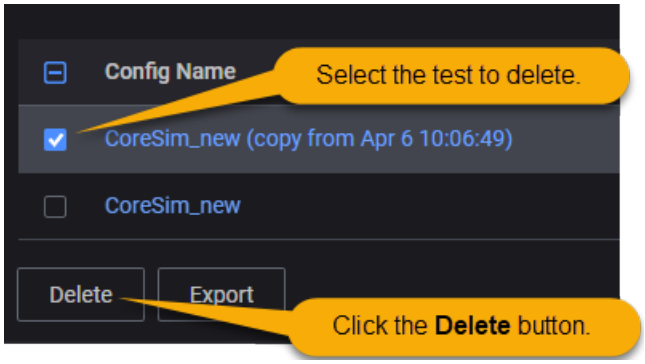
Delete configs and sessions

The terms *test config* and *test session* are not entirely synonymous. A "config" refers to a configuration definition file (JSON format), whereas a "session" is an instance of that file that is loaded in memory and is capable of being run.

How to delete a CoreSIM config

To delete a saved configuration from the **Browse Configs** page, do the following:

1. From the **Dashboard** page, click the **Browse Configs** button. The **Browse Configs** page appears.
2. From the **Test Categories** section, select the category containing the test to be deleted.
3. Select the test configuration you want to delete and click the **Delete** button.



   This will delete the configuration from the database, but not the session itself.

Important notes

Before deleting a session, be aware of the following application behaviors:

- The session will be permanently removed and cannot be recovered.
- However, when you delete a session, the session's config is not deleted. Therefore, you can create new sessions based on that config.
- If you have a session open, and you delete the config upon which the session is based, the session is not deleted. Therefore, you can open the session and save a new config from it.

How to delete a Keysight Open RAN Simulators, Cloud Edition 5.2 session

You can also delete a test session from the Dashboard:

1. Go to the **Dashboard**.
2. Locate the tile for the session that you plan to delete, then click the **X** in the upper right corner. CoreSIM opens a confirmation dialog.

3. Select **Delete** to confirm the action.

CHAPTER 8

Manage CoreSIM licenses

CoreSIM is a licensed product. You can manage licenses using either the integrated CoreSIM License Manager or a centralized License server that is managed by your organization.

Chapter contents:

Licensing Requirements

The license server is shipped as a separate `.ova` file.

After deploying the `.ova`, you will have access to a web interface for the license server (for example: `https://10.38.156.169`) .

You can:

- activate licenses by selecting the **Activate** button,
- sync licenses,
- generating a license request bin file by selecting **Offline Operations** and then **Generate Request**,
- import offline licenses by selecting **Offline Operations** and then **Import Licenses**,
- check the license statistics,
- deactivate Licenses by selecting the **Deactivate** button.

After activation, the licenses and features will be available in the CoreSIM web UI.

License Manager

The first time you use CoreSIM, you need to active at least one license. You activate and manage your licenses using the CoreSIM **License Manager** functions, which are accessed from the setup menu.

- How to open License Manager on the next page
- Activate a license on the next page
- Deactivate a license on the next page
- Sync licenses on the next page
- Reserve a license on the next page
- Get license statistics on page 289
- Perform offline license operations on page 289

How to open License Manager

To access the CoreSIM License Manager:

1. Select **Administration** from the setup menu ( ).
2. Select **License Manager** (from the **Adminstration** menu).

Activate a license

To activate one or more CoreSIM licenses:

1. Select **Administration** from the setup menu ( ), then select **License Manager**.
2. Select **Activate licenses**.
   CoreSIM opens the **Activate Licenses** dialog.
3. Enter your license data in the dialog box.
   You can use either activation codes or entitlement codes (one or more).
4. Select **Load Data**, indicate the number of licenses you want to activate, then click **Activate**.

Your new licenses—which should now be listed in the License Manager page—are now available for running tests.

Deactivate a license

To deactivate one or more CoreSIM licenses:

1. Select **Administration** from the setup menu ( ), then select **License Manager**.
2. Select **Deactivate licenses**, then and indicate a new quantity for each of the existing licenses.
3. Select **Perform the Activation** to complete the task.

NOTE It is recommended to deactivate the license before deleting a CoreSIM VM. This way you can easily reuse the same license (Activation Code) when deploying another CoreSIM VM.

Sync licenses

To synchronize one or more CoreSIM licenses:

1. Select **Administration** from the setup menu ( ), then select **License Manager**.
2. Select **Sync licenses**.

Reserve a license

To reserve one or more CoreSIM licenses:

1. Select **Administration** from the setup menu ( ), then select **License Manager**.
2. Select the **Manage Reservation** icon.
   CoreSIMopens a new window.
3. Select the license you wish to reserve.
4. Enter the number of desired licenses in **New Reserved Count** field.
5. Enter the duration of the reservation (in hours) in the **Duration to Reserve** field.

NOTE The License Statistics display shows all reserved features, ordered by count and reserved time. The initial reserved count and duration is overwritten when a new reservation is performed.

Get license statistics

To activate one or more CoreSIM licenses:

1. Select **Administration** from the setup menu (⚙), then select **License Manager**.
2. Select **License statistics**.

Perform offline license operations

Offline license management is required for cases in which your test network is operating in an isolated environment with no Internet access. To perform offline CoreSIM license operations:

1. Select **Administration** from the setup menu (⚙), then select **License Manager**.
2. Select **Offline operations**.
   CoreSIM opens the **Keysight Licensing Offline Operations** dialog.
3. Click **Generate request**.
4. Using a system that has Internet connectivity, access the KSM Offline Operations Page, and follow the steps provided for the desired operation.
5. From your offline system, return to the **Keysight Licensing Offline Operations** dialog, then click **Import license**.
6. Click **Finish** to complete the task.

License Server

Rather than using the internal CoreSIM License Manager, you can use a centralized License server that is managed by your organization.

Add a License Server

To add a license server in the CoreSIM web UI:

1. Log in the CoreSIM web UI.
2. Under the Settings Menu (⚙), select License Servers.
   The dialog shows the license server currently used.
   NOTE To see the list of installed licenses, you need to access the license server in a web browser: https://<license-Server-IP>
3. Enter the license server IP address in the empty license server field, then select the Add button (**+**) next to the field.
4. Select **CLOSE** to confirm your action and close the License server dialog.

Remove a License Server

To remove a license server that was previously added in the CoreSIM web UI:

1. Log in the CoreSIM web UI.
2. Under the Settings menu (⚙), select License servers.
   The license servers dialog opens. listing the previously-set license servers.
3. Select the **Delete** button next to the license server that you want to remove.
4. Select **CLOSE** to confirm your action and close the License server dialog.

Activate a license

To activate one or more CoreSIM licenses:

1. From the Setting menu (⚙), select **Application Settings**.
   CoreSIM opens the **Applications Settings** dialog.
2. Select a **License Provider** from the drop-down list.
3. Enter the IP address in the **License Server IP** field.
4. Click **Update**.

CHAPTER 9

Manage CoreSIM users

Managing the users who can access the application is one of the primary CoreSIM administrative requirements.

User categories

CoreSIM user accounts can be of one of the following types:

- Administrative user: Can access the Access Control functions and perform various administrative tasks, including the definition and management of other user accounts.
- Regular user: Can access the application and use all of the resources involved in test creation, execution, and analysis.

Creating users

Each user who requires access to the CoreSIM application must have a user account. To add a user:

1. Select the settings menu (⚙) and then select **Administration**.
2. Select **Access Control** from the **Administration** menu.
   CoreSIM opens the **Keycloak Admin Console** in a new browser tab.
3. Select **Users** from the list of **Manage** functions (in the navigation pane).
4. Select the **Add user** button.
5. Enter the required information in the **Add user** form, then select the **Save** button.
   The following values are required for the new user:
   - Username (which must be unique within the realm).
   - Email address
   - First and Last Name
   - *User Enabled* set to **ON**.
6. Select the **Save** button.
   CoreSIM adds the user and displays that user's information in the **Details** tab.
7. Set the initial password for the user:
   a. Select the **Credentials** tab.
   b. Enter the *Password*.
   c. Re-enter the password in the *Password Confirmation* field.
   d. Set *Temporary***ON** if the user will be required to change the password upon initial log in.
   e. Select the **Set Password** button.

CoreSIM displays a confirmation dialog.

f. Select the **Set Password** button to confirm the action.

Reset a user's password

Administrative users can reset a user's password:

1. Select the settings menu (⚙) and then select **Administration**.
2. Select **Access Control** from the **Administration** menu.
   CoreSIM opens the **Realm Settings** window.
3. Select **Users** from the list of **Manage** functions.
4. Select the user.
5. Select the **Credentials** tab.
6. Enter the new *Password*.
7. Re-enter the new password in the *Password Confirmation* field.
8. Set *Temporary***ON** if the user will be required to change the password upon initial log in.
9. Select the **Reset Password** button.
   CoreSIM displays a confirmation dialog.
10. Select the **Reset Password** button to confirm the action.

Disable a user account

Administrative users can temporarily disable a user's account:

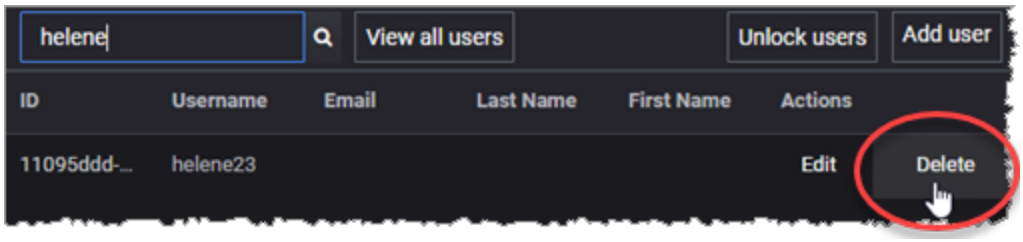
1. Select the settings menu (⚙) and then select **Administration**.
2. Select **Access Control** from the **Administration** menu.
   CoreSIM opens the **Realm Settings** window.
3. Select **Users** from the list of **Manage** functions.
4. Select the user.
5. Set *User Enabled* to **OFF**.

This user account will not be able to log in until the account access is set to **ON**.

Delete a user account

Administrative users can reset a user's password:

1. Select the settings menu (⚙) and then select **Administration**.
2. Select **Access Control** from the **Administration** menu.
   CoreSIM opens the **Realm Settings** window.
3. Select **Users** from the list of **Manage** functions.
4. View all users or search for the Username of the account that you will delete.
5. Click **Delete**.



6. CoreSIM opens a confirmation dialog.
7. Select **Delete** to confirm that you are permanently deleting this user account.

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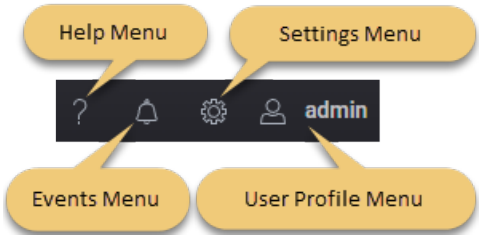
CHAPTER 10

CoreSIM general settings

The **Settings** menu can be accessed by selecting the gear icon (⚙) on the top right corner of the **Dashboard** page.



It contains the following menus:

- Help
- Events
- Settings
- User Profile

Help Menu

The ***Help Menu*** can be accessed by selecting the question mark icon on the top right corner of the Dashboard page. Here you can do the following actions:

- Access **Help** where you can find info about the official CoreSIM documentation and access the Rest API Browser.
- Access **Technical Support** section, where you can do the following:
  - **Contact Keysight**
  - **Collect diagnostics** - for more details refer to Collect Diagnostics.
  - **EULA** - select this option to revisit and accept Keysight Software End User License agreement.
  - Access **My software support...** for official Keysight support.
  - **About** - this option displays details regarding the running software version.

Events Menu

The ***Events Menu*** can be accessed by selecting the bell icon on the top right corner of the Dashboard page. You can view notifications and test events.

Settings Menu

The ***Settings Menu*** can be accessed by selecting the wheel icon on the top right corner of the Dashboard page. Here you can do the following actions:

- **License Manager** - select this option to open the License Manager section.
- **Agent Management** - select this option to open the Traffic agents management section.

- **Software Updates** - select this option to open the Software Updates section. To update to a newer version, do the following:
  - Open the **Settings** menu (⚙) and click on **Software Updates**.
  - Click **Select Packages For Upload** and open the folder containing the upgrade file.
  - Select the upgrade file and click **Open**.
  - Click **Start Update** to initiate the update process.
  - If needed, you can remove the update packages from the update section by clicking **Reset Current Changes**.
- **Application settings** - select this option set or update the license server IP. For more details, refer to Configure License Server.
- **Logs Level** - select this option to collect logs info. For more details, refer to Collect Diagnostics, Cleanup and Data Migration.
- **Data migration** - select this option to open the data migration tool. For more details, refer to Collect Diagnostics, Cleanup and Data Migration.
- **System Monitor** - select this option to open the system tool. For more details, refer to Collect Diagnostics, Cleanup and Data Migration.
- **User Management** - select this option to open the Access Control section. This section handles server administration security configuration and also all the users settings. For more information on the Access Control options and configuration, refer to the official Keycloak documentation.

User Profile

The ***User Profile Menu*** can be accessed by selecting the user icon on the top right corner of the Dashboard page. Here you can:

- Access and review your user profile.
- Change CoreSIM Dashboard theme.
- **Log Out** - select this option to log out of CoreSIM.

CHAPTER 10

Statistics

The **Statistics** page has several panels, which can be dragged and dropped and rearranged on the dashboard. They can also duplicated or removed, and there are a wide variety of formatting options for each panel.

NOTE

CoreSIM presents a default statistics dashboard, which is based on Grafana. You can change the dashboard to accommodate your own needs and select from many Key Performance Indicators (KPIs) that the agent exposes towards the middleware.

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CHAPTER 11

Troubleshooting

CoreSIM provides a number of tools and methods to help you evaluate, troubleshoot, and correct problems that may arise during test development and execution.

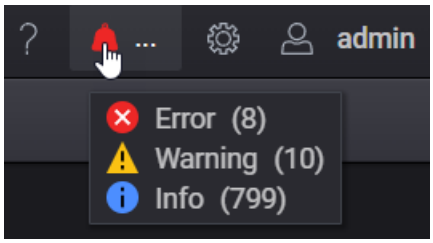
The main debugging tools that CoreSIM provides are notification and event management, messages displayed during test execution, test diagnostics data, and log files.

Chapter contents:

View Notifications and Test Events

The navigation bar displays a notifications icon and a counter showing the total number of triggered notifications since the counter was last reset for the current CoreSIM instance. The icon and the counter are visible from all the pages of the CoreSIM web UI. The notification icon ( ) indicates in real-time the number of registered events.

