

QualNet 6.1

Statistics Database User's Guide

September 2012



Scalable Network Technologies, Inc.

6100 Center Drive, Suite 1250
Los Angeles, CA 90045

Phone: 310-338-3318
Fax: 310-338-7213

<http://www.scalable-networks.com>

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6100 Center Drive, Suite 1250
Los Angeles, CA 90045
Phone: 310-338-3318
Fax: 310-338-7213

<http://www.scalable-networks.com>

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Preface

Who Should Read this Guide

QualNet 6.1 Statistics Database User's Guide describes the tables in the QualNet statistics database and how to generate and view them.

QualNet Document List

The following table shows the QualNet Documentation Set and offers a brief description of each document.

Document	Description
<i>QualNet API Reference Guide</i>	This guide is a supplement to <i>QualNet Programmer's Guide</i> and provides detailed information on the QualNet API functions and parameters. This is available in both PDF and HTML formats.
<i>QualNet Distributed Reference Guide</i>	This guide provides instructions for running QualNet on a distributed architecture.
<i>QualNet Documentation Portfolio</i>	The documentation portfolio combines all QualNet documents in a single PDF file.
<i>QualNet Installation Guide</i>	This guide provides detailed steps for installing QualNet on Windows and Linux/Mac platforms.

Document	Description
<i>QualNet Model Libraries</i>	This set of documents contains detailed reference information on all QualNet models and includes the following protocol libraries. See <i>QualNet Model Library Index</i> for an alphabetical list of all our models and a reference to which library they can be found in. Advanced Wireless Cellular Developer LTE Multimedia and Enterprise Sensor Networks Standard Interfaces TIREM Advanced Propagation UMTS Urban Propagation Wireless
<i>QualNet Product Tour</i>	This tour provides an introduction to QualNet by means of an example.
<i>QualNet Programmer's Guide</i>	This is a guide to the QualNet programming interface and functions, allowing users to develop and customize protocol models.
<i>QualNet Release Notes</i>	This document lists the changes (added and removed features, bug fixes, etc.) made in the current version of QualNet with respect to the previous version.
<i>QualNet Statistics Database User's Guide</i>	This is a guide to the statistics database generated by QualNet.
<i>QualNet User's Guide</i>	This is a detailed guide for using <i>QualNet</i> and works in combination with the <i>QualNet Model Libraries</i> set of documents.

Document Conventions

QualNet documents use the following conventions:

Convention	Description
<i>Book Title</i>	Title of a document.
Command Input	A command name or qualified command phrase, daemon, file, or option name.
Command Output	Text displayed by the computer.
Note: or Notes:	Information of special interest.
[]	In syntax definitions, square brackets indicate items that are optional.
Code Segment	Segment of code from QualNet source files used for illustration.
Added Code	Example of code that the user should add to existing QualNet functions and declarations to add a custom model to QualNet. A vertical margin in the left column indicates new lines of code that need to be added.
Ellipses (. . .)	Ellipses are used to indicate lines of code from QualNet source files that have been omitted from an example for the sake of brevity.

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More Information

- For general information about SCALABLE, visit the company website at www.scalable-networks.com.
- For more information on QualNet, please contact QualNet Sales at sales@scalable-networks.com or visit the QualNet website at www.scalable-networks.com.
- For technical help on QualNet, please contact QualNet Support at support@scalable-networks.com or visit our Support website at support.scalable-networks.com.
- For help on QualNet documentation, please contact QualNet Support at support@scalable-networks.com or visit the QualNet website at www.scalable-networks.com and click on Documentation.

1 Introduction

At the end of an experiment, QualNet generates a statistics file (with extension “.stat”) containing information for analyzing behavior of protocols, network performance, etc. The statistics file is a plain text file that can be opened by using any text editor. It can also be viewed graphically using the QualNet Analyzer. See *QualNet User’s Guide* for the syntax of the output file.

Besides the statistics file, QualNet also provides for the generation of several statistics tables in a statistics database. These tables contain information in much finer detail than in the statistics file. The user can specify which tables are generated and can configure the information contained in each table. This chapter describes the statistics tables and the parameters to configure them.

1.1 Generating Statistics Tables

QualNet uses SQLite and MySQL 5.0 to generate the statistics database.

SQLite is a C library that implements a self-contained, embeddable, zero-configuration SQL database engine. By default, QualNet uses SQLite for database operations. SQLite is ideal for small databases and sequential operation. For details on SQLite, go to <http://www.sqlite.org>.

MySQL must be used when running QualNet in parallel mode. MySQL can be found at <http://www.mysql.com>. Note that MySQL must be available on the machine that will be used to compile QualNet. Likewise, MySQL must be properly licensed for the installation. See the MySQL website for more information.

If the user enables statistics database generation (see [Section 3.1](#) and [Section 3.2](#)), then QualNet creates statistics tables in a database. If the simulation uses SQLite, the database file is created in the directory from where QualNet is run and is named after the `EXPERIMENT-NAME` parameter in the scenario configuration (.config) file and the date and time of the run. If MySQL is used, a new logical database is created for each run within MySQL.

If MySQL is used to generate the database, the database is named using the following convention:

`<experiment-name>_<date>_<time>`

If SQLite is used to generate the database, the database is named using the following convention:

`<experiment-name>_<date>_<time>.sqlite`

where

`<experiment-name>` Experiment name (value of the EXPERIMENT-NAME parameter)

`<date>` Date of the run (year, month, day) in YYYYMMDD format

`<time>` Time of the run (hour, minutes, seconds) in HHMMSS format

Example

If the EXPERIMENT-NAME parameter is set to “myscenario” and the simulation run began at 1:58:22 P.M. on September 2nd, 2007, then a database with the name “myscenario_20070902_135822” is created if MySQL is used. The name of the database is “myscenario_20070902_135822.sqlite” if SQLite is used.

The user can specify which statistics tables are to be generated and the information to be included in each table by means of configuration parameters (see [Section 3.1](#) and [Section 3.2](#)).

1.1.1 Installing and Configuring MySQL

To install and configure MySQL on your system, perform the following steps:

1. Install MySQL 5.0 or later available from <http://www.mysql.com>. Note the installation directory.

Note: The statistics database functionality is not compatible with MySQL 4.x.

2. Add a user to MySQL as follows (and note the ' tick marks around your username and '%' character).
 - a. Open a command window and type the following command (modify the command to match the MySQL installation directory):

```
mysql -u root --socket=/tmp/mysql.sock
```

- b. Open a MySQL shell by typing the following command:

```
mysql
```

- c. In the MySQL shell, enter the following command:

```
GRANT ALL PRIVILEGES ON *.* TO '<user>'@'localhost' IDENTIFIED BY
'<pass>';
```

Notes: 1. To use the database remotely, enter the following command as well:

```
GRANT ALL PRIVILEGES ON *.* TO '<user>'@'%' IDENTIFIED BY
'<pass>';
```

2. On a Windows system, the IDENTIFIED BY ' <pass>' clause may have to be replaced by IDENTIFIED BY PASSWORD(' <pass>') or OLD_PASSWORD(' <pass>'), depending on the installation.

3. Test that the installation works using the `mysql> show databases` command as below:

```
mysql> show databases;
+-----+
| Database                |
+-----+
| information_schema      |
| SRW1b20080821_111335   |
| SRW1b20080821_111424   |
| mysql                   |
| test                    |
+-----+
5 rows in set (0.00 sec)
mysql>
```

4. In the scenario configuration (.config) file, include the following parameters for your username and password for MySQL on that host. See [Section 3.1.2](#) for details.

```
STATS-DB-USERNAME <user>
STATS-DB-PASSWORD <pass>
STATS-DB-SERVER <SQL-server>
GESTALT-USE-WORKER-THREAD YES
```

Troubleshooting Tips

- If you cannot connect to MySQL, first ensure that the service is installed on the local machine. This can be done by reviewing the process list in the Task Manager (in Windows) or by using the `ps` command (in UNIX).
- It is recommended that MySQL be configured using the `mysql.ini` file to support extremely large simulations (refer to the MySQL documentation for the location of the `mysql.ini` file on different platforms). Enter the following lines in the `mysql.ini` file:

```
[mysqld]
max_allowed_packet = 32000000;
wait_timeout = 129600;
```

Alternatively, enter the following commands in the MySQL shell:

```
set max_allowed_packet = 32000000;
set wait_timeout = 129600;
```

1.1.2 Performance Considerations

There are a number of different considerations which effect performance. Recommendations are as follows:

- Single machine, single processor: SQLite, no worker thread, sequential mode.
- Database server and single machine, single processor: MySQL, no worker thread, sequential mode.
- Parallel machine, N processors, SQLite or MySQL, worker threads $M=N-1$ partitions.
- Database server, N processors, MySQL, worker threads $M=N-1$ partitions or no worker thread $M=N$ partitions.
- Cluster machine, single processor per machine, database server, MySQL.

- Cluster machine, $n=2+$ processors per machine, database server, MySQL, worker threads $M=N-1$ partitions, suggest multiprocessor SQL database server.

Note: SQLite can behave incorrectly or fail entirely when the database file is stored on an NFS partition. Avoid placing database files on NFS partitions when using SQLite3

1.2 Viewing Statistics Tables

Any database software can be used to open the generated database. We recommend the following database viewers:

- SQLite Database Browser. This software can be downloaded from <http://sqlitebrowser.sourceforge.net>.
- SQLite Analyzer: This software can be downloaded from http://www.kraslabs.com/sqlite_analyzer.php.
- OpenXPSuite: This software can be downloaded from <http://www.osenxpsuite.net/?xp=3>.
- SQLiteManager: This software can be downloaded from <http://www.sqlabs.net>.
- MySQL Query Browser: This software can be downloaded from <http://www.mysql.com>.

1.3 Model Supported by Statistics Database

The models listed in [Table 1-1](#) input statistics into various scenario statistics database tables (see [Section 2.1](#)).

TABLE 1-1. Models that Input Data into Scenario Statistics Database Tables

Model	Library
802.3 LAN/Ethernet	Developer
802.11 MAC Protocol	Wireless
802.11a/g PHY Model	Wireless
802.11b PHY Model	Wireless
Abstract Link MAC	Developer
Abstract PHY Model	Wireless
Automatic Model Selection	Urban Propagation
Constant Bit Rate (CBR) Traffic Generator	Developer
Detailed Switch Model	Multimedia and Enterprise
File Transfer Protocol (FTP)	Developer
File Transfer Protocol/Generic (FTP/Generic)	Developer
Forward_App	N/A
HyperText Transfer Protocol (HTTP)	Developer
Internet Group Management Protocol (IGMP)	Developer
Internet Protocol version 4 (IPv4)	Developer
Long Term Evolution (LTE) Layer 2 Model	LTE
Long Term Evolution (LTE) PHY Model	LTE

TABLE 1-1. Models that Input Data into Scenario Statistics Database Tables (Continued)

Model	Library
Microwave Links	Wireless
Multi-Generator (MGEN) Toolset*	Military Radios
Multicast Constant Bit Rate (MCBR) Traffic Generator	Developer
Multicast Extensions to OSPF (MOSPF)	Multimedia and Enterprise
Open Shortest Path First version 2 (OSPFv2) Routing Protocol	Multimedia and Enterprise
Protocol Independent Multicast Protocol: Dense Mode (PIM-DM) and Sparse Mode (PIM-SM)	Multimedia and Enterprise
Super Application Traffic Generator	Developer
Traffic Generator (Traffic-Gen)	Developer
Transmission Control Protocol (TCP)	Developer
User Datagram Protocol (UDP)	Developer
Variable Bit Rate (VBR) Traffic Generator	Developer
Voice over Internet Protocol (VoIP)	Multimedia and Enterprise

*** Subject to export restriction under the International Traffic in Arms Regulations (ITAR) 22 CFR 120-130. International sales of these modules require authorization from the US Department of State.**

In addition to the scenario statistics database tables, some models also input data into model-specific statistics tables (see [Section 2.2](#)). These models are listed in [Table 1-2](#).

TABLE 1-2. Models that Generate Model-specific Tables

Model	Library
Automatic Model Selection	Urban Propagation
Internet Group Management Protocol (IGMP)	Developer
Multicast Extensions to OSPF (MOSPF)	Multimedia and Enterprise
Open Shortest Path First version 2 (OSPFv2) Routing Protocol	Multimedia and Enterprise
Protocol Independent Multicast Protocol: Dense Mode (PIM-DM) and Sparse Mode (PIM-SM)	Multimedia and Enterprise

1.4 Conventions Used

1.4.1 Format for Command Line Configuration

This section describes the general format for specifying parameters in input files, the precedence rules for parameters, and the conventions used in the description of command line configuration for each model.

1.4.1.1 General Format of Parameter Declaration

The general format for specifying a parameter in an input file is:

```
[<Qualifier>] <Parameter Name> [<Index>] <Parameter Value>
```

where

<Qualifier>

The qualifier is optional and defines the scope of the parameter declaration. The scope can be one of the following: Global, Node, Subnet, and Interface. Multiple instances of a parameter with different qualifiers can be included in an input file. Precedence rules (see [Section 1.4.1.2](#)) determine the parameter value for a node or interface.

Global: The parameter declaration is applicable to the entire scenario (to all nodes and interfaces), subject to precedence rules. The scope of a parameter declaration is global if the qualifier is not included in the declaration.

Example:

```
MAC-PROTOCOL          MACDOT11
```

Node: The parameter declaration is applicable to specified nodes, subject to precedence rules. The qualifier for a node-level declaration is a list of space-separated node IDs or a range of node IDs (specified by using the keyword `thru`) enclosed in square brackets.

Example:

```
[5 thru 10] MAC-PROTOCOL          MACDOT11
```

Subnet: The parameter declaration is applicable to all interfaces in specified subnets, subject to precedence rules. The qualifier for a subnet-level declaration is a space-separated list of subnet addresses enclosed in square brackets. A subnet address can be specified in the IP dot notation or in the EXata N syntax.

Example:

```
[N8-1.0 N2-1.0] MAC-PROTOCOL          MACDOT11
```

Interface: The parameter declaration is applicable to specified interfaces. The qualifier for an interface-level declaration is a space-separated list of subnet addresses enclosed in square brackets.

Example:

```
[192.168.2.1 192.168.2.4] MAC-PROTOCOL          MACDOT11
```

<Parameter Name>

Name of the parameter.

<Index>	Instance of the parameter to which this parameter declaration is applicable, enclosed in square brackets. This should be in the range 0 to $n-1$, where n is the number of instances of the parameter. The instance specification is optional in a parameter declaration. If an instance is not included, then the parameter declaration is applicable to all instances of the parameter, unless otherwise specified.
<Parameter Value>	Value of the parameter.

Note: There should be at least one space between the qualifier and the parameter name.
There should not be any spaces between the parameter name and the index.

Examples of parameter declarations in input files are:

PHY-MODEL	PHY802.11b
[1] PHY-MODEL	PHY802.11a
[N8-1.0] PHY-RX-MODEL	BER-BASED
[8 thru 10] ROUTING-PROTOCOL	RIP
[192.168.2.1 192.168.2.4] MAC-PROTOCOL	GENERICMAC
NODE-POSITION-FILE	./default.nodes
PROPAGATION-CHANNEL-FREQUENCY [0]	2.4e9
[1 2] QUEUE-WEIGHT [1]	0.3

Note In the rest of this document, we will not use the qualifier or the index in a parameter's description. Users should use a qualifier and/or index to restrict the scope of a parameter, as appropriate.

1.4.1.2 Precedence Rules

Parameters without Instances

If the parameter declarations do not include instances, then the following rules of precedence apply when determining the parameter values for specific nodes and interfaces:

Interface > Subnet > Node > Global

This can be interpreted as follows:

- The value specified for an interface takes precedence over the value specified for a subnet, if any.
- The value specified for a subnet takes precedence over the value specified for a node, if any.
- The value specified for a node takes precedence over the value specified for the scenario (global value), if any.

Parameters with Instances

If the parameter declarations are a combination of declarations with and without instances, then the following precedence rules apply (unless otherwise stated):

Interface[i] > Subnet[i] > Node[i] > Global[i] > Interface > Subnet > Node > Global

This can be interpreted as follows:

- Values specified for a specific instance (at the interface, subnet, node, or global level) take precedence over values specified without the instance.

- For values specified for the same instance at different levels, the following precedence rules apply:
 - The value specified for an interface takes precedence over the value specified for a subnet, if any, if both declarations are for the same instance.
 - The value specified for a subnet takes precedence over the value specified for a node, if any, if both declarations are for the same instance.
 - The value specified for a node takes precedence over the value specified for the scenario (global value), if any, if both declarations are for the same instance.

1.4.1.3 Parameter Description Format

In this guide, most parameters are described using a tabular format described below. The parameter description tables have three columns labeled “Parameter”, “Value”, and “Description”. [Table 1-3](#) shows the format of parameter tables. [Table 1-5](#) shows examples of parameter descriptions in this format.

TABLE 1-3. Parameter Table Format

Parameter	Value	Description
<Parameter Name>	<Type>	<Description>
[<Dependency>]	[<Range>]	
<Designation>	[<Default Value>]	
<Scope>	[<Unit>]	
[<Instances>]		

Parameter Column

The first column contains the following entries:

- **<Parameter Name>**: The first entry is the parameter name (this is the exact name of the parameter to be used in the input files).
- **<Dependency>**: This entry specifies the condition for the parameter to be included in the input file. Usually, the condition is some other parameter being set to a certain value). If the only condition for including the parameter is to select the model, then this entry is omitted.

Examples of dependencies are:

Dependency: MAC-DOT-11-ASSOCIATION = DYNAMIC

Dependency: ANTENNA-MODEL-TYPE \neq OMNIDIRECTIONAL

- **<Designation>**: This entry can be *Optional* or *Required*. These terms are explained below.
 - **Optional**: This indicates that the parameter is optional and may be omitted from the configuration file. (If applicable, the default value for this parameter is included in the second column.)
 - **Required**: This indicates that the parameter is mandatory and must be included in the configuration file.

Note: The parameter designation is relative to the dependency. For example, if a parameter must be included if some condition is true, then the condition is listed in the <Dependency> field and the parameter designation is set to *Required*.

- **<Scope>**: This entry specifies the possible scope of the parameter, i.e., if the parameter can be specified at the global, node, subnet, or interface levels. Any combination of these levels is possible. If the parameter can be specified at all four levels, the keyword “All” is used to indicate that.

Examples of scope specification are:

Scope: All

Scope: Subnet, Interface

Scope: Global, Node

- **<Instances>**: If the parameter can have multiple instances, this entry indicates the type of index. If the parameter can not have multiple instances, then this entry is omitted.

Examples of instance specification are:

Instances: channel number

Instances: interface index

Instances: queue index

Value Column

The second column contains the following information:

- **<Type>**: The first entry is the parameter type and can be one of the following: Integer, Real, String, Time, Filename, IP Address, Coordinates, Node-list, or List. If the type is a List, then all possible values in the list are enumerated below the word “List”.

Table 1-4 shows the values a parameter can take for each type.

TABLE 1-4. Parameter Types

Type	Description
Integer	Integer value Examples: 2, 10
Real	Real value Examples: 15.0, -23.5
String	String value Examples: TEST, SWITCH1
Time	Time value expressed in EXata time syntax (refer to <i>QualNet User's Guide</i>) Examples: 1.5S, 200MS, 10US
List	One of the enumerated values. Example: See the parameter MOBILITY in Table 1-5.
Filename	Name of a file in EXata filename syntax (refer to <i>QualNet User's Guide</i>) Examples: <div> <div>../data/terrain/los-angeles-w</div> <div>(For Windows and UNIX)</div> </div> <div> <div>C:\snt\qualnet\6.1\scenarios\WF\WF.nodes</div> <div>(For Windows)</div> </div> <div> <div>/root/snt/qualnet/6.1/scenarios/WF/WF.nodes</div> <div>(For UNIX)</div> </div>

TABLE 1-4. Parameter Types (Continued)

Type	Description
Path	Path to a directory in EXata path syntax (see <i>QualNet User's Guide</i>) Examples: <div style="display: flex; justify-content: space-between;"> ../../../../data/terrain (For Windows and UNIX) </div> <div style="display: flex; justify-content: space-between;"> C:\snt\qualnet\6.1\scenarios\WF (For Windows) </div> <div style="display: flex; justify-content: space-between;"> /root/snt/qualnet/6.1/scenarios/WF (For UNIX) </div>
IP Address	IPv4 or IPv6 address Examples: 192.168.2.1, 2000:0:0:0::1
IPv4 Address	IPv4 address Examples: 192.168.2.1
IPv6 Address	IPv6 address Examples: 2000:0:0:0::1
Coordinates	Coordinates in Cartesian or Lat-Lon-Alt system. The altitude is optional. Examples: (100, 200, 2.5), (-25.3478, 25.28976)
Node-list	List of node IDs separated by commas and enclosed in "{" and "}". Examples: {2, 5, 10}, {1, 3 thru 6}

- **<Range>**: This is an optional entry and is used if the range of values that a parameter can take is restricted. The permissible range is listed after the label "*Range*:" The range can be specified by giving the minimum value, the maximum value, or both. If the range of values is not restricted, then this entry is omitted.

If both the minimum and maximum values are specified, then the following convention is used to indicate whether the minimum and maximum values are included in the range:

(min, max)	$\min < \text{parameter value} < \max$
[min, max)	$\min \leq \text{parameter value} < \max$
(min, max]	$\min < \text{parameter value} \leq \max$
[min, max]	$\min \leq \text{parameter value} \leq \max$

min (or max) can be a parameter name, in which case it denotes the value of that parameter.

Examples of range specification are:

Range: ≥ 0
Range: (0.0, 1.0]
Range: [1, MAX-COUNT]
Range: [1S, 200S]

Note: If an upper limit is not specified in the range, then the maximum value that the parameter can take is the largest value of the type (integer, real, time) that can be stored in the system.

- **<Default>**: This is an optional entry which specifies the default value of an optional or conditional-optional parameter. The default value is listed after the label “*Default:*”
- **<Unit>**: This is an optional entry which specifies the unit for the parameter, if applicable. The unit is listed after the label “*Unit:*”. Examples of units are: meters, dBm, slots.

Description Column

The third column contains a description of the parameter. The significance of different parameter values is explained here, where applicable. In some cases, references to notes, other tables, sections in the User’s Guide, or to other documents may be included here.

Table 1-5 shows examples of parameter descriptions using the format described above.

TABLE 1-5. Example Parameter Table

Parameter	Values	Description
MOBILITY <i>Optional</i>	List: <ul style="list-style-type: none"> • NONE • FILE • GROUP-MOBILITY • RANDOM-WAYPOINT <i>Default:</i> NONE	Mobility model used for the node. If MOBILITY is set to NONE, then the nodes remain fixed in one place for the duration of the simulation. See Table 7-11 for a description of mobility models.
BACKOFF-LIMIT <i>Dependency:</i> USE-BACKOFF = YES <i>Required</i>	Integer <i>Unit:</i> slots	Upper limit of backoff interval after collision. A backoff interval is randomly chosen between 1 and this number following a collision.
IP-QUEUE-PRIORITY-QUEUE-SIZE <i>Default:</i> NO <i>Instances:</i> queue index	Integer <i>Unit:</i> bytes	Size of the output priority queue.
MAC-DOT11-DIRECTIONAL-ANTENNA-MODE <i>Default:</i> NO	List <ul style="list-style-type: none"> • YES • NO <i>Default:</i> NO	Indicates whether the radio is to use a directional antenna for transmission and reception.

1.4.2 Format for GUI Configuration

The GUI configuration section for a model outlines the steps to configure the model using the GUI. The following conventions are used in the GUI configuration sections:

Path to a Parameter Group

As a shorthand, the location of a parameter group in a properties editor is represented as a path consisting of the name of the properties editor, name of the tab within the properties editor, name of the parameter group within the tab (if applicable), name of the parameter sub-group (if applicable), and so on.

Example

The following statement:

Go to **Default Device Properties Editor > Interfaces > Interface # > MAC Layer**

is equivalent to the following sequence of steps:

1. Open the Default Device Properties Editor for the node.
2. Click the **Interfaces** tab.
3. Expand the applicable Interface group.
4. Click the **MAC Layer** parameter group.

The above path is shown in [Figure 1-1](#).

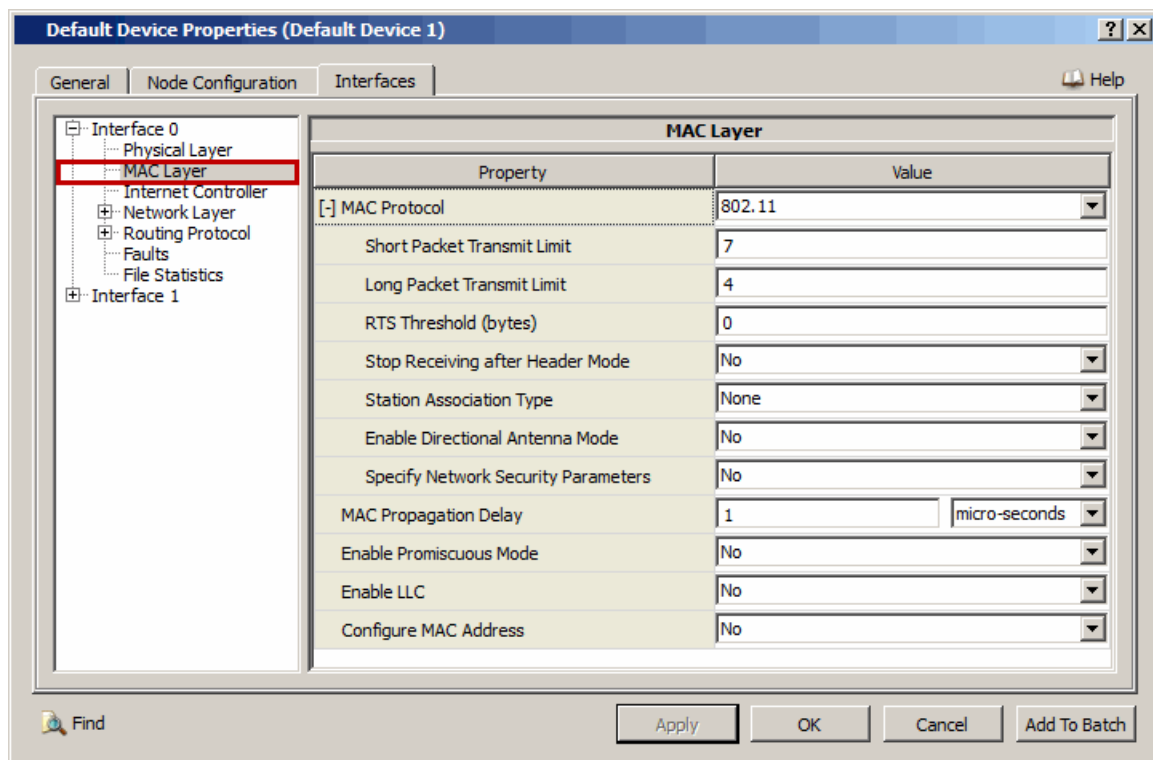


FIGURE 1-1. Path to a Parameter Group

Path to a Specific Parameter

As a shorthand, the location of a specific parameter within a parameter group is represented as a path consisting of all ancestor parameters and their corresponding values starting from the top-level parameter. The value of an ancestor parameter is enclosed in square brackets after the parameter name.

Example

The following statement:

Set **MAC Protocol** [= 802.11] > **Station Association Type** [= Dynamic] > **Set Access Point** [= Yes] > **Enable Power Save Mode** to Yes

is equivalent to the following sequence of steps:

1. Set **MAC Protocol** to 802.11.
2. Set **Station Association Type** to Dynamic.
3. Set **Set Access Point** to Yes.
4. Set **Enable Power Save Mode** to Yes.

The above path is shown in [Figure 1-2](#).

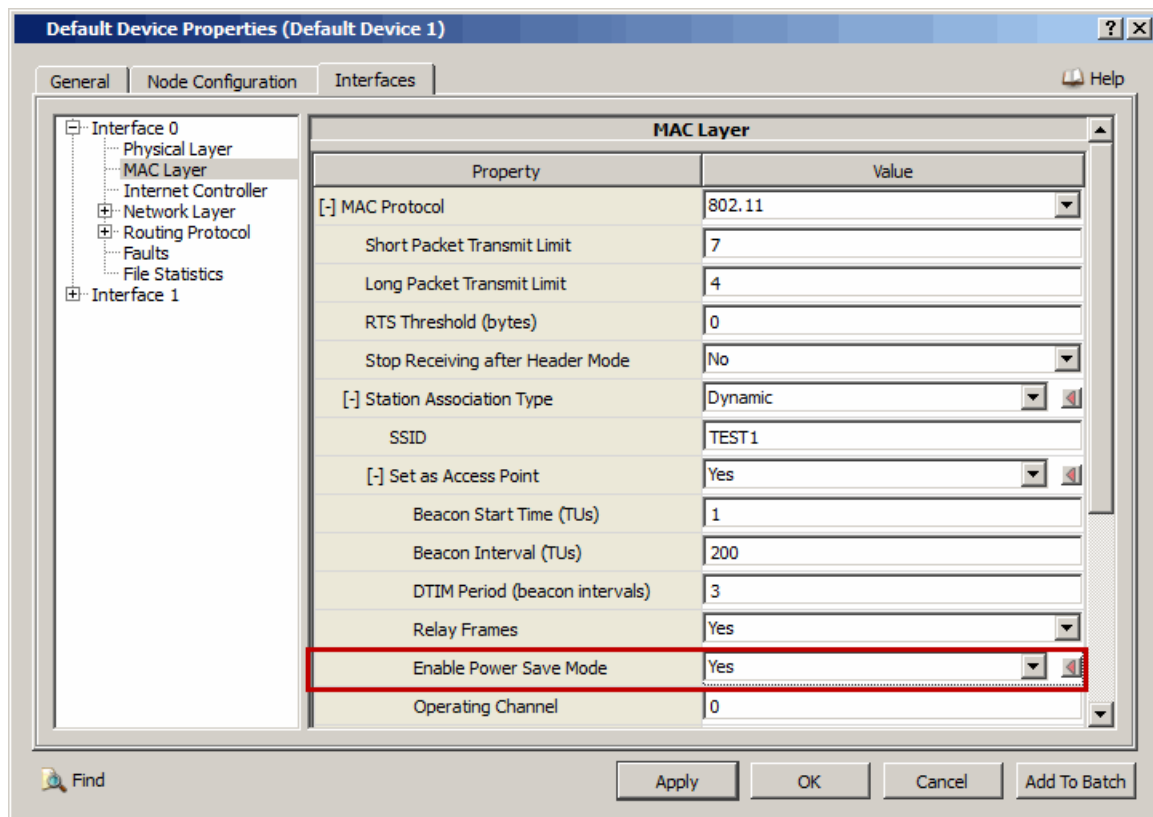


FIGURE 1-2. Path to a Specific Parameter

Parameter Table

GUI configuration of a model is described as a series of a steps. Each step describes how to configure one or more parameters. Since the GUI display name of a parameter may be different from the name in the configuration file, each step also includes a table that shows the mapping between the GUI names and command line names of parameters configured in that step. For a description of a GUI parameter, see the description of the equivalent command line parameter in the command line configuration section.

The format of a parameter mapping table is shown in [Table 1-6](#).

TABLE 1-6. Mapping Table

GUI Parameter	Scope of GUI Parameter	Command Line Parameter
<i><GUI Display Name></i>	<i><Scope></i>	<i><Command Line Parameter Name></i>

The first column, labeled “GUI Parameter”, lists the name of the parameter as it is displayed in the GUI.

The second column, labeled “Scope of GUI Parameter”, lists the level(s) at which the parameter can be configured. <Scope> can be any combination of: Global, Node, Subnet, Wired Subnet, Wireless Subnet, Point-to-point Link, and Interface.

Table 1-7 lists the Properties Editors where parameters with different scopes can be set.

- Notes:**
1. Unless otherwise stated, the “Subnet” scope refers to “Wireless Subnet”.
 2. The scope column can also refer to Properties Editors for special devices and network components (such as ATM Device Properties Editor) which are not included in Table 1-7.

TABLE 1-7. Properties Editors for Different Scopes

Scope of GUI Parameter	Properties Editor
Global	Scenario Properties Editor
Node	Default Device Properties Editor (General and Node Configuration tabs)
Subnet Wireless Subnet	Wireless Subnet Properties Editor
Wired Subnet	Wired Subnet Properties Editor
Point-to-point Link	Point-to-point Link Properties Editor
Interface	Interface Properties Editor, Default Device Properties Editor (Interfaces tab)

The third column, labeled “Command Line Parameter”, lists the equivalent command line parameter.

Note: For some parameters, the scope may be different in command line and GUI configurations (a parameter may be configurable at fewer levels in the GUI than in the command line).

Table 1-8 is an example of a parameter mapping table.

TABLE 1-8. Example Mapping Table

GUI Parameter	Scope of GUI Parameter	Command Line Parameter
Define Area	Node	OSPFv2-DEFINE-AREA
OSPFv2 Configuration File	Node	OSPFv2-CONFIG-FILE
Specify Autonomous System	Node	N/A
Configure as Autonomous System Boundary Router	Node	AS-BOUNDARY-ROUTER
Inject External Route	Node	N/A
Enable Stagger Start	Node	OSPFv2-STAGGER-START

2

Description of Statistics Tables

The statistics database contains two types of tables:

- **Scenario Statistics Tables:** These tables contains statistics for the whole scenario and are described in [Section 2.1](#).
- **Model-specific Statistics Tables:** These tables contains statistics for specific models and are described in [Section 2.2](#).

Each statistics table has two types of columns: standard and optional. The standard columns are always included in the table, whereas the optional columns are controlled by the user by means of parameters in the scenario configuration (.config) file. If a column is optional, then a configuration parameter is associated with it, which is used in the scenario configuration file to include or exclude the column in the generated table (see [Section 3.1.2](#)). By default, an optional column is included in the table. If a column is standard, then there is no configuration parameter associated with it, i.e., it's Configuration Parameter entry is "N/A". For example, in the Queue Description table (see [Section 2.1.1.3](#)), column "Timestamp" is standard, whereas column "QueueDiscipline" is optional and is included in the generated table by default, but can be excluded if the parameter `STATS-DB-QUEUE-DESCRIPTION-TABLE-DISCIPLINE` is set to NO in the scenario configuration file.

2.1 Scenario Statistics Tables

QualNet generates different types of scenario statistics tables. Tables of different types contain metrics at different levels of detail. Scenario statistics tables are of the following types:

- **Description Tables:** Description tables contain the description of simulation entities, such as nodes or connections.
- **Status Tables:** Status tables record the change in status of simulation entities, such as an entity interface being damaged, or an entity joining a multicast group, etc.
- **Aggregate Tables:** Aggregate tables contain metrics of the simulation at the scenario level. These tables record transmissions and receptions at the Application Layer, Transport Layer, Network Layer, MAC Layer, and Physical Layer. Aggregate tables record statistics for specified time intervals.
- **Summary Tables:** Summary tables contain metrics for end-to-end or per-hop communication. These tables also record packet transmission and reception at the different layers. However, only events on the entire message are recorded: if a message is fragmented, events on the fragments are not recorded. Summary tables do not record control events.

- **Events Tables:** Events tables contain detailed metrics collected at the message, packet, segment, frame, or signal level, as well as control events.
- **Connectivity Tables:** Connectivity tables contain connectivity information from the perspective of the different layers. These tables provide a view of connections between nodes at each layer.

Events tables contain the most detailed metrics and the information contained in the Aggregate and Summary tables can be derived from the information in the Events table. When detailed statistics are not required, the user can generate only the Summary and Aggregate tables and disable the Events tables. This can also be done to improve runtime performance or to save storage space.

2.1.1 Description Tables

Description tables provide detailed description of simulation entities. A Description table does not record metrics of any kind. These tables can be cross-referenced and used to filter metrics based on various criteria, such as node ID, host-name, etc.

The different Description tables are listed in [Table 2-1](#). A configuration parameter is associated with each table. These configuration parameters are used in the scenario configuration (.config) file to specify which tables are generated (see [Section 3.1.2](#)).

TABLE 2-1. Description Tables

Table	Configuration Parameter	Table Name in Database
Node Description Table	STATS-DB-NODE-DESCRIPTION-TABLE	NODE_Description
Queue Description Table	STATS-DB-QUEUE-DESCRIPTION-TABLE	QUEUE_Description
Scheduler Description Table	STATS-DB-SCHEDULER-DESCRIPTION-TABLE	SCHEDULER_Description
Session Description Table	STATS-DB-SESSION-DESCRIPTION-TABLE	SESSION_Description
Connection Description Table	STATS-DB-CONNECTION-DESCRIPTION-TABLE	CONNECTION_Description
Interface Description Table	STATS-DB-INTERFACE-DESCRIPTION-TABLE	INTERFACE_Description
PHY Description Table	STATS-DB-PHY-DESCRIPTION-TABLE	PHY_Description

2.1.1.1 Meta-data Columns

For each Description table, the user can specify any number of meta-data columns. The meta-data columns are unique in that the data included in these columns are not generated by the simulator but are read from the scenario configuration file. The headings of the meta-data columns are also read from the configuration file by means of a meta-data column parameter. For example, the parameter `NODE-META-DATA-COLUMN-NAME` is used to specify the name(s) of meta-data column(s) in the Node Description table (see [Table 2-2](#)). The data for these meta-columns is specified by means of another parameter (for the Node Description table, this parameter is `NODE-META-DATA`, which is described in [Table 3-4](#)). For example, the user can specify a meta-data column heading to be “Echelon” and specify a node to have the value “Company”, “Battalion”, or “Brigade” for that column. Another example of a meta-data column heading is “Platform Type” and the possible values that a node can be assigned for that column are “UAV”, “C2 Node”, etc.

2.1.1.2 Node Description Table

The Node Description table contains descriptions of nodes in the scenario. The columns of the Node Description table are listed in [Table 2-2](#).

TABLE 2-2. Columns of the Node Description Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	Real	Simulation time (in seconds) of the entry in the table.
Nodeld	N/A	Integer	Node identifier.
HostName	N/A	String	Host name of the node.
Meta-data	NODE-META-DATA-COLUMN-NAME	String	User-specified value. See description in Section 2.1.1.1 .

2.1.1.3 Queue Description Table

The Queue Description table provides the description of each queue in the simulation. The columns of the Queue Description table are listed in [Table 2-3](#).

TABLE 2-3. Columns of the Queue Description Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	Real	Simulation time (in seconds) of the entry in the table.
Nodeld	N/A	Integer	Node identifier.
InterfaceIndex	N/A	Integer	Index of the interface on the node.
QueueType	N/A	String	Defines the purpose of the queue, e.g., network input, MAC output, etc.
QueueIndex	N/A	Integer	Index of the queue
QueueDiscipline	STATS-DB-QUEUE-DESCRIPTION-TABLE-DISCIPLINE	String	Type of queue, e.g., FIFO.
QueuePriority	STATS-DB-QUEUE-DESCRIPTION-TABLE-PRIORITY	Integer	Priority of the queue
QueueSize	STATS-DB-QUEUE-DESCRIPTION-QUEUE-SIZE	Integer	Size of the queue.
Meta-data	QUEUE-META-DATA-COLUMN-NAME	String	User-specified value. See description in Section 2.1.1.1 .

2.1.1.4 Scheduler Description Table

The Scheduler Description table provides the description of each scheduler in the simulation. The columns of the Scheduler Description table are listed in [Table 2-4](#).

TABLE 2-4. Columns of the Scheduler Description Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	Real	Simulation time (in seconds) of the entry in the table.
NodeId	N/A	Integer	Node identifier.
InterfaceIndex	N/A	Integer	Index of the interface on the node.
SchedulerType	N/A	String	Type of scheduler.
SchedulerAlgorithm	STATS-DB-SCHEDULER-DESCRIPTION-SCHEDULER-ALGORITHM	String	Scheduling algorithm used by the Network Layer.
Meta-data	SCHEDULER-META-DATA-COLUMN-NAME	String	User-specified value. See description in Section 2.1.1.1 .

2.1.1.5 Session Description Table

The Session Description Table provides the description of each application session that exists in the simulation. The columns of the Session Description table are listed in [Table 2-5](#).

TABLE 2-5. Columns of the Session Description Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	Real	Simulation time (in seconds) of the entry in the table.
SessionId	N/A	Integer	ID of the session.
SenderId	N/A	Integer	Node ID of the sender.
ReceiverId	N/A	Integer	Node ID of the receiver.
AppType	STATS-DB-SESSION-DESCRIPTION-APP-TYPE	String	Type of the application.
SenderAddr	STATS-DB-SESSION-DESCRIPTION-SENDER-ADDRESS	String	IP address of the sender.
ReceiverAddr	STATS-DB-SESSION-DESCRIPTION-RECEIVER-ADDRESS	String	IP address of the receiver.
SenderPort	STATS-DB-SESSION-DESCRIPTION-SENDER-PORT	String	Port of the sender.
ReceiverPort	STATS-DB-SESSION-DESCRIPTION-RECEIVER-PORT	String	Port of the receiver.

TABLE 2-5. Columns of the Session Description Table (Continued)

Column	Configuration Parameter	Type	Description
TransportProtocol	STATS-DB-SESSION-DESCRIPTION-TRANSPORT-PROTOCOL	String	Transport Layer protocol.
Meta-data	SESSION-META-DATA-COLUMN-NAME	String	User-specified value. See description in Section 2.1.1.1 .

2.1.1.6 Connection Description Table

The Connection Description table provides the description of each Transport Layer connection that exists in the simulation. Note that in QualNet, only TCP has the concept of connections. The columns of the Connection Description table are listed in [Table 2-6](#).

TABLE 2-6. Columns of the Connection Description Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	Real	Simulation time (in seconds) of the entry in the table.
SenderId	N/A	Integer	Node ID of the sender.
ReceiverId	N/A	Integer	Node ID of the receiver.
SenderAddr	N/A	String	IP address of the sender.
ReceiverAddr	N/A	String	IP address of the receiver.
SenderPort	N/A	String	Port of the sender.
ReceiverPort	N/A	String	Port of the receiver.
ConnectionType	STATS-DB-CONNECTION-DESCRIPTION-CONNECTION-TYPE	String	Type of the connection.
NetworkProtocol	STATS-DB-CONNECTION-DESCRIPTION-NETWORK-PROTOCOL	String	Network Layer protocol.
Meta-data	CONNECTION-META-DATA-COLUMN-NAME	String	User-specified value. See description in Section 2.1.1.1 .

2.1.1.7 Interface Description Table

The Interface Description table contains descriptions of nodes' interfaces in the scenario. The columns of the Interface Description table are listed in [Table 2-7](#).

TABLE 2-7. Columns of the Interface Description Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	Real	Simulation time (in seconds) of the entry in the table.
NodeId	N/A	Integer	Node identifier.
InterfaceIndex	N/A	Integer	Index of the interface on the node.

TABLE 2-7. Columns of the Interface Description Table (Continued)

Column	Configuration Parameter	Type	Description
InterfaceName	STATS-DB-INTERFACE-DESCRIPTION-INTERFACE-NAME	String	Name of the interface, if there is one.
InterfaceAddress	STATS-DB-INTERFACE-DESCRIPTION-INTERFACE-ADDRESS	String	Network address of the interface, in dot-decimal notation.
SubnetMask	STATS-DB-INTERFACE-DESCRIPTION-SUBNET-MASK	String	The subnet mask of the interface, in dot-decimal notation.
RoutingProtocol	STATS-DB-INTERFACE-DESCRIPTION-ROUTING-PROTOCOL	String	The name of the routing protocol running on the interface.
MulticastProtocol	STATS-DB-INTERFACE-DESCRIPTION-MULTICAST-PROTOCOL	String	The name of the multicast protocol running on the interface, if there is one.
Meta-data	INTERFACE-META-DATA-COLUMN-NAME	String	User-specified value. See description in Section 2.1.1.1 .

2.1.1.8 PHY Description Table

The PHY Description table provides the description of each PHY index in the simulation. The columns of the PHY Description table are listed in [Table 2-8](#).

TABLE 2-8. Columns of the PHY Description Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	Real	Simulation time (in seconds) of the entry in the table.
NodeId	N/A	Integer	Node identifier.
InterfaceIndex	N/A	Integer	Index of the interface on the node.
PhyIndex	N/A	String	Index of the PHY interface.
Meta-data	PHY-META-DATA-COLUMN-NAME	String	User-specified value. See description in Section 2.1.1.1 .

2.1.2 Status Tables

The Status tables keep track of changes in status/state of simulation entities. These tables are updated periodically. The time period for updating the Status tables is specified by the user. The different Status tables and the configuration parameters associated with them are listed in [Table 2-9](#).

TABLE 2-9. Status Tables

Table	Configuration Parameter	Table Name in Database
Node Status Table	STATS-DB-NODE-STATUS-TABLE	NODE_Status
Interface Status Table	STATS-DB-INTERFACE-STATUS-TABLE	INTERFACE_Status
Multicast Status Table	STATS-DB-MULTICAST-STATUS-TABLE	MULTICAST_Status
Queue Status Table	STATS-DB-QUEUE-STATUS-TABLE	QUEUE_Status

2.1.2.1 Node Status Table

The Node Status table provides information in regards to the current state/status of a node. The columns of the Node Status table are listed in [Table 2-10](#).

TABLE 2-10. Columns of the Node Status Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	Real	Simulation time (in seconds) when the node status information is written to the database in an interval basis.
nodeId	N/A	Integer	Node identifier.
TriggeredUpdate	N/A	String	This value indicates if the database entry updated by any node events instead of time interval. For example, if the node's status becomes "enabled" from "disabled", this field will be TRUE in the new entry inserted into database; otherwise, this entry is updated by interval, this field is FALSE.
X or Lat	STATS-DB-NODE-STATUS-TABLE-POSITION	Real	Indicate the node's position at the time shown by the timestamp field. If the Cartesian system is used, the node's position is represented by X, Y, Z; otherwise, if LATLONALT is used, the node's position is Lat, Lon, Alt.
Y or Lon		Real	
Z or Alt		Real	

TABLE 2-10. Columns of the Node Status Table (Continued)

Column	Configuration Parameter	Type	Description
XVelocity or LatVelocity	STATS-DB-NODE-STATUS-TABLE-VELOCITY	Real	Indicate the node's velocity at the time shown by the timestamp field. If the Cartesian system is used, the node's velocity is represented by XVelocity, YVelocity, ZVelocity; otherwise, if LATLONALT is used, the node's velocity is LatVelocity, LonVelocity, AltVelocity.
YVelocity or LonVelocity		Real	
ZVelocity or AltVelocity		Real	
ActiveState	STATS-DB-NODE-STATUS-TABLE-ACTIVE-STATE	String	Indicates whether the node is enabled.
DamageState	STATS-DB-NODE-STATUS-TABLE-DAMAGE-STATE	String	Indicates whether the node has been damaged.

2.1.2.2 Interface Status Table

The Interface Status table provides information in regards to the current state/status of a node's interface. The columns of the Interface Status table are listed in [Table 2-11](#).

TABLE 2-11. Columns of the Interface Status Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	Real	Simulation time (in seconds) when the interface status information is written to the database in an interval basis.
NodeId	N/A	Integer	Node identifier.
InterfaceAddress	N/A	String	IP address of the interface.
InterfaceEnabled	N/A	String	TRUE indicates the interface is enabled at the time shown by the timestamp; otherwise, the interface is disabled.
TriggeredUpdate	N/A	String	This value indicates if the database entry updated by any interface events instead of time interval. For example, if the interface's status becomes "enabled" from "disabled", this field will be TRUE in the new entry inserted into database; otherwise, this entry is updated by interval, this field is FALSE.

2.1.2.3 Multicast Status Table

The Multicast Status table provides information in regards to when a node joins and leaves a multicast group. The columns of the Multicast Status table are listed in [Table 2-12](#).

TABLE 2-12. Columns of the Multicast Status Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	Real	Simulation time (in seconds) when the multicast group information has written to the database.
NodeAddress	N/A	String	Address of the node that joins/leaves the group.
GroupAddress	N/A	String	Address of the group that the node joins/leaves.
JoiningTime	N/A	Real	Time the node joins the group.
LeavingTime	N/A	Real	Time the node leaves the group.
GroupName	N/A	String	Name of the group.

2.1.2.4 Queue Status Table

The Queue Status table provides information in regards to the current state of the queue. The columns of the Queue Status table are listed in [Table 2-13](#).

TABLE 2-13. Columns of the Queue Status Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	Real	Simulation time (in seconds) when the queue information is written to the database.
NodeID	N/A	Integer	Node ID.
InterfaceIndex	N/A	String	Interface Index.
QueuePosition	N/A	String	Position of the queue, for example, <code>Network Input</code> .
QueueIndex	N/A	Integer	Index of the queue.
PacketsEnqueued	N/A	Integer	Number of the packets queued from the beginning of simulation up to the time specified in the Timestamp column.
PacketsDequeued	N/A	Integer	Number of the packets dequeued from the beginning of simulation up to the time specified in the Timestamp column.
PacketsDropped	N/A	Integer	Number of the packets dropped from the beginning of simulation up to the time specified in the Timestamp column.

TABLE 2-13. Columns of the Queue Status Table (Continued)

Column	Configuration Parameter	Type	Description
PacketsDroppedForcefully	N/A	Integer	Number of the packets dropped forcefully from the beginning of simulation up to the time specified in the Timestamp column.
FreeSpace	N/A	Integer	Free space in the queue at the shown time.
AverageServiceTime	N/A	Integer	Average service time forcefully from the beginning of simulation up to the time specified in the Timestamp column.

2.1.3 Aggregate Tables

Aggregate tables record the overall simulation statistics over a time period. These tables are updated periodically. The time period for updating the Aggregate tables is specified by the user. The different Aggregate tables and the configuration parameters associated with them are listed in [Table 2-14](#).

TABLE 2-14. Aggregate Tables

Table	Configuration Parameter	Table Name in Database
Application Aggregate Table	STATS-DB-APPLICATION-AGGREGATE-TABLE	APPLICATION_Aggregate
Transport Aggregate Table	STATS-DB-TRANSPORT-AGGREGATE-TABLE	TRANSPORT_Aggregate
Network Aggregate Table	STATS-DB-NETWORK-AGGREGATE-TABLE	NETWORK_Aggregate
MAC Aggregate Table	STATS-DB-MAC-AGGREGATE-TABLE	MAC_Aggregate
PHY Aggregate Table	STATS-DB-PHY-AGGREGATE-TABLE	PHY_Aggregate
Queue Aggregate Table	STATS-DB-QUEUE-AGGREGATE-TABLE	QUEUE_Aggregate

2.1.3.1 Application Aggregate Table

The Application Aggregate table provides summary metrics for all applications at the Application Layer. The columns of the Application Aggregate table are listed in [Table 2-15](#).

- Notes:**
1. By default, a database table index (AppAggregateIndex) is created for the Application Aggregate table. The table index improves the speed of data retrieval operations at the expense of slower write operations and increased storage space. Creation of the table index can be suppressed by means of the configuration parameter `STAT-DB-APPLICATION-AGGREGATE-INDEX` (see [Table 3-9](#)).
 2. For Super Application, which supports a reply process, the number of messages sent and received in the Application Aggregate table includes both request and reply messages. The same applies to the fragments and bytes sent and received.
 3. Multicast Super Application has no reply process, and works only with UDP.
 4. When a MCBR sender sends traffic to an invalid address, the messages would still be counted in the messages sent column, but since these are to an invalid destination, there will be no packets received corresponding to these.
 5. The Application Aggregate table records jitter based on difference in delay between successive packets. The jitter is NULL if less than 2 packets are received in that session. A value of 0 indicates that the jitter is 0 due to equal delay in arrival of successive packets.
 6. The Application Aggregate table shows NULL for Message Completion Rate, Offered Load, and Throughput when the number of effective messages sent or received is 0.
 7. Offered load (OfferedLoad, UnicastOfferedLoad, and MulticastOfferedLoad columns) includes both data and control packets.