When a notification is triggered, a color-coded banner is displayed when you hover over the notification icon:

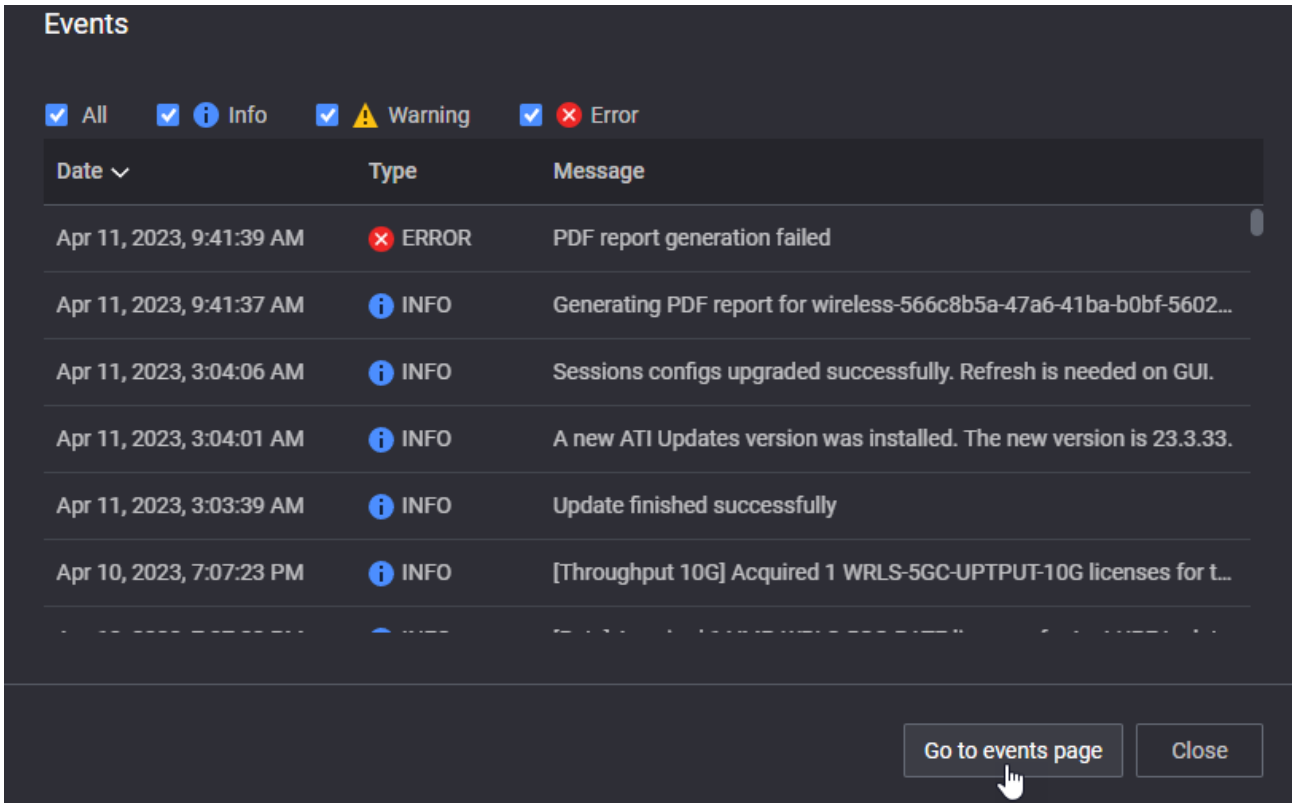


- **Blue**- for informational messages
- **Orange** - for messages informing you of actions you are not allowed to perform
- **Red** - for error messages

Types of events:

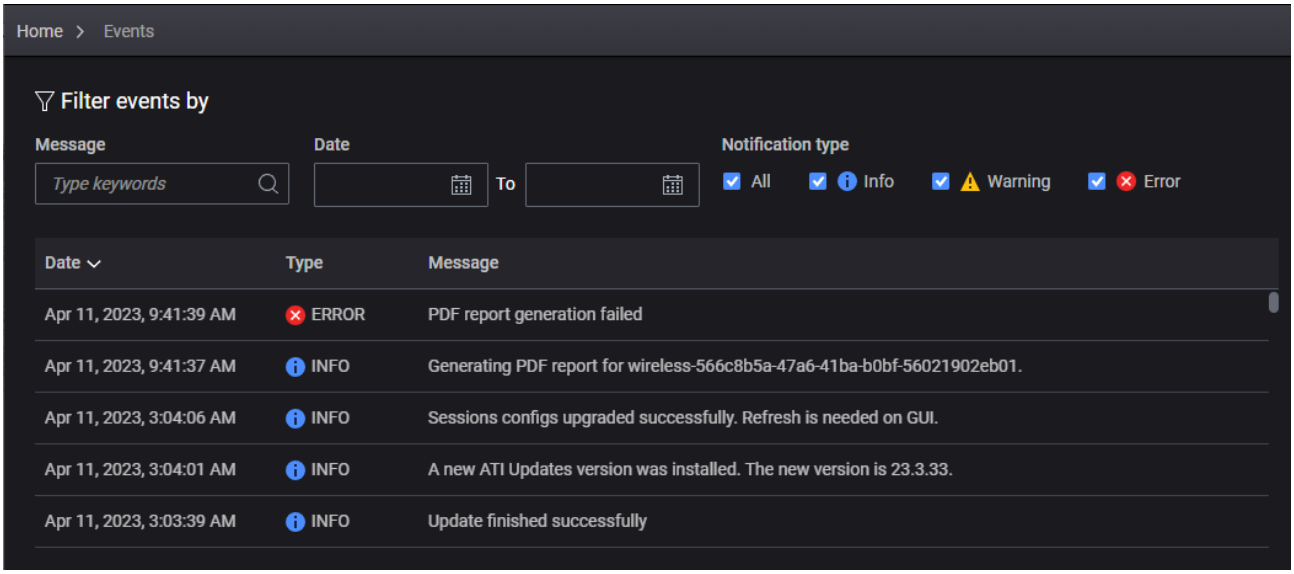
- **ERROR** - An *error* notification indicates that an error has occurred that impacts application stability. The application is possibly in an unstable or indeterminate state, and the should either be restarted or should carry out error recovery or re-initialization routines.
- **INFO** - An *info* notification indicates a general-purpose notification, such as logging data or a heartbeat indicator.
- **WARNING** - A *warning* notification indicates an error has occurred that potentially impacts application stability.

To view more details on the triggered events, select the notifications icon. The **Events** window is displayed.



Here you can view details on the registered events regarding the logging date, their severity type and description. You can choose to display all events or certain types of events, based on their severity, by selecting or clearing the associated check-box.

To view the events page, click the **Go to Events Page** button. Here you can search for events based on the available filtering criteria, like date, message, or event type.



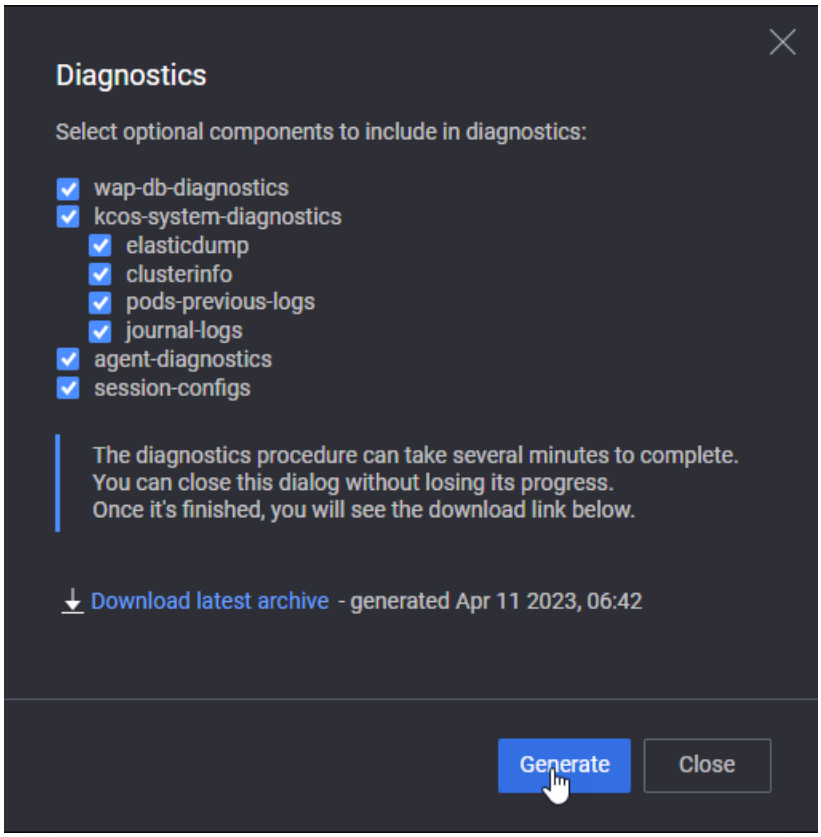
Collect Diagnostics, Cleanup and Data Migration

Collect Diagnostics

CoreSIM diagnostics tool is used to collect debug logs and other information needed in troubleshooting any encountered issues.

To collect diagnostics, do the following:

1. Select the Help menu (question mark icon)> **Collect Diagnostics**. The Diagnostics window appears.



2. If needed, select the optional components to include in the diagnostics report.
3. Select **Generate**. The diagnostics procedure can take several minutes to complete. Once it is finished, a download link will be displayed.
4. Select the download link in order to retrieve the diagnostics report.

Collect Logs

To collect logs info, do the following:

1. Click on **Logs Level** in the **Settings** menu. The Controller Logs Level window appears.
2. Select the log level used to collect diagnostics. Available options are:
   - **ERROR**- Designates messages indicating that an error has occurred that impacts application stability.
   - **WARN** - Designates messages indicating that an error has occurred that potentially impacts application stability.
   - **INFO** - Designates informational messages that highlight the progress of the application at coarse-grained level.
   - **DEBUG** - Designates fine-grained informational events that are most useful for debugging the application.
4. Click **Generate**. The diagnostics procedure can take several minutes to complete. Once it is finished, a download link will be displayed.
5. Select the download link in order to retrieve the diagnostics report.

System Monitor

CoreSIM system monitor tool is used to check the controller health and review the used resources and their availability. Also, it allows to perform a system cleanup:

1. Click on **System Monitor** in the **Settings** menu.
2. Select the required option:
   - **Controller Health** - this will open the Controller Health dashboard, where the available controller resources are displayed.
   - **System Cleanup** - this will open the System Cleanup window where the size of the following items are displayed: **Logs size**, **Diagnostics size**, **Migration size**. Use the **Delete** button to delete the archives.

Data Migration

CoreSIM data migration tool allows you to migrate controller data from one setup to another. You can export authentication data and other data (such as configurations, external license servers, controller proxies, and results) from a source controller, which you can then import to a new target controller. When the import procedure is complete, the resources that you imported from the source controller will have replaced all the existing data on the target controller.

IMPORTANT The export procedure cannot run when the available controller disk space is lower than 50%. To free up disk space by removing diagnostics, logs, or migration archives, use the **System cleanup** option under the **Settings** menu > **System Monitor**.

To export data from the source controller:

1. From the **Settings** menu, select **Data Migration** > **Export Controller**. The **Export Controller Data** window opens informing you of the components to be exported.
2. Click the **Start** button. A notification at the bottom of the screen informs you that the migration package is being queued in preparation for export, and the **Export Controller Data** will automatically close.

   When all the export resources are collected and available on your local system, a notification informs you that the export package was created.

   The export package is downloaded on your local system in the form of a compressed .zip file, under your usual downloads location (for example, *C:\Users\<user name>\Downloads\migrate_package1676028828*)

To import data on the target controller:

1. From the **Settings** menu, select **Data Migration** > **Import Controller**.

   The **Import Controller Data** window opens.
2. Click **Select migrate package for upload**, and select the migration package that you exported from the source controller, and click **Open**.

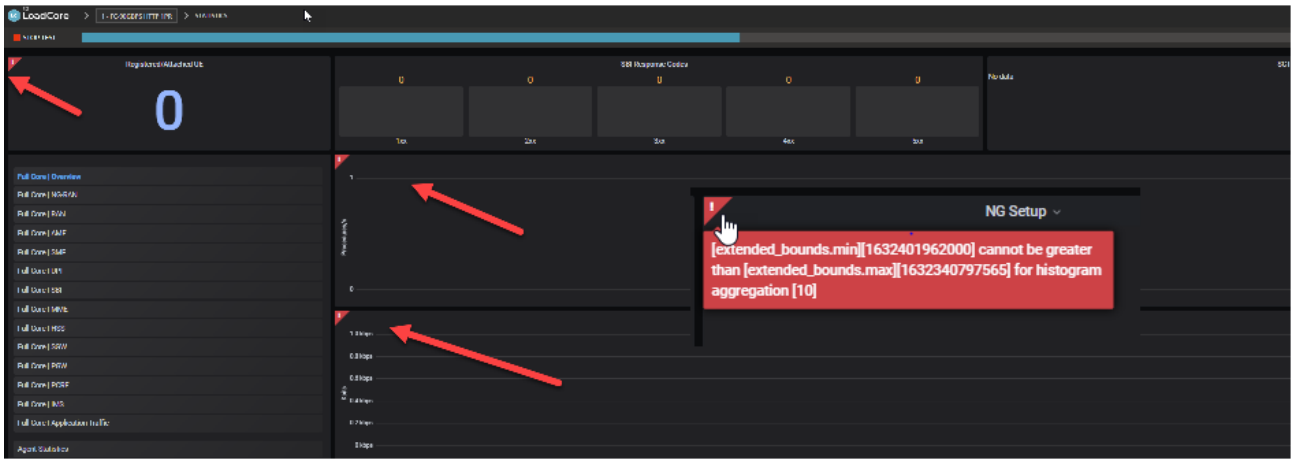
   A warning is displayed informing you that the import procedure cannot be canceled or reverted after it is initiated.
3. Confirm acknowledgment of data loss by selecting the **I understand this will wipe existing data** check box.
4. Click the **Start** button.

The import procedure initiates. The application screen is grayed out during import and will become active again when the import procedure is complete.

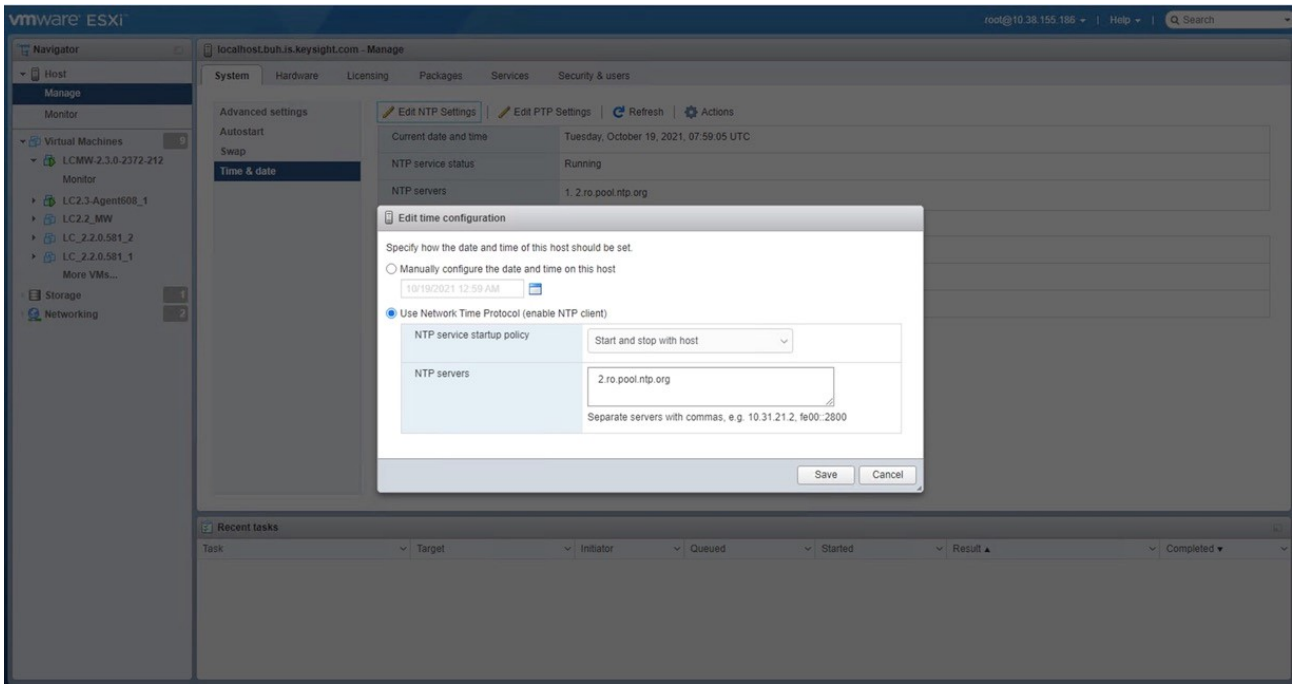
5. After the import procedure is finished, close the **Import Controller Data** window.
6. Log out of the web UI, and log in again to see the newly imported controller data.