TABLE 2-15. Columns of the Application Aggregate Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	Real	Simulation time (in seconds) of the entry in the table.
UnicastMessagesSent	N/A	Integer	Total number of unicast messages sent from the beginning of simulation up to the time specified in the Timestamp column, by all unicast session senders.
UnicastMessagesReceived	N/A	Integer	Total number of unicast messages received from the beginning of simulation up to the time specified in the Timestamp column, by all unicast session receivers.

TABLE 2-15. Columns of the Application Aggregate Table (Continued)

Column	Configuration Parameter	Type	Description
MulticastMessagesSent	N/A	Integer	Sum of all multicast messages sent from the beginning of simulation up to the time specified in the Timestamp column, by the senders of all multicast sessions.
EffectiveMuticastMessagesSent	N/A	Integer	Sum of all the multicast messages sent to each receiver independently, by the senders of all multicast session (when the receiver is a part of the multicast group) from the beginning of simulation up to the time specified in the Timestamp column.
MulticastMessagesReceived	N/A	Integer	Sum of all multicast messages received from the beginning of simulation up to the time specified in the Timestamp column, by the receivers of all multicast sessions.
UnicastBytesSent	N/A	Integer	Total number of unicast bytes sent from the beginning of simulation up to the time specified in the Timestamp column, by all unicast session senders.
UnicastBytesReceived	N/A	Integer	Total number of unicast bytes received from the beginning of simulation up to the time specified in the Timestamp column, by all unicast session receivers.
MulticastBytesSent	N/A	Integer	Sum of all multicast bytes sent from the beginning of simulation up to the time specified in the Timestamp column, by the senders of all multicast sessions.
EffectiveMuticastBytesSent	N/A	Integer	Sum of all the multicast bytes sent to each receiver independently, by the senders of all multicast session (when the receiver is a part of the multicast group) from the beginning of simulation up to the time specified in the Timestamp column.

TABLE 2-15. Columns of the Application Aggregate Table (Continued)

Column	Configuration Parameter	Type	Description
MulticastBytesReceived	N/A	Integer	Sum of all multicast bytes received from the beginning of simulation up to the time specified in the Timestamp column, by the receivers of all multicast sessions.
UnicastFragSent	N/A	Integer	Total number of unicast fragments sent from the beginning of simulation up to the time specified in the Timestamp column, by all unicast session senders.
UnicastFragReceived	N/A	Integer	Total number of unicast fragments received from the beginning of simulation up to the time specified in the Timestamp column, by all unicast session receivers.
MulticastFragSent	N/A	Integer	Sum of all multicast fragments sent from the beginning of simulation up to the time specified in the Timestamp column, by the senders of all multicast sessions.
EffectiveMulticastFragSent	N/A	Integer	Sum of all the multicast fragments sent to each receiver independently, by the senders of all multicast session (when the receiver is a part of the multicast group) from the beginning of simulation up to the time specified in the Timestamp column.
MulticastFragReceived	N/A	Integer	Sum of all multicast fragments received from the beginning of simulation up to the time specified in the Timestamp column, by the receivers of all multicast sessions.
UnicastMessageCompletionRate	N/A	Real	Unicast message completion rate from the beginning of simulation up to the time specified in the Timestamp column.
MulticastMessageCompletionRate	N/A	Real	Multicast message completion rate from the beginning of simulation up to the time specified in the Timestamp column.

TABLE 2-15. Columns of the Application Aggregate Table (Continued)

Column	Configuration Parameter	Type	Description
UnicastOfferedLoad	N/A	Real	Offered load (in bps) for unicast messages from the beginning of simulation up to the time specified in the Timestamp column.
UnicastThroughput	N/A	Real	Throughput (in bps) for unicast messages from the beginning of simulation up to the time specified in the Timestamp column.
MulticastOfferedLoad	N/A	Real	Offered load (in bps) for multicast messages from the beginning of simulation up to the time specified in the Timestamp column.
MulticastThroughput	N/A	Real	Throughput (in bps) for multicast messages from the beginning of simulation up to the time specified in the Timestamp column.
UnicastDelay	STATS-DB-APPLICATION-AGGREGATE-UNICAST-DELAY	Real	Average unicast message delay (in seconds) from the beginning of simulation up to the time specified in the Timestamp column.
MulticastDelay	STATS-DB-APPLICATION-AGGREGATE-MULTICAST-DELAY	Real	Average multicast message delay (in seconds) from the beginning of simulation up to the time specified in the Timestamp column.
AverageDelay	STATS-DB-APPLICATION-AGGREGATE-AVERAGE-DELAY	Real	Average delay (in seconds) for the applications in the scenario from the beginning of simulation up to the time specified in the Timestamp column.
UnicastJitter	STATS-DB-APPLICATION-AGGREGATE-UNICAST-JITTER	Real	Average unicast message jitter (in seconds) from the beginning of simulation up to the time specified in the Timestamp column.
MulticastJitter	STATS-DB-APPLICATION-AGGREGATE-MULTICAST-JITTER	Real	Average multicast message jitter (in seconds) from the beginning of simulation up to the time specified in the Timestamp column.
AverageJitter	STATS-DB-APPLICATION-AGGREGATE-AVERAGE-JITTER	Real	Average jitter (in seconds) for the applications in the scenario from the beginning of simulation up to the time specified in the Timestamp column.

TABLE 2-15. Columns of the Application Aggregate Table (Continued)

Column	Configuration Parameter	Type	Description
UnicastHopCount	STATS-DB-APPLICATION-AGGREGATE-UNICAST-HOP-COUNT	Real	Average unicast message hop count from the beginning of simulation up to the time specified in the Timestamp column.
MulticastHopCount	STATS-DB-APPLICATION-AGGREGATE-MULTICAST-HOP-COUNT	Real	Average multicast message hop count from the beginning of simulation up to the time specified in the Timestamp column.
AverageThroughput	STATS-DB-APPLICATION-AGGREGATE-AVERAGE-THROUGHPUT	Real	Average throughput (in bps) for the applications in the scenario from the beginning of simulation up to the time specified in the Timestamp column.
AverageOfferedLoad	STATS-DB-APPLICATION-AGGREGATE-AVERAGE-OFFERLOAD	Real	Average offered load (in bps) for the applications in the scenario from the beginning of simulation up to the time specified in the Timestamp column.

2.1.3.2 Transport Aggregate Table

The Transport Aggregate table provides summarized metrics of all the transport protocol data in the simulation. The columns of the Transport Aggregate table are listed in [Table 2-16](#).

- Notes:**
1. By default, a database table index (TransAggregateIndex) is created for the Transport Aggregate table. The table index improves the speed of data retrieval operations at the expense of slower write operations and increased storage space. Creation of the table index can be suppressed by means of the configuration parameter `STAT-DB-TRANSPORT-AGGREGATE-INDEX` (see [Table 3-9](#)).
 2. Offered load (OfferedLoad column) includes both data and control packets.

TABLE 2-16. Columns of the Transport Aggregate Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	Real	Simulation time (in seconds) of the entry in the table.
UnicastSegmentsSent	N/A	Integer	Total Number of unicast segments sent from the beginning of simulation up to the time specified in the Timestamp column.
MulticastSegmentsSent	N/A	Integer	Total Number of multicast segments sent from the beginning of simulation up to the time specified in the Timestamp column.

TABLE 2-16. Columns of the Transport Aggregate Table (Continued)

Column	Configuration Parameter	Type	Description
BroadcastSegmentsSent	N/A	Integer	Total Number of broadcast segments sent from the beginning of simulation up to the time specified in the Timestamp column.
UnicastSegmentsRcvd	N/A	Integer	Total Number of unicast segments received from the beginning of simulation up to the time specified in the Timestamp column.
MulticastSegmentsRcvd	N/A	Integer	Total Number of multicast segments received from the beginning of simulation up to the time specified in the Timestamp column.
BroadcastSegmentsRcvd	N/A	Integer	Total Number of broadcast segments received from the beginning of simulation up to the time specified in the Timestamp column.
UnicastBytesSent	N/A	Integer	Total Number of unicast bytes sent from the beginning of simulation up to the time specified in the Timestamp column.
MulticastBytesSent	N/A	Integer	Total Number of multicast bytes sent from the beginning of simulation up to the time specified in the Timestamp column.
BroadcastBytesSent	N/A	Integer	Total Number of broadcast bytes sent from the beginning of simulation up to the time specified in the Timestamp column.
UnicastBytesRcvd	N/A	Integer	Total Number of unicast bytes received from the beginning of simulation up to the time specified in the Timestamp column.
MulticastBytesRcvd	N/A	Integer	Total Number of multicast bytes received from the beginning of simulation up to the time specified in the Timestamp column.
BroadcastBytesRcvd	N/A	Integer	Total Number of broadcast bytes received from the beginning of simulation up to the time specified in the Timestamp column.

TABLE 2-16. Columns of the Transport Aggregate Table (Continued)

Column	Configuration Parameter	Type	Description
UnicastOfferedLoad	N/A	Real	Unicast Offered load (in bps) from the beginning of simulation up to the time specified in the Timestamp column.
MulticastOfferedLoad	N/A	Real	Multicast Offered load (in bps) from the beginning of simulation up to the time specified in the Timestamp column.
BroadcastOfferedLoad	N/A	Real	Broadcast Offered load (in bps) from the beginning of simulation up to the time specified in the Timestamp column.
UnicastThroughput	N/A	Real	Unicast Throughput load (in bps) from the beginning of simulation up to the time specified in the Timestamp column.
MulticastThroughput	N/A	Real	Multicast Throughput load (in bps) from the beginning of simulation up to the time specified in the Timestamp column.
BroadcastThroughput	N/A	Real	Broadcast Throughput load (in bps) from the beginning of simulation up to the time specified in the Timestamp column.
UnicastAverageDelay	STATS-DB-TRANSPORT-AGGREGATE-DELAY	Real	Average unicast message delay (in seconds) from the beginning of simulation up to the time specified in the Timestamp column.
MulticastAverageDelay		Real	Average multicast message delay (in seconds).
BroadcastAverageDelay		Real	Average broadcast message delay (in seconds).
UnicastAverageJitter	STATS-DB-TRANSPORT-AGGREGATE-JITTER	Real	Average unicast message jitter (in seconds) from the beginning of simulation up to the time specified in the Timestamp column.
MulticastAverageJitter		Real	Average multicast message jitter (in seconds).
BroadcastAverageJitter		Real	Average broadcast message jitter (in seconds).

2.1.3.3 Network Aggregate Table

The Network Aggregate table provides a summary of Network Layer data. The columns of the Network Aggregate table are listed in [Table 2-17](#).

- Notes:**
1. By default, a database table index (NetAggregateIndex) is created for the Network Aggregate table. The table index improves the speed of data retrieval operations at the expense of slower write operations and increased storage space. Creation of the table index can be suppressed by means of the configuration parameter `STAT-DB-NETWORK-AGGREGATE-INDEX` (see [Table 3-9](#)).
 2. The following terms are used in [Table 2-17](#):
 - *Unicast data traffic*: Data traffic addressed to a single node
 - *Unicast control traffic*: Control traffic addressed to a single node
 - *Multicast data traffic*: Data traffic addressed to a multicast group address
 - *Multicast control traffic*: Control traffic addressed to a multicast group address
 - *Broadcast data traffic*: Data traffic addressed to the IP address 255.255.255.255 or interface broadcast address
 - *Broadcast control traffic*: Control traffic addressed the IP address 255.255.255.255 or interface broadcast address
 - *Number of packets/bytes sent*: Number of packets/bytes sent from the Network Layer to the MAC Layer at the source node(s)
 - *Number of packets/bytes received*: Number of packets/bytes received by the Network Layer from the MAC Layer
 - *Number of packets/bytes forwarded*: Number of packets/bytes forwarded by the Network Layer at intermediate nodes (nodes that are neither source nor destination of the packet)
 3. Offered load (UnicastOfferedLoad, MulticastOfferedLoad, and BroadcastOfferedLoad columns) includes both data and control packets.

TABLE 2-17. Columns of the Network Aggregate Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	Real	Simulation time (in seconds) of the entry in the table.
UnicastOfferedLoad	N/A	Real	Offered load (in bps) of unicast traffic at the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
MulticastOfferedLoad	N/A	Real	Offered load (in bps) of multicast traffic at the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.

TABLE 2-17. Columns of the Network Aggregate Table (Continued)

Column	Configuration Parameter	Type	Description
BroadcastOfferedLoad	N/A	Real	Offered load (in bps) of broadcast traffic at the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
UnicastDataPacketsSent	N/A	Integer	Number of unicast data packets sent by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
UnicastDataPacketsRecd	N/A	Integer	Number of unicast data packets received by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
UnicastDataPacketsForward	N/A	Integer	Number of unicast data packets forwarded by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
MulticastDataPacketsSent	N/A	Integer	Number of multicast data packets sent by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
MulticastDataPacketsRecd	N/A	Integer	Number of multicast data packets received by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
MulticastDataPacketsForward	N/A	Integer	Number of multicast data packets forwarded by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
BroadcastDataPacketsSent	N/A	Integer	Number of broadcast data packets sent by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
BroadcastDataPacketsRecd	N/A	Integer	Number of broadcast data packets received by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.

TABLE 2-17. Columns of the Network Aggregate Table (Continued)

Column	Configuration Parameter	Type	Description
BroadcastDataPacketsForward	N/A	Integer	Number of broadcast data packets forwarded by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
UnicastControlPacketsSent	N/A	Integer	Number of unicast control packets sent by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
UnicastControlPacketsReceived	N/A	Integer	Number of unicast control packets received by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
UnicastControlPacketsForward	N/A	Integer	Number of unicast control packets forwarded by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
MulticastControlPacketsSent	N/A	Integer	Number of multicast control packets sent by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
MulticastControlPacketsReceived	N/A	Integer	Number of multicast control packets received by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
MulticastControlPacketsForward	N/A	Integer	Number of multicast control packets forwarded by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
BroadcastControlPacketsSent	N/A	Integer	Number of broadcast control packets sent by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.

TABLE 2-17. Columns of the Network Aggregate Table (Continued)

Column	Configuration Parameter	Type	Description
BroadcastControlPacketsRecd	N/A	Integer	Number of broadcast control packets received by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
BroadcastControlPacketsForward	N/A	Integer	Number of broadcast control packets forwarded by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
UnicastDataBytesSent	N/A	Integer	Number of unicast data bytes sent by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
UnicastDataBytesRecd	N/A	Integer	Number of unicast data bytes received by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
UnicastDataBytesForward	N/A	Integer	Number of unicast data bytes forwarded by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
MulticastDataBytesSent	N/A	Integer	Number of multicast data bytes sent by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
MulticastDataBytesRecd	N/A	Integer	Number of multicast data bytes received by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
MulticastDataBytesForward	N/A	Integer	Number of multicast data bytes forwarded by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
BroadcastDataBytesSent	N/A	Integer	Number of broadcast data bytes sent by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
BroadcastDataBytesRecd	N/A	Integer	Number of broadcast data bytes received by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.

TABLE 2-17. Columns of the Network Aggregate Table (Continued)

Column	Configuration Parameter	Type	Description
BroadcastDataBytesForwarded	N/A	Integer	Number of broadcast data bytes forwarded by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
UnicastControlBytesSent	N/A	Integer	Number of unicast control bytes sent by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
UnicastControlBytesRecd	N/A	Integer	Number of unicast control bytes received by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
UnicastControlBytesForwarded	N/A	Integer	Number of unicast control bytes forwarded by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
MulticastControlBytesSent	N/A	Integer	Number of multicast control bytes sent by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
MulticastControlBytesRecd	N/A	Integer	Number of multicast control bytes received by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
MulticastControlBytesForwarded	N/A	Integer	Number of multicast control bytes forwarded by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
BroadcastControlBytesSent	N/A	Integer	Number of broadcast control bytes sent by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
BroadcastControlBytesRecd	N/A	Integer	Number of broadcast control bytes received by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.

TABLE 2-17. Columns of the Network Aggregate Table (Continued)

Column	Configuration Parameter	Type	Description
BroadcastControlBytesForward	N/A	Integer	Number of broadcast control bytes forwarded by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
UnicastIpOutNoRoutes	STATS-DB-NETWORK-AGGREGATE-UNICAST-IP-NO-ROUTES	Integer	Number of unicast packets dropped for no routes.
MulticastIpOutNoRoutes	STATS-DB-NETWORK-AGGREGATE-MULTICAST-IP-NO-ROUTES	Integer	Number of multicast packets dropped for no routes.
UnicastDelay	STATS-DB-NETWORK-AGGREGATE-UNICAST-DELAY	Real	Average unicast packet delay (in seconds) from the beginning of simulation up to the time specified in the Timestamp column.
MulticastDelay	STATS-DB-NETWORK-AGGREGATE-MULTICAST-DELAY	Real	Average multicast packet delay (in seconds) from the beginning of simulation up to the time specified in the Timestamp column.
BroadcastDelay	STATS-DB-NETWORK-AGGREGATE-BROADCAST-DELAY	Real	Average broadcast packet delay (in seconds) from the beginning of simulation up to the time specified in the Timestamp column.
UnicastJitter	STATS-DB-NETWORK-AGGREGATE-UNICAST-JITTER	Real	Average unicast packet jitter (in seconds) from the beginning of simulation up to the time specified in the Timestamp column.

TABLE 2-17. Columns of the Network Aggregate Table (Continued)

Column	Configuration Parameter	Type	Description
MulticastJitter	STATS-DB-NETWORK- AGGREGATE-MULTICAST- JITTER	Real	<p>Average multicast packet jitter (in seconds) from the beginning of simulation up to the time specified in the Timestamp column.</p> <p>Note: The average jitter of one-hop traffic is calculated for all traffic targeted to the same multicast destination address. The average multicast packet jitter is the average of all average one-hop multicast traffic jitters.</p>
BroadcastJitter	STATS-DB-NETWORK- AGGREGATE-BROADCAST- JITTER	Real	<p>Average broadcast packet jitter (in seconds) from the beginning of simulation up to the time specified in the Timestamp column.</p> <p>Note: The average jitter of one-hop traffic is calculated for all traffic targeted to the same broadcast destination address. The average broadcast packet jitter is the average of all average one-hop broadcast traffic jitters.</p>

2.1.3.4 MAC Aggregate Table

The MAC Aggregate table provides summarized metrics of all the MAC Layer data in the simulation. The columns of the MAC Aggregate table are listed in [Table 2-18](#).

Note: By default, a database table index (MacAggregateIndex) is created for the MAC Aggregate table. The table index improves the speed of data retrieval operations at the expense of slower write operations and increased storage space. Creation of the table index can be suppressed by means of the configuration parameter `STAT-DB-MAC-AGGREGATE-INDEX` (see [Table 3-9](#)).

TABLE 2-18. Columns of the MAC Aggregate Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	Real	Simulation time (in seconds) of the entry in the table.
Throughput	N/A	Real	Throughput (in bps) at the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.
UnicastDataFramesSent	N/A	Integer	Number of unicast data frames sent by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.
UnicastDataFramesReceived	N/A	Integer	Number of unicast data frames received by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.
UnicastControlFramesSent	N/A	Integer	Number of unicast control frames sent by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.
UnicastControlFramesReceived	N/A	Integer	Number of unicast control frames received by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.
UnicastDataBytesSent	N/A	Integer	Number of unicast data bytes sent by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.
UnicastDataBytesReceived	N/A	Integer	Number of unicast data bytes received by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.
UnicastControlBytesSent	N/A	Integer	Number of unicast control bytes sent by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.
UnicastControlBytesReceived	N/A	Integer	Number of unicast control bytes received by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.

TABLE 2-18. Columns of the MAC Aggregate Table (Continued)

Column	Configuration Parameter	Type	Description
MulticastDataFramesSent	N/A	Integer	Number of multicast data frames sent by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.
MulticastDataFramesReceived	N/A	Integer	Number of multicast data frames received by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.
MulticastControlFramesSent	N/A	Integer	Number of multicast control frames sent by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.
MulticastControlFramesReceived	N/A	Integer	Number of multicast control frames received by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.
MulticastDataBytesSent	N/A	Integer	Number of multicast data bytes sent by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.
MulticastDataBytesReceived	N/A	Integer	Number of multicast data bytes received by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.
MulticastControlBytesSent	N/A	Integer	Number of multicast control bytes sent by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.
MulticastControlBytesReceived	N/A	Integer	Number of multicast control bytes received by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.
BroadcastDataFramesSent	N/A	Integer	Number of broadcast data frames sent by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.
BroadcastDataFramesReceived	N/A	Integer	Number of broadcast data frames received by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.

TABLE 2-18. Columns of the MAC Aggregate Table (Continued)

Column	Configuration Parameter	Type	Description
BroadcastControlFramesSent	N/A	Integer	Number of broadcast control frames sent by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.
BroadcastControlFramesReceived	N/A	Integer	Number of broadcast control frames received by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.
BroadcastDataBytesSent	N/A	Integer	Number of broadcast data bytes sent by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.
BroadcastDataBytesReceived	N/A	Integer	Number of Broadcast data bytes received by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.
BroadcastControlBytesSent	N/A	Integer	Number of broadcast control bytes sent by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.
BroadcastControlBytesReceived	N/A	Integer	Number of broadcast control bytes received by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.

TABLE 2-18. Columns of the MAC Aggregate Table (Continued)

Column	Configuration Parameter	Type	Description
UnicastAverageQueueingDelay	STATS-DB-MAC-AGGREGATE-DELAY	Real	Average queueing delay (delay from the time when the Network Layer sends a packet to the time it is removed from the MAC Layer queues) for unicast packets from the beginning of simulation up to the time specified in the Timestamp column.
UnicastAverageMediumAccessDelay		Real	Average medium access delay (delay from the time when the MAC Layer sends a packet to the time it is sent by the PHY Layer) for unicast packets from the beginning of simulation up to the time specified in the Timestamp column.
UnicastAverageMediumDelay		Real	Average medium delay (delay from the time a packet is sent by the MAC Layer at the sender to the time it is received by the MAC Layer at the receiver) for unicast packets from the beginning of simulation up to the time specified in the Timestamp column.
MulticastAverageQueueingDelay		Real	Average queueing delay for multicast packets.
MulticastAverageMediumAccessDelay		Real	Average medium access delay for multicast packets.
MulticastAverageMediumDelay		Real	Average medium delay for multicast packets.
BroadcastAverageQueueingDelay		Real	Average queueing delay for broadcast packets.
BroadcastAverageMediumAccessDelay		Real	Average medium access delay for broadcast packets.
BroadcastAverageMediumDelay	STATS-DB-MAC-AGGREGATE-JITTER	Real	Average medium delay for broadcast packets.
UnicastAverageJitter		Real	Average unicast packet jitter (in seconds) from the beginning of simulation up to the time specified in the Timestamp column.
MulticastAverageJitter		Real	Average multicast packet jitter (in seconds).
BroadcastAverageJitter		Real	Average broadcast packet jitter (in seconds).

2.1.3.5 PHY Aggregate Table

The PHY Aggregate table provides summarized metrics of all the PHY Layer data in the simulation. The columns of the PHY Aggregate table are listed in [Table 2-19](#).

- Notes:**
1. By default, a database table index (PhyAggregateIndex) is created for the PHY Aggregate table. The table index improves the speed of data retrieval operations at the expense of slower write operations and increased storage space. Creation of the table index can be suppressed by means of the configuration parameter `STAT-DB-PHY-AGGREGATE-INDEX` (see [Table 3-9](#)).
 2. The PHY Aggregate table supports the Abstract PHY protocol.

TABLE 2-19. Columns in the PHY Aggregate Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	Real	Simulation time (in seconds) of the entry in the table.
SignalsTransmitted	N/A	Integer	Number of signals sent by the PHY Layer from the beginning of simulation up to the time specified in the Timestamp column.
SignalsLocked	N/A	Integer	Number of signals locked by the PHY Layer from the beginning of simulation up to the time specified in the Timestamp column.
SignalsReceived	N/A	Integer	Number of signals received by the PHY Layer from the beginning of simulation up to the time specified in the Timestamp column.
SignalsDropped	N/A	Integer	Total number of signals dropped by the PHY Layer from the beginning of simulation up to the time specified in the Timestamp column.
SignalsDroppedDueToInterference	N/A	Integer	Number of signals dropped by the PHY Layer due to interference from the beginning of simulation up to the time specified in the Timestamp column.
Utilization	N/A	Real	Utilization at the PHY Layer from the beginning of simulation up to the time specified in the Timestamp column.
AverageInterference	N/A	Real	Average interference (in dBm) from the beginning of simulation up to the time specified in the Timestamp column

TABLE 2-19. Columns in the PHY Aggregate Table (Continued)

Column	Configuration Parameter	Type	Description
AveragePathLoss	STATS-DB-PHY-AGGREGATE-PATHLOSS	Real	Average pathloss (in dB) from the beginning of simulation up to the time specified in the Timestamp column
AverageSignalPower	STATS-DB-PHY-AGGREGATE-SIGNAL-POWER	Real	Average signal power (in dBm) from the beginning of simulation up to the time specified in the Timestamp column
AverageDelay	STATS-DB-PHY-AGGREGATE-DELAY	Real	Average signal delay (in seconds) from the beginning of simulation up to the time specified in the Timestamp column

2.1.3.6 Queue Aggregate Table

The Queue Aggregate table provides summarized metrics of all the queue data in the simulation. The columns of the Queue Aggregate table are listed in [Table 2-20](#).