NTP troubleshooting

If you are experiencing issues with UI statistics appearing delayed or not showing at all, the cause might be related to NTP.



If you are using ESX make sure the NTP server is set:



To check if the time is in sync on the middleware and agents, you can run the following commands:

- on agents:
  ```
  date
  ntpq -p
  sudo systemctl status ntp
  ```
- on middleware:
  ```
  date
  kcos date-time time-zone show
  kcos date-time ntp-servers show
  ```

You can also try to disable and enable NTP settings on the middleware:

```
kcos date-time ntp disable
```

```
kcos date-time ntp enable
```

The default NTP for CoreSim Middleware is `ntp.ubuntu.com`. If you are using a local or another NTP server it is best to change it with:

`kcos date-time ntp-servers set` (it should also be the same as the one set in ESX)

IMPORTANT Start the NTP service on the agents (usually done when `agent-setup.sh` is run) only after setting the clock/NTP server on the middleware. Setting the clock on the middleware after the btpservice started on the agents can lead to it panicking (agent side) on big adjustments on sync. Restarting ntp agent side (`sudo systemctl restart ntp`) should fix this.

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APPENDIX A

Predefined Applications

The following table describes the available Predefined Applications.

Application	Description
Adobe Reader Updates Chrome	This application simulates Adobe Reader Updates web application with the Google Chrome browser.
Adobe Reader Updates Firefox	This application simulates Adobe Reader Updates web application with the Google Firefox browser.
Adobe Reader Updates Internet Explorer	This application simulates Adobe Reader Updates web application with the Google Internet Explorer browser.
Adobe Reader Updates Microsoft Edge	This application simulates Adobe Reader Updates web application with the Google Microsoft Edge browser.
ADP Chrome	This application simulates ADP web application with the Chrome browser.
ADP Firefox	This application simulates ADP web application with the Firefox browser.
ADP Internet Explorer	This application simulates ADP web application with the Internet Explorer browser.
ADP Microsoft Edge	This application simulates ADP web application with the Microsoft Edge browser.
Airbnb Chrome	This application simulates Airbnb web application with the Google Chrome browser.
Airbnb Firefox	This application simulates Airbnb web application with the Mozilla Firefox browser.
Airbnb Internet Explorer	This application simulates Airbnb web application with the Internet Explorer browser.
Airbnb Microsoft Edge	This application simulates Airbnb web application with the Microsoft Edge browser.
appointy Chrome	This application simulates appointy web application with the Chrome browser.
appointy Firefox	This application simulates appointy web application with the Firefox browser.
appointy Internet Explorer	This application simulates appointy web application with the Internet Explorer browser.
appointy Microsoft	This application simulates appointy web application with the Microsoft Edge

Application	Description
Edge	browser.
AWS Console Chrome	This application simulates AWS Console web application with the Chrome browser.
AWS Console Firefox	This application simulates AWS Console web application with the Firefox browser.
AWS Console Internet Explorer	This application simulates AWS Console web application with the Internet Explorer browser.
AWS Console Microsoft Edge	This application simulates AWS Console web application with the Microsoft Edge browser.
AWS S3 Chrome	This application simulates AWS S3 web application with the Google Chrome browser.
AWS S3 Firefox	This application simulates AWS S3 web application with the Mozilla Firefox browser.
AWS S3 Internet Explorer	This application simulates AWS S3 web application with the Internet Explorer browser.
AWS S3 Microsoft Edge	This application simulates AWS S3 web application with the Microsoft Edge browser.
Baidu Chrome	This application simulates Baidu web application with the Chrome browser.
Baidu Firefox	This application simulates Baidu web application with the Firefox browser.
Baidu Internet Explorer	This application simulates Baidu web application with the Internet Explorer browser.
Baidu Maps Chrome	This application simulates Baidu Maps web application with the Google Chrome browser.
Baidu Maps Firefox	This application simulates Baidu Maps web application with the Mozilla Firefox browser.
Baidu Maps Internet Explorer	This application simulates Baidu Maps web application with the Internet Explorer browser.
Baidu Maps Microsoft Edge	This application simulates Baidu Maps web application with the Microsoft Edge browser.
Baidu Microsoft Edge	This application simulates Baidu web application with the Microsoft Edge browser.
Bilibili Chrome	This application simulates Bilibili web application with the Google Chrome browser.

Application	Description
Bilibili Firefox	This application simulates Bilibili web application with the Mozilla Firefox browser.
Bilibili Internet Explorer	This application simulates Bilibili web application with the Internet Explorer browser.
Bilibili Microsoft Edge	This application simulates Bilibili web application with the Microsoft Edge browser.
Cisco Spark Chrome	This application simulates Cisco Spark web application with the Chrome browser.
Cisco Spark Firefox	This application simulates Cisco Spark web application with the Firefox browser.
Cisco Spark Internet Explorer	This application simulates Cisco Spark web application with the Internet Explorer browser.
Cisco Spark Microsoft Edge	This application simulates Cisco Spark web application with the Microsoft Edge browser.
Commvault Chrome	This application simulates Commvault web application with the Google Chrome browser.
Commvault Firefox	This application simulates Commvault web application with the Mozilla Firefox browser.
Commvault Internet Explorer	This application simulates Commvault web application with the Internet Explorer browser.
Commvault Microsoft Edge	This application simulates Commvault web application with the Microsoft Edge browser.
Crawling Wikipedia (Chinese) Chrome	This application simulates Crawling Wikipedia (Chinese) web application with the Chrome browser.
Crawling Wikipedia (Chinese) Firefox	This application simulates Crawling Wikipedia (Chinese) web application with the Firefox browser
Crawling Wikipedia (Chinese) Internet Explorer	This application simulates Crawling Wikipedia (Chinese) web application with the Internet Explorer browser.
Crawling Wikipedia (Chinese) Microsoft Edge	This application simulates Crawling Wikipedia (Chinese) web application with the Microsoft Edge browser.

Application	Description
DocuSign Chrome	This application simulates DocuSign web application with the Google Chrome browser.
DocuSign Firefox	This application simulates DocuSign web application with the Mozilla Firefox browser.
DocuSign Internet Explorer	This application simulates DocuSign web application with the Internet Explorer browser.
DocuSign Microsoft Edge	This application simulates DocuSign web application with the Microsoft Edge browser.
Dreambox Chrome	This application simulates Dreambox web application with the Google Chrome browser.
Dreambox Firefox	This application simulates Dreambox web application with the Mozilla Firefox browser.
Dreambox Internet Explorer	This application simulates Dreambox web application with the Internet Explorer browser.
Dreambox Microsoft Edge	This application simulates Dreambox web application with the Microsoft Edge browser.
eBanking Chrome to Apache	This application simulates a banking web application with the Google Chrome browser connecting to an Apache web server. The user registers, logs into the website and performs common actions like viewing transactions, accounts and opening the contact page ended with logout.
eBanking Firefox to IIS	This application simulates a banking web application with the Mozilla Firefox browser connecting to an IIS web server. The user registers, logs into the website and performs common actions like viewing transactions, accounts and opening the contact page ended with logout.
eBanking Internet Explorer to Nginx	This application simulates a banking web application with the Internet Explorer browser connecting to an Nginx web server. The user registers, logs into the website and performs common actions like viewing transactions, accounts and opening the contact page ended with logout.
eBanking Microsoft Edge to Apache	This application simulates a banking web application with the Microsoft Edge browser connecting to an Apache web server. The user registers, logs into the website and performs common actions like viewing transactions, accounts and opening the contact page ended with logout.
EpixNow Chrome	This application simulates EpixNow web application with the Google Chrome browser.
EpixNow Firefox	This application simulates EpixNow web application with the Mozilla Firefox browser.

Application	Description
EpixNow Internet Explorer	This application simulates EpixNow web application with the Internet Explorer browser.
EpixNow Microsoft Edge	This application simulates EpixNow web application with the Microsoft Edge browser.
eShop Chrome to Apache	This application simulates an online shop web application with the Google Chrome browser connecting to an Apache web server. The user searches for a product, views information about it, logs in, adds a product to the cart, deletes it from the cart and then logs out.
eShop Firefox to IIS	This application simulates an online shop web application with the Mozilla Firefox browser connecting to an IIS web server. The user searches for a product, views information about it, logs in, adds a product to the cart, deletes it from the cart and then logs out.
eShop Internet Explorer to Nginx	This application simulates an online shop web application with the Internet Explorer browser connecting to an Nginx web server. The user searches for a product, views information about it, logs in, adds a product to the cart, deletes it from the cart and then logs out.
eShop Microsoft Edge to Apache	This application simulates an online shop web application with the Microsoft Edge browser connecting to an Apache web server. The user searches for a product, views information about it, logs in, adds a product to the cart, deletes it from the cart and then logs out.
Facebook Audio Chrome	This application simulates Facebook Audio web application with the Google Chrome browser.
Facebook Audio Firefox	This application simulates Facebook Audio web application with the Mozilla Firefox browser.
Facebook Audio Internet Explorer	This application simulates Facebook Audio web application with the Internet Explorer browser.
Facebook Audio Microsoft Edge	This application simulates Facebook Audio web application with the Microsoft Edge browser.
Facebook Chrome	This application simulates Facebook web application with the Google Chrome browser.
Facebook Firefox	This application simulates Facebook web application with the Mozilla Firefox browser.
Facebook Internet Explorer	This application simulates Facebook web application with the Internet Explorer browser.
Facebook Microsoft Edge	This application simulates Facebook web application with the Microsoft Edge browser.

Application	Description
FacebookLive Chrome	This application simulates FacebookLive web application with the Google Chrome browser.
FacebookLive Firefox	This application simulates FacebookLive web application with the Mozilla Firefox browser.
FacebookLive Internet Explorer	This application simulates FacebookLive web application with the Internet Explorer browser.
FacebookLive Microsoft Edge	This application simulates FacebookLive web application with the Microsoft Edge browser.
Gab Chrome	This application simulates Gab web application with the Google Chrome browser.
Gab Firefox	This application simulates Gab web application with the Mozilla Firefox browser.
Gab Internet Explorer	This application simulates Gab web application with the Internet Explorer browser.
Gab Microsoft Edge	This application simulates Gab web application with the Microsoft Edge browser.
Gaode Maps Chrome	This application simulates Gaode Maps web application with the Google Chrome browser.
Gaode Maps Firefox	This application simulates Gaode Maps web application with the Mozilla Firefox browser.
Gaode Maps Internet Explorer	This application simulates Gaode Maps web application with the Internet Explorer browser.
Gaode Maps Microsoft Edge	This application simulates Gaode Maps web application with the Microsoft Edge browser.
Google Classroom Chrome	This application simulates Google Classroom web application with the Chrome browser.
Google Classroom Firefox	This application simulates Google Classroom web application with the Firefox browser.
Google Classroom Internet Explorer	This application simulates Google Classroom web application with the Internet Explorer browser.
Google Classroom Microsoft Edge	This application simulates Google Classroom web application with the Microsoft Edge browser.
Google Drive Chrome	This application simulates Google Drive web application with the Google Chrome browser.

Application	Description
Google Drive Firefox	This application simulates Google Drive web application with the Mozilla Firefox browser.
Google Drive Internet Explorer	This application simulates Google Drive web application with the Internet Explorer browser.
Google Drive Microsoft Edge	This application simulates Google Drive web application with the Microsoft Edge browser.
Google Sheets Chrome	This application simulates Google Sheets web application with the Chrome browser.
Google Sheets Firefox	This application simulates Google Sheets web application with the Firefox browser.
Google Sheets Internet Explorer	This application simulates Google Sheets web application with the Internet Explorer browser.
Google Sheets Microsoft Edge	This application simulates Google Sheets web application with the Microsoft Edge browser.
Google Slides Chrome	This application simulates Google Slides web application with the Chrome browser.
Google Slides Firefox	This application simulates Google Slides web application with the Firefox browser.
Google Slides Internet Explorer	This application simulates Google Slides web application with the Internet Explorer browser.
Google Slides Microsoft Edge	This application simulates Google Slides web application with the Microsoft Edge browser.
GoogleHangouts Chrome	This application simulates GoogleHangouts web application with the Chrome browser.
GoogleHangouts Firefox	This application simulates GoogleHangouts web application with the Firefox browser.
GoogleHangouts Internet Explorer	This application simulates GoogleHangouts web application with the Internet Explorer browser.
GoogleHangouts Microsoft Edge	This application simulates GoogleHangouts web application with the Microsoft Edge browser.
GooglePhotos Chrome	This application simulates GooglePhotos web application with the Chrome browser.
GooglePhotos Firefox	This application simulates GooglePhotos web application with the Firefox browser.

Application	Description
GooglePhotos Internet Explorer	This application simulates GooglePhotos web application with the Internet Explorer browser.
GooglePhotos Microsoft Edge	This application simulates GooglePhotos web application with the Microsoft Edge browser.
HTTP App	This application simulates a generic HTTP application.
Jingdong Chrome	This application simulates Jingdong web application with the Google Chrome browser.
Jingdong Firefox	This application simulates Jingdong web application with the Mozilla Firefox browser.
Jingdong Internet Explorer	This application simulates Jingdong web application with the Internet Explorer browser.
Jingdong Microsoft Edge	This application simulates Jingdong web application with the Microsoft Edge browser.
Jira Chrome	This application simulates Jira web application with the Chrome browser.
Jira Firefox	This application simulates Jira web application with the Firefox browser.
Jira Internet Explorer	This application simulates Jira web application with the Internet Explorer browser.
Jira Microsoft Edge	This application simulates Jira web application with the Microsoft Edge browser.
League of Legends Chrome	This application simulates League of Legends web application with the Google Chrome browser.
League of Legends Firefox	This application simulates League of Legends web application with the Mozilla Firefox browser.
League of Legends Internet Explorer	This application simulates League of Legends web application with the Internet Explorer browser.
League of Legends Microsoft Edge	This application simulates League of Legends web application with the Microsoft Edge browser.
Mail.ru Chrome	This application simulates Mail.ru web application with the Chrome browser.
Mail.ru Firefox	This application simulates Mail.ru web application with the Firefox browser.
Mail.ru Internet Explorer	This application simulates Mail.ru web application with the Internet Explorer browser.
Mail.ru Microsoft Edge	This application simulates Mail.ru web application with the Microsoft Edge browser.