TABLE 2-20. Columns in the Queue Aggregate Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	Real	Simulation time (in seconds) of the entry in the table.
PacketsEnqueued	N/A	Integer	Number of packets queued by the Network queues from the beginning of simulation up to the time specified in the Timestamp column.
PacketsDequeued	N/A	Integer	Number of packets dequeued by the Network queues from the beginning of simulation up to the time specified in the Timestamp column.
PacketsDropped	N/A	Integer	Number of packets dropped by the Network queues from the beginning of simulation up to the time specified in the Timestamp column.
PacketsDroppedForcefully	N/A	Integer	Number of packets dropped forcefully by the Network queues from the beginning of simulation up to the time specified in the Timestamp column.
BytesEnqueued	N/A	Integer	Number of bytes queued by the Network queues from the beginning of simulation up to the time specified in the Timestamp column.
BytesDequeued	N/A	Integer	Number of bytes dequeued by the Network queues from the beginning of simulation up to the time specified in the Timestamp column.

TABLE 2-20. Columns in the Queue Aggregate Table (Continued)

Column	Configuration Parameter	Type	Description
BytesDropped	N/A	Integer	Number of bytes dropped by the Network queues from the beginning of simulation up to the time specified in the Timestamp column.
BytesDroppedForcefully	N/A	Integer	Number of bytes dropped forcefully by the Network queues from the beginning of simulation up to the time specified in the Timestamp column.

2.1.4 Summary Tables

Summary tables record simulation statistics on per-hop or per application session basis over a time period. These tables are updated periodically. The time period for updating the Summary tables is specified by the user. The different Summary tables and the configuration parameters associated with them are listed in [Table 2-21](#).

TABLE 2-21. Summary Tables

Table	Configuration Parameter	Table Name in Database
Application Session Summary Table	STATS-DB-APPLICATION-SUMMARY-TABLE	APPLICATION_Summary
Multicast Application Summary Table	STATS-DB-MULTICAST-APPLICATION-SUMMARY-TABLE	MULTICAST_APPLICATION_Summary
Transport Summary Table	STATS-DB-TRANSPORT-SUMMARY-TABLE	TRANSPORT_Summary
Network Summary Table	STATS-DB-NETWORK-SUMMARY-TABLE	NETWORK_Summary
Multicast Network Summary Table	STATS-DB-MULTICAST-NETWORK-SUMMARY-TABLE	MULTICAST_NETWORK_Summary
MAC Summary Table	STATS-DB-MAC-SUMMARY-TABLE	MAC_Summary
PHY Summary Table	STATS-DB-PHY-SUMMARY-TABLE	PHY_Summary
Queue Summary Table	STATS-DB-QUEUE-SUMMARY-TABLE	QUEUE_Summary

2.1.4.1 Application Session Summary Table

The Application Session Summary table provides summary metrics for all application sessions. The columns of the Application Session Summary table are listed in [Table 2-22](#).

- Notes:**
1. By default, a database table index (AppSummaryIndex) is created for the Application Session Summary table. The table index improves the speed of data retrieval operations at the expense of slower write operations and increased storage space. Creation of the table index can be suppressed by means of the configuration parameter `STAT-DB-APPLICATION-SUMMARY-INDEX` (see [Table 3-11](#)).
 2. For Super Application, which supports a reply process, the number of messages sent and received in the Application Summary table includes both request and reply messages. The same applies to the fragments and bytes sent and received.
 3. Multicast Super Application has no reply process, and works only with UDP.
 4. When a MCBR sender sends traffic to an invalid address, the messages would still be counted in the messages sent column, but since these are to an invalid destination, there will be no packets received corresponding to these.
 5. The Application Summary table records jitter based on difference in delay between successive packets. The jitter is NULL if less than 2 packets are received in that session. A value of 0 indicates that the jitter is 0 due to equal delay in arrival of successive packets.
 6. The Application Summary table shows NULL for Message Completion Rate, Offered Load, and Throughput when the number of effective messages sent or received is 0.
 7. Offered load (OfferedLoad column) includes both data and control packets.

TABLE 2-22. Columns of the Application Session Summary Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	Real	Simulation time (in seconds) of the entry in the table.
SenderId	N/A	Integer	Node identifier of the sending node.
ReceiverId	N/A	Integer	Node identifier of the receiving node. This is 0 in the case of multicast, and -1 if the traffic is allowed to be sent to an invalid node.
ReceiverAddress	N/A	String	Address of the destination node in the case of Unicast, group address in the case of multicast
SessionId	N/A	Integer	Unique identifier for the session.
Tos	N/A	Integer	TOS of the session

TABLE 2-22. Columns of the Application Session Summary Table (Continued)

Column	Configuration Parameter	Type	Description
MessagesSent	N/A	Integer	Number of messages sent from the beginning of simulation up to the time specified in the Timestamp column, by the sender.
EffectiveMessagesSent	N/A	Integer	This column makes more sense for multicast applications. For Unicast applications, this column gives the same information as the MessagesSent column. In the case of multicast, this parameter represents the sum of messages sent to each receiver by the sender when the receivers are actually a part of the group.
MessagesReceived	N/A	Integer	Number of messages received from the beginning of simulation up to the time specified in the Timestamp column. In the case of multicast, this parameter represents the sum of the messages received by all the members of the group, to which the sender sends the messages.
BytesSent	N/A	Integer	Number of bytes sent from the beginning of simulation up to the time specified in the Timestamp column.
EffectiveBytesSent	N/A	Integer	This column makes more sense for multicast applications. For Unicast applications, this column gives the same information as the BytesSent column. In the case of multicast, this parameter represents the sum of the bytes sent to each receiver by the sender when the receivers are actually a part of the group.
BytesReceived	N/A	Integer	Number of bytes received from the beginning of simulation up to the time specified in the Timestamp column. In the case of multicast, this parameter represents the sum of the bytes received by all the members of the group, to which the sender sends the messages

TABLE 2-22. Columns of the Application Session Summary Table (Continued)

Column	Configuration Parameter	Type	Description
FragSent	N/A	Integer	Number of fragments sent from the beginning of simulation up to the time specified in the Timestamp column.
EffectiveFragSent	N/A	Integer	<p>This column makes more sense for multicast applications. For Unicast applications, this column gives the same information as the FragSent column.</p> <p>In the case of multicast, this parameter represents the sum of the fragments sent to each receiver by the sender when the receivers are actually a part of the group.</p>
FragReceived	N/A	Integer	<p>Number of fragments received from the beginning of simulation up to the time specified in the Timestamp column.</p> <p>In the case of multicast, this parameter represents the sum of the fragments received by all the members of the group, to which the sender sends the messages.</p>
ApplicationType	N/A	String	Type of application.
ApplicationName	N/A	String	<p>Name associated with the application, if any.</p> <p>This row is empty if no name is associated with the application.</p>
MessageCompletionRate	N/A	Real	<p>Message completion rate from the beginning of simulation up to the time specified in the Timestamp column.</p> <p>For multicast, this would mean the number of messages received by all the multicast receivers with respect to the effective number of messages that were sent to the receivers.</p>
OfferedLoad	N/A	Real	<p>Offered load (in bps) from the beginning of simulation up to the time specified in the Timestamp column.</p> <p>For multicast, this represents the overall offered load for all members of the group.</p>

TABLE 2-22. Columns of the Application Session Summary Table (Continued)

Column	Configuration Parameter	Type	Description
Throughput	N/A	Real	Throughput (in bps) from the beginning of simulation up to the time specified in the Timestamp column. For multicast, this represents the overall throughput for all members of the group.
Delay	STATS-DB-APPLICATION-SUMMARY-DELAY	Real	Average message delay (in seconds) from the beginning of simulation up to the time specified in the Timestamp column. For multicast, this represents the overall average delay for all members of the group.
Jitter	STATS-DB-APPLICATION-SUMMARY-JITTER	Real	Average message jitter (in seconds) from the beginning of simulation up to the time specified in the Timestamp column. For multicast, this represents the overall average jitter for all members of the group.
HopCount	STATS-DB-APPLICATION-SUMMARY-HOP-COUNT	Real	Average message hop count from the beginning of simulation up to the time specified in the Timestamp column. For multicast, this represents the overall average hop count for all members of the group.

2.1.4.2 Multicast Application Summary Table

The Multicast Application Summary table provides summary metrics for multicast application sessions. The columns of the Multicast Application Summary table are listed in [Table 2-23](#).

- Notes:**
1. By default, a database table index (MulticastAppSummaryIndex) is created for the Multicast Application Summary table. The table index improves the speed of data retrieval operations at the expense of slower write operations and increased storage space. Creation of the table index can be suppressed by means of the configuration parameter `STAT-DB-MULTICAST-APPLICATION-SUMMARY-INDEX` (see [Table 3-11](#)).
 2. Multicast Super Application has no reply process, and works only with UDP.
 3. The Multicast Application Summary table records jitter based on difference in delay between successive packets. The jitter is NULL if less than 2 packets are received in that session. A value of 0 indicates that the jitter is 0 due to equal delay in arrival of successive packets.
 4. The Multicast Application Summary table shows NULL for Message Completion Rate, Offered Load, and Throughput when the number of effective messages sent/messages received is 0.
 5. Offered load (OfferedLoad column) includes both data and control packets.

TABLE 2-23. Columns of the Multicast Application Summary Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	Real	Simulation time (in seconds) of the entry in the table.
SenderId	N/A	Integer	Node identifier of the sending node.
ReceiverId	N/A	Integer	Node identifier of the receiving node in the group.
ReceiverAddress	N/A	String	Multicast group address.
SessionId	N/A	Integer	Unique identifier for the session.
Tos	N/A	Integer	TOS of the session.
MessagesSent	N/A	Integer	Number of messages sent from the beginning of simulation up to the time specified in the Timestamp column, by the sender to the receiver, when the receiver is a part of the group.
MessagesReceived	N/A	Integer	Number of messages received from the beginning of simulation up to the time specified in the Timestamp column, by the receiver group member.
BytesSent	N/A	Integer	Number of bytes sent from the beginning of simulation up to the time specified in the Timestamp column, by the sender to the receiver, when the receiver is a part of the group.

TABLE 2-23. Columns of the Multicast Application Summary Table (Continued)

Column	Configuration Parameter	Type	Description
BytesReceived	N/A	Integer	Number of messages received from the beginning of simulation up to the time specified in the Timestamp column, by the receiver group member.
FragSent	N/A	Integer	Number of fragments sent from the beginning of simulation up to the time specified in the Timestamp column, by the sender to the receiver, when the receiver is a part of the group.
FragReceived	N/A	Integer	Number of fragments received from the beginning of simulation up to the time specified in the Timestamp column, by the receiver group member.
ApplicationType	N/A	String	Type of application.
ApplicationName	N/A	String	Name associated with the application, if any. This row is empty if no name is associated with the application.
MessageCompletionRate	N/A	Real	Message completion rate from the beginning of simulation up to the time specified in the Timestamp column, for that receiver
OfferedLoad	N/A	Real	Offered load (in bps) from the beginning of simulation up to the time specified in the Timestamp column, for that receiver
Throughput	N/A	Real	Throughput (in bps) from the beginning of simulation up to the time specified in the Timestamp column, for that receiver.
Delay	STATS-DB-MULTICAST-APPLICATION-SUMMARY-DELAY	Real	Average message delay (in seconds) from the beginning of simulation up to the time specified in the Timestamp column, for that receiver.
Jitter	STATS-DB-MULTICAST-APPLICATION-SUMMARY-JITTER	Real	Average message jitter (in seconds) from the beginning of simulation up to the time specified in the Timestamp column, for that receiver.
HopCount	STATS-DB-MULTICAST-APPLICATION-SUMMARY-HOP-COUNT	Real	Average message hop count from the beginning of simulation up to the time specified in the Timestamp column, for that receiver

2.1.4.3 Transport Summary Table

The Transport Summary table provides metrics of each transport connection in the simulation. The columns of the Transport Summary table are listed in [Table 2-24](#).

- Notes:**
1. By default, a database table index (TransSummaryIndex) is created for the Transport Summary table. The table index improves the speed of data retrieval operations at the expense of slower write operations and increased storage space. Creation of the table index can be suppressed by means of the configuration parameter `STAT-DB-TRANSPORT-SUMMARY-INDEX` (see [Table 3-11](#)).
 2. Offered load (OfferedLoad column) includes both data and control packets.

TABLE 2-24. Columns in the Transport Summary Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	Real	Simulation time (in seconds) of the entry in the table.
SenderAddr	N/A	String	IP address of the sending node.
ReceiverAddr	N/A	String	IP address of the receiving node.
SenderPort	N/A	Integer	Port of the sending node
ReceiverPort	N/A	Integer	Port of the receiving node
UnicastSegmentsSent	N/A	Integer	Number of unicast segments sent from the beginning of simulation up to the time specified in the Timestamp column.segments sent.
MulticastSegmentsSent	N/A	Integer	Number of multicast segments sent from the beginning of simulation up to the time specified in the Timestamp column.
BroadcastSegmentsSent	N/A	Integer	Number of broadcast segments sent from the beginning of simulation up to the time specified in the Timestamp column.
UnicastSegmentsRcvd	N/A	Integer	Number of unicast segments received from the beginning of simulation up to the time specified in the Timestamp column.
MulticastSegmentsRcvd	N/A	Integer	Number of multicast segments received from the beginning of simulation up to the time specified in the Timestamp column.

TABLE 2-24. Columns in the Transport Summary Table (Continued)

Column	Configuration Parameter	Type	Description
BroadcastSegmentsRcvd	N/A	Integer	Number of broadcast segments received from the beginning of simulation up to the time specified in the Timestamp column.
UnicastBytesSent	N/A	Integer	Number of unicast bytes sent from the beginning of simulation up to the time specified in the Timestamp column.
MulticastBytesSent	N/A	Integer	Number of multicast bytes sent from the beginning of simulation up to the time specified in the Timestamp column.
BroadcastBytesSent	N/A	Integer	Number of broadcast bytes sent from the beginning of simulation up to the time specified in the Timestamp column.
UnicastBytesRcvd	N/A	Integer	Number of unicast bytes received from the beginning of simulation up to the time specified in the Timestamp column.
MulticastBytesRcvd	N/A	Integer	Number of multicast bytes received from the beginning of simulation up to the time specified in the Timestamp column.
BroadcastBytesRcvd	N/A	Integer	Number of broadcast bytes received from the beginning of simulation up to the time specified in the Timestamp column.
UnicastOfferedLoad	N/A	Real	Unicast Offered load (in bps) from the beginning of simulation up to the time specified in the Timestamp column.
MulticastOfferedLoad	N/A	Real	Multicast Offered load (in bps) from the beginning of simulation up to the time specified in the Timestamp column.
BroadcastOfferedLoad	N/A	Real	Broadcast Offered load (in bps) from the beginning of simulation up to the time specified in the Timestamp column.
UnicastThroughput	N/A	Real	Unicast Throughput load (in bps) from the beginning of simulation up to the time specified in the Timestamp column.

TABLE 2-24. Columns in the Transport Summary Table (Continued)

Column	Configuration Parameter	Type	Description
MulticastThroughput	N/A	Real	Multicast Throughput load (in bps) from the beginning of simulation up to the time specified in the Timestamp column.
BroadcastThroughput	N/A	Real	Broadcast Throughput load (in bps) from the beginning of simulation up to the time specified in the Timestamp column.
UnicastAverageDelay	STATS-DB-TRANSPORT-SUMMARY-DELAY	Real	Average unicast message delay (in seconds) from the beginning of simulation up to the time specified in the Timestamp column.
MulticastAverageDelay		Real	Average multicast message delay (in seconds).
BroadcastAverageDelay		Real	Average broadcast message delay (in seconds).
UnicastAverageJitter	STATS-DB-TRANSPORT-SUMMARY-JITTER	Real	Average unicast message jitter (in seconds) from the beginning of simulation up to the time specified in the Timestamp column.
MulticastAverageJitter		Real	Average multicast message jitter (in seconds).
BroadcastAverageJitter		Real	Average broadcast message jitter (in seconds).

2.1.4.4 Network Summary Table

The Network Summary table provides summary metrics for all one-hop pairs in the simulation. The columns of the Network Summary table are listed in [Table 2-25](#).

Notes: 1. By default, a database table index (NetSummaryIndex) is created for the Network Summary table. The table index improves the speed of data retrieval operations at the expense of slower write operations and increased storage space. Creation of the table index can be suppressed by means of the configuration parameter `STAT-DB-NETWORK-SUMMARY-INDEX` (see [Table 3-11](#)).

2. The following terms are used in [Table 2-25](#):

- *Number of packets/bytes sent*: Number of packets/bytes sent from the Network Layer to the MAC Layer at the source node(s).
- *Number of packets/bytes received*: Number of packets/bytes received by the Network Layer from the MAC Layer.
- *Number of packets/bytes forwarded*: Number of packets/bytes forwarded by the Network Layer at intermediate nodes (nodes that are neither source nor destination of the packet).

TABLE 2-25. Columns of the Network Summary Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	String	Simulation time (in seconds) of the entry in the table.
SenderAddr	N/A	String	IP address of the sending node.
ReceiverAddr	N/A	String	IP address of the one-hop neighbor if unicast; broadcast address or multicast group address otherwise
DataPacketsSent	N/A	Integer	Number of data packets sent from the SenderAddr by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
DataPacketsRecd	N/A	Integer	Number of data packets received at the SenderAddr by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
DataPacketsForward	N/A	Integer	Number of data packets forwarded from the SenderAddr by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
ControlPacketsSent	N/A	Integer	Number of control packets sent from the SenderAddr by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
ControlPacketsRecd	N/A	Integer	Number of control packets received at the SenderAddr by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
ControlPacketsForward	N/A	Integer	Number of control packets forwarded from the SenderAddr by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
DataBytesSent	N/A	Integer	Number of data bytes sent from the SenderAddr by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.

TABLE 2-25. Columns of the Network Summary Table (Continued)

Column	Configuration Parameter	Type	Description
DataBytesRecd	N/A	Integer	Number of data bytes received at the SenderAddr by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
DataBytesForward	N/A	Integer	Number of data bytes forwarded from the SenderAddr by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
ControlBytesSent	N/A	Integer	Number of control bytes sent by from the SenderAddr the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
ControlBytesRecd	N/A	Integer	Number of control bytes received at the SenderAddr by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
ControlBytesForward	N/A	Integer	Number of control bytes forwarded from the SenderAddr by the Network Layer from the beginning of simulation up to the time specified in the Timestamp column.
DataDelay	STATS-DB-NETWORK-SUMMARY-DATA-DELAY	Real	Average data packet delay (in seconds) from the beginning of simulation up to the time specified in the Timestamp column.
ControlDelay	STATS-DB-NETWORK-SUMMARY-CONTROL-DELAY	Real	Average control packet delay (in seconds) from the beginning of simulation up to the time specified in the Timestamp column.

TABLE 2-25. Columns of the Network Summary Table (Continued)

Column	Configuration Parameter	Type	Description
DataJitter	STATS-DB-NETWORK-SUMMARY-DATA-JITTER	Real	Average data packet jitter (in seconds) from the beginning of simulation up to the time specified in the Timestamp column. Note: The average broadcast (multicast) data packet jitter of one-hop traffic is calculated for all data traffic targeted to the same broadcast (multicast) destination address.
ControlJitter	STATS-DB-NETWORK-SUMMARY-CONTROL-JITTER	Real	Average control packet jitter (in seconds) from the beginning of simulation up to the time specified in the Timestamp column. Note: The average broadcast (multicast) control packet jitter of one-hop traffic is calculated for all control traffic targeted to the same broadcast (multicast) destination address.

2.1.4.5 Multicast Network Summary Table

The Multicast Network Summary Table provides metrics for traffic information about multicast. This summary is from the perspective of the MOSPF, PIM-SM, AND PIM-DM protocols. The metrics shown by this table is in the form of peg count for respective node from the last recorded time in the Timestamp column to the time specified in the Timestamp column for the current record. The columns of the Multicast Network Summary table are listed in [Table 2-26](#).

TABLE 2-26. Columns in the Multicast Network Summary Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	String	Simulation time (in seconds) of the entry in the table.
NodeID	N/A	Integer	Node identifier of the node for which the statistics are collected.
ProtocolType	N/A	String	Shows the protocol for which this information is related to. This can be MOSPF, PIM-SM, or PIM-DM or OTHER. Here OTHER refers to the data collection when no multicast protocol exist.
DataSent	N/A	Integer	Counts data packets originated by the node. It does not include any loopback packet.

TABLE 2-26. Columns in the Multicast Network Summary Table (Continued)

Column	Configuration Parameter	Type	Description
DataReceived	N/A	Integer	Counts data packets received by the node. It also includes the loopback packet.
DataForwarded	N/A	Integer	Counts data packets forwarded by the node. It includes any loopback packet.
DataDiscarded	N/A	Integer	Counts data packets dropped by the node.

2.1.4.6 MAC Summary Table

The MAC Summary table provides metrics of each neighbor pair at the MAC Layer in the simulation. The columns of the MAC Summary table are listed in [Table 2-27](#).

TABLE 2-27. Columns of the MAC Summary Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	Real	Simulation time (in seconds) of the entry in the table.
SenderId	N/A	Integer	Sender ID
ReceiverId	N/A	Integer	Receiver ID
InterfaceIndex	N/A	Integer	Index of the interface
UnicastDataFramesSent	N/A	Integer	Number of unicast data frames sent by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.
UnicastDataFramesReceived	N/A	Integer	Number of unicast data frames received by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.
UnicastControlFramesSent	N/A	Integer	Number of unicast control frames sent by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.
UnicastControlFramesReceived	N/A	Integer	Number of unicast control frames received by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.
UnicastDataBytesSent	N/A	Integer	Number of unicast data bytes sent by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.

TABLE 2-27. Columns of the MAC Summary Table (Continued)

Column	Configuration Parameter	Type	Description
UnicastDataBytesReceived	N/A	Integer	Number of unicast data bytes received by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.
UnicastControlBytesSent	N/A	Integer	Number of unicast control bytes sent by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.
UnicastControlBytesReceived	N/A	Integer	Number of unicast control bytes received by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.
MulticastDataFramesSent	N/A	Integer	Number of multicast data frames sent by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.
MulticastDataFramesReceived	N/A	Integer	Number of multicast data frames received by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.
MulticastControlFramesSent	N/A	Integer	Number of multicast control frames sent by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.
MulticastControlFramesReceived	N/A	Integer	Number of multicast control frames received by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.
MulticastDataBytesSent	N/A	Integer	Number of multicast data bytes sent by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.
MulticastDataBytesReceived	N/A	Integer	Number of multicast data bytes received by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.
MulticastControlBytesSent	N/A	Integer	Number of multicast control bytes sent by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.

TABLE 2-27. Columns of the MAC Summary Table (Continued)

Column	Configuration Parameter	Type	Description
MulticastControlBytesReceived	N/A	Integer	Number of multicast control bytes received by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.
BroadcastDataFramesSent	N/A	Integer	Number of broadcast data frames sent by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.
BroadcastDataFramesReceived	N/A	Integer	Number of broadcast data frames received by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.
BroadcastControlFramesSent	N/A	Integer	Number of broadcast control frames sent by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.
BroadcastControlFramesReceived	N/A	Integer	Number of broadcast control frames received by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.
BroadcastDataBytesSent	N/A	Integer	Number of broadcast data bytes sent by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.
BroadcastDataBytesReceived	N/A	Integer	Number of Broadcast data bytes received by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.
BroadcastControlBytesSent	N/A	Integer	Number of broadcast control bytes sent by the MAC Layer from the beginning of simulation up to the time specified in the Timestamp column.
FramesDroppedSender	N/A	Integer	Number of frames dropped at sender from the beginning of simulation up to the time specified in the Timestamp column.

TABLE 2-27. Columns of the MAC Summary Table (Continued)

Column	Configuration Parameter	Type	Description
FramesDroppedReceiver	N/A	Integer	Number of frames dropped at receiver from the beginning of simulation up to the time specified in the Timestamp column.
BytesDroppedSender	N/A	Integer	Number of bytes dropped at sender from the beginning of simulation up to the time specified in the Timestamp column.
BytesDroppedReceiver	N/A	Integer	Number of bytes dropped at receiver from the beginning of simulation up to the time specified in the Timestamp column.

TABLE 2-27. Columns of the MAC Summary Table (Continued)

Column	Configuration Parameter	Type	Description
UnicastAverageQueuingDelay	STATS-DB-MAC-SUMMARY-DELAY	Real	Average queueing delay (delay from the time when the Network Layer sends a packet to the time it is removed from the MAC Layer queues) for unicast packets from the beginning of simulation up to the time specified in the Timestamp column.
UnicastAverageMediumAccessDelay		Real	Average medium access delay (delay from the time when the MAC Layer sends a packet to the time it is sent by the PHY Layer) for unicast packets from the beginning of simulation up to the time specified in the Timestamp column.
UnicastAverageMediumDelay		Real	Average medium delay (delay from the time a packet is sent by the MAC Layer at the sender to the time it is received by the MAC Layer at the receiver) for unicast packets from the beginning of simulation up to the time specified in the Timestamp column.
MulticastAverageMediumAccessDelay		Real	Average medium access delay for multicast packets.
MulticastAverageQueuingDelay		Real	Average queueing delay for multicast packets.
MulticastAverageMediumDelay		Real	Average medium delay for multicast packets.
BroadcastAverageQueuingDelay		Real	Average queueing delay for broadcast packets.
BroadcastAverageMediumAccessDelay		Real	Average medium access delay for broadcast packets.
BroadcastAverageMediumDelay		Real	Average medium delay for broadcast packets.
UnicastAverageJitter	STATS-DB-MAC-SUMMARY-JITTER	Real	Average unicast packet jitter (in seconds) from the beginning of simulation up to the time specified in the Timestamp column.
MulticastAverageJitter		Real	Average multicast packet jitter (in seconds).
BroadcastAverageJitter		Real	Average broadcast packet jitter (in seconds).

2.1.4.7 PHY Summary Table

The PHY Summary table provides metrics of each transmitter/receiver pair at the PHY Layer in the simulation. The columns of the PHY Summary table are listed in [Table 2-28](#).

Note: The PHY Summary table also includes statistics for the Abstract Link MAC and Abstract Satellite models.