Application	Description
Meraki Chrome	This application simulates Meraki web application with the Google Chrome browser.
Meraki Firefox	This application simulates Meraki web application with the Mozilla Firefox browser.
Meraki Internet Explorer	This application simulates Meraki web application with the Internet Explorer browser.
Meraki Microsoft Edge	This application simulates Meraki web application with the Microsoft Edge browser.
Mewe Chrome	This application simulates Mewe web application with the Google Chrome browser.
Mewe Firefox	This application simulates Mewe web application with the Mozilla Firefox browser.
Mewe Internet Explorer	This application simulates Mewe web application with the Internet Explorer browser.
Mewe Microsoft Edge	This application simulates Mewe web application with the Microsoft Edge browser.
MongoDB	This application simulates the MongoDB, a cross-platform document-oriented database.
Netease Music Chrome	This application simulates Netease Music web application with the Google Chrome browser.
Netease Music Firefox	This application simulates Netease Music web application with the Mozilla Firefox browser.
Netease Music Internet Explorer	This application simulates Netease Music web application with the Internet Explorer browser.
Netease Music Microsoft Edge	This application simulates Netease Music web application with the Microsoft Edge browser.
Office 365 Outlook People Chrome	This application simulates Office 365 Outlook People web application with the Chrome browser.
Office 365 Outlook People Firefox	This application simulates Office 365 Outlook People web application with the Firefox browser.
Office 365 Outlook People Internet Explorer	This application simulates Office 365 Outlook People web application with the Internet Explorer browser.
Office 365 Outlook	This application simulates Office 365 Outlook People web application with the

Application	Description
People Microsoft Edge	Microsoft Edge browser.
Office365 Excel Chrome	This application simulates Office365 Excel web application with the Google Chrome browser.
Office365 Excel Firefox	This application simulates Office365 Excel web application with the Mozilla Firefox browser.
Office365 Excel Internet Explorer	This application simulates Office365 Excel web application with the Internet Explorer browser.
Office365 Excel Microsoft Edge	This application simulates Office365 Excel web application with the Microsoft Edge browser.
Office365 OneDrive Chrome	This application simulates Office365 OneDrive web application with the Google Chrome browser.
Office365 OneDrive Firefox	This application simulates Office365 OneDrive web application with the Mozilla Firefox browser.
Office365 OneDrive Internet Explorer	This application simulates Office365 OneDrive web application with the Internet Explorer browser.
Office365 OneDrive Microsoft Edge	This application simulates Office365 OneDrive web application with the Microsoft Edge browser.
Office365 Outlook Chrome	This application simulates Office365 Outlook web application with the Google Chrome browser.
Office365 Outlook Firefox	This application simulates Office365 Outlook web application with the Mozilla Firefox browser.
Office365 Outlook Internet Explorer	This application simulates Office365 Outlook web application with the Internet Explorer browser.
Office365 Outlook Microsoft Edge	This application simulates Office365 Outlook web application with the Microsoft Edge browser.
OK.ru Chrome	This application simulates OK.ru web application with the Chrome browser.
OK.ru Firefox	This application simulates OK.ru web application with the Firefox browser.
OK.ru Internet Explorer	This application simulates OK.ru web application with the Internet Explorer browser.
OK.ru Microsoft Edge	This application simulates OK.ru web application with the Microsoft Edge browser.

Application	Description
Portal Chrome to Apache	This application simulates a portal web application with the Google Chrome browser connecting to an Apache web server. The user logs into the website and performs common actions such as search and upload image before logs out.
Portal Firefox to IIS	This application simulates a portal web application with the Mozilla Firefox browser connecting to an IIS web server. The user logs into the website and performs common actions such as search and upload image before logs out.
Portal Internet Explorer to Nginx	This application simulates a portal web application with the Internet Explorer browser connecting to an Nginx web server. The user logs into the website and performs common actions such as search and upload image before logs out.
Portal Microsoft Edge to Apache	This application simulates a portal web application with the Microsoft Edge browser connecting to an Apache web server. The user logs into the website and performs common actions such as search and upload image before logs out.
Reddit Chrome	This application simulates Reddit web application with the Google Chrome browser.
Reddit Firefox	This application simulates Reddit web application with the Mozilla Firefox browser.
Reddit Internet Explorer	This application simulates Reddit web application with the Internet Explorer browser.
Reddit Microsoft Edge	This application simulates Reddit web application with the Microsoft Edge browser.
Salesforce Chrome	This application simulates Salesforce web application with the Chrome browser.
Salesforce Firefox	This application simulates Salesforce web application with the Firefox browser.
Salesforce Internet Explorer	This application simulates Salesforce web application with the Internet Explorer browser.
Salesforce Microsoft Edge	This application simulates Salesforce web application with the Microsoft Edge browser.
Service-Now Chrome	This application simulates Service-Now web application with the Google Chrome browser.
Service-Now Firefox	This application simulates Service-Now web application with the Mozilla Firefox browser.
Service-Now	This application simulates Service-Now web application with the Internet

Application	Description
Internet Explorer	Explorer browser.
Service-Now Microsoft Edge	This application simulates Service-Now web application with the Microsoft Edge browser.
Skype 8 Chrome	This application simulates Skype 8 web application with the Chrome browser.
Skype 8 Firefox	This application simulates Skype 8 web application with the Firefox browser.
Skype 8 Internet Explorer	This application simulates Skype 8 web application with the Internet Explorer browser.
Skype 8 Microsoft Edge	This application simulates Skype 8 web application with the Microsoft Edge browser.
Skype Chrome	This application simulates Skype web application with the Chrome browser.
Skype Firefox	This application simulates Skype web application with the Firefox browser.
Skype Internet Explorer	This application simulates Skype web application with the Internet Explorer browser.
Skype Microsoft Edge	This application simulates Skype web application with the Microsoft Edge browser.
SMTP	Emulates an SMTP Email session.
Social Network Chrome to Apache	This application simulates a social network web application with Google Chrome browser connecting to an Apache web server. The user logs into the website, performs common actions such as view profile, like post, unlike post, create a post, comment to a post and then logs out.
Social Network Firefox to IIS	This application simulates a social network web application with Mozilla Firefox browser connecting to an IIS web server. The user logs into the website, performs common actions such as view profile, like post, unlike post, create a post, comment to a post and then logs out.
Social Network Internet Explorer to Nginx	This application simulates a social network web application with Internet Explorer browser connecting to an Nginx web server. The user logs into the website, performs common actions such as view profile, like post, unlike post, create a post, comment to a post and then logs out.
Social Network Microsoft Edge to Apache	This application simulates a social network web application with Microsoft Edge browser connecting to an Apache web server. The user logs into the website, performs common actions such as view profile, like post, unlike post, create a post, comment to a post and then logs out.
Splunk Chrome	This application simulates Splunk web application with the Google Chrome browser.

Application	Description
Splunk Firefox	This application simulates Splunk web application with the Mozilla Firefox browser.
Splunk Internet Explorer	This application simulates Splunk web application with the Internet Explorer browser.
Splunk Microsoft Edge	This application simulates Splunk web application with the Microsoft Edge browser.
Tubi Chrome	This application simulates Tubi web application with the Chrome browser.
Tubi Firefox	This application simulates Tubi web application with the Firefox browser.
TWC Firefox	This application simulates TWC web application with the Firefox browser.
TWC Internet Explorer	This application simulates TWC web application with the Internet Explorer browser.
TWC Microsoft Edge	This application simulates TWC web application with the Microsoft Edge browser.
Video Platform Chrome to Apache	This application simulates a video platform web application with Google Chrome browser connecting to an Apache web server. The user logs into the website, performs common actions such as search video, download video, upload video, delete video, like video, unlike video and then logs out.
Video Platform Firefox to IIS	This application simulates a video platform web application with Mozilla Firefox browser connecting to an IIS web server. The user logs into the website, performs common actions such as search video, download video, upload video, delete video, like video, unlike video and then logs out.
Video Platform Internet Explorer to Nginx	This application simulates a video platform web application with Internet Explorer browser connecting to an Nginx web server. The user logs into the website, performs common actions such as search video, download video, upload video, delete video, like video, unlike video and then logs out.
Video Platform Microsoft Edge to Apache	This application simulates a video platform web application with Microsoft Edge browser connecting to an Apache web server. The user logs into the website, performs common actions such as search video, download video, upload video, delete video, like video, unlike video and then logs out.
VKontakte Chrome	This application simulates VKontakte web application with the Chrome browser.
VKontakte Firefox	This application simulates VKontakte web application with the Firefox browser.
VKontakte Internet Explorer	This application simulates VKontakte web application with the Internet Explorer browser.

Application	Description
VKontakte Microsoft Edge	This application simulates VKontakte web application with the Microsoft Edge browser.
Yammer Chrome	This application simulates Yammer web application with the Google Chrome browser.
Yammer Firefox	This application simulates Yammer web application with the Mozilla Firefox browser.
Yammer Internet Explorer	This application simulates Yammer web application with the Internet Explorer browser.
Yammer Microsoft Edge	This application simulates Yammer web application with the Microsoft Edge browser.
YYLive Chrome	This application simulates YYLive web application with the Google Chrome browser.
YYLive Firefox	This application simulates YYLive web application with the Mozilla Firefox browser.
YYLive Internet Explorer	This application simulates YYLive web application with the Internet Explorer browser.
YYLive Microsoft Edge	This application simulates YYLive web application with the Microsoft Edge browser.

APPENDIX B

Application Actions

The following table lists the application actions and action parameters available in CoreSIM.

Application Action	Action Parameters	Parameter Description
Adobe Reader Updates		
Check For Updates	Current Version	Displays the current version.
	Update Version	Displays the update version.
Download Updates	Update Version	Displays the current version.
ADP		
Load Main Paige	N/A	N/A
Load Login Information Page	N/A	N/A
Load Employee Login Page	N/A	N/A
Airbnb		
Load First Page	City	Set the city name.
	Country	Set the country name.
	Checkin date	Set the check-in date.
	Checkout Date	Set the check-out date.
Specify Search Criteria	City	Set the city name.
	State/province	Ste the state/province name.
	Country	Set the country name.
	Checkin date	Set the check-in date.
	Checkout Date	Set the check-out date.
	Selected rental name	Set the selected rental name.
	Second selected rental	Set the second selected rental name.

Application Action	Action Parameters	Parameter Description
Select a Rental	Main rental photo	Select an option: • **Synthetic data (bytes)** and set the value. • **Payload profile** - select an option from the drop-down list or use the **Upload** button to upload a file.
	Main rental photo (low resolution)	Select an option: • **Synthetic data (bytes)** and set the value. • **Payload profile** - select an option from the drop-down list or use the **Upload** button to upload a file.
	Photo of host	Select an option: • **Synthetic data (bytes)** and set the value. • **Payload profile** - select an option from the drop-down list or use the **Upload** button to upload a file.
	Photo 2 of rental	Select an option: • **Synthetic data (bytes)** and set the value. • **Payload profile** - select an option from the drop-down list or use the **Upload** button to upload a file.
	Photo 3 of rental	Select an option: • **Synthetic data (bytes)** and set the value. • **Payload profile** - select an option from the drop-down list or use the **Upload** button to upload a file.
	Photo 4 of rental	Select an option: • **Synthetic data (bytes)** and set the value. • **Payload profile** - select an option from the drop-down list or use the **Upload** button to upload a file.
	Photo 5 of rental	Select an option: • **Synthetic data (bytes)** and set the value. • **Payload profile** - select an option from the drop-down list or use the **Upload** button to upload a file.

Application Action	Action Parameters	Parameter Description
	City	Set the city name.
	State/province	Ste the state/province name.
	Country	Set the country name.
	Checkin date	Set the check-in date.
	Checkout Date	Set the check-out date.
	Selected rental name	Set the selected rental name.
	Airbnb host name	Set the airbnb host name.
	Reviewer	Set the reviewer name.
	Second reviewer	Set the second reviewer name.
	Third reviewer	Set the third reviewer name.
View Rental Photos	Thumbnail photo of host	Select an option: • **Synthetic data (bytes)** and set the value. • **Payload profile** - select an option from the drop-down list or use the **Upload** button to upload a file.
	Thumbnail photo of first reviewer	Select an option: • **Synthetic data (bytes)** and set the value. • **Payload profile** - select an option from the drop-down list or use the **Upload** button to upload a file.
	Thumbnail photo of third reviewer	Select an option: • **Synthetic data (bytes)** and set the value. • **Payload profile** - select an option from the drop-down list or use the **Upload** button to upload a file.
	City	Set the city name.
	State/province	Ste the state/province name.
	Country	Set the country name.
	Checkin date	Set the check-in date.

Application Action	Action Parameters	Parameter Description
	Checkout Date	Set the check-out date.
View More Amenities	City	Set the city name.
	Country	Set the country name.
	Checkin date	Set the check-in date.
	Checkout Date	Set the check-out date.
View Hot Profile	Thumbnail photo of first reviewer	
	Photo 3 of rental	Select an option: • **Synthetic data (bytes)** and set the value. • **Payload profile** - select an option from the drop-down list or use the **Upload** button to upload a file.
	City	Set the city name.
	State/province	Ste the state/province name.
	Country	Set the country name.
	Checkin date	Set the check-in date.
	Checkout Date	Set the check-out date.
	Selected rental name	Set the selected rental name.
	Airbnb host name	Set the airbnb host name.
	Reviewer	Set the reviewer name.
	Second reviewer	Set the second reviewer name.
	Third reviewer	Set the third reviewer name.
	Second selected rental	Set the second selected rental name.
View Second Property	Photo 1 of rental	Select an option: • **Synthetic data (bytes)** and set the value. • **Payload profile** - select an option from the drop-down list or use the **Upload** button to upload a file.

Application Action	Action Parameters	Parameter Description
	Photo 4 of rental	Select an option: • **Synthetic data (bytes)** and set the value. • **Payload profile** - select an option from the drop-down list or use the **Upload** button to upload a file.
	Photo 5 of rental	Select an option: • **Synthetic data (bytes)** and set the value. • **Payload profile** - select an option from the drop-down list or use the **Upload** button to upload a file.
	City	Set the city name.
	Second selected rental	Set the second selected rental name.
View the Calendar	N/A	N/A
appointy		
Load Login Page	User name	Set the user name.
Login	User name	Set the user name.
	Password	Provide the password
	Profession	Set the profession.
	City	Set the city name.
	State/Province	Set the state/province name.
	Staff member 1	Set the name of the first staff member.
	Staff member 2	Set the name of the second staff member.
	Customer 1 first name	Set the first name of Customer 1.
	Customer 1 last name	Set the last name of Customer 1.
	Customer 2 first name	Set the first name of Customer 2.
	Customer 2 last name	Set the last name of Customer 2.

Application Action	Action Parameters	Parameter Description
Book New Customer	User name	Set the user name.
	Full manager name	Set the manager name.
	City	Set the city name.
	State/Province	Set the state/province name.
	Service	Set the service name.
	Staff member 1	Set the name of the first staff member.
	Customer 2 first name	Set the first name of Customer 2.
	Customer 2 last name	Set the last name of Customer 2.
View New Users Pulldown	User name	Set the user name.
View New Appointments Pulldown	User name	Set the user name.
Select Dashboard Tab	User name	Set the user name.
	Profession	Set the profession.
Select Reports Tab	User name	Set the user name.
View Week Calendar	User name	Set the user name.
View Customers Tab	User name	Set the user name.
	City	Set the city name.
	Customer 1 first name	Set the first name of Customer 1.
	Customer 1 last name	Set the last name of Customer 1.
	Customer 2 first name	Set the first name of Customer 2.
	Customer 2 last name	Set the last name of Customer 2.