TABLE 2-28. Columns of the PHY Summary Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	Real	Simulation time (in seconds) of the entry in the table.
SenderID	N/A	Integer	Node ID of the sending node.
ReceiverID	N/A	Integer	Node ID of the receiving node.
ChannelIndex	N/A	Integer	Channel index. Note: Because there is no PHY model associated with the Abstract Link MAC and Abstract Satellite models, for these models, this entry is NULL.
PhyIndex	N/A	Integer	Physical interface index. Note: Because there is no PHY model associated with the Abstract Link MAC and Abstract Satellite models, for these models, this entry is the receiver's interface index.
NumRcvdSignals	N/A	Integer	Number of signals received by the Physical Layer from the beginning of simulation up to the time specified in the Timestamp column. Note: Because there is no PHY model associated with the Abstract Link MAC and Abstract Satellite models, for these models, this entry is the number of frames received by the MAC Layer at the receiver node.

TABLE 2-28. Columns of the PHY Summary Table (Continued)

Column	Configuration Parameter	Type	Description
NumRcvdErrorSignals	N/A	Integer	<p>Number of error signals received by the Physical Layer from the beginning of simulation up to the time specified in the Timestamp column.</p> <p>Note: Because there is no PHY model associated with the Abstract Link MAC and Abstract Satellite models, for these models, this entry is the number of frames received in error by the MAC Layer at the receiver node.</p>
Utilization	N/A	Real	<p>Average utilization of the Physical Layer from the beginning of simulation up to the time specified in the Timestamp column.</p> <p>Note: Because there is no PHY model associated with the Abstract Link MAC and Abstract Satellite models, for these models, this entry is the average utilization of the MAC Layer (except that it is NULL for satellite nodes in the Abstract Satellite model).</p>
AverageInterference	N/A	Real	<p>Average interference (in dBm) of the Physical Layer from the beginning of simulation up to the time specified in the Timestamp column.</p> <p>Note: Because there is no PHY model associated with the Abstract Link MAC and Abstract Satellite models, for these models, this entry is NULL.</p>
AveragePathLoss	STATS-DB-PHY-SUMMARY-PATHLOSS	Real	<p>Average pathloss (in dB) of the physical layer from the beginning of simulation up to the time specified in the Timestamp column.</p> <p>Note: Because there is no PHY model associated with the Abstract Link MAC and Abstract Satellite models, for these models, this entry is NULL.</p>

TABLE 2-28. Columns of the PHY Summary Table (Continued)

Column	Configuration Parameter	Type	Description
AverageSignalPower	STATS-DB-PHY-SUMMARY-SIGNAL-POWER	Real	Average signal power (in dBm) from the beginning of simulation up to the time specified in the Timestamp column. Note: Because there is no PHY model associated with the Abstract Link MAC and Abstract Satellite models, for these models, this entry is NULL.
AverageDelay	STATS-DB-PHY-SUMMARY-DELAY	Real	Average packet delay (in seconds) from the beginning of simulation up to the time specified in the Timestamp column.

2.1.4.8 Queue Summary Table

The Queue Summary table provides summarized metrics of all the queue data in the simulation. The columns of the Queue Summary table are listed in [Table 2-29](#).

TABLE 2-29. Columns of the Queue Summary Table

Column	Configuration Parameter	Type	DESCRIPTION
Timestamp	N/A	Real	Simulation time (in seconds) of the entry in the table.
NodeId	N/A	Integer	Node id
InterfaceIndex	N/A	String	Index of the interface
QueuePosition	N/A	String	Position of the queue, such as Network Input.
QueueIndex	N/A	Integer	Index of the queue
QueueType	N/A	String	Type of the queue, such as FIFO.
QueueSize	N/A	Integer	Size of the queue
PacketsEnqueued	N/A	Integer	Number of packets queued from the beginning of simulation up to the time specified in the Timestamp column.
PacketsDequeued	N/A	Integer	Number of packets dequeued from the beginning of simulation up to the time specified in the Timestamp column.
PacketsDropped	N/A	Integer	Number of packets dropped from the beginning of simulation up to the time specified in the Timestamp column.

TABLE 2-29. Columns of the Queue Summary Table (Continued)

Column	Configuration Parameter	Type	DESCRIPTION
PacketsDroppedForcefully	N/A	Integer	Number of packets dropped forcefully from the beginning of simulation up to the time specified in the Timestamp column.
BytesEnqueued	N/A	Integer	Number of bytes queued from the beginning of simulation up to the time specified in the Timestamp column.
BytesDequeued	N/A	Integer	Number of bytes dequeued from the beginning of simulation up to the time specified in the Timestamp column.
BytesDropped	N/A	Integer	Number of bytes dropped from the beginning of simulation up to the time specified in the Timestamp column.
BytesDroppedForcefully	N/A	Integer	Number of bytes dropped forcefully from the beginning of simulation up to the time specified in the Timestamp column.
AverageQueueLength	N/A	Integer	Average queue length from the beginning of simulation up to the time specified in the Timestamp column.
PeakQueueLength	N/A	Integer	Peak queue length from the beginning of simulation up to the time specified in the Timestamp column.
AverageTimeinQueue	N/A	Real	Average time spent in queues from the beginning of simulation up to the time specified in the Timestamp column.
LongestTimeinQueue	N/A	Real	The Longest time spent in queues from the beginning of simulation up to the time specified in the Timestamp column.
AverageFreeSpace	N/A	Integer	Average free space in queues from the beginning of simulation up to the time specified in the Timestamp column.
MinimumFreeSpace	N/A	Integer	Minimum free space in queues from the beginning of simulation up to the time specified in the Timestamp column.

2.1.5 Events Tables

Events tables log each event (sent, received, dropped, or retransmitted) that occurs to a message, segment, packet, frame, or signal. The different Events tables and the configuration parameters associated with them are listed in [Table 2-30](#).

TABLE 2-30. Events Tables

Table	Configuration Parameter	Table Name in Database
Application Message Events Table	STATS-DB-APPLICATION-EVENTS-TABLE	APPLICATION_Events
Transport Segment Events Table	STATS-DB-TRANSPORT-EVENTS-TABLE	TRANSPORT_Events
Network Packet Events Table	STATS-DB-NETWORK-EVENTS-TABLE	NETWORK_Events
MAC Frame Events Table	STATS-DB-MAC-EVENTS-TABLE	MAC_Events
PHY Signal Events Table	STATS-DB-PHY-EVENTS-TABLE	PHY_Events
Queue Events Table	STATS-DB-QUEUE-EVENTS-TABLE	QUEUE_Events

If any of the Events tables listed in [Table 2-30](#) is enabled, an auxiliary table called Message_Id_Mapping Table is also generated. See [Section 2.1.5.7](#) for a description of this table.

2.1.5.1 Application Message Events Table

The Application Message Events table logs every message or fragment that the Application Layer sends, receives, drops, retransmits, etc. If a message is fragmented, then events for the entire message as well as message fragments are recorded in the table. The events for the entire message are recorded before the events for the message fragments. For example, if the fragment size is 10,000 bytes and the Application Layer sends a message of size 50,000 bytes, then a send event for the entire message is recorded, followed by five send events for the five message fragments. The columns of the Application Message Events table are listed in [Table 2-31](#).

TABLE 2-31. Columns of the Application Message Events Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	Real	Simulation time (in seconds) when the event occurs.
NodeId	N/A	Integer	Node identifier.
SessionInitiator	N/A	Integer	Identifier of the session which initiates the application.
ReceiverId	N/A	Integer	Node identifier of the receiving node. It will be null for multicast/broadcast traffic or if the traffic is sent to an invalid address.

TABLE 2-31. Columns of the Application Message Events Table (Continued)

Column	Configuration Parameter	Type	Description
ReceiverAddress	N/A	String	For unicast traffic, this is the node identifier of the destination node. For multicast traffic, this is the group address.
MessageId	N/A	String	Message identifier. The message ID is formed by combining the node identifier, message sequence number, and possibly the Application Layer message fragment number, using the format described in Section 2.1.5.7.1 .
Size	N/A	Integer	Size of the message or fragment (in bytes).

TABLE 2-31. Columns of the Application Message Events Table (Continued)

Column	Configuration Parameter	Type	Description
EventType	N/A	String	<p>Event type.</p> <p>The event type can be one of the following:</p> <p>AppSendToLower: This event occurs when the application sends a packet to UDP/TCP.</p> <p>AppReceiveFromLower: This event occurs when the application receives a packet (which is not a duplicate or out-of-order) from UDP/TCP.</p> <p>AppReceiveDuplicateFromLower: This event occurs when the application receives a duplicate packet from UDP/TCP.</p> <p>AppReceiveOutOfOrderFromLower: This event occurs when the application receives an out-of-order packet from UDP/TCP.</p> <p>AppDrop: This event occurs when a message is dropped at the Application Layer.</p> <p>Note: AppReceiveDuplicateFromLower is recorded only if the parameter STATS-DB-APPLICATION-EVENTS-RECORD-DUPLICATE (see Table 3-13) is set to YES.</p> <p>Note: AppReceiveOutOfOrderFromLower is recorded only if the parameter STATS-DB-APPLICATION-EVENTS-RECORD-OUT-OF-ORDER (see Table 3-13) is set to YES.</p>
SessionId	N/A	Integer	Identification of the TCP session created between the sender and receiver.
ApplicationType	N/A	String	Type of application.
ApplicationName	N/A	String	<p>Name associated with the application, if any.</p> <p>A name can be associated with any Super Application, CBR or MCBR session in the application configuration (.app) file.</p> <p>This row is empty if no name is associated with the application.</p>

TABLE 2-31. Columns of the Application Message Events Table (Continued)

Column	Configuration Parameter	Type	Description
MessageSeqNum	STATS-DB-APPLICATION-EVENTS-MSG-SEQUENCE-NUM	Integer	Message sequence number.
SocketMessageld1	STATS-DB-APPLICATION-EVENTS-SOCKET-INTERFACE-MESSAGE-IDS	Integer	First ID of the message from the Socket Interface.
SocketMessageld2		Integer	Second ID of the message from the Socket Interface.
Priority	STATS-DB-APPLICATION-EVENTS-PRIORITY	Integer	<p>Message precedence.</p> <p>The following values are used to indicate the precedence level:</p> <p>0: Routine (default)</p> <p>1: Priority</p> <p>2: Immediate</p> <p>3: Flash</p> <p>4: Flash Override</p> <p>5: Critical</p> <p>6: Internet Control</p> <p>7: Net Control</p>
MessageFailureType	STATS-DB-APPLICATION-EVENTS-FAILURE-TYPE	String	Reason for message failure. See Table 2-32 .
Delay	STATS-DB-APPLICATION-EVENTS-DELAY	Real	Time (in seconds) it takes the message to reach the destination.
Jitter	STATS-DB-APPLICATION-EVENTS-JITTER	Real	Variation in inter-arrival time of packets (in seconds) caused by network congestion, timing drift, or route changes.

TABLE 2-32. Failure Types for Application Message Events Table

Failure Type	Model	Description
Duplicate Message	MCBR, CBR, Super Application, Forward Application, VoIP	Message is dropped because it is a duplicate. The parameter <code>STATS-DB-APPLICATION-EVENTS-RECORD-DUPLICATE</code> (see Table 3-13) must be set to <code>YES</code> for this event to be recorded.
Not Enough Fragments Received For Reassembly	Super Application	Message is dropped because not all fragments of the message were received before the next message arrives. All fragments of the incomplete message are dropped. This type of failure can happen only if fragmentation occurs.
Out of Order Message	MCBR, CBR, Super Application, Forward Application, VoIP	Message is dropped because it is received out of order. The parameter <code>STATS-DB-APPLICATION-EVENTS-RECORD-OUT-OF-ORDER</code> (see Table 3-13) must be set to <code>YES</code> for this event to be recorded.
TCP Connection Failure	Forward Application	Failed to open a connection to the forward TCP Server.
Unknown Application	General	Message is dropped because it is meant for an application that is not running within QualNet. This can happen if the packet is injected from an external interface.

2.1.5.2 Transport Segment Events Table

The Transport Segment Events table logs each segment that the Transport Layer sends, receives, drops, retransmits, etc. The table contains the contents of the Transport Layer. The columns of the Transport Segment Events table are listed in [Table 2-33](#).

Note: Abstract TCP events are not recorded in the Transport Segment Events table.

TABLE 2-33. Columns of the Transport Segment Events Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	Real	Simulation time (in seconds) when the event occurs.
NodeId	N/A	Integer	Node identifier.
MessageId	N/A	String	<p>Message identifier.</p> <p>The message ID is formed by combining the node identifier, message sequence number, and possibly the Application Layer message fragment number, using the format described in Section 2.1.5.7.1.</p> <p>An Application Layer message may be divided into several TCP segments. Also, several Application Layer message may be packed into one TCP message. Therefore, sequence number of messages coming into and going out of TCP may be different. Another database table, the Message ID Mapping table, records the mapping of IDs of messages coming into and going out of TCP. See Section 2.1.5.7.2 for details of the Message ID Mapping table.</p>
Size	N/A	Integer	Size of the message or fragment (in bytes).
SenderPort	N/A	Integer	Port of the sending node
ReceiverPort	N/A	Integer	Port of the receiving node
MessageSeqNum	STATS-DB-TRANSPORT-EVENTS-MSG-SEQUENCE-NUM	Integer	Message sequence number.
ConnectionType	STATS-DB-TRANSPORT-EVENTS-CONNECTION-TYPE	String	Type of the connection
DataHeaderSize	STATS-DB-TRANSPORT-EVENTS-DATA-HEADER-SIZE	Integer	Header size of the segment
SegmentType	STATS-DB-TRANSPORT-EVENTS-SEGMENT-TYPE	String	Type of the segment, e.g., data or control.

TABLE 2-33. Columns of the Transport Segment Events Table (Continued)

Column	Configuration Parameter	Type	Description
EventType	STATS-DB-TRANSPORT- EVENTS-EVENT-TYPE	String	<p>Event type.</p> <p>The event type can be one of the following:</p> <p>TCPReceiveFromUpper/ UDPReceiveFromUpper: This event occurs when TCP/UDP receives a message from an application.</p> <p>TCPSendToLower/ UDPSendToLower: This event occurs when TCP/UDP sends either a segment created from a message received from the Application Layer (in the case of TCP) or the message received from the Application Layer (in the case of UDP) to the lower layer.</p> <p>TCPReceiveFromLower/ UDPReceiveFromLower: This event occurs when TCP/UDP receives a message from the lower layer.</p> <p>TCPSendToUpper/ UDPSendToUpper: This event occurs when TCP/UDP delivers a message to the Application Layer.</p> <p>UdpDrop: This event occurs when a message is dropped by UDP.</p>
MessageFailureType	STATS-DB-TRANSPORT- EVENTS-FAILURE-TYPE	String	Reason for message failure

2.1.5.3 Network Packet Events Table

The Network Packet Events table logs every packet or fragment that the Network Layer sends, receives, drops, retransmits, etc. If a packet is fragmented, then events for the entire packet as well as packet fragments are recorded in the table. The events for the entire packet are recorded before the events for the packet fragments. The columns of the Network Packet Events table are listed in [Table 2-34](#).

TABLE 2-34. Columns of the Network Packet Events Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	Real	Simulation time (in seconds) when the event occurs.
NodeId	N/A	Integer	Node identifier.

TABLE 2-34. Columns of the Network Packet Events Table (Continued)

Column	Configuration Parameter	Type	Description
MessageId	N/A	String	<p>Message identifier.</p> <p>The message ID is formed by combining the node identifier, message sequence Number, and Application Layer and Network Layer fragment numbers, using the format described in Section 2.1.5.7.1.</p> <p>Note: Note that when a message is fragmented for the first time, <code>NF<NetFragID></code> will be appended to the existing message ID. If an IP fragment is fragmented again, <code>-<NetFragID></code> will be appended to the message ID.</p> <p>Note: IP tunnel and IAHEP fragmentation are not supported. Thus, the message ID schemes can not trace tunneled and IAHEP fragmented packets.</p>
SenderAddress	N/A	String	IP address of the sender.
ReceiverAddress	N/A	String	IP address of the receiver.
PacketSize	N/A	Integer	Size of the packet or fragment (in bytes).

TABLE 2-34. Columns of the Network Packet Events Table (Continued)

Column	Configuration Parameter	Type	Description
EventType	N/A	String	<p>Event type.</p> <p>The event type can be one of the following:</p> <p><code>NetworkSendToLower</code>: This event occurs when the Network Layer sends a packet to the lower layer.</p> <p><code>NetworkSendToUpper</code>: This event occurs when the Network Layer delivers a packet to the upper layer.</p> <p><code>NetworkReceiveFromLower</code>: This event occurs when the Network Layer receives a packet from the lower layer.</p> <p><code>NetworkReceiveFromUpper</code>: This event occurs when the Network Layer receives a packet from the upper layer.</p> <p><code>NetworkForwardPacket</code>: This event occurs when the Network Layer forwards a packet from the source to the destination.</p> <p><code>NetworkPacketDrop</code>: The event occurs when a packet is dropped at the Network Layer.</p>
InterfaceIndex	N/A	String	Index of the incoming or outgoing interface.
MessageSeqNum	STATS-DB-NETWORK-EVENTS-MSG-SEQUENCE-NUM	Integer	Message sequence number.
DataHeaderSize	STATS-DB-NETWORK-EVENTS-DATA-HEADER-SIZE	Integer	Size of the header (in bytes).
PacketType	STATS-DB-NETWORK-EVENTS-MESSAGE-TYPE	String	Data packet or control packet.
ProtocolType	STATS-DB-NETWORK-EVENTS-PROTOCOL	String	<p>Protocol that created the IP header of the packet.</p> <p>It can be one of the following:</p> <ul style="list-style-type: none"> • <code>IPPROTO_UDP</code> • <code>IPPROTO_TCP</code> • <code>IPPROTO_HSLs</code>

TABLE 2-34. Columns of the Network Packet Events Table (Continued)

Column	Configuration Parameter	Type	Description
Priority	STATS-DB-NETWORK-EVENTS-PRIORITY	Integer	Message precedence. The following values are used to indicate the precedence level: 0 Routine (default) 1 Priority 2 Immediate 3 Flash 4 Flash Override 5 Critical 6 Internet Control 7 Net Control
PacketFailureType	STATS-DB-NETWORK-EVENTS-FAILURE-TYPE	String	Reason for packet failure. See Table 2-35 .
HopCount	STATS-DB-NETWORK-EVENTS-HOP-COUNT	Integer	Number of hops in the path from the source to the destination.

TABLE 2-35. Failure Types for Network Packet Events Table

Failure Type	Model	Description
Adaptation Protocol Not Available	IP	Packet dropped because adaptation protocol is not available.
Broadcast Self Originated Packet	IP	Packet is not forwarded since the broadcast source address is itself.
Deleting Outbound Packet	IP	Outbound packet dropped.
Duplicate Multicast Packet, MOSPF	MOSPF	Duplicate MOSPF packet dropped.
Duplicate Multicast Packet, ODMRP	ODMRP	Duplicate ODMRP packet dropped.
Fragment Hold Timer Expired	IP	Fragments are dropped since the hold timer expired.
Fragments Reassemble Error	IP	Fragment dropped due to reassembly error.
ICMP Not Enabled	IP	ICMP packet dropped because ICMP is not available.
IP Forwarding Not Enabled	IP	Packet because IP forwarding is not enabled.
IP Header Error	IP	Packet dropped because of IP Header errors.
IP Queue Full	IP	Packet because the IP queue is full.
IP Version Invalid	IP	Packet dropped because the IP version is invalid.
IP Version Mismatch	IP	Packet dropped due to IP version mismatch.
Multicast Leaf Node, Does not Forward	PIM - Dense Mode PIM - Sparse Mode	Packet dropped because the node is a multicast leaf node.
Multicast Self Originated Packet	IP	Packet is not forwarded since the multicast source address is itself.

TABLE 2-35. Failure Types for Network Packet Events Table (Continued)

Failure Type	Model	Description
No Route	IP	Packet dropped because there is no route to forward the packet.
No Route, PIM-SM	PIM - Sparse Mode	Packet dropped because there is no outgoing interface to forward the packet on.
No Route to RP	PIM - Sparse Mode	Packet dropped because there is no route to Rendezvous Point.
No Route to Source	PIM - Dense Mode	Packet dropped because there is no route to the source node.
No Routing Protocol Available	IP	Packet is not forwarded since no routing protocol is available.
Option Field Not Empty, MAODV	MAODV	Packet because the MAODV option field is not empty.
Packet Aged in Queue	IP	Queued packets dropped due to aging.
Packet Not from Desired Interface	PIM - Dense Mode	Packet dropped because it is not from the desired incoming interface.
Packet Not from the Upstream Interface	PIM - Dense Mode	Packet dropped because it is not from an upstream node.
Packet Too Big, Fragmentation Not Allowed	IP	Packet dropped because it is too large and there is no fragmentation option.
Protocol Unavailable	IP	Packet dropped because there is no supported protocol.
Protocol Unavailable, AODV	IP	AODV packet dropped because AODV is not available.
Protocol Unavailable, DSR	IP	DSR packet dropped because DSR is not available.
Protocol Unavailable, DYMO	IP	DYMO packet dropped because DYMO is not available.
Protocol Unavailable, FSRL	IP	FSRL packet dropped because FSLR is not available.
Protocol Unavailable, IGRP	IP	IGRP packet dropped because IGRP is not available.
Protocol Unavailable, LAR1	IP	LAR1 packet because LAR1 is not available.
Protocol Unavailable, ODR	IP	ODR packet dropped because ODR is not available.
Protocol Unavailable, OSPF	IP	OSPF packet dropped because OSPF is not available.
Protocol Unavailable, STAR	IP	STAR packet because STAR is not available.
Register Stop Sent	PIM - Sparse Mode	Packet dropped because the Register-Stop message has been sent
Upstream Is Not a PIM Router	PIM - Dense Mode	Packet dropped because it is not from a PIM router.
Zero TTL	IP	Packet dropped due to zero TTL.

2.1.5.4 MAC Frame Events Table

The MAC Frame Events table logs each frame that the MAC Layer sends, receives, drops, retransmits, etc. The table contains the contents of the MAC Layer. The columns of the MAC Frame Events table are listed in [Table 2-36](#).

TABLE 2-36. Columns of the MAC Frame Events Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	Real	Simulation time (in seconds) when the event occurs.
Nodeld	N/A	Integer	Node identifier.
MessageId	N/A	String	<p>Message identifier.</p> <p>The message ID is formed by combining the node identifier, message sequence Number, and Application Layer, Network Layer, and MAC Layer fragment numbers, using the format described in Section 2.1.5.7.1.</p> <p>Note: The message ID feature does not support message packing and unpacking. Thus message ID schemes can not trace packed messages.</p>
InterfaceIndex	N/A	Integer	Interface of the incoming or outgoing interface.
MessageSize	N/A	Integer	Size of the message.

TABLE 2-36. Columns of the MAC Frame Events Table (Continued)

Column	Configuration Parameter	Type	Description
EventType	N/A	String	Event type. The event type can be one of the following: <i>MacSendToLower</i> : This event occurs when the MAC Layer sends a packet to the lower layer. <i>MacSendToUpper</i> : This event occurs when the MAC Layer delivers a packet to the upper layer. <i>MacReceiveFromLower</i> : This event occurs when the MAC Layer receives a packet from the lower layer. <i>MacReceiveFromUpper</i> : This event occurs when the MAC Layer receives a packet from the upper layer. <i>MacDrop</i> : The event occurs when a packet is dropped at the MAC Layer.
HeaderSize	N/A	Integer	Size of the header (in bytes).
DestAddress	N/A	String	MAC address of the receiver.
SrcAddress	N/A	String	MAC address of the sender.
SequenceNumber	STATS-DB-MAC-EVENTS-MSG-SEQUENCE-NUM	Integer	Message sequence number.
ChannelIndex	STATS-DB-MAC-EVENTS-CHANNEL-INDEX	Integer	Index of the transmission channel.
FrameType	STATS-DB-MAC-EVENTS-MSG-FRAME-TYPE	String	Type of frames, for example, Data, RTS, CTS, etc.
FailureType	STATS-DB-MAC-EVENTS-MSG-FAILURE-TYPE	String	Failure type for packets dropped at the MAC Layer. See Table 2-37 .

TABLE 2-37. Failure Types for MAC Frame Events Table

Failure Type	Model	Description
Corrupted due to Collision	802.3	Packet dropped because of collisions.
Discard Broadcast Packet	LTE PDCP	Packet is dropped due to no broadcast support
Discard due to No Connection	LTE PDCP	Packet is dropped due to no entity connection
Discard due to Power Off	LTE PDCP	Packet is dropped due to power set to off

TABLE 2-37. Failure Types for MAC Frame Events Table (Continued)

Failure Type	Model	Description
Discard due to RlcAmEntity Overflow	LTE RLC	Packet is dropped due to RlcAmEntity buffer overflow
Discarded Received RLC PDU due to Reset	LTE RLC	Packet is dropped due to entity reset
Dropped by Ingress Filtering	SWITCH	Packet is dropped due to ingress filtering
Frame arrived from unknown Vlan	SWITCH	Packet is dropped due to unknown Vlan
Interface Disabled	All	Packet dropped because the interface is disabled
Layer2 Device	All	Device is not a Layer 2 device.
No Effective Bandwidth	LINK, 802.3	Packet dropped because effective bandwidth is 0.
Packet With Error	Microwave LINK, NCW	Packet dropped due to errors.
Port state is Discarding	SWITCH	Packet is dropped due to current port state
Port state is learning	SWITCH	Packet is dropped due to current port state
Reach Max Backoff Attempts	802.3	Packet dropped after maximum retries.
Unable to forward data packet	SWITCH	Packet is dropped due to clearing of queue
Unable to queue the packet	SWITCH	Packet is dropped due to full queue
Unicast Packet for Upper Layer	SWITCH	Upper layer packet is dropped

2.1.5.5 PHY Signal Events Table

The PHY Signal Events table logs every signal transmitted, received, dropped by physical layer. This table has the contents of the physical layer. The columns of the PHY Signal Events table are listed in [Table 2-38](#).

TABLE 2-38. Columns of the PHY Signal Events Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	Real	Simulation time (in seconds) when the event occurs.
NodeID	N/A	Integer	Node identifier.
MessageID	N/A	String	Message identifier. The message ID is formed by combining the node identifier, message sequence Number, and Application Layer, Network Layer, and MAC Layer fragment numbers, using the format described in Section 2.1.5.7.1 .
PhyIndex	N/A	Integer	Index of the PHY interface.
Size	N/A	Integer	Size of the signal.

TABLE 2-38. Columns of the PHY Signal Events Table (Continued)

Column	Configuration Parameter	Type	Description
EventType	N/A	String	Event type. The event type can be one of the following: PhyReceiveFromUpper: This event occurs when the PHY Layer receives a packet from the upper layer. PhySendToUpper: This event occurs when the PHY Layer delivers a packet to the upper layer. PhySendSignal: This event occurs when the PHY Layer sends a signal. PhyReceiveSignal: This event occurs when the PHY Layer receives a signal. PhyDrop: The event occurs when a signal is dropped at the PHY Layer due to a PHY Layer failure (see Table 2-39).
ChannelIndex	STATS-DB-PHY-EVENTS-CHANNEL-INDEX	Integer	Index of the channel.
ControlSize	STATS-DB-PHY-EVENTS-PREAMBLE-SIZE	Integer	Preamble size of the signal.
FailureType	STATS-DB-PHY-EVENTS-FAILURE-TYPE	String	Failure type for packet dropped at the PHY Layer. See Table 2-39 .
SignalPower	STATS-DB-PHY-EVENTS-SIGNAL-POWER	Real	Power of the signal (in dBm).
Interference	STATS-DB-PHY-EVENTS-INTERFERENCE-POWER	Real	Interference power (in dBm) of the signal.
PathLoss	STATS-DB-PHY-EVENTS-PATHLOSS	Real	Path Loss (in dB) of the signal.

TABLE 2-39. Failure Types for PHY Signal Events Table

Failure Type	Model	Description
PHY Busy in Receiving	Abstract PHY, 802.11	Packet dropped because radio is busy in receiving other packets.
PHY not Listening to Channel	All PHY models	Packet dropped due to node not listening to the channel.
PHY Stop Rx for Tx	Abstract PHY, 802.11	Packet dropped due to reception abort for switching to transmission.

TABLE 2-39. Failure Types for PHY Signal Events Table (Continued)

Failure Type	Model	Description
Rx Terminated by MAC	Abstract PHY, 802.11, LTE PHY	Packet dropped due to reception terminated by upper layer.
Signal below Propagation Limit	All PHY models	Packet dropped due to signal strength below propagation limit.
Signal below Rx Threshold	Abstract PHY, 802.11	Packet dropped due to signal below reception threshold.
Signal Received with Error	Abstract PHY, 802.11	Packet dropped due to reception error.

2.1.5.6 Queue Events Table

The Queue Events table logs every packet processed by the queues in the simulation. The columns of the Queue Events table are listed in [Table 2-40](#).

TABLE 2-40. Columns of the Queue Events Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	Real	Simulation time (in seconds) when the event occurs.
MessageId	N/A	String	Message identifier. The message ID is formed by combining the node identifier, message sequence Number, and Application Layer, Network Layer, and MAC Layer fragment numbers, using the format described in Section 2.1.5.7.1 .
NodeId	N/A	Integer	Node identifier.
InterfaceIndex	N/A	String	Index of the interface.
QueuePosition	N/A	String	Position of the queue, for example, <i>Network Input</i> .
QueueIndex	N/A	Integer	Index of the queue.
SizeofPacket	N/A	Integer	Size of the packet.
PacketPriority	N/A	Integer	Message precedence. The following values are used to indicate the precedence level: <ul style="list-style-type: none"> 0 Routine (default) 1 Priority 2 Immediate 3 Flash 4 Flash Override 5 Critical 6 Internet Control 7 Net Control

TABLE 2-40. Columns of the Queue Events Table (Continued)

Column	Configuration Parameter	Type	Description
EventType	N/A	String	Event type. The event type can be one of the following: SuccessfulEnqueue: This event occurs when a packet is successfully enqueued. Dequeue: This event occurs when a packet is dequeued. FailedEnqueue: This event occurs when the packet could not be enqueued. QueueDrop: The event occurs when a packet is dropped at the queue.
FailureType	N/A	String	Failure type for packets dropped at the queue. See Table 2-41 .
TimeinQueue	N/A	Real	Duration of the time a packet spent in the queue.
FreeSpace	N/A	Integer	Current free space of the queue.

TABLE 2-41. Failure Types for Queue Events Table

Failure Type	Model	Description
Enqueue Failed because Queue is Full	Queue	Packet could not be enqueued because the queue is full.
Simulation Reset or Ends	Queue	Packet dropped because the simulation has ended or has been reset.

2.1.5.7 Message Identifiers and Tracing Messages

Each Events table has a `MessageId` (message identifier) column which identifies the message corresponding to the event. The format of the message identifier is described in [Section 2.1.5.7.1](#).

As a message travels up and down the protocol stack, several messages may be combined into one (when packing or desegmentation occurs) or a single message may be split into several messages (when unpacking or segmentation occurs). Because of this, the message identifiers may change as the message traverses the protocol stack. In order to trace a message, a Message ID Mapping table is generated. This table is described in [Section 2.1.5.7.2](#).

2.1.5.7.1 Format of the Message Identifier

The message identifier for a complete message is formed by combining the node identifier (`NodeId`) and the message sequence number (`MessageSeqNum`) in the following format:

`N<NodeId>S<MessageSeqNum>`

where

<code><NodeId></code>	Node Identifier
<code><MessageSeqNum></code>	Message sequence number

If the message is fragmented, then message identifier for each fragment is formed by appending the fragment number at each layer to the message identifier of the original message in the following format:

`N<NodeId>S<MessageSeqNum> [AF<AppFragID>] [NF<NetFragID>] [MF<MACFragID>]`

where

<code><NodeId></code>	Node Identifier
<code><MessageSeqNum></code>	Message sequence number
<code><AppFragID></code>	Application Layer fragment number, in the range 0 to n-1, where n is the number of Application Layer fragments. If there is no fragmentation at the Application Layer, the Application Layer fragment number is not included in the message identifier.
<code><NetFragID></code>	Network Layer fragment number, in the range 0 to n-1, where n is the number of Network Layer fragments. If there is no fragmentation at the Network Layer, the Network Layer fragment number is not included in the message identifier.
<code><MACFragID></code>	MAC Layer fragment number, in the range 0 to n-1, where n is the number of MAC Layer fragments. If there is no fragmentation at the Network Layer, the MAC Layer fragment number is not included in the message identifier.

Example:

Consider the following message identifier:

`N100S2000AF1MF3`

In this message identifier, the node ID is 100, the message sequence number is 200, the Application Layer fragment number is 1, and the MAC Layer fragment number is 3. There is no fragmentation at the Network Layer.

Note: For an Application Layer fragment, the Application Layer fragment number is included in the message identifier displayed in the Application Message Events Table only if fragmentation occurs at the Application Layer and the parameter `STATS-DB-APPLICATION-EVENTS-RECORD-FRAGMENT` is set to YES.

The Application Layer fragment number is always included in the message identifier displayed in the other events tables if fragmentation occurs at the Application Layer, irrespective of the value of the parameter `STATS-DB-APPLICATION-EVENTS-RECORD-FRAGMENT`.

2.1.5.7.2 Message ID Mapping Table

The Message ID Mapping is used in conjunction with the Events tables to trace messages as they traverse the protocol stack. The Message ID Mapping table tracks the IDs of messages which may get modified when being processed at a layer due to several messages being combined into one or a message being split into several messages. For example, at the sender three Application Layer messages may be combined into one at the Transport Layer. In this case, there will be three entries in the Message ID Mapping table which map the IDs of the three component messages to the ID of the combined message. At the receiver, the combined message is split into its three component messages. There will be three entries in the Message ID Mapping table which map ID of the combined message to the IDs of the three component messages.

The columns of the Message ID Mapping table are described in [Table 2-42](#).

TABLE 2-42. Columns of the Message ID Mapping Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	Real	Simulation time (in seconds) when the segment is processed.
NodeId	N/A	Integer	Node identifier.
MessageIdIn	N/A	String	Message identifier of the incoming message.
MessageIdOut	N/A	String	Message identifier of the outgoing message.
Protocol	N/A	String	Protocol that inserts this entry.

2.1.6 Connectivity Tables

The Connectivity tables represent the network connectivity from the perspective of each layer. For example, the Physical Layer may consider two nodes to be connected if one can receive a signal transmitted by the other, but the Network Layer may consider the same two nodes to be not connected if the routes have not converged yet. The different Connectivity tables and the configuration parameters associated with them are listed in [Table 2-43](#).

TABLE 2-43. Connectivity Tables

Table	Configuration Parameter	Table Name in Database
Application Layer Connectivity Table	STATS-DB-APPLICATION-CONNECTIVITY-TABLE	APPLICATION_Connectivity
Transport Layer Connectivity Table	STATS-DB-TRANSPORT-CONNECTIVITY-TABLE	TRANSPORT_Connectivity
Network Layer Connectivity Table	STATS-DB-NETWORK-CONNECTIVITY-TABLE	NETWORK_Connectivity
Multicast Connectivity Table	STATS-DB-MULTICAST-CONNECTIVITY-TABLE	MULTICAST_Connectivity
MAC Layer Connectivity Table	STATS-DB-MAC-CONNECTIVITY-TABLE	MAC_Connectivity
Physical Layer Connectivity Table	STATS-DB-PHY-CONNECTIVITY-TABLE	PHY_Connectivity

2.1.6.1 Application Layer Connectivity Table

The Application Layer Connectivity table provides connectivity information at the application session level. This also includes multicast connectivity. The columns of the Application Layer Connectivity table are listed in [Table 2-44](#).

TABLE 2-44. Columns of the Application Layer Connectivity Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	Real	Simulation time (in seconds) when the application connectivity is written to the database.
SenderAddr	N/A	String	IP address of the sender.
ReceiverAddr	N/A	String	IP address of the receiver.
SessionId	N/A	Integer	Sender's application session ID.

2.1.6.2 Transport Layer Connectivity Table

The Transport Layer Connectivity table provides connectivity information at the transport protocol level. Note that not all protocols maintain connection information. This includes multicast connectivity. The columns of the Transport Layer Connectivity table are listed in [Table 2-45](#).

TABLE 2-45. Columns of the Transport Layer Connectivity Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	Real	Simulation time (in seconds) when the transport connectivity is written to the database.
SenderAddr	N/A	String	IP address of the sender.
SenderPort	N/A	Integer	Port of the sender.

TABLE 2-45. Columns of the Transport Layer Connectivity Table (Continued)

Column	Configuration Parameter	Type	Description
ReceiverAddr	N/A	String	IP address of the receiver.
ReceiverPort	N/A	Integer	Port of the receiver.

2.1.6.3 Network Layer Connectivity Table

The Network Layer Connectivity table provides information on network connectivity from the Network Layer perspective. A destination node is considered to be connected to a source node if there is an entry in the source node's forwarding table for the destination node. The columns of the Network Layer Connectivity table are listed in [Table 2-46](#).

TABLE 2-46. Columns of the Network Layer Connectivity Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	String	Simulation time (in seconds) when the IP forwarding table is written to the database.
NodeId	N/A	Integer	Node identifier
DestinationAddr	N/A	String	IP address of the destination node.
Cost	N/A	Real	Number of hops in the path from the source to the destination.
DestMaskAddr	N/A	String	Subnet mask of the destination.
AdminDistance	N/A	Integer	Priority associated with the routing protocol.
NextHopAddr	STATS-DB-NETWORK-CONNECTIVITY-NEXT-HOP-ADDRESS	String	IP address of the next hop node.
OutgoingInterfaceIndex	STATS-DB-NETWORK-CONNECTIVITY-OUTGOING-INTERFACE-INDEX	Integer	Interface index used for the outgoing packet.
RoutingProtocolType	STATS-DB-NETWORK-CONNECTIVITY-ROUTING-PROTOCOL	String	Routing protocol used for the packet.

2.1.6.4 Multicast Connectivity Table

The Multicast Connectivity Table provides connectivity information about multicast protocols. This connectivity is from the perspective of the MOSPF, PIM-SM, and PIM-DM protocol specific forwarding tables.

For MOSPF and PIM-DM, the connectivity information is generated when the data traffic exist. In these cases the field `RootNodeType` will always have the value `Source` having field `RootNodeId` as the Node ID of the multicast traffic generator node with respect to the multicast group as value in field `DestAddr`.

For PIM-SM, the connectivity information is mainly divided into two parts `Source` tree and `RP` tree. The Source tree refers to the path from multicast traffic generator nodes to RP nodes, and the RP tree refers to the path from RP node to the respective receivers' node. In case of Source tree, field `RootNodeType` will

always have the value `Source` having field `RootNodeId` as the Node ID of the multicast traffic generator node with respect to the multicast group as value in field `DestAddr`. In case of RP tree, field `RootNodeType` will always have the value `RP` having field `RootNodeId` as the Node ID of the RP node with respect to the multicast group as value in field `DestAddr`. The information from RP to receivers i.e. RP trees, is independent of data traffic. However, the connectivity for Source trees will be generated only when there is a flow of the respective data traffic.

In Source trees, if the forwarding node i.e. `SenderId` is itself a source node of the multicast data traffic then the `UpstreamNodeId` and `UpstreamInterface` fields will have the value `null`. In case of PIM-SM if the `SenderId` node is the RP node, which is also the end of the Source tree, then the value for the field `OutgoingInterfaceIndex` will be `null`.

In RP trees, if the forwarding node i.e. `SenderId` is itself a RP node for the respective multicast data group then `UpstreamInterface` field will contain the value `null`.

For MOSPF, PIM-DM and PIM-SM, the multicast connectivity tree with respect to a multicast data traffic generator node can be derived easily by follow up the fields `RootNodeType` and `RootNodeId` as value `Source` and traffic generator node ID respectively, for a multicast group as `DestAddr`. However, in case of PIM-SM it will be up to the RP nodes only.

For PIM-SM, the multicast connectivity tree beyond RP nodes to the designated receivers can be derived using the RP trees by follow up the fields `RootNodeType` and `RootNodeId` as value `RP` and node ID of the RP node respectively, for a multicast group as `DestAddr`.

Note: This table does not include the host nodes which do not run a multicast protocol. Also it does not include leaf receiver nodes even if they run a multicast protocol.

The columns of the Multicast Connectivity table are listed in [Table 2-47](#).

TABLE 2-47. Columns of the Multicast Connectivity Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	Real	Simulation time (in seconds) when the multicast connectivity is written to the database.
SenderId	N/A	Integer	Node ID of the forwarding node.
DestAddr	N/A	String	Destination address of the receiving multicast group.
RootNodeType	N/A	String	Describes the type of the root for which the forwarding node is participating as a connectivity node. It can be either <code>Source</code> or <code>RP</code> for PIM-SM, for else it will be <code>Source</code> .
RootNodeId	N/A	Integer	Node ID of the root node.

TABLE 2-47. Columns of the Multicast Connectivity Table (Continued)

Column	Configuration Parameter	Type	Description
OutgoingInterfaceIndex	N/A	String	Interface index of the forwarding node.
UpstreamNodeId	N/A	String	Node ID of the upstream node.
UpstreamInterface	N/A	String	Interface index of the forwarding node to connect to the upstream node.

2.1.6.5 MAC Layer Connectivity Table

The MAC Layer Connectivity Table provides connectivity information at the MAC Layer. This connectivity is from the perspective of the MAC scheduling algorithm. Thus, even if at the physical layer, a neighbor is reachable, at the MAC Layer, that same neighbor may not part of a node's transmission neighbor. The columns of the MAC Layer Connectivity table are listed in [Table 2-48](#).

TABLE 2-48. Columns of the MAC Layer Connectivity Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	Real	Simulation time (in seconds) when the MAC Layer connectivity is written to the database.
SenderId	N/A	Integer	Node ID of the sending node.
ReceiverId	N/A	Integer	Node ID of the receiving node.
SenderInterfaceIndex	N/A	Integer	Interface index of the sending node.
ChannelIndex	N/A	String	Channel index.

2.1.6.6 PHY Layer Connectivity Table

The Physical Layer Connectivity table provides information on network connectivity from the Physical Layer perspective. A destination node is considered to be connected to a source node if it can receive a signal transmitted by the source node. Each entry in the Physical Layer Connectivity table represents unidirectional communication. The columns of the Physical Layer Connectivity table are listed in [Table 2-49](#).

TABLE 2-49. Columns of the Physical Layer Connectivity Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	String	Simulation time (in seconds) when the Physical Layer connectivity graph is computed and written to the database.
SenderId	N/A	Integer	Node identifier of the sender.
ReceiverId	N/A	Integer	Node identifier of the receiver.

TABLE 2-49. Columns of the Physical Layer Connectivity Table (Continued)

Column	Configuration Parameter	Type	Description
SenderPhyIndex	N/A	Integer	Physical Layer index of the outgoing interface.
ReceiverPhyIndex	N/A	Integer	Physical Layer index of the incoming interface.
ChannelIndex	N/A	Integer	Index of channel used by the sender and receiver to communicate.
SenderListening	N/A	String	Indication whether the sender node is listening on the channel.
ReceiverListening	N/A	String	Indication whether the receiver node is listening on the channel.
AntennaType	N/A	String	Antenna type used by the sender. It can be one of the following: SwitchedBeam, Steerable, Patterened, Omnidirectional, or None.
BestAngle	N/A	String	Indication whether the sender and receiver are reachable from each other when the receiver points in the direction of the receiver.
WorstAngle	N/A	String	Indication whether the sender and receiver are reachable from each other for the worst antenna gain in the direction of the receiver.

2.2 Model-specific Statistics Tables

This section describes model-specific statistics generated by QualNet. The statistics table for a model is generated only if the scenario uses that model.

The different model-specific tables are listed in [Table 2-50](#). A configuration parameter is associated with each table. These configuration parameters are used in the scenario configuration (.config) file to specify which tables are generated (see [Section 3.1.2](#)).

TABLE 2-50. Model-specific Statistics Tables

Table	Configuration Parameter	Table Name in Database
IGMP Summary Table	STATS-DB-MULTICAST-IGMP-SUMMARY-TABLE	IGMP_Summary
MOSPF Summary Table	STATS-DB-MULTICAST-MOSPF-SUMMARY-TABLE	MOSPF_Summary

TABLE 2-50. Model-specific Statistics Tables (Continued)

Table	Configuration Parameter	Table Name in Database
OSPF Aggregate Statistics Table	STATS-DB-OSPF-AGGREGATE-TABLE	OSPF_Aggregate
OSPF External LSA Table	STATS-DB-OSPF-EXTERNAL-LSA-TABLE	OSPF_ExternalLsa
OSPF Interface State Table	STATS-DB-OSPF-INTERFACE-STATE-TABLE	OSPF_InterfaceState
OSPF Neighbor State Table	STATS-DB-OSPF-NEIGHBOR-STATE-TABLE	OSPF_NeighborState
OSPF Network LSA Table	STATS-DB-OSPF-NETWORK-LSA-TABLE	OSPF_NetworkLsa
OSPF Router LSA Table	STATS-DB-OSPF-ROUTER-LSA-TABLE	OSPF_RouterLsa
OSPF Summary LSA Table	STATS-DB-OSPF-SUMMARY-LSA-TABLE	OSPF_SummaryLsa
OSPF Summary Statistics Table	STATS-DB-OSPF-SUMMARY-TABLE	OSPF_Summary
PIM-DM Summary Table	STATS-DB-MULTICAST-PIM-DM-SUMMARY-TABLE	PIM_DM_Summary
PIM-SM Status Table	STATS-DB-MULTICAST-PIM-SM-STATUS-TABLE	PIM_SM_Status
PIM-SM Summary Table	STATS-DB-MULTICAST-PIM-SM-SUMMARY-TABLE	PIM_SM_Summary
Urban Propagation Statistics Table	STATS-DB-URBAN-PROP-TABLE	URBAN_Propagation

2.2.1 IGMP Summary Table

The IGMP Summary table provides information in regards to the status of the nodes in multicast scenario. The columns of the IGMP Summary table are listed in [Table 2-51](#).

TABLE 2-51. Columns of the IGMP Summary Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	String	Simulation time (in seconds) of the entry in the table.
RouterNodeID	N/A	Integer	Node identifier of the router node.
MulticastAddress	N/A	String	Destination address of the multicast group.

TABLE 2-51. Columns of the IGMP Summary Table (Continued)

Column	Configuration Parameter	Type	Description
JoinMsgReceived	N/A	Integer	Number of join messages received by the router node from the last recorded time in the Timestamp column to the time specified in the Timestamp column.
ActiveNodeIds	N/A	String	List of node Ids that are currently active in the multicast group and associated with the router node at the time specified in the Timestamp column.

2.2.2 MOSPF Summary Table

The MOSPF Summary table provides information in regards to the group LSAs and router LSAs in multicast scenario. The metrics shown by this table is in the form of peg count for respective node from the last recorded time in the Timestamp column to the time specified in the Timestamp column for the current record. The columns of the MOSPF Summary table are listed in [Table 2-52](#).

TABLE 2-52. Columns of the Multicast MOSPF_Summary Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	String	Simulation time (in seconds) of the entry in the table.
NodeId	N/A	Integer	Node identifier of the router node.
GroupLSAGenerated	N/A	Integer	Number of group LSAs generated by the router node.
GroupLSAFlushed	N/A	Integer	Number of group LSAs flushed by the router node.
GroupLSAReceived	N/A	Integer	Number of group LSAs received by the router node.
RouterLSA_WCMRSent	N/A	Integer	Number of router LSAs WCMR (with rtype/bit 5 set) originated by the router node.
RouterLSA_WCMRReceived	N/A	Integer	Number of router LSAs WCMR (with rtype/bit 5 set) received by the router node.
RouterLSA_VLEPSent	N/A	Integer	Number of router LSAs VLEP (with rtype/bit 6 set) originated by the router node.
RouterLSA_VLEPReceived	N/A	Integer	Number of router LSAs VLEP (with rtype/bit 6 set) received by the router node.
RouterLSA_ASBRSent	N/A	Integer	Number of router LSAs ASBR (with rtype/bit 7 set) originated by the router node.

TABLE 2-52. Columns of the Multicast MOSPF_Summary Table (Continued)

Column	Configuration Parameter	Type	Description
RouterLSA_ASBRReceived	N/A	Integer	Number of router LSAs ASBR (with rtype/bit 7 set) received by the router node.
RouterLSA_ABRSent	N/A	Integer	Number of router LSAs ABR (with rtype/bit 8 set) originated by the router node.
RouterLSA_ABRReceived	N/A	Integer	Number of router LSAs ABR (with rtype/bit 8 set) received by the router node.

2.2.3 OSPF Aggregate Statistics Table

The OSPF Aggregate Statistics table provides periodic information about the Open Shortest Path First (OSPF) protocol and the control traffic generated and received at an aggregate level (refer to *Multimedia and Enterprise Model Library* for details of the OSPF protocol). The columns of this table are listed in [Table 2-53](#).

Note: Since Radio Open Shortest Path First (ROSPF) is an interface type of OSPF, ROSPF statistics are also reported in the OSPF Aggregate Statistics table.

TABLE 2-53. Columns of the OSPF Aggregate Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	Real	Simulation time (in seconds) of the entry in the table.
OfferedLoad	N/A	Real	Total offered load comprised of all control traffic originated by the OSPF protocol from the beginning of simulation up to the time specified in the Timestamp column.
LSUpdateSent	N/A	Integer	Number of LS Updates generated.
LSUpdateRecv	N/A	Integer	Number of LS Updates received.
LSUpdateBytesSent	N/A	Integer	Number of LS Update bytes generated.
LSUpdateBytesRecv	N/A	Integer	Number of LS Update bytes received.
AckSent	N/A	Integer	Number of Acknowledgements generated.
AckRecv	N/A	Integer	Number of Acknowledgements received.
AckBytesSent	N/A	Integer	Number of Acknowledgement bytes generated.
AckBytesRecv	N/A	Integer	Number of Acknowledgement bytes received.

TABLE 2-53. Columns of the OSPF Aggregate Table (Continued)

Column	Configuration Parameter	Type	Description
DDPktSent	N/A	Integer	Number of Database Description packets generated.
DDPktRecv	N/A	Integer	Number of Database Description packets received.
DDPktBytesSent	N/A	Integer	Number of Database Description bytes generated.
DDPktBytesRecv	N/A	Integer	Number of Database Description bytes received.
DDPktRxmt	N/A	Integer	Number of Database Description packets retransmitted.
DDPktBytesRxmt	N/A	Integer	Number of Database Description bytes retransmitted.
LSReqSent	N/A	Integer	Number of Link State Request packets generated.
LSReqRecv	N/A	Integer	Number of Link State Request packets received.
LSReqBytesSent	N/A	Integer	Number of Link State Request bytes generated.
LSReqBytesRecv	N/A	Integer	Number of Link State Request bytes received.
LSReqRxmt	N/A	Integer	Number of Link State Request packets retransmitted.

2.2.4 OSPF External LSA Table

The OSPF External LSA table provides periodic information about the OSPF External Link State Database (LSDB) of an OSPF node (refer to *Multimedia and Enterprise Model Library* for details of the OSPF protocol). The columns of this table are listed in [Table 2-54](#).

TABLE 2-54. Columns of the OSPF External LSA Table

Column	Configuration Parameters	Type	Description
Timestamp	N/A	Real	Simulation time (in seconds) of the entry in the table.
Nodeld	N/A	Integer	Node whose LSDB entry this row corresponds to.
Areald	N/A	Integer	Area ID for which this LSDB entry corresponds to.
AdvertisingRouterAddr	N/A	String	IP address of the router that advertised this LSA.
DestinationAddr	N/A	String	IP address of external entity.
LinkStateAge	N/A	Integer	Age of LSA in LSDB.