Application Action	Action Parameters	Parameter Description
Logout	User name	Set the user name.
AWS Console		
Load AWS Page	N/A	N/A
Load AWS Management Console	Region name	Set the region name.
Sign In	User email	Provide the user email.
	Password	Provide the password.
	User name	Set the user name.
	Region name	Set the region name.
Check Account Info	User email	Provide the user email.
	Region name	Set the region name.
Check Account Billing	User email	Provide the user email.
	Region name	Set the region name.
Check Credentials	Region name	Set the region name.
	Existing keyID 1	Provide the existing keyID 1.
	Existing keyID 2	Provide the existing keyID 2.
Create New Access Key	New KeyID	Set the new keyID.
Download Key file	New KeyID	Set the new keyID.
	Key file name	Set the key file name.
Delete Key	Existing keyID 1	Provide the existing keyID 1.
Sign Out	User email	Provide the user email.
	Region name	Set the region name.
AWS S3		

Application Action	Action Parameters	Parameter Description
Check Buckets Names	User email	Provide the user email.
	Region name	Set the region name.
	KeyID	Provide the keyID.
Create Buckets	Region name	Set the region name.
	KeyID	Set the keyID.
	Source bucket name	Set the source bucket name.
	Destination bucket name	Set the destination bucket name.
Upload File	Region name	Set the region name.
	KeyID	Set the keyID.
	Source bucket bame	Set the source bucket name.
	Local file name for upload	Select an option: • **Synthetic data (bytes)** and set the value. • **Payload profile** - select an option from the drop-down list or use the **Upload** button to upload a file.
List Files	Region name	Set the region name.
	KeyID	Set the keyID.
	Source bucket name	Set the source bucket name.
	Source file name	Set the source file name.
Copy Files	Region name	Set the region name.
	KeyID	Set the keyID.
	Source bucket name	Set the source bucket name.
	Destination bucket name	Set the destination bucket name.
	Source file name	Set the source file name.

Application Action	Action Parameters	Parameter Description
Verify Copied Files	Region name	Set the region name.
	KeyID	Set the keyID.
	Destination bucket name	Set the destination bucket name.
Download Files	Region name	Set the region name.
	KeyID	Set the keyID.
	Source bucket name	Set the source bucket name.
	Source file name	Set the source file name.
Delete Files and Buckest	User email	Provide the user email.
	Region name	Set the region name.
	KeyID	Provide the keyID.
	Source bucket name	Set the source bucket name.
	Destination bucket name	Set the destination bucket name.
	Source file name	Set the source file name.
Baidu		
Access Baidu News	N/A	N/A
Access Baidu Maps	N/A	N/A
Access Baidu Pictures	N/A	N/A
Load Maine Paige	N/A	N/A
Search String	Search query	Provide the search criteria.
Search Image	Baidu search image file	Select an option: • **Synthetic data (bytes)** and set the value. • **Payload profile** - select an option from the drop-down list or use the **Upload** button to upload a file.

Application Action	Action Parameters	Parameter Description
Access Baidu Passport	N/A	N/A
Baidu Maps		
Load Web Page	N/A	N/A
Search a Place	Query string	Provide the search criteria.
Finding a route	Query string	Provide the search criteria.
	Source location	Set the search location.
	Destination location	Set the destination location.
Bilibili		
Open Bilibili Website	N/A	N/A
Login	Usename	Provide the usernamel.
	Password	Provide the password.
Search Video	Video name	Provide the video name.
Watch Video	N/A	N/A
Upload Video	Uploaded video title	Set the title for the uploaded video.
	Uploaded video file	Select an option: • **Synthetic data (bytes)** and set the value. • **Payload profile** - select an option from the drop-down list or use the **Upload** button to upload a file.
Logout	N/A	N/A
Cisco Spark		
Start the Application	N/A	N/A
Click Get Started	N/A	N/A
Click Next	User email address	Provide the user's email address.
Click SignIn	The contact's	Provide the contact's first/last name.

Application Action	Action Parameters	Parameter Description
	first/last name	
	User email address	Provide the user's email address.
	The contact's email address	Provide the contact's email address.
	Password	Provide the password.
	User's first/last name	Provide the user's first/last name
Create a Team	User email address	Provide the user's email address.
Add Contact	The contact's first/last name	Provide the contact's first/last name.
	User email address	Provide the user's email address.
	The contact's email address	Provide the contact's email address.
Send Message	The contact's first/last name	Provide the contact's first/last name.
	User email address	Provide the user's email address.
	The contact's email address	Provide the contact's email address.
Send File	User email address	Provide the user's email address.
	User's first/last name	Provide the user's first/last name
Initiate a Call	The contact's first/last name	Provide the contact's first/last name.
	User email address	Provide the user's email address.
	The contact's email address	Provide the contact's email address.

Application Action	Action Parameters	Parameter Description
Hang Up Call	The contact's first/last name	Provide the contact's first/last name.
	User email address	Provide the user's email address.
	The contact's email address	Provide the contact's email address.
Exit	N/A	N/A
Commvault		
Get Login Page	N/A	N/A
Login	User email	Provide the user's email address.
	Password	Provide the password.
View Drive	N/A	N/A
Create Folder	Created folder name	Set the name of the created folder.
Rename Folder	Folder name	Set the folder's new name.
Move File	Folder name	Provide the folder name.
Navigate To Folder	Folder name	Provide the folder name.
Upload File	Uploaded file name	Select an option: • **Synthetic data (bytes)** and set the value. • **Payload profile** - select an option from the drop-down list or use the **Upload** button to upload a file.
Download File	Downloaded file name	Select an option: • **Synthetic data (bytes)** and set the value. • **Payload profile** - select an option from the drop-down list or use the **Upload** button to upload a file.
Get Public Link	Folder ID	Provide the folder ID.
Move File To Trash	N/A	N/A
View Trash	N/A	N/A

Application Action	Action Parameters	Parameter Description
Restore File From Trash	Folder name	Provide the folder name.
Empty Trash	N/A	N/A
View Public Links	N/A	N/A
Deelte Public Link	Folder ID	Provide the folder ID.
Log Out	N/A	N/A
Crawling Wikipedia (Chinese)		
Crawl Link 1	Root URI	Set the root URI.
Crawl Link 2	Root URI	Set the root URI.
Crawl Link 3	Root URI	Set the root URI.
Crawl Link 4	Root URI	Set the root URI.
DocuSign		
Load Front Page	N/A	N/A
Dreambox		
Login	Login email address	Provide the login email address.
	Password	Provide the password.
Open Dashboard	N/A	N/A
Check Activity Status	From date	Set the starting date.
	To date	Set the end date.
Add Assignment	Select a grade	Set a grade.
	Select a category	Set a category.
	Short description	provide a short description.
Set Dreambox Game	N/A	N/A
Pause Dreambox Game	N/A	N/A
Quit Dreambox	N/A	N/A

Application Action	Action Parameters	Parameter Description
Game		
Logout	N/A	N/A
eBanking		
Sign Up	SignUp username	Select an option: • **User input** and provide the value. • **Playlist file** - select an option from the drop-down list or use the **Upload** button to upload a file.
	SignUp password	Select an option: • **User input** and provide the value. • **Playlist file** - select an option from the drop-down list or use the **Upload** button to upload a file.
	SignUp confirm password	Select an option: • **User input** and provide the value. • **Playlist file** - select an option from the drop-down list or use the **Upload** button to upload a file.
Login	Login username	Select an option: • **User input** and provide the value. • **Playlist file** - select an option from the drop-down list or use the **Upload** button to upload a file.
	Login password	Select an option: • **User input** and provide the value. • **Playlist file** - select an option from the drop-down list or use the **Upload** button to upload a file.
View Transactions	N/A	N/A
View Accounts	N/A	N/A
Get Contact Page	N/A	N/A
Loqout	N/A	N/A
EpixNow		

Application Action	Action Parameters	Parameter Description
Open Login Page	N/A	N/A
Login	Email	Provide the login email address.
	Password	Provide the password.
Browse Movies	Search keyword	Provide the search criteria.
Search Movies	Search keyword	Provide the search criteria.
Play	Search keyword	Provide the search criteria.
Logout	N/A	N/A
eShop		
Search Product	Product name	Provide the product name.
View Product	Product ID	Provide the product ID.
Login	Login username	Select an option: • **User input** and provide the value. • **Playlist file** - select an option from the drop-down list or use the **Upload** button to upload a file.
	Login password	Select an option: • **User input** and provide the value. • **Playlist file** - select an option from the drop-down list or use the **Upload** button to upload a file.
Add To Cart	N/A	N/A
Remove From Cart	N/A	N/A
Buy	Full name	Provide the full name.
	Address	Provide the address.
	Account number	Provide the account number.
Logout	N/A	N/A
Facebook Audio		
Open Home Page	N/A	N/A
Login	Encrypted	Provide the password.

Application Action	Action Parameters	Parameter Description
	password	
	Email	Provide the login email address.
Create Audio Room	N/A	N/A
Join Audio Room	N/A	N/A
Leave Audio Room	N/A	N/A
Logout	N/A	N/A
Facebook		
Get Homepage	N/A	N/A
Sign In	User email	Select an option: • **User input** and provide the value. • **Playlist file** - select an option from the drop-down list or use the **Upload** button to upload a file.
	User password	Select an option: • **User input** and provide the value. • **Playlist file** - select an option from the drop-down list or use the **Upload** button to upload a file.
	User first name	Provide the first name.
	User second name	Provide the second name.
Open Notifications	N/A	N/A
Search Person	Search string	Provide the search criteria.
Add Friend	Friend first name	Provide the friend's first name.
	Friend second name	Provide the friend's second name.
Send Message	Message body	Provide the message.
	Recipient first name	Provide the recipient's first name.
	Recipient second name	Provide the recipient's second name.

Application Action	Action Parameters	Parameter Description
Send Message With Attachment	Message body	Provide the message.
	Recipient first name	Provide the recipient's first name.
	Recipient second name	Provide the recipient's second name.
	Filename	Provide the file name
	Upload File	Select an option: • **Synthetic data (bytes)** and set the value. • **Payload profile** - select an option from the drop-down list or use the **Upload** button to upload a file.
Download Attachment	Download file	Select an option: • **Synthetic data (bytes)** and set the value. • **Payload profile** - select an option from the drop-down list or use the **Upload** button to upload a file.
Go To Profile	N/A	N/A
Post In News Feed	Post Message	Provide the message.
	Post file	Select an option: • **Synthetic data (bytes)** and set the value. • **Payload profile** - select an option from the drop-down list or use the **Upload** button to upload a file.
Comment Post	Comment message	Provide the post message.
	Post author	Provide the post's author.
Delete Comment	Post author	Provide the post's author.
Like Post	N/A	N/A
Unlike Post	N/A	N/A
Sign Out	N/A	N/A
FacebookLive		

Application Action	Action Parameters	Parameter Description
Sign In	C_user cookie2	Set the value.
	C_user cookie	Set the value.
	User email address	Provide the user email address.
	Password	Provide the password.
	User name	Provide the username.
	Friend 1 first name	Provide the first name.
Start Live Stream	C_user cookie	Set the value.
	User name	Provide the username.
	Friend 1 first name	Provide the first name.
	Friend 3 first name	Provide the first name.
	Video stream ID	Set the video stream ID.
Sign Out	C_user cookie	Set the value.
	User email address	Provide the user email address.
	User name	Provide the username.
	Video stream ID	Set the video stream ID.
Gab		
Open Home Page	N/A	N/A
Open Login Page	N/A	N/A
Login	Email	Provide the email address.
	Password	Provide the password.
Read News	N/A	N/A
Post News	Statut text	Provide the message.
Logout	N/A	N/A

Application Action	Action Parameters	Parameter Description
Gaode Maps		
Open Website	N/A	N/A
Search Location	Destination	Provide the destination.
Find Route	Destination	Provide the destination.
	Starting location	Provide the starting location.
	Transportation method	Provide the transportation method.
Google Classroom		
Load Homepage	N/A	N/A
Login	Username	Provide the username.
	User email	Provide the email address.
	User password	Provide the password.
	Student username	Provide the student's username.
	Student email	Provide the student's email address.
Create New Classroom	Username	Provide the username.
	User email	Provide the email address.
	Student username	Provide the student's username.
	Student email	Provide the student's email address.
	Classroom name	Set the classroom name.
	Section name	Set the section name.
	Room name	Set the room name.
	Subject name	Set the subject name.
Create New Post	Post text	Provide the text message.
Edit Post	Post text	Provide the text message.
Add Attachment to Post	Post attachment	Select an option:

Application Action	Action Parameters	Parameter Description
		• **Synthetic data (bytes)** and set the value. • **Payload profile** - select an option from the drop-down list or use the **Upload** button to upload a file.
	Username	Provide the username.
	User email	Provide the email address.
	Post text	Provide the text message.
Load Classroom Tab	N/A	N/A
Create New Assignment	Classroom name	Set the classroom name.
	Section name	Set the section name.
	Room name	Set the room name.
	Subject name	Set the subject name.
	Post text	Provide the text message.
	Assignment title	Provide the assignment title.
Add Attachment to Assignment	Assignment document	Select an option: • **Synthetic data (bytes)** and set the value. • **Payload profile** - select an option from the drop-down list or use the **Upload** button to upload a file.
	Username	Provide the username.
	User email	Provide the email address.
	Assignment title	Provide the assignment title.
Load People Tab	N/A	N/A
Invite a Student	Student email	Provide the student's email address.
	Classroom name	Set the classroom name.
	Section name	Set the section name.
	Room name	Set the room name.
	Subject name	Set the subject name.

Application Action	Action Parameters	Parameter Description
Student Load Homepage	Post attachment	Select an option: • **Synthetic data (bytes)** and set the value. • **Payload profile** - select an option from the drop-down list or use the **Upload** button to upload a file.
	Username	Provide the username.
	Student username	Provide the student's username.
	Student email	Provide the student's email address.
	Classroom name	Set the classroom name.
	Section name	Set the section name.
	Room name	Set the room name.
	Subject name	Set the subject name.
	Post text	Provide the text message.
	Assignment title	Provide the assignment title.
Student Add Submission	Submission document compressed	Select an option: • **Synthetic data (bytes)** and set the value. • **Payload profile** - select an option from the drop-down list or use the **Upload** button to upload a file.
	Student username	Provide the student's username.
	Student email	Provide the student's email address.
	Classroom name	Set the classroom name.
	Section name	Set the section name.
	Room name	Set the room name.
	Subject name	Set the subject name.
Add Student Private Comment	Student private comment	Provide the comment.
Load Grades Tab	Assignment title	Provide the assignment title.

Application Action	Action Parameters	Parameter Description
View Submission	Submission document	Select an option: • **Synthetic data (bytes)** and set the value. • **Payload profile** - select an option from the drop-down list or use the **Upload** button to upload a file.
	Submission document webp format	Select an option: • **Synthetic data (bytes)** and set the value. • **Payload profile** - select an option from the drop-down list or use the **Upload** button to upload a file.
	Username	Provide the username.
	User email	Provide the email address.
	Student username	Provide the student's username.
	Student email	Provide the student's email address.
	Classroom name	Set the classroom name.
	Section name	Set the section name.
	Assignment title	Provide the assignment title.
	Student private comment	Provide the comment.
Add Professor Private Comment	Username	Provide the username.
	User email	Provide the email address.
	Student username	Provide the student's username.
	Student email	Provide the student's email address.
	Assignment title	Provide the assignment title.
	Student private comment	Provide the comment.
	Professor private comment	Provide the comment.
Grade Submission	Grade of the	Provide the grade value.

Application Action	Action Parameters	Parameter Description
	assignment	
Archive Classroom	Classroom name	Set the classroom name.
	Section name	Set the section name.
	Room name	Set the room name.
	Subject name	Set the subject name.
	Post text	Provide the text message.
	Assignment title	Provide the assignment title.
Delete Classroom	Classroom name	Set the classroom name.
	Section name	Set the section name.
	Room name	Set the room name.
	Subject name	Set the subject name.
Logout	Username	Provide the username.
	User email	Provide the email address.
Google Drive		
Get Sigh In Page	N/A	N/A
Sign In	User email	Select an option: • **User input** and provide the value. • **Playlist file** - select an option from the drop-down list or use the **Upload** button to upload a file.
	User password	Select an option: • **User input** and provide the value. • **Playlist file** - select an option from the drop-down list or use the **Upload** button to upload a file.
Create Folder	Folder name	Set the folder name.
Upload File	File name	Provide the file name.
	Upload file	Select an option: • **Synthetic data (bytes)** and set the value.

Application Action	Action Parameters	Parameter Description
		• **Payload profile** - select an option from the drop-down list or use the **Upload** button to upload a file.
Delete File	File name	Provide the file name.
Empty Bin	File name	Provide the file name.
	File content	Select an option: • **Synthetic data (bytes)** and set the value. • **Payload profile** - select an option from the drop-down list or use the **Upload** button to upload a file.
Create Text Document	Document content	Provide the document content.
	Document name	Provide the document name.
Create Presentation	Powerpoint content	Provide the content.
	Powerpoint name	Provide the name.
Create Spreadsheet	Spreadsheet content	Provide the content.
	Spreadsheet name	Provide the name.
Download File	File name	Provide the file name.
	Downloaded file	Select an option: • **Synthetic data (bytes)** and set the value. • **Payload profile** - select an option from the drop-down list or use the **Upload** button to upload a file.
Sign Out	N/A	N/A
Google Sheets		
Load Sigh In Page	N/A	N/A
Sign In	Username	Provide the username.
	Password	Provide the password.

Application Action	Action Parameters	Parameter Description
Create a New Sheet	N/A	N/A
Input Data	Username	Provide the username.
	Sheet name	Provide the sheet name.
	Key text 1	Provide the key text.
	Value text 1	Provide the value text
	Key text 2	Provide the key text.
	Value text 2	Provide the value text
	Key text 3	Provide the key text.
	Value text 3	Provide the value text
Share the Sheet	Username	Provide the username.
	Sheet name	Provide the sheet name.
	Receiver username	Provide the username of the reciever.
Complete sharing	Username	Provide the username.
	Sheet name	Provide the sheet name.
	Receiver username	Provide the username of the receiver.
	Sharing note	Provide the text for the sharing note.
Sign Out	Username	Provide the username.
Google Slides		
Load Sigh In Page	N/A	N/A
Sign In	Username	Provide the username.
	Password	Provide the password.
Start a New Presentation	Username	Provide the username.
Start a New Slide	N/A	N/A
Input Slide Text	Slide Name	Provide the value.

Application Action	Action Parameters	Parameter Description
Replace Image	Username	Provide the username.
	File attachment	Select an option: • **Synthetic data (bytes)** and set the value. • **Payload profile** - select an option from the drop-down list or use the **Upload** button to upload a file.
Name the Slide	Slide name	Provide the value.
Share the Slide	Username	Provide the username.
	Slide name	Provide the value.
	Receiver username	Provide the username of the receiver.
Send Sharing	Receiver username	Provide the username of the receiver.
Sign Out	Username	Provide the username.
GoogleHangouts		
Load First Page	N/A	N/A
Sign In	User's first/last name	Provide the user's first/last name.
	User email address	Provide the user email address.
	Password	Provide the password.
	Other user's first/last name	Provide the other user's first/last name.
Start Chat	User's first/last name	Provide the user's first/last name.
	User email address	Provide the user email address.
	Other user's first/last name	Provide the other user's first/last name.
Send Text Message	First chat text message	Provide the text message.

Application Action	Action Parameters	Parameter Description
Receive Text Message	N/A	N/A
Send a File	User email address	Provide the user email address.
	Second chat text message	Provide the text message.
Receive Text Reply	User email address	Provide the user email address.
Send Image	N/A	N/A
Receive Image	User's first/last name	Provide the user's first/last name.
	User email address	Provide the user email address.
	Other user's first/last name	Provide the other user's first/last name.
	First chat text message	Provide the text message.
	Second chat text message	Provide the text message.
Make Phone Call	User's first/last name	Provide the user's first/last name.
	User email address	Provide the user email address.
	Phone number	Provide the phone number.
Start Video Call	User's first/last name	Provide the user's first/last name.
	User email address	Provide the user email address.
	Other user's first/last name	Provide the other user's first/last name.
Logout	User's first/last name	Provide the user's first/last name.

Application Action	Action Parameters	Parameter Description
	User email address	Provide the user email address.
GooglePhotos		
Load Login Page	N/A	N/A
Login to Google	Password	Provide the password.
	Full user name	Provide the username.
	Downloaded photo	Select an option: • **Synthetic data (bytes)** and set the value. • **Payload profile** - select an option from the drop-down list or use the **Upload** button to upload a file.
View a Photo	User email address	Provide the user email address.
	Full user name	Provide the username.
View Next Photo	Full user name	Provide the username.
Return to Main Page	Full user name	Provide the username.
	Downloaded photo	Select an option: • **Synthetic data (bytes)** and set the value. • **Payload profile** - select an option from the drop-down list or use the **Upload** button to upload a file.
View Albums Page	Shared folder name	Provide the folder name.
Select an Album	User email address	Provide the user email address.
	Full user name	Provide the username.
	Shared folder name	Provide the folder name.
Upload a Photo	Uploaded Photo	Select an option: • **Synthetic data (bytes)** and set the value. • **Payload profile** - select an option from the drop-down list or use the **Upload** button to

Application Action	Action Parameters	Parameter Description
		upload a file.
Return to Photos Page	N/A	N/A
Download a Photo	Full user name	Provide the username.
	Downloaded photo	Select an option: • **Synthetic data (bytes)** and set the value. • **Payload profile** - select an option from the drop-down list or use the **Upload** button to upload a file.
Logout of Google	User email address	Provide the user email address.
	Full user name	Provide the username.
HTTP		

Application Action	Action Parameters	Parameter Description
HTTP GET	Path	The value of the path requested.
	Query	The value of the query requested.
	Request headers	The name-value options provided are: • Accept-Language • Sec-Fetch-User • Upgrade-Insecure-Requests • Sec-Fetch-Site Use the **Add** button to add new options or the **Delete** to remove them.
	Status code	The value of the response status code.
	Reason phrase	The value of the reason phrase.
	Response headers	The name-value options provided are: • Cache-Control • Etag Use the **Add** button to add new options or the **Delete** to remove them.
	Response body	Select an option: • **Synthetic data (bytes)** and set the value. • **Payload profile** - select an option from the drop-down list or use the **Upload** button to upload a file. • **Dynamic payload** - select an option from the drop-down list or use the **Upload** button to upload a file.

Application Action	Action Parameters	Parameter Description
HTTP POST	URL	Provide the URL.
	Request headers	The name-value options provided are: • Sec-Fetch-User • Upgrade-Insecure-Requests • Accept-Language • Sec-Fetch-Site Use the **Add** button to add new options or the **Delete** to remove them.
	Request body	Select an option: • **Synthetic data (bytes)** and set the value. • **Payload profile** - select an option from the drop-down list or use the **Upload** button to upload a file. • **Dynamic payload** - select an option from the drop-down list or use the **Upload** button to upload a file.
	Status code	The value of the response status code.
	Reason phrase	The value of the reason phrase.
	Response headers	The name-value options provided are: • Etag • Cache-Control Use the **Add** button to add new options or the **Delete** to remove them.
	Response Body	Add a response message.
Jingdong		
Go To Jingdong	N/A	N/A
Login	Username	Provide the username.
Search For products	Search keyword	Provide the search criteria.
Check Products Information	N/A	N/A

Application Action	Action Parameters	Parameter Description
Checkout	Username	Provide the username.
	Product name	Provide the product name.
	Order ID	Provide the order ID.
Logout	N/A	N/A
Jira		
Load Login Page	Story name	Provide the story name.
Login	Login email address	Provide the login email address.
	Password	Provide the password.
Create Project	Login email address	Provide the login email address.
	Project name	Provide the project name.
Create Story	Project name	Provide the project name.
	Story name	Provide the story name.
Add Comments to Story	Story name	Provide the story name.
Mark The Story To Closed	Story name	Provide the story name.
Logout	Story name	Provide the story name.
League of Legends		
Login	User ID	Provide the user ID.
Start Game	User ID	Provide the user ID.
Attack	N/A	N/A
Mail.ru		
Login	Username	Provide the username.
	Password	Provide the password.

Application Action	Action Parameters	Parameter Description
Send Mail	Fullname	Provide the fullname.
	Recipient email address	Provide the recipient email address.
	Recipient email subject	Provide the email subject.
	Recipient email body	Provide the email body.
View Mail	Fullname	Provide the fullname.
	Message sender email	Provide the sender email.
	Message sender name	Provide the sender name.
	View message subject	Provide the message subject.
	View message body	Provide the message body.
Logout	N/A	N/A
Meraki		
Login	Dashboard email address	Provide the email address.
	Dashboard password	Provide the password.
Enroll Device	New device address	Provide the device address.
	Enrollment message	Provide an enrollment message.
Add Application	New device address	Provide the device address.
	New application search query	Provide the search criteria.
Add Profile	New device address	Provide the device address.

Application Action	Action Parameters	Parameter Description
	Test profile name	Provide the test profile name.
	Test profile description	Provide the test profile description.
	Backup file name	Provide the backup file name.
Push Updates	N/A	N/A
View Clients	New device address	Provide the device address.
View Map	New device address	Provide the device address.
View Logs	New device address	Provide the device address.
Download CSV	Dashboard email address	Provide the email address.
Send Command	Remote command line	Provide the remote command line,
View Summary	New device address	Provide the device address.
Add Geofence	Geofence name	Provide the geofence name.
	Area name	Provide the area name.
Add Policy	Policy name	Provide the policy name
Add owner	New device address	Provide the device address.
	Owner name	Provide the name.
	Owner username	Provide the username.
	Owner password	Provide the password.
	Owner email	Provide the email.
Logout	N/A	N/A
Mewe		
Open Login Page	N/A	N/A

Application Action	Action Parameters	Parameter Description
Login	Email	Provide the email address.
	Password	Provide the password.
Read News Feed	N/A	N/A
Post Status	Status message	Provide the message text.
Logout	N/A	N/A
MongoDB		
Insert	N/A	N/A
Update	N/A	N/A
Query	N/A	N/A
Get More	N/A	N/A
Delete	N/A	N/A
Kill Cursor	N/A	N/A
Diagnostic Messages	N/A	N/A
Netease		
Go to Netease Music	N/A	N/A
Login	N/A	N/A
Search Music	Artist ID	Provide the artist ID.
PlayMusic	Music file name 1	Provide the music file name.
	Music file name 2	Provide the music file name.
	Music file name 3	Provide the music file name.
	Music file name 4	Provide the music file name.
Add To Playlist	Artist ID	Provide the artist ID.
Recommend Music	Artist ID	Provide the artist ID.

Application Action	Action Parameters	Parameter Description
Watch Music Video	Artist ID	Provide the artist ID.
	Music video ID 1	Provide the music video ID.
	Music video ID 2	Provide the music video ID.
	Music video ID 3	Provide the music video ID.
	Music video ID 4	Provide the music video ID.
Logout	N/A	N/A
Office 365 Outlook People		
Get Sign In Page	N/A	N/A
Sign In	User name	Provide the user name.
	Password	Provide the password.
Crete a New Contact	Contact first name	Provide the first name.
	Contact last name	Provide the last name.
	Contact email	Provide the email address.
Search for a Contact	Search people	Provide the search criteria.
Delete a Contact	Contact email	Provide the email address.
Sign Out	N/A	N/A
Office365 Excel		
Get Home Page	N/A	N/A
Sign In	User email	Select an option: • **User input** and provide the value. • **Playlist file** - select an option from the drop-down list or use the **Upload** button to upload a file.
	User password	Select an option: • **User input** and provide the value. • **Playlist file** - select an option from the drop-down list or use the **Upload** button to upload a file.

Application Action	Action Parameters	Parameter Description
Get Excel Tab	N/A	N/A
Get Excel Workbook	Workbook name	Provide the workbook name.
Edit Workbook	Content	Provide the content.
Pin Workbook	Workbook name	Provide the workbook name.
Open Workbook In OneDrive	N/A	N/A
Sign Out	N/A	N/A
Office365 OneDrive		
Get Home Page	N/A	N/A
Sign In	User email	Select an option: • **User input** and provide the value. • **Playlist file** - select an option from the drop-down list or use the **Upload** button to upload a file.
	User password	Select an option: • **User input** and provide the value. • **Playlist file** - select an option from the drop-down list or use the **Upload** button to upload a file.
Get OneDrive Tab	N/A	N/A
Delete File	File name	Provide the file name.
Upload File	File name	Provide the file name.
	Upload file	Select an option: • **Synthetic data (bytes)** and set the value. • **Payload profile** - select an option from the drop-down list or use the **Upload** button to upload a file.
Create Folder	Folder name	Provide the folder name.
Create Excel Workbook	Workbook name	Provide the workbook name.
Create Word	Document name	Provide the document name.

Application Action	Action Parameters	Parameter Description
Document		
Create Powerpoint Presentation	Powerpoint name	Provide the powerpoint name.
Sign Out	N/A	N/A
Office365 Outlook		
Sign In	User email	Select an option: • **User input** and provide the value. • **Playlist file** - select an option from the drop-down list or use the **Upload** button to upload a file.
	User password	Select an option: • **User input** and provide the value. • **Playlist file** - select an option from the drop-down list or use the **Upload** button to upload a file.
View Inbox	N/A	N/A
Send Message	Recipient	Provide the email address.
	Subject	Provide the email subject.
	Body	Provide the email body text.
Send Message With Attachment	Recipient	Provide the email address.
	Subject	Provide the email subject.
	Body	Provide the email body text.
	Attachment	Select an option: • **Synthetic data (bytes)** and set the value. • **Payload profile** - select an option from the drop-down list or use the **Upload** button to upload a file.
	Attachment filename	Provide the file name.
Open Message	N/A	N/A
Delete Message	N/A	N/A

Application Action	Action Parameters	Parameter Description
Navigate To Calendar Panel	N/A	N/A
Create A New Event	Event date	Set the event date.
	Event start time	Set the start time.
	Event end time	Set the end time
	Event name	Set the event name.
Delete An Event	Event date	Set the event date.
	Event start time	Set the start time.
	Event end time	Set the end time
	Event name	Set the event name.
Navigate to People Panel	N/A	N/A
Create a New Contact	Contact email	Provide the address email.
	First name	Provide the first name.
	Second name	Provide the second name.
	Phone number	Provide the phone number.
Search For A Contact	Search string	Provide the search criteria.
Delete A Contact	Contact email	Provide the address email.
	First name	Provide the first name.
	Second name	Provide the second name.
	Phone number	Provide the phone number.
Navigate To Task Panel	N/A	N/A
Create New Task	Task title	Provide the task tile.
Mark Task Completed	Task title	Provide the task tile.
Delete Task	N/A	N/A

Application Action	Action Parameters	Parameter Description
Sign Out	N/A	N/A
OK.ru		
Login	Username	Provide the user name.
	Password	Provide the password.
View Feed	N/A	N/A
Post Message	Message	Provide the message text.
Logout	N/A	N/A
Portal		
Login	User email	Select an option: • **User input** and provide the value. • **Playlist file** - select an option from the drop-down list or use the **Upload** button to upload a file.
	User password	Select an option: • **User input** and provide the value. • **Playlist file** - select an option from the drop-down list or use the **Upload** button to upload a file.
Search Image	Search query	Provide the search criteria.
Upload Image	Uploaded file name	Provide the file name.
	Uploaded file	Select an option: • **Synthetic data (bytes)** and set the value. • **Payload profile** - select an option from the drop-down list or use the **Upload** button to upload a file.
Logout	N/A	N/A
Reddit		
Load Main Page	N/A	N/A

Application Action	Action Parameters	Parameter Description
Sign In	Username	Provide the user name.
	Account password	Provide the password.
Access Post	N/A	N/A
Create Comment	Comment content	Provide content for the comment.
Delete Comment	N/A	N/A
Search Posts	Query string	Provide the search criteria.
Subscribe to Subreddit	Subreddit	Provide the subreddit.
Access Gifts Page	Subreddit	Provide the subreddit.
Load Profile	Username	Provide the user name.
Access Settings	N/A	N/A
Access Messages	N/A	N/A
Sign Out	N/A	N/A
Salesforce		
Load Login Page	User name	Provide the user name.
Login	User name	Provide the user name.
	Login email address	Provide the login email address.
	Password	Provide the password.
Select Top Deal	User name	Provide the user name.
	Login email address	Provide the login email address.
Update Call Log	User name	Provide the user name.
	Login email address	Provide the login email address.
Select Opportunities Tab	Login email address	Provide the login email address.