TABLE 2-54. Columns of the OSPF External LSA Table (Continued)

Column	Configuration Parameters	Type	Description
Cost	N/A	Integer	Cost to reach external entity from advertising router.
LinkStateType	N/A	String	Type of External LSA. Possible values are: <ul style="list-style-type: none"> • AS-EXTERNAL (5) • NSSA-EXTERNAL (7)

2.2.5 OSPF Interface State Table

The OSPF Interface State table provides periodic information about the OSPF interface state machine of an OSPF node (refer to *Multimedia and Enterprise Model Library* for details of the OSPF protocol). The columns of this table are listed in [Table 2-55](#).

TABLE 2-55. Columns of the OSPF Interface State Table

Column	Configuration Parameters	Type	Description
Timestamp	N/A	Real	Simulation time (in seconds) of the entry in the table.
InterfaceAddress	N/A	String	IP address of the interface for which this entry corresponds to.
CurrentState	N/A	String	Current state of the interface. Possible interface states are: <ul style="list-style-type: none"> • S_Down • S_Loopback • S_Waiting • S_PointToPoint • S_DROther • S_Backup • S_DR • UNKNOWN
Areald	N/A	Integer	Area ID that this interface belongs to
MobileLeaf	N/A	String	Indicates whether this interface is a mobile leaf router. Possible values are: <ul style="list-style-type: none"> • Yes • No

2.2.6 OSPF Neighbor State Table

The OSPF Neighbor State table provides periodic information about the OSPF neighbor state machine of an OSPF node (refer to *Multimedia and Enterprise Model Library* for details of the OSPF protocol). The columns of this table are listed in [Table 2-56](#).

TABLE 2-56. Columns of the OSPF Neighbor State Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	Real	Simulation time (in seconds) of the entry in the table.
InterfaceAddress	N/A	String	IP address of the interface for which this entry corresponds to.
NeighborInterfaceAddress	N/A	String	Neighbor IP address
NeighborState	N/A	String	Current state of the neighbor from the perspective of this node. Possible interface states are: <ul style="list-style-type: none"> • S_NeighborDown • S_Attempt • S_Init • S_TwoWay • S_ExStart • S_Exchange • S>Loading • S_Full • Unknown

2.2.7 OSPF Network LSA Table

The OSPF Network LSA table provides periodic information about the OSPF Network Link State Database (LSDB) of an OSPF node (refer to *Multimedia and Enterprise Model Library* for details of the OSPF protocol). The columns of this table are listed in [Table 2-57](#).

TABLE 2-57. Columns of the OSPF Network LSA Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	Real	Simulation time (in seconds) of the entry in the table.
NodeId	N/A	Integer	Node whose LSDB entry this row corresponds to.
AreaId	N/A	Integer	Area ID for which this LSDB entry corresponds to.
AdvertisingRouterAddr	N/A	String	IP address of the router that advertised this LSA.
AttachedRouterAddr	N/A	String	IP address of router affiliated with Multi-Access network.
LinkStateAge	N/A	Integer	Age of LSA in LSDB.

2.2.8 OSPF Router LSA Table

The OSPF Router LSA table provides periodic information about the OSPF Router Link State Database (LSDB) of an OSPF node (refer to *Multimedia and Enterprise Model Library* for details of the OSPF protocol). The columns of this table are listed in [Table 2-58](#).

TABLE 2-58. Columns of the OSPF Router LSA Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	Real	Simulation time (in seconds) of the entry in the table.
Nodeld	N/A	Integer	Node whose LSDB entry this row corresponds to.
Areald	N/A	Integer	Area ID for which this LSDB entry corresponds to.
AdvertisingRouterAddr	N/A	String	IP address of the router that advertised this LSA.
LinkId	N/A	String	Identifies the object that the advertising router connects to. (See RFC 2328 for more details)
LinkData	N/A	String	Identifies the interface address, subnet mask, or MIB-II ifIndex value of the advertising router. (See RFC 2328 for more details)
LinkType	N/A	String	Type of router link. Possible values are: <ul style="list-style-type: none"> • OSPFv2_POINT_TO_POINT (1) • OSPFv2_TRANSIT (2) • OSPFv2_STUB (3) • OSPFv2_VIRTUAL (4) • UNKNOWN
LinkStateAge	N/A	Integer	Age of LSA in LSDB
Cost	N/A	Integer	The cost of using this router link.

2.2.9 OSPF Summary LSA Table

The OSPF Summary LSA table provides periodic information about the OSPF Summary Link State Database (LSDB) of an OSPF node (refer to *Multimedia and Enterprise Model Library* for details of the OSPF protocol). The columns of this table are listed in [Table 2-59](#).

TABLE 2-59. Columns of the OSPF Summary LSA Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	Real	Simulation time (in seconds) of the entry in the table.
Nodeld	N/A	Integer	Node whose LSDB entry this row corresponds to.
Areald	N/A	Integer	Area ID for which this LSDB entry corresponds to.

TABLE 2-59. Columns of the OSPF Summary LSA Table (Continued)

Column	Configuration Parameter	Type	Description
AdvertisingRouterAddr	N/A	String	IP address of the router that advertised this LSA.
DestinationAddr	N/A	String	IP address being summarized
LinkStateAge	N/A	Integer	Age of LSA in LSDB
LinkStateType	N/A	String	Type of Summary LSA. Possible values are: <ul style="list-style-type: none"> • NETWORK_SUMMARY (3) • ROUTER_SUMMARY (4)

2.2.10 OSPF Summary Statistics Table

The OSPF Summary Statistics table provides periodic information about the OSPF protocol and the control traffic generated and received at an aggregate level from the perspective of a single node (refer to *Multimedia and Enterprise Model Library* for details of the OSPF protocol). The columns of this table are listed in [Table 2-60](#).

TABLE 2-60. Columns of the OSPF Summary Statistics Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	Real	Simulation time (in seconds) of the entry in the table.
InterfaceAddress	N/A	String	IP address of the interface for which this entry corresponds to.
OfferedLoad	N/A	Real	Total offered load comprised of all control traffic originated by the OSPF protocol from the beginning of simulation up to the time specified in the Timestamp column.
LSUpdateSent	N/A	Integer	Number of LS Updates generated.
LSUpdateRecv	N/A	Integer	Number of LS Updates received.
LSUpdateBytesSent	N/A	Integer	Number of LS Update bytes generated.
LSUpdateBytesRecv	N/A	Integer	Number of LS Update bytes received.
AckSent	N/A	Integer	Number of Acknowledgements generated.
AckRecv	N/A	Integer	Number of Acknowledgements received.
AckBytesSent	N/A	Integer	Number of Acknowledgement bytes generated.
AckBytesRecv	N/A	Integer	Number of Acknowledgement bytes received.
DDPktSent	N/A	Integer	Number of Database Description packets generated.

TABLE 2-60. Columns of the OSPF Summary Statistics Table (Continued)

Column	Configuration Parameter	Type	Description
DDPktRecv	N/A	Integer	Number of Database Description packets received.
DDPktBytesSent	N/A	Integer	Number of Database Description bytes generated.
DDPktBytesRecv	N/A	Integer	Number of Database Description bytes received.
DDPktRxmt	N/A	Integer	Number of Database Description packets retransmitted.
DDPktBytesRxmt	N/A	Integer	Number of Database Description bytes retransmitted.
LSReqSent	N/A	Integer	Number of Link State Request packets generated.
LSReqRecv	N/A	Integer	Number of Link State Request packets received.
LSReqBytesSent	N/A	Integer	Number of Link State Request bytes generated.
LSReqBytesRecv	N/A	Integer	Number of Link State Request bytes received.
LSReqRxmt	N/A	Integer	Number of Link State Request packets retransmitted.

2.2.11 PIM-DM Summary Table

The PIM-DM Summary table provides information in regards to the various PIM-DM messages in multicast scenario. The metrics shown by this table is in the form of peg count for respective node from the last recorded time in the Timestamp column to the time specified in the Timestamp column for the current record. The columns of the PIM-DM Summary table are listed in [Table 2-61](#).

TABLE 2-61. Columns of the PIM-DM Summary Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	String	Simulation time (in seconds) of the entry in the table.
Nodeld	N/A	Integer	Node identifier of the router node.
HelloSent	N/A	Integer	Number of Hello messages sent by the node.
HelloReceived	N/A	Integer	Number of Hello messages received by the node.
JoinPruneSent	N/A	Integer	Number of Join/Prune messages sent by the node.
JoinPruneReceived	N/A	Integer	Number of Join/Prune messages received by the node.
GraftSent	N/A	Integer	Number of Graft messages sent by the node.

TABLE 2-61. Columns of the PIM-DM Summary Table (Continued)

Column	Configuration Parameter	Type	Description
GraftReceived	N/A	Integer	Number of Graft messages received by the node.
GraftAckSent	N/A	Integer	Number of Graft ACK messages sent by the node.
GraftAckReceived	N/A	Integer	Number of Graft ACK messages received by the node.
AssertSent	N/A	Integer	Number of Assert messages sent by the node.
AssertReceived	N/A	Integer	Number of Assert messages received by the node.

2.2.12 PIM-SM Status Table

The PIM-SM Status table provides information in regards to the BSR, Candidate BSR, RP, Candidate RP and DR in multicast scenario. The columns of the PIM-SM Status table are listed in [Table 2-62](#).

TABLE 2-62. Columns of the PIM-SM Status Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	String	Simulation time (in seconds) of the entry in the table.
NodeId	N/A	Integer	Node identifier of the router node.
BSR_Type	N/A	String	Describes the BSR type of the node at the time specified in the Timestamp column. It can be Candidate, BSR, or null.
RP_Type	N/A	String	Describes the RP type of the node at the time specified in the Timestamp column. It can be Candidate, BSR, or null.
GroupAddress	N/A	String	Describes the multicast group address for which the node is RP at the time specified in the Timestamp column.
GroupAddressRange	N/A	String	List of (multicast group address/mask range) pair separated by comma “,” for which the node is Candidate RP at the time specified in the Timestamp column.

TABLE 2-62. Columns of the PIM-SM Status Table (Continued)

Column	Configuration Parameter	Type	Description
IsDR	N/A	String	Indicates whether the node is DR or not for any network address at the time specified in the Timestamp column. It can have values YES, NO, and null.
NetworkAddress	N/A	Integer	List of network address separated by comma “,” for which the node is DR at the time specified in the Timestamp column.

2.2.13 PIM-SM Summary Table

The PIM-SM Summary table provides information in regards to the various PIM-SM messages in multicast scenario. The metrics shown by this table is in the form of peg count for respective node from the last recorded time in the Timestamp column to the time specified in the Timestamp column for the current record. The columns of the PIM-SM Summary table are listed in [Table 2-63](#).

TABLE 2-63. Columns of the PIM-SM Summary Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	String	Simulation time (in seconds) of the entry in the table.
NodeId	N/A	Integer	Node identifier of the router node.
HelloSent	N/A	Integer	Number of Hello messages sent by the node.
HelloReceived	N/A	Integer	Number of Hello messages received by the node.
JoinPruneSent	N/A	Integer	Number of Join/Prune messages sent by the node.
JoinPruneReceived	N/A	Integer	Number of Join/Prune messages received by the node.
CandidateRPSent	N/A	Integer	Number of Candidate-RP messages sent by the node.
CandidateRPReceived	N/A	Integer	Number of Candidate-RP messages received by the node.
BootstrapSent	N/A	Integer	Number of Bootstrap messages sent by the node.
BootstrapReceived	N/A	Integer	Number of Bootstrap messages received by the node.
RegisterSent	N/A	Integer	Number of Register messages sent by the node.
RegisterReceived	N/A	Integer	Number of Register messages received by the node.
RegisterStopSent	N/A	Integer	Number of Register stop messages sent by the node.

TABLE 2-63. Columns of the PIM-SM Summary Table (Continued)

Column	Configuration Parameter	Type	Description
RegisterStopReceived	N/A	Integer	Number of Register stop messages received by the node.
AssertSent	N/A	Integer	Number of Assert messages sent by the node.
AssertReceived	N/A	Integer	Number of Assert messages received by the node.

2.2.14 Urban Propagation Statistics Table

The Urban Propagation Statistics table is generated if the scenario uses Automatic Model Selection for selecting a propagation model (refer to *Urban Propagation Model Library*). It logs every calculation of an urban propagation pathloss. Pathloss is calculated only if one or both of the nodes have moved since the last signal sent between the nodes, and the distance between the nodes has changed at least by an amount determined by the parameters `MOBILITY-POSITION-GRANULARITY`, `PROPAGATION-COMMUNICATION-PROXIMITY`, and `PROPAGATION-PROFILE-UPDATE-RATIO` (refer to *QualNet User's Guide*). The columns of the Urban Propagation Statistics table are listed in [Table 2-64](#).

TABLE 2-64. Columns of the Urban Propagation Statistics Table

Column	Configuration Parameter	Type	Description
Timestamp	N/A	Real	Simulation time (in seconds) of the entry in the table.
TxNodeID	N/A	Integer	Transmitting node's identifier.
RxNodeID	N/A	Integer	Receiving node's identifier.
TxLocation	N/A	Real, Real, Real	Transmitting node's coordinates.
RxLocation	N/A	Real, Real, Real	Receiving node's coordinates.
Frequency	N/A	Real	Channel frequency.
Distance	N/A	Real	Distance between the transmitting and receiving nodes (in meters).
FreeSpaceLink	N/A	Integer (0 or 1)	Indicates whether the link between the two nodes was found to be a free space link.
LoSLink	N/A	Integer (0 or 1)	Indicates whether there is line of sight between the two nodes.
TxInCanyon	N/A	Integer (0 or 1)	Indicates whether the first node is in an urban canyon (i.e., below the roof height in an urban area).
RxInCanyon	N/A	Integer (0 or 1)	Indicates whether the second node is in an urban canyon.
TxIndoors	N/A	Integer (0 or 1)	Indicates whether the first node is inside a building.
RxIndoors	N/A	Integer (0 or 1)	Indicates whether the second node is inside a building.

TABLE 2-64. Columns of the Urban Propagation Statistics Table (Continued)

Column	Configuration Parameter	Type	Description
ModelSelected	N/A	Text	Name of the model selected by the urban auto-select algorithm.
UrbanPathloss	N/A	Real	Total calculated pathloss (in dB).
FreeSpaceLoss	N/A	Real	Pathloss (in dB) calculated using the Free-space model (for comparison).
TwoRayLoss	N/A	Real	Pathloss (in dB) calculated using the two ray ground reflection model (for comparison).
ITMLoss	N/A	Real	Pathloss (in dB) calculated using the ITM pathloss model (for comparison).
NumWalls	N/A	Integer	Number of walls on the path inside a building.
NumFloors	N/A	Integer	Number of floors crossed by the signal inside a building.
OutsideDistance	N/A	Real	For a segmented path, the length of the outdoor segment.
InsideDistance1	N/A	Real	For a segmented path, the length of the first indoor segment.
InsideDistance2	N/A	Real	For a segmented path, the length of the second indoor segment.
OutsidePathloss	N/A	Real	For a segmented path, the loss (in dB) calculated for the outdoor segment.
InsideLoss1	N/A	Real	For a segmented path, the loss (in dB) calculated for the first indoor segment.
InsideLoss2	N/A	Real	For a segmented path, the loss (in dB) calculated for the second indoor segment.

3

Configuring Statistics Tables

3.1 Command Line Configuration

This section describes the parameters for configuring the statistics database. These parameters specify which statistics tables are generated, the optional columns that are included in each table, and properties such as the frequency of update of tables.

The general parameters for configuring the statistics database are described in [Section 3.1.1](#). Parameters for configuring different types of statistics tables are described in [Section 3.1.2](#) through [Section 3.1.9](#). See [Section 1.4.1.3](#) for a description of the format used for the parameter tables.

3.1.1 General Configuration Parameters for Statistics Database

[Table 3-1](#) describes the general configuration parameters for the statistics database.

TABLE 3-1. General Statistics Database Configuration Parameters

Parameter	Value	Description
STATS-DB-COLLECTION <i>Optional</i> <i>Scope: Global</i>	List: <ul style="list-style-type: none">• YES• NO <i>Default: NO</i>	Indicates whether statistics tables are to be generated.
STATS-DB-ENGINE <i>Optional</i> <i>Scope: Global</i>	List: <ul style="list-style-type: none">• SQLITE• MYSQL <i>Default: SQLITE</i>	Determines whether database output should be delivered to a SQLite database or to MySQL database. Note: Only MySQL may be used when running in parallel.
STATS-DB-USERNAME <i>Optional</i> <i>Scope: Global</i>	String <i>Default: statsdb</i>	Username for the MySQL session to be used within the simulation. Note: This parameter is required only if MySQL is used.

TABLE 3-1. General Statistics Database Configuration Parameters (Continued)

Parameter	Value	Description
STATS-DB-PASSWORD <i>Optional</i> <i>Scope: Global</i>	String <i>Default: statsdb</i>	Password to be used for the MySQL session within the simulation. Note: This parameter is required only if MySQL is used.
STATS-DB-SERVER <i>Optional</i> <i>Scope: Global</i>	String <i>Default: localhost</i>	The hostname (or IP address) of the MySQL server to be used for this simulation. Note: This parameter is required only if MySQL is used. For parallel and distributed architectures, the name of the central database server must be provided.
GESTALT-USE-WORKER-THREAD <i>Optional</i> <i>Scope: Global</i>	List: <ul style="list-style-type: none"> • YES • NO <i>Default: YES</i>	Indicates to the simulation runtime libraries to prefer the use of worker threads to improve run-time performance.

3.1.2 Database Detail Level Configuration

The user can specify the level of detail of the generated database. One of three levels can be specified: High, Medium, or Low, each corresponding to a pre-defined set of statistics tables (see [Table 3-2](#)). Alternatively, the user can generate a custom set of tables by configuring them individually. If one of the pre-defined set of tables is selected, all tables (and all optional columns of each table) in that set are generated by default and need not be configured individually.

TABLE 3-2. Statistics Tables Generated for Different Detail Levels

Detail Level	Generated Tables																																		
High	All tables (except Model-specific tables) with all optional columns of each table are generated.																																		
Medium	<p>The following tables with all optional columns of each table are generated:</p> <table> <tr> <td>Node Description table</td><td>Application Session Summary table</td></tr> <tr> <td>Queue Description table</td><td>Multicast Application Summary table</td></tr> <tr> <td>Scheduler Description table</td><td>Transport Summary table</td></tr> <tr> <td>Session Description table</td><td>Network Summary table</td></tr> <tr> <td>Connection Description table</td><td>MAC Summary table</td></tr> <tr> <td>Interface Description table</td><td>PHY Summary table</td></tr> <tr> <td>PHY Description table</td><td>Queue Summary table</td></tr> <tr> <td>Node Status table</td><td>Application Connectivity table</td></tr> <tr> <td>Interface Status table</td><td>Transport Connectivity table</td></tr> <tr> <td>Multicast Status table</td><td>Network Connectivity table</td></tr> <tr> <td>Queue Status table</td><td>Multicast Connectivity table</td></tr> <tr> <td>Application Aggregate table</td><td>MAC Connectivity table</td></tr> <tr> <td>Transport Aggregate table</td><td>PHY Connectivity table</td></tr> <tr> <td>Network Aggregate table</td><td></td></tr> <tr> <td>MAC Aggregate table</td><td></td></tr> <tr> <td>PHY Aggregate table</td><td></td></tr> <tr> <td>Queue Aggregate table</td><td></td></tr> </table>	Node Description table	Application Session Summary table	Queue Description table	Multicast Application Summary table	Scheduler Description table	Transport Summary table	Session Description table	Network Summary table	Connection Description table	MAC Summary table	Interface Description table	PHY Summary table	PHY Description table	Queue Summary table	Node Status table	Application Connectivity table	Interface Status table	Transport Connectivity table	Multicast Status table	Network Connectivity table	Queue Status table	Multicast Connectivity table	Application Aggregate table	MAC Connectivity table	Transport Aggregate table	PHY Connectivity table	Network Aggregate table		MAC Aggregate table		PHY Aggregate table		Queue Aggregate table	
Node Description table	Application Session Summary table																																		
Queue Description table	Multicast Application Summary table																																		
Scheduler Description table	Transport Summary table																																		
Session Description table	Network Summary table																																		
Connection Description table	MAC Summary table																																		
Interface Description table	PHY Summary table																																		
PHY Description table	Queue Summary table																																		
Node Status table	Application Connectivity table																																		
Interface Status table	Transport Connectivity table																																		
Multicast Status table	Network Connectivity table																																		
Queue Status table	Multicast Connectivity table																																		
Application Aggregate table	MAC Connectivity table																																		
Transport Aggregate table	PHY Connectivity table																																		
Network Aggregate table																																			
MAC Aggregate table																																			
PHY Aggregate table																																			
Queue Aggregate table																																			
Low	<p>The following tables with all optional columns of each table are generated:</p> <table> <tr> <td>Node Description table</td><td>Application Aggregate table</td></tr> <tr> <td>Queue Description table</td><td>Transport Aggregate table</td></tr> <tr> <td>Scheduler Description table</td><td>Network Aggregate table</td></tr> <tr> <td>Session Description table</td><td>MAC Aggregate table</td></tr> <tr> <td>Connection Description table</td><td>PHY Aggregate table</td></tr> <tr> <td>Interface Description table</td><td>Queue Aggregate table</td></tr> <tr> <td>PHY Description table</td><td></td></tr> </table>	Node Description table	Application Aggregate table	Queue Description table	Transport Aggregate table	Scheduler Description table	Network Aggregate table	Session Description table	MAC Aggregate table	Connection Description table	PHY Aggregate table	Interface Description table	Queue Aggregate table	PHY Description table																					
Node Description table	Application Aggregate table																																		
Queue Description table	Transport Aggregate table																																		
Scheduler Description table	Network Aggregate table																																		
Session Description table	MAC Aggregate table																																		
Connection Description table	PHY Aggregate table																																		
Interface Description table	Queue Aggregate table																																		
PHY Description table																																			
Custom	No table is generated by default. The user must select tables individually.																																		

The parameters for specifying the detail level are described in [Table 3-3](#).

TABLE 3-3. Statistics Database Detail Level Parameters

Parameter	Value	Description
STATS-DB-DETAIL <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • CUSTOM • HIGH • MEDIUM LOW <i>Default:</i> CUSTOM	Level of detail of the statistics database. If this parameter is set to CUSTOM , none of the statistics database tables is selected. The user must select the tables and to be generated by configuring the parameters described in Section 3.1.3 through Section 3.1.9 . If this parameter is set to HIGH , all statistics database tables (except Model-specific tables) are generated (with all optional columns for each of the tables). If this parameter is set to MEDIUM , all Description, Status, Aggregate, Summary, and Connectivity tables are generated (with all optional columns for each of the tables). If this parameter is set to LOW , all Description and Aggregate tables are generated (with all optional columns for each of the tables).

The user can also select a detail level and add tables to or remove tables from the set corresponding to that level. Parameters for configuring individual tables are described in [Section 3.1.3](#) through [Section 3.1.8](#).

For example, to generate all Description tables, the Node Status table, and all Aggregate tables except the Queue Aggregate table, the following parameters can be used (parameters `STATS-DB-STATUS-TABLE`, `STATS-DB-NODE-STATUS-TABLE`, and `STATS-DB-QUEUE-AGGREGATE-TABLE` are described in [Table 3-7](#) and [Table 3-9](#)):

STATUS-DB-DETAIL	LOW
STATS-DB-STATUS-TABLE	YES
STATS-DB-NODE-STATUS-TABLE	YES
STATS-DB-QUEUE-AGGREGATE-TABLE	NO

Note: Model-specific tables are not enabled automatically and must be configured as described in [Section 3.1.9](#).

3.1.3 Configuration Parameters for Description Tables

[Table 3-4](#) describes the parameters for configuring the Description tables, including parameters for meta-data columns but excluding parameters for all other optional columns. [Table 3-5](#) describes the parameters for configuring optional columns (except meta-data columns) of Description tables. [Table 3-6](#) describes additional meta-data parameters for importing scenarios into the GUI.

TABLE 3-4. Description Tables Configuration Parameters

Parameter	Value	Description
STATS-DB-DESCRIPTION-TABLE <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> YES	Indicates whether Description tables are to be generated.
STATS-DB-NODE-DESCRIPTION-TABLE <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> NO	Indicates whether the Node Description table is to be generated.
NODE-META-DATA-COLUMN-NAME <i>Optional</i> <i>Scope:</i> Global <i>Instances:</i> Meta-data column number	String	Heading of the meta-data column in the Node Description table.
NODE-META-DATA <i>Optional</i> <i>Scope:</i> Node <i>Instances:</i> Meta-data column number	String	Value associated with the meta-data column with the same index in the Node Description table for the specified node.
STATS-DB-QUEUE-DESCRIPTION-TABLE <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> NO	Indicates whether the Queue Description table is to be generated.
QUEUE-META-DATA-COLUMN-NAME <i>Optional</i> <i>Scope:</i> Global <i>Instances:</i> Meta-data column number	String	Heading of the meta-data column in the Queue Description table.
QUEUE-META-DATA <i>Optional</i> <i>Scope:</i> Node <i>Instances:</i> Meta-data column number	String	Value associated with the meta-data column with the same index in the Queue Description table for the specified node.