Application Action	Action Parameters	Parameter Description
Select An Opportunity	User name	Provide the user name.
	Login email address	Provide the login email address.
Edit Amount	User name	Provide the user name.
	Login email address	Provide the login email address.
Select Notes Tab	User name	Provide the user name.
	Login email address	Provide the login email address.
Edit a Note	User name	Provide the user name.
	Login email address	Provide the login email address.
Select Dashboards Tab	User name	Provide the user name.
	Login email address	Provide the login email address.
Opoen Adoption Dashboard	User name	Provide the user name.
	Login email address	Provide the login email address.
Select Calendar Tab	User name	Provide the user name.
	Login email address	Provide the login email address.
Add a Meeting	User name	Provide the user name.
	Login email address	Provide the login email address.
Logout	User name	Provide the user name.
	Login email address	Provide the login email address.
Service-Now		
Get Sign In Page	N/A	N/A

Application Action	Action Parameters	Parameter Description
Sign In	Username	Provide the user name.
	Password	Provide the password.
View an Incident	Username	Provide the user name.
	Incident number searched	Provide the incident number.
	Search shot description	Provide a description.
Create an Incident	Username	Provide the user name.
	Incident number searched	Provide the incident number.
	Description	Provide a description.
	Caller	Provide the caller.
	Caller email	Provide the caller email.
Sign Out	N/A	N/A
Skype 8		
Sign In	Sign-in address	Provide the email address.
	Password	Provide the password.
Add Contact	Contact email address	Provide the email address.
	Contact's first/last name	Provide the first/last name.
View Contact Profile	Contact email address	Provide the email address.
Send an IM	N/A	N/A
Receive an IM	N/A	N/A
Start Audio Call	N/A	N/A
End Audio Call	N/A	N/A
Sign Out	N/A	N/A

Application Action	Action Parameters	Parameter Description
Skype		
Login	Login email address	Provide the email address.
	User name	Provide the user name.
	Peer email address	Provide the peer email address.
	Peer user name	Provide the peer user name.
	Peer activity message	Provide the message.
Video Call	Login email address	Provide the email address.
	User name	Provide the user name.
	Peer email address	Provide the peer email address.
	Peer user name	Provide the peer user name.
End Video Call	Login email address	Provide the email address.
	User name	Provide the user name.
	Peer email address	Provide the peer email address.
	Peer user name	Provide the peer user name.
Voice Call	Login email address	Provide the email address.
	User name	Provide the user name.
	Peer email address	Provide the peer email address.
	Peer user name	Provide the peer user name.
End Voice Call	Login email address	Provide the email address.
	User name	Provide the user name.

Application Action	Action Parameters	Parameter Description
	Peer email address	Provide the peer email address.
	Peer user name	Provide the peer user name.
Logout	Login email address	Provide the email address.
	User name	Provide the user name.
	Peer email address	Provide the peer email address.
	Peer user name	Provide the peer user name.
	Peer activity message	Provide the message.
SMTP		
Ehlo	N/A	N/A
Auth Login	N/A	N/A
Send Mail	Email subject	Provide the email subject.
	Email content	Provide the email content.
	Number of attachment	Provide the value for the number of attachment.
	Attachment Content	Provide the attachment content.
Quit	N/A	N/A
Social Network		
Login	Login username	Select an option: • **User input** and provide the value. • **Playlist file** - select an option from the drop-down list or use the **Upload** button to upload a file.
	Login password	Select an option: • **User input** and provide the value. • **Playlist file** - select an option from the drop-down list or use the **Upload** button to upload a

Application Action	Action Parameters	Parameter Description
		file.
News feed	N/A	N/A
View Profile	Member ID	Provide the member ID.
Like Post	N/A	N/A
Unlike Post	N/A	N/A
Create Post	Post content	Provide the content.
Comment To Post	Original post ID	Provide the post ID.
	Comment content	Provide the content.
Logout	N/A	N/A
Splunk		
Load Login Page	N/A	N/A
Login	Username	Provide the user name.
	Password	Provide the password.
Upload Log	Description	Provide a description.
	Index	Provide the index.
	Log File	Select an option: • **Synthetic data (bytes)** and set the value. • **Payload profile** - select an option from the drop-down list or use the **Upload** button to upload a file.
Search Log	Index	Provide the index.
Logout	Username	Provide the user name.
Tubi		
Open Tubi Page	N/A	N/A

Application Action	Action Parameters	Parameter Description
Login	Email address	Provide the email address.
	Password	Provide the password.
	User ID	Provide the user ID.
	User name	Provide the user name.
Browse Tubi	Genre	Provide the genre.
Select Movie	Genre	Provide the genre.
	Movie name	Provide the movie name.
	Movie duration	Provide the movie duration.
	Movie description	Provide the movie description.
	Movie director	Provide the movie director.
	Movie release year	Provide the release year.
	Movie actor 1	Provide the movie actor.
	Movie actor 2	Provide the movie actor.
	Movie content ID	Provide the movie content ID.
	Recommended movie name	Provide the recommended movie name.
Play Video	Movie content ID	Provide the movie content ID.
Pause Video	Movie content ID	Provide the movie content ID.
Selet Recommended Movie	Genre	Provide the genre.
	Recommended movie name	Provide the recommended movie name.
	Recommended movie duration	Provide the recommended movie duration.
Logout	N/A	N/A
TWC		
Open The Weather Channel App	N/A	N/A

Application Action	Action Parameters	Parameter Description
View 48 Hours Details	N/A	N/A
View 15 Days Details	N/A	N/A
Swipe to Bottom of Main Page	N/A	N/A
Video Platform		
Login	Login username	Select an option: • **User input** and provide the value. • **Playlist file** - select an option from the drop-down list or use the **Upload** button to upload a file.
	Login password	Select an option: • **User input** and provide the value. • **Playlist file** - select an option from the drop-down list or use the **Upload** button to upload a file.
Search Video	Video name	Provide the video name.
Download video	Downloaded file name	Provide the file name.
	Downloaded file	Select an option: • **Synthetic data (bytes)** and set the value. • **Payload profile** - select an option from the drop-down list or use the **Upload** button to upload a file.
Upload Video	Uploaded file name	Provide the file name.
	Uploaded file	Select an option: • **Synthetic data (bytes)** and set the value. • **Payload profile** - select an option from the drop-down list or use the **Upload** button to upload a file.
Delete Video	N/A	N/A

Application Action	Action Parameters	Parameter Description
Like Video	N/A	N/A
Unlike Video	N/A	N/A
Logout	N/A	N/A
VKontakte		
Load Login page	N/A	N/A
Login	Username	Provide the user name.
	Password	Provide the password.
View Feed	View feed message	Provide the message.
Post Message	Post message	Provide the message.
Logout	N/A	N/A
Yammer		
Select First Group	User email address	Provide the email address.
	User name	Provide the user name.
Select Second Group	User email address	Provide the email address.
Select Third Group	User email address	Provide the email address.
Like an Entry	User email address	Provide the email address.
Reply to a Post	User email address	Provide the email address.
	User name	Provide the user name.
Post New Message	User email address	Provide the email address.
	User name	Provide the user name.
Select Another Group	User email address	Provide the email address.

Application Action	Action Parameters	Parameter Description
YYLive		
Load Home Page	N/A	N/A
Select Category	Category	Provide the category.
Play Video	Video ID	Provide the Video ID.

The difference between Dynamic and Payload files

- If the chosen file is Payload (not Dynamic), the exact contents of the file can be seen on the wire.
- If the chosen file is Dynamic and the file does not contain Macros, then the behavior is the same as above.
- If the chosen file is Dynamic and the file contains Macros, then each Macro is evaluated during the test with the expected value that the Macro is meant to generate.

Artifacts

This section contains useful information and details on Playlist and Macro features.

Rules and Grammar for Playlists

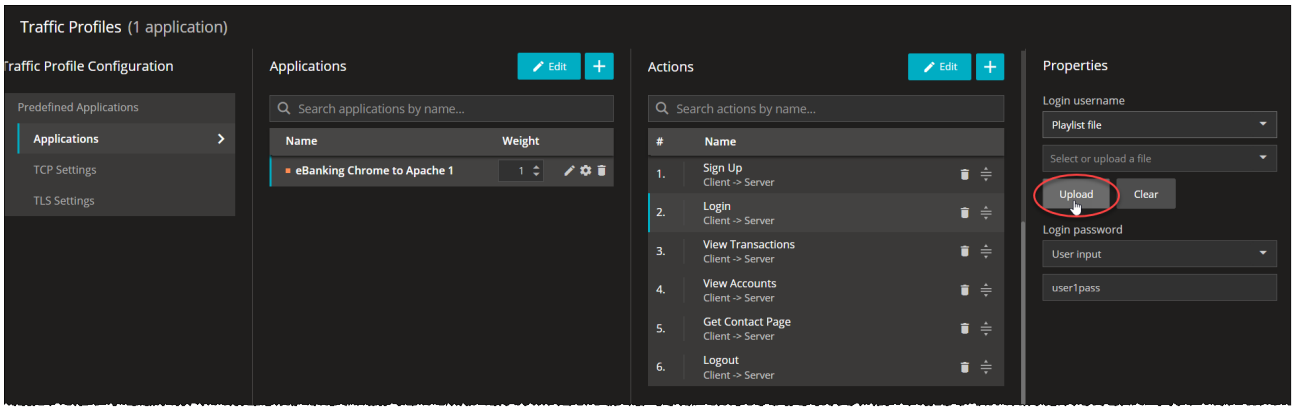
Rules to support comma or double-quotes as a part of a playlist:

1. Each playlist item with comma or double-quote in the content **must** be enclosed within double-quotes.
2. Every double-quote used as a part of the content must be escaped with another double-quote.

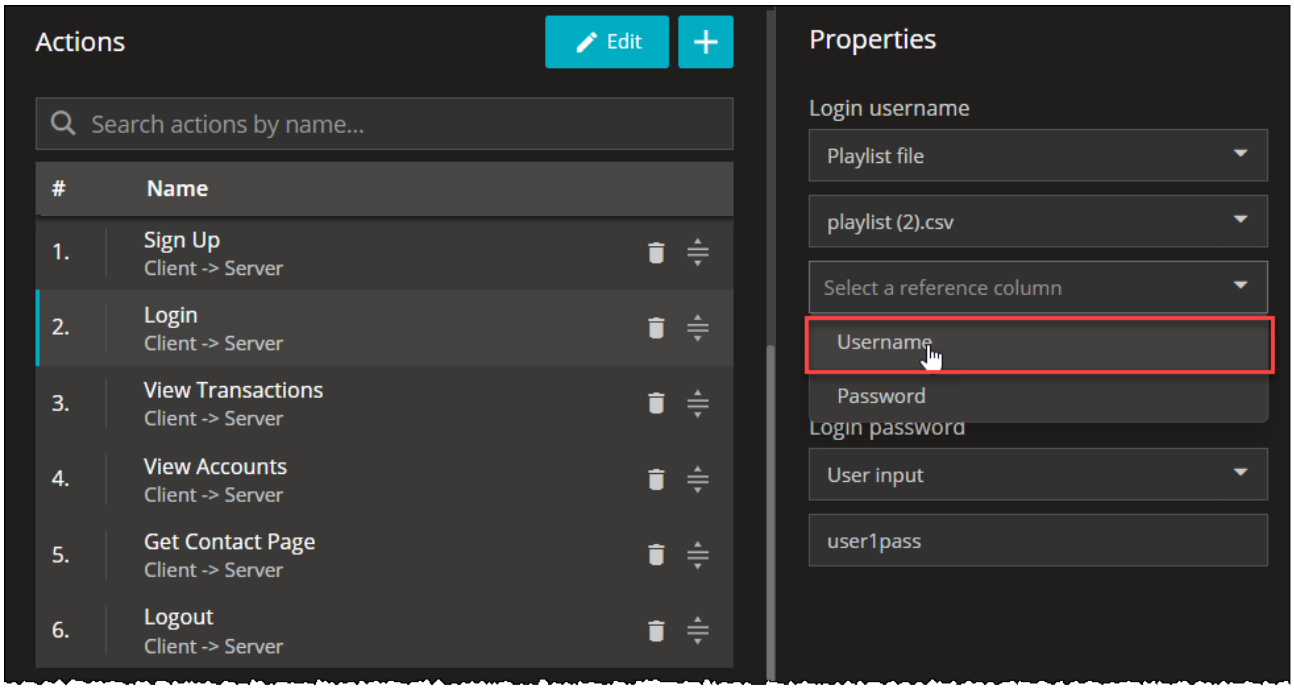
Each record is located on a separate line, delimited by a line break (CRLF). For example: `record = value *(COMMA value)`:

Record	***value 1***	***value 2***
abcd	abcd	
abcd,wxyz	abcd	wxyz
"abcd,pqr","wxyz"	abcd,pqr	wxyz
"abcd,pq""r","wxyz"	abcd,pq"r	wxyz

For all applications that have a **Sign In** or **Sign Up** action, the following parameters offer the possibility of uploading a playlist file: Login Username, Login password or SignUp Username, SignUp password, SignUp confirm password. Select the **Playlist file** option and select the **Upload** option:



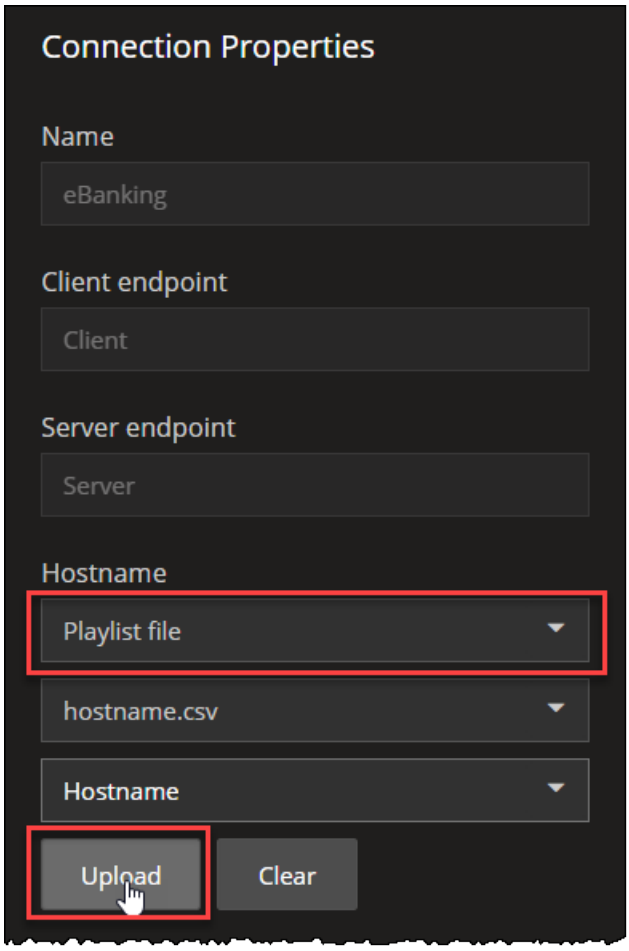
After the upload is performed, the reference column has corresponding csv column names, which can be chosen from the dropdown menu:



For some applications, the Hostname (under **ConnectionProperties**) offers the possibility of uploading a playlist file:

1. Select the **Playlist** file option .
2. Select **Upload**.

3. Choose the **Reference** column name from the drop-down.



Example of a Hostname playlist file:

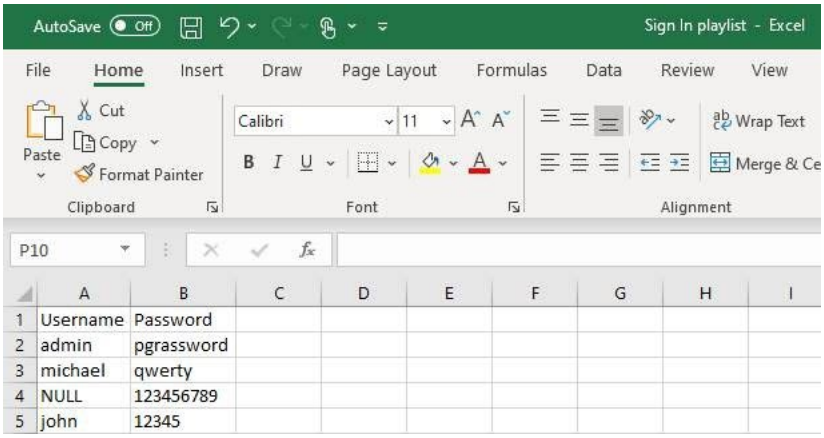
NOTE As of now, we do not validate empty Hostname values, if they are fetched from a playlist file.

	A	B
1	Hostname	
2	server1.com	
3	server2.com	
4	server3.com	
5	server4.com	
6	server5.com	
7	server6.com	
8	server7.com	
9	server8.com	
10	server9.com	
11	server10.com	
12		
13		
14		
15		
16		
17		

hostname(4107)

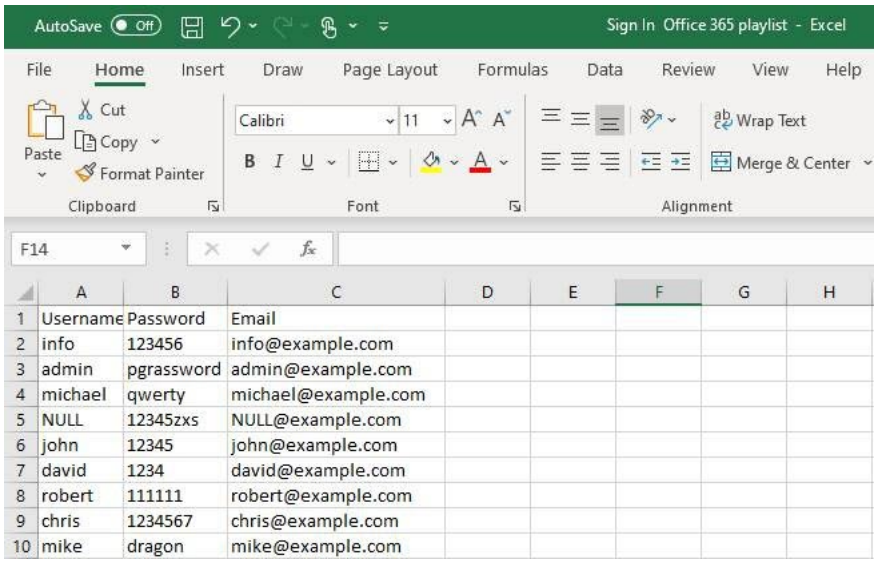
About Playlists

For the **Sign In** action in eBanking, eShop, Social Network, Portal or the **Sign Up** action in eBanking applications, please use this Sign In playlist file:



	A	B	C	D	E	F	G	H	I
1	Username	Password							
2	admin	pgrassword							
3	michael	qwerty							
4	NULL	123456789							
5	john	12345							

For the **Sign In** action in Office 365 (Outlook, Excel, OneDrive) applications , please use this Sign In Office 365 playlist file:



	A	B	C	D	E	F	G	H
1	Username	Password	Email					
2	info	123456	info@example.com					
3	admin	pgrassword	admin@example.com					
4	michael	qwerty	michael@example.com					
5	NULL	12345zxs	NULL@example.com					
6	john	12345	john@example.com					
7	david	1234	david@example.com					
8	robert	111111	robert@example.com					
9	chris	1234567	chris@example.com					
10	mike	dragon	mike@example.com					

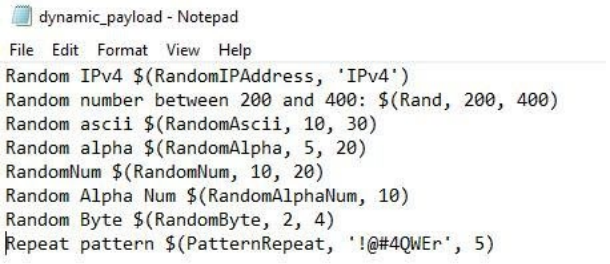
About Macros

A macro is a method or function which allows you to customize the payload text data with the following parameters. The `maxLength` limit is set to 1024:

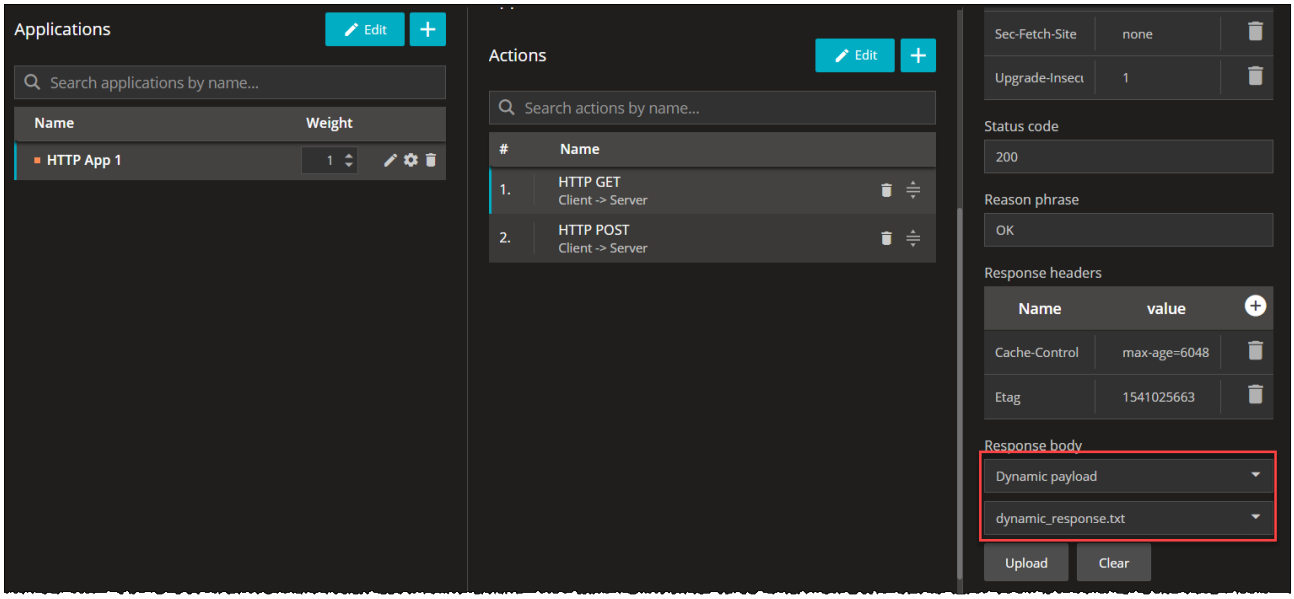
Macros	***Description***
$(RandomIPAddress, 'IPv4')	The **RandomIPAddress** macro randomly generates IPv4 address. IPv6 is not yet supported.
$(Rand, minValue, maxValue)	The **Rand** macro generates one random number within the range [minValue, maxValue]. It takes one or two parameters. Range is 0 – N or N1 – N2.
$(RandomAscii, minLength, maxLength)	The **RandomAscii** macro generates a sequence of random Ascii characters with values in the range: 0-127 minLength and maxLength are numbers. The sequence length is randomly chosen between the 2 values. If only one argument is specified, it is used as a fixed length.
$(RandomAlpha, minLength, maxLength)	The **RandomAlpha** macro generates a sequence of random letters [A-Za-z]. minLength and maxLength are numbers. The sequence length is randomly chosen between the 2 values. If only one argument is specified, it is used as a fixed length.
$(RandomNum, minLength, maxLength)	The **RandomNum** macro generates a sequence of random digits minLength and maxLength are numbers. The sequence length is randomly chosen between the 2 values. If only one argument is specified, it is used as a fixed length.
$(RandomAlphaNum, minLength, maxLength)	The **RandomAlphaNum** macro generates a sequence of random letters or digits [A-Za-z0-9]. minLength and maxLength are numbers. The sequence length is randomly chosen between the 2 values. If only one argument is specified, it is used as a fixed length.

$(RandomByte, minLength, maxLength)	The **RandomByte** macro generates a sequence of random bytes. minLength and maxLength are numbers. The sequence length is randomly chosen between the 2 values. If only one argument is specified, it is used as a fixed length.
$(PatternRepeat, pattern, minLength, maxLength)	The **PatternRepeat** macro generates a sequence of characters by repeating the <pattern> pattern. minLength and maxLength are numbers. The sequence length is randomly chosen between the 2 values. If only one argument is specified, it is used as a fixed length. If the chosen length is not an exact multiple of the length of <pattern>, the last repetition of <pattern> is truncated.

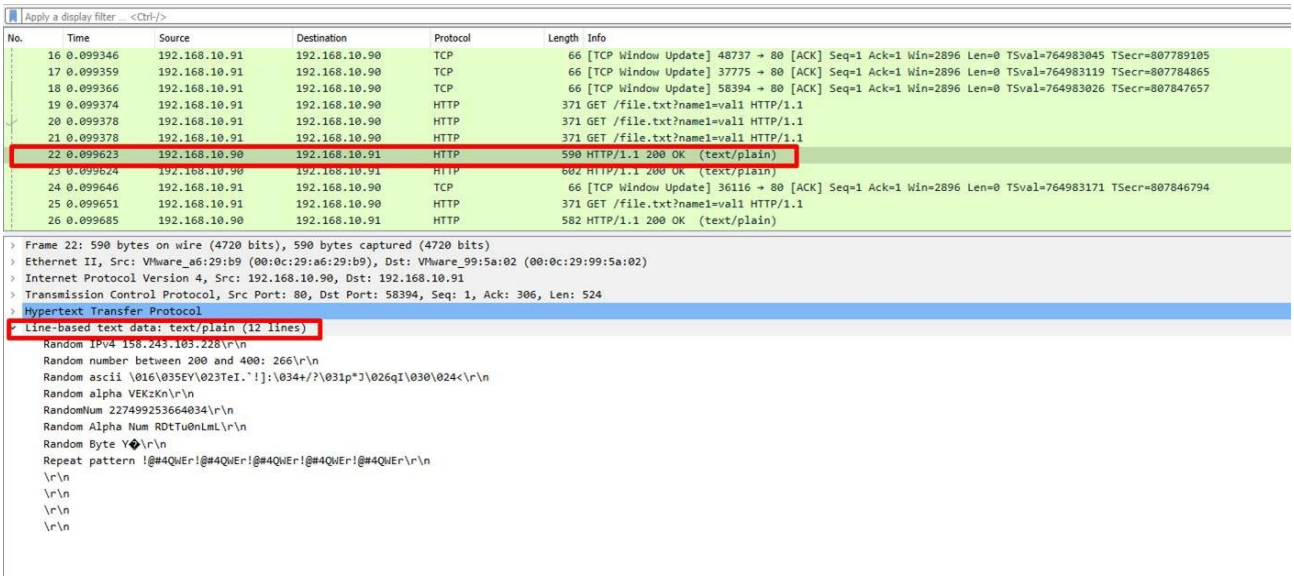
The following is the macro file structure, and please use this macros file for the correct file format:



This feature is also available for the HTTP application, on both HTTP GET and HTTP POST actions, under the following parameters: Response body/Response body. Switch to the dynamic payload and upload the `dynamic_payload` file:



Assign the agents, enable capture and start the test. After the test is finished, download the captured information and you can see the payload, as set in the macro file:


Apply a display filter ... <Ctrl-/>
No. Time Source Destination Protocol Length Info
16 0.099346 192.168.10.91 192.168.10.90 TCP 66 [TCP Window Update] 48737 → 80 [ACK] Seq=1 Ack=1 Win=2896 Len=0 TSval=764983045 TSecr=807789105
17 0.099359 192.168.10.91 192.168.10.90 TCP 66 [TCP Window Update] 37775 → 80 [ACK] Seq=1 Ack=1 Win=2896 Len=0 TSval=764983119 TSecr=807784865
18 0.099366 192.168.10.91 192.168.10.90 TCP 66 [TCP Window Update] 58394 → 80 [ACK] Seq=1 Ack=1 Win=2896 Len=0 TSval=764983026 TSecr=807847657
19 0.099374 192.168.10.91 192.168.10.90 HTTP 371 GET /file.txt?name1=val1 HTTP/1.1
20 0.099378 192.168.10.91 192.168.10.90 HTTP 371 GET /file.txt?name1=val1 HTTP/1.1
21 0.099378 192.168.10.91 192.168.10.90 HTTP 371 GET /file.txt?name1=val1 HTTP/1.1
22 0.099623 192.168.10.90 192.168.10.91 HTTP 590 HTTP/1.1 200 OK (text/plain)
23 0.099624 192.168.10.90 192.168.10.91 HTTP 602 HTTP/1.1 200 OK (text/plain)
24 0.099646 192.168.10.91 192.168.10.90 TCP 66 [TCP Window Update] 36116 → 80 [ACK] Seq=1 Ack=1 Win=2896 Len=0 TSval=764983171 TSecr=807846794
25 0.099651 192.168.10.91 192.168.10.90 HTTP 371 GET /file.txt?name1=val1 HTTP/1.1
26 0.099685 192.168.10.90 192.168.10.91 HTTP 582 HTTP/1.1 200 OK (text/plain)
Frame 22: 590 bytes on wire (4720 bits), 590 bytes captured (4720 bits)
Ethernet II, Src: VMware_a6:29:b9 (00:0c:29:a6:29:b9), Dst: VMware_99:5a:02 (00:0c:29:99:5a:02)
Internet Protocol Version 4, Src: 192.168.10.90, Dst: 192.168.10.91
Transmission Control Protocol, Src Port: 80, Dst Port: 58394, Seq: 1, Ack: 306, Len: 524
Hypertext Transfer Protocol
Line-based text data: text/plain (12 lines)
Random IPv4 158.243.103.228\r\n
Random number between 200 and 400: 266\r\n
Random ascii \016\035EY\023TeI.^!]:\034+/?\031p*J\026qI\030\024<\r\n
Random alpha VEKzKn\r\n
RandomNum 227499253664034\r\n
Random Alpha Num RDtTu0nLmL\r\n
Random Byte Y\r\n
Repeat pattern !@#4QWEr!@#4QWEr!@#4QWEr!@#4QWEr!@#4QWEr\r\n
\r\n
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