TABLE 3-4. Description Tables Configuration Parameters (Continued)

Parameter	Value	Description
STATS-DB-SCHEDULER- DESCRIPTION-TABLE <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> NO	Indicates whether the Scheduler Description table is to be generated.
SCHEDULER-META-DATA- COLUMN-NAME <i>Optional</i> <i>Scope:</i> Global <i>Instances:</i> Meta-data column number	String	Heading of the meta-data column in the Scheduler Description table.
SCHEDULER-META-DATA <i>Optional</i> <i>Scope:</i> Node <i>Instances:</i> Meta-data column number	String	Value associated with the meta-data column with the same index in the Scheduler Description table for the specified node.
STATS-DB-SESSION- DESCRIPTION-TABLE <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> NO	Indicates whether the Session Description table is to be generated.
SESSION-META-DATA-COLUMN- NAME <i>Optional</i> <i>Scope:</i> Global <i>Instances:</i> Meta-data column number	String	Heading of the meta-data column in the Session Description table.
SESSION-META-DATA <i>Optional</i> <i>Scope:</i> Node <i>Instances:</i> Meta-data column number	String	Value associated with the meta-data column with the same index in the Session Description table for the specified node.
STATS-DB-CONNECTION- DESCRIPTION-TABLE <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> NO	Indicates whether the Connection Description table is to be generated.

TABLE 3-4. Description Tables Configuration Parameters (Continued)

Parameter	Value	Description
CONNECTION-META-DATA-COLUMN-NAME <i>Optional</i> <i>Scope:</i> Global <i>Instances:</i> Meta-data column number	String	Heading of the meta-data column in the Connection Description table.
CONNECTION-META-DATA <i>Optional</i> <i>Scope:</i> Node <i>Instances:</i> Meta-data column number	String	Value associated with the meta-data column with the same index in the Connection Description table for the specified node.
STATS-DB-INTERFACE-DESCRIPTION-TABLE <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> NO	Indicates whether the Interface Description table is to be generated.
INTERFACE-META-DATA-COLUMN-NAME <i>Optional</i> <i>Scope:</i> Global <i>Instances:</i> Meta-data column number	String	Value associated with the meta-data column with the same index in the Interface Description table.
INTERFACE-META-DATA <i>Optional</i> <i>Scope:</i> Node <i>Instances:</i> Meta-data column number	String	Value associated with the meta-data column with the same index in the Interface Description table for the specified node.
STATS-DB-PHY-DESCRIPTION-TABLE <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> NO	Indicates whether the PHY Description table is to be generated.
PHY-META-DATA-COLUMN-NAME <i>Optional</i> <i>Scope:</i> Global <i>Instances:</i> Meta-data column number	String	Heading of the meta-data column in the PHY Description table.

TABLE 3-4. Description Tables Configuration Parameters (Continued)

Parameter	Value	Description
PHY-META-DATA <i>Optional</i> <i>Scope:</i> Node <i>Instances:</i> Meta-data column number	String	Value associated with the meta-data column with the same index in the PHY Description table for the specified node.

Table 3-5 describes the parameters for configuring optional columns (except meta-data columns) of Description tables. For the sake of brevity, we use a different format for describing these parameters. For each Description table, Table 3-5 lists the name of the optional columns and the parameter to configure each column. The table should be interpreted as follows:

- Each parameter is optional.
- The possible values of each parameter are: YES or NO. YES indicates that the column is included in the statistics table NO indicates that the column is not included.
- Each parameter can be specified at the global level.

TABLE 3-5. Parameters for Configuring Optional Columns of Description Tables

Table	Column	Configuration Parameter	Default Value
Queue Description Table	QueueDiscipline	STATS-DB-QUEUE-DESCRIPTION-TABLE-DISCIPLINE	YES
	QueuePriority	STATS-DB-QUEUE-DESCRIPTION-TABLE-PRIORITY	YES
	QueueSize	STATS-DB-QUEUE-DESCRIPTION-QUEUE-SIZE	YES
Scheduler Description Table	SchedulerAlgorithm	STATS-DB-SCHEDULER-DESCRIPTION-SCHEDULER-ALGORITHM	YES
Session Description Table	AppType	STATS-DB-SESSION-DESCRIPTION-APP-TYPE	YES
	SenderAddr	STATS-DB-SESSION-DESCRIPTION-SENDER-ADDRESS	YES
	ReceiverAddr	STATS-DB-SESSION-DESCRIPTION-RECEIVER-ADDRESS	YES
	SenderPort	STATS-DB-SESSION-DESCRIPTION-SENDER-PORT	YES
	ReceiverPort	STATS-DB-SESSION-DESCRIPTION-RECEIVER-PORT	YES
	TransportProtocol	STATS-DB-SESSION-DESCRIPTION-TRANSPORT-PROTOCOL	YES
Connection Description Table	ConnectionType	STATS-DB-CONNECTION-DESCRIPTION-CONNECTION-TYPE	YES
	NetworkProtocol	STATS-DB-CONNECTION-DESCRIPTION-NETWORK-PROTOCOL	YES

TABLE 3-5. Parameters for Configuring Optional Columns of Description Tables (Continued)

Table	Column	Configuration Parameter	Default Value
Interface Description Table	InterfaceName	STATS-DB-INTERFACE-DESCRIPTION-INTERFACE-NAME	YES
	InterfaceAddress	STATS-DB-INTERFACE-DESCRIPTION-INTERFACE-ADDRESS	YES
	SubnetMask	STATS-DB-INTERFACE-DESCRIPTION-SUBNET-MASK	YES
	RoutingProtocol	STATS-DB-INTERFACE-DESCRIPTION-ROUTING-PROTOCOL	YES
	MulticastProtocol	STATS-DB-INTERFACE-DESCRIPTION-MULTICAST-PROTOCOL	YES

Meta-data Parameters for Importing Scenarios into GUI

In order to display meta-data columns in the GUI when a scenario with meta-data columns is imported into the GUI, additional parameters need to be included in the scenario configuration file. These parameters specify the number of meta-data columns in each Description table for each node and are described in [Table 3-6](#).

TABLE 3-6. Meta-data Parameters for GUI

Parameter	Value	Description
GUI-NUM-NODE-META-DATA <i>Optional</i> <i>Scope:</i> Global, Node	Integer	Number of meta-data columns for the node in the Node Description table. This parameter must be specified for each node for which there is meta-data in the Node Description table.
GUI-NUM-QUEUE-META-DATA <i>Optional</i> <i>Scope:</i> Global, Node	Integer	Number of meta-data columns for the node in the Queue Description table. This parameter must be specified for each node for which there is meta-data in the Queue Description table.
GUI-NUM-SCHEDULER-META-DATA <i>Optional</i> <i>Scope:</i> Global, Node	Integer	Number of meta-data columns for the node in the Scheduler Description table. This parameter must be specified for each node for which there is meta-data in the Scheduler Description table.
GUI-NUM-SESSION-META-DATA <i>Optional</i> <i>Scope:</i> Global, Node	Integer	Number of meta-data columns for the node in the Session Description table. This parameter must be specified for each node for which there is meta-data in the Session Description table.

TABLE 3-6. Meta-data Parameters for GUI (Continued)

Parameter	Value	Description
GUI-NUM-CONNECTION-META-DATA <i>Optional</i> <i>Scope:</i> Global, Node	Integer	Number of meta-data columns for the node in the Connection Description table. This parameter must be specified for each node for which there is meta-data in the Connection Description table.
GUI-NUM-INTERFACE-META-DATA <i>Optional</i> <i>Scope:</i> Global, Node	Integer	Number of meta-data columns for the node in the Interface Description table. This parameter must be specified for each node for which there is meta-data in the Interface Description table.

Example

If there are two meta-data columns in the Node Description table and the meta-data for node 1 for the two columns are UAV and C2Node, respectively, then include the following lines in the scenario configuration file:

```
[1] GUI-NUM-NODE-META-DATA      2
[1] NODE-META-DATA [0]          UAV
[1] NODE-META-DATA [1]          C2Node
```

3.1.4 Configuration Parameters for Status Tables

[Table 3-7](#) describes the parameters for configuring the Status tables (except optional columns). [Table 3-8](#) describes the parameters for configuring optional columns of Status tables.

TABLE 3-7. Status Tables Configuration Parameters

Parameter	Value	Description
STATS-DB-STATUS-TABLE <i>Optional</i> <i>Scope:</i> Global	List: • YES • NO <i>Default:</i> YES	Indicates whether Status tables are to be generated.
STATS-DB-STATUS-PRINT-END-SIMULATION <i>Optional</i> <i>Scope:</i> Global	List: • YES • NO <i>Default:</i> YES	Indicates if the status table statistics will be inserted into the database at the end of simulation. Status table statistics are inserted into the database at intervals controlled by parameter STATS-DB-SUMMARY-INTERVAL. If STATS-DB-STATUS-PRINT-END-SIMULATION is set to YES, then status table statistics will also be inserted into the database at the end of simulation.
STATS-DB-STATUS-INTERVAL <i>Optional</i> <i>Scope:</i> Global	Time <i>Range:</i> > 0S <i>Default:</i> 600S	The time between consecutive entries in the Status tables.

TABLE 3-7. Status Tables Configuration Parameters (Continued)

Parameter	Value	Description
STATS-DB-NODE-STATUS-TABLE <i>Optional</i> <i>Scope: Global</i>	List: <ul style="list-style-type: none"> • YES • NO <i>Default: NO</i>	Indicates whether the Node Status table is to be generated.
STATS-DB-INTERFACE-STATUS-TABLE <i>Optional</i> <i>Scope: Global</i>	List: <ul style="list-style-type: none"> • YES • NO <i>Default: NO</i>	Indicates whether the Interface Status table is to be generated.
STATS-DB-MULTICAST-STATUS-TABLE <i>Optional</i> <i>Scope: Global</i>	List: <ul style="list-style-type: none"> • YES • NO <i>Default: NO</i>	Indicates whether the Multicast Status table is to be generated.
STATS-DB-QUEUE-STATUS-TABLE <i>Optional</i> <i>Scope: Global</i>	List: <ul style="list-style-type: none"> • YES • NO <i>Default: NO</i>	Indicates whether the Queue Status table is to be generated.

Table 3-8 describes the parameters for configuring optional columns of Status tables. These parameters are described in the same format as the parameters for optional columns of Description tables (see Section 3.1.2).

TABLE 3-8. Parameters for Configuring Optional Columns of Status Tables

Table	Column	Configuration Parameter	Default Value
Node Status Table	X or Lat	STATS-DB-NODE-STATUS-TABLE-POSITION	YES
	Y or Lon		
	Z or Alt		
	XVelocity or LatVelocity	STATS-DB-NODE-STATUS-TABLE-VELOCITY	YES
	YVelocity or LonVelocity		
	ZVelocity or AltVelocity		
	ActiveState	STATS-DB-NODE-STATUS-TABLE-ACTIVE-STATE	YES
	DamageState	STATS-DB-NODE-STATUS-TABLE-DAMAGE-STATE	YES

3.1.5 Configuration Parameters for Aggregate Tables

Table 3-9 describes the parameters for configuring the Aggregate tables (except optional columns).

Table 3-10 describes the parameters for configuring optional columns of Aggregate tables.

TABLE 3-9. Aggregate Tables Configuration Parameters

Parameter	Value	Description
STATS-DB-AGGREGATE-TABLE <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> YES	Indicates whether Aggregate tables are to be generated.
STATS-DB-AGGREGATE-PRINT-END-SIMULATION <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> YES	Indicates if the aggregate table statistics will be inserted into the database at the end of simulation. Aggregate table statistics are inserted into the database at intervals controlled by parameter STATS-DB-AGGREGATE-INTERVAL. If STATS-DB-AGGREGATE-PRINT-END-SIMULATION is set to YES, then Aggregate table statistics will also be inserted into the database at the end of simulation.
STATS-DB-AGGREGATE-INTERVAL <i>Optional</i> <i>Scope:</i> Global	Time <i>Range:</i> > 0S <i>Default:</i> 600S	Time between consecutive entries in the Aggregate tables.
STATS-DB-APPLICATION-AGGREGATE-TABLE <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> NO	Indicates whether the Application Aggregate table is to be generated.
STATS-DB-APPLICATION-AGGREGATE-INDEX <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> YES	Indicates whether a database table index (AppAggregateIndex) for the Application Aggregate table is to be created.
STATS-DB-TRANSPORT-AGGREGATE-TABLE <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> NO	Indicates whether the Transport Aggregate table is to be generated.
STATS-DB-TRANSPORT-AGGREGATE-INDEX <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> YES	Indicates whether a database table index (TransAggregateIndex) for the Transport Aggregate table is to be created.

TABLE 3-9. Aggregate Tables Configuration Parameters (Continued)

Parameter	Value	Description
STATS-DB-NETWORK- AGGREGATE-TABLE <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> NO	Indicates whether the Network Aggregate table is to be generated.
STATS-DB-NETWORK- AGGREGATE-INDEX <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> YES	Indicates whether a database table index (NetAggregateIndex) for the Network Aggregate table is to be created.
STATS-DB-MAC-AGGREGATE- TABLE <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> NO	Indicates whether the MAC Aggregate table is to be generated.
STATS-DB-MAC-AGGREGATE- INDEX <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> YES	Indicates whether a database table index (MacAggregateIndex) for the MAC Aggregate table is to be created.
STATS-DB-PHY-AGGREGATE- TABLE <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> NO	Indicates whether the PHY Aggregate table is to be generated.
STATS-DB-PHY-AGGREGATE- INDEX <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> YES	Indicates whether a database table index (PhyAggregateIndex) for the PHY Aggregate table is to be created.
STATS-DB-QUEUE-AGGREGATE- TABLE <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> NO	Indicates whether the Queue Aggregate table is to be generated.

Table 3-10 describes the parameters for configuring optional columns of Aggregate tables. These parameters are described in the same format as the parameters for optional columns of Description tables (see [Section 3.1.2](#)).

TABLE 3-10. Parameters for Configuring Optional Columns of Aggregate Tables

Table	Column	Configuration Parameter	Default Value
Application Aggregate Table	UnicastDelay	STATS-DB-APPLICATION-AGGREGATE-UNICAST-DELAY	YES
	MulticastDelay	STATS-DB-APPLICATION-AGGREGATE-MULTICAST-DELAY	YES
	AverageDelay	STATS-DB-APPLICATION-AGGREGATE-AVERAGE-DELAY	YES
	UnicastJitter	STATS-DB-APPLICATION-AGGREGATE-UNICAST-JITTER	NO
	MulticastJitter	STATS-DB-APPLICATION-AGGREGATE-MULTICAST-JITTER	NO
	AverageJitter	STATS-DB-APPLICATION-AGGREGATE-AVERAGE-JITTER	YES
	UnicastHopCount	STATS-DB-APPLICATION-AGGREGATE-UNICAST-HOP-COUNT	YES
	MulticastHopCount	STATS-DB-APPLICATION-AGGREGATE-MULTICAST-HOP-COUNT	YES
	AverageThroughput	STATS-DB-APPLICATION-AGGREGATE-AVERAGE-THROUGHPUT	YES
	AverageOfferedLoad	STATS-DB-APPLICATION-AGGREGATE-AVERAGE-OFFERLOAD	YES
Transport Aggregate Table	UnicastAverageDelay	STATS-DB-TRANSPORT-AGGREGATE-DELAY	YES
	MulticastAverageDelay		
	BroadcastAverageDelay		
	UnicastAverageJitter	STATS-DB-TRANSPORT-AGGREGATE-JITTER	YES
	MulticastAverageJitter		
	BroadcastAverageJitter		
Network Aggregate Table	UnicastIpOutNoRoutes	STATS-DB-NETWORK-AGGREGATE-UNICAST-IP-NO-ROUTES	YES
	MulticastIpOutNoRoutes	STATS-DB-NETWORK-AGGREGATE-MULTICAST-IP-NO-ROUTES	YES
	UnicastDelay	STATS-DB-NETWORK-AGGREGATE-UNICAST-DELAY	YES
	MulticastDelay	STATS-DB-NETWORK-AGGREGATE-MULTICAST-DELAY	YES
	BroadcastDelay	STATS-DB-NETWORK-AGGREGATE-BROADCAST-DELAY	YES
	UnicastJitter	STATS-DB-NETWORK-AGGREGATE-UNICAST-JITTER	NO
	MulticastJitter	STATS-DB-NETWORK-AGGREGATE-MULTICAST-JITTER	NO
	BroadcastJitter	STATS-DB-NETWORK-AGGREGATE-BROADCAST-JITTER	NO

TABLE 3-10. Parameters for Configuring Optional Columns of Aggregate Tables (Continued)

Table	Column	Configuration Parameter	Default Value
MAC Aggregate Table	UnicastAverageQueuingDelay	STATS-DB-MAC-AGGREGATE-DELAY	YES
	UnicastAverageMediumAccessDelay		
	UnicastAverageMediumDelay		
	MulticastAverageQueueingDelay		
	MulticastAverageMediumAccessDelay		
	MulticastAverageMediumDelay		
	BroadcastAverageQueueingDelay		
	BroadcastAverageMediumAccessDelay		
	BroadcastAverageMediumDelay		
	UnicastAverageJitter	STATS-DB-MAC-AGGREGATE-JITTER	YES
	MulticastAverageJitter		
	BroadcastAverageJitter		
PHY Aggregate Table	AveragePathLoss	STATS-DB-PHY-AGGREGATE-PATHLOSS	YES
	AverageSignalPower	STATS-DB-PHY-AGGREGATE-SIGNAL-POWER	YES
	AverageDelay	STATS-DB-PHY-AGGREGATE-DELAY	YES

3.1.6 Configuration Parameters for Summary Tables

Table 3-11 describes the parameters for configuring the Summary tables (except optional columns).

Table 3-12 describes the parameters for configuring optional columns of Summary tables.

TABLE 3-11. Summary Tables Configuration Parameters

Parameter	Value	Description
STATS-DB-SUMMARY-TABLE <i>Optional</i> <i>Scope: Global</i>	List: <ul style="list-style-type: none"> • YES • NO Default: YES	Indicates whether Summary tables are to be generated.

TABLE 3-11. Summary Tables Configuration Parameters (Continued)

Parameter	Value	Description
STATS-DB-SUMMARY-PRINT-END-SIMULATION <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> YES	Indicates if the summary table statistics will be inserted into the database at the end of simulation. Summary table statistics are inserted into the database at intervals controlled by parameter STATS-DB-SUMMARY-INTERVAL. If STATS-DB-SUMMARY-PRINT-END-SIMULATION is set to YES, then Summary table statistics will also be inserted into the database at the end of simulation.
STATS-DB-SUMMARY-INTERVAL <i>Optional</i> <i>Scope:</i> Global	Time <i>Range:</i> > 0S <i>Default:</i> 600S	Time between consecutive entries in the Summary tables.
STATS-DB-APPLICATION-SUMMARY-TABLE <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> NO	Indicates whether the Application Session Summary table is to be generated.
STATS-DB-APPLICATION-SUMMARY-INDEX <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> YES	Indicates whether a database table index (AppSummaryIndex) for the Application Session Summary table is to be created.
STATS-DB-MULTICAST-APPLICATION-SUMMARY-TABLE <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> NO	Indicates whether the Multicast Application Summary table is to be generated.
STATS-DB-MULTICAST-APPLICATION-SUMMARY-INDEX <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> YES	Indicates whether a database table index (MulticastAppSummaryIndex) for the Multicast Application Summary table is to be created.
STATS-DB-TRANSPORT-SUMMARY-TABLE <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> NO	Indicates whether the Transport Summary table is to be generated.
STATS-DB-TRANSPORT-SUMMARY-INDEX <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> YES	Indicates whether a database table index (TransSummaryIndex) for the Transport Summary table is to be created.

TABLE 3-11. Summary Tables Configuration Parameters (Continued)

Parameter	Value	Description
STATS-DB-NETWORK-SUMMARY-TABLE <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> NO	Indicates whether the Network Summary table is to be generated.
STATS-DB-NETWORK-SUMMARY-INDEX <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> YES	Indicates whether a database table index (NetSummaryIndex) for the Network Summary table is to be created.
STATS-DB-MULTICAST-NETWORK-SUMMARY-TABLE <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> NO	Indicates whether the Multicast Network Summary table is to be generated.
STATS-DB-MAC-SUMMARY-TABLE <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> NO	Indicates whether the MAC Summary table is to be generated.
STATS-DB-PHY-SUMMARY-TABLE <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> NO	Indicates whether the PHY Summary table is to be generated.
STATS-DB-QUEUE-SUMMARY-TABLE <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> NO	Indicates whether the Queue Summary table is to be generated.

Table 3-12 describes the parameters for configuring optional columns of Summary tables. These parameters are described in the same format as the parameters for optional columns of Description tables (see Section 3.1.2).

TABLE 3-12. Parameters for Configuring Optional Columns of Summary Tables

Table	Column	Configuration Parameter	Default Value
Application Session Summary Table	Delay	STATS-DB-APPLICATION-SUMMARY-DELAY	YES
	Jitter	STATS-DB-APPLICATION-SUMMARY-JITTER	NO
	HopCount	STATS-DB-APPLICATION-SUMMARY-HOP-COUNT	YES
Multicast Application Session Summary Table	Delay	STATS-DB-MULTICAST-APPLICATION-SUMMARY-DELAY	YES
	Jitter	STATS-DB-MULTICAST-APPLICATION-SUMMARY-JITTER	NO
	HopCount	STATS-DB-MULTICAST-APPLICATION-SUMMARY-HOP-COUNT	YES
Transport Summary Table	UnicastAverageDelay	STATS-DB-TRANSPORT-SUMMARY-DELAY	YES
	MulticastAverageDelay		
	BroadcastAverageDelay		
	UnicastAverageJitter	STATS-DB-TRANSPORT-SUMMARY-JITTER	YES
	MulticastAverageJitter		
	BroadcastAverageJitter		
Network Summary Table	DataDelay	STATS-DB-NETWORK-SUMMARY-DATA-DELAY	YES
	ControlDelay	STATS-DB-NETWORK-SUMMARY-CONTROL-DELAY	YES
	DataJitter	STATS-DB-NETWORK-SUMMARY-DATA-JITTER	YES
	ControlJitter	STATS-DB-NETWORK-SUMMARY-CONTROL-JITTER	YES

TABLE 3-12. Parameters for Configuring Optional Columns of Summary Tables (Continued)

Table	Column	Configuration Parameter	Default Value
MAC Summary Table	UnicastAverageQueueingDelay	STATS-DB-MAC-SUMMARY-DELAY	YES
	UnicastAverageMediumAccessDelay		
	UnicastAverageMediumDelay		
	MulticastAverageQueueingDelay		
	MulticastAverageMediumAccessDelay		
	MulticastAverageMediumDelay		
	BroadcastAverageQueueingDelay		
	BroadcastAverageMediumAccessDelay		
	BroadcastAverageMediumDelay		
	UnicastAverageJitter	STATS-DB-MAC-SUMMARY-JITTER	YES
	MulticastAverageJitter		
	BroadcastAverageJitter		
PHY Summary Table	AveragePathLoss	STATS-DB-PHY-SUMMARY-PATHLOSS	YES
	AverageSignalPower	STATS-DB-PHY-SUMMARY-SIGNAL-POWER	YES
	AverageDelay	STATS-DB-PHY-SUMMARY-DELAY	YES

3.1.7 Configuration Parameters for Events Tables

[Table 3-13](#) describes the parameters for configuring the Events tables (except optional columns).

[Table 3-14](#) describes the parameters for configuring optional columns of Events tables.

TABLE 3-13. Events Tables Configuration Parameters

Parameter	Value	Description
STATS-DB-EVENTS-TABLE <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> YES	Indicates whether Events tables are to be generated.
STATS-DB-APPLICATION-EVENTS-TABLE <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> NO	Indicates whether the Application Message Events table is to be generated.

TABLE 3-13. Events Tables Configuration Parameters (Continued)

Parameter	Value	Description
STATS-DB-APPLICATION- EVENTS-RECORD-DUPLICATE <i>Optional</i> <i>Scope: Global</i>	List: <ul style="list-style-type: none"> • YES • NO <i>Default: YES</i>	Indicates whether to record AppDrop events (with FailureType as “Duplicate Message”) in the Application Message Events table for duplicate messages or fragments. Note: Applications such as Super Application and Forward Application support fragmentation but do not reassemble duplicate fragments into a duplicate message. In such cases, AppDrop event (with FailureType as “Duplicate Message”) is not recorded for the message.
STATS-DB-APPLICATION- EVENTS-RECORD-OUT-OF- ORDER <i>Optional</i> <i>Scope: Global</i>	List: <ul style="list-style-type: none"> • YES • NO <i>Default: YES</i>	Indicates whether to record AppDrop events (with FailureType as “Out of Order Message”) in the Application Message Events table for out-of-order messages or fragments. Note: Applications such as Super Application and Forward Application support fragmentation but do not reassemble duplicate fragments into a duplicate message. In such cases, AppDrop event (with FailureType as “Out of Order Message”) is not recorded for the message.
STATS-DB-APPLICATION- SEQUENCE-NUMBER-CACHE- SIZE <i>Optional</i> <i>Scope: Global</i>	Integer <i>Range: 0 or ≥ 2</i> <i>Default: 0</i>	Specifies the cache size for storing sequence numbers to be used for detecting duplicate and out-of-order messages and fragments. If this parameter is set 0, the cache size is unlimited. The cache size affects the accuracy of distinguishing between duplicate and out-of-order messages. When the cache gets full, older sequence numbers are removed from the cache. This may result in an out-of-order message being incorrectly interpreted as a duplicate message. On the other hand, unlimited cache size may consume a lot of memory when there is packet loss.
STATS-DB-APPLICATION- EVENTS-RECORD-FRAGMENT <i>Optional</i> <i>Scope: Global</i>	List: <ul style="list-style-type: none"> • YES • NO <i>Default: YES</i>	Indicates whether events should be recorded in the Application Message Events table for complete messages or for fragments. Events are recorded either for complete messages or for fragments, not both. If this parameter is set to YES, events are recorded for fragments; otherwise, events are recorded for complete messages. This is relevant only for applications that support fragmentation, such as Super Application and Forward Application.

TABLE 3-13. Events Tables Configuration Parameters (Continued)

Parameter	Value	Description
STATS-DB-APPLICATION- EVENTS-MULTIPLE-VALUES <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> YES	Indicates whether multiple Application Message Events table entries can be inserted in the MySQL database with a single INSERT operation.
STATS-DB-APPLICATION- EVENTS-BUFFER-SIZE <i>Optional</i> <i>Scope:</i> Global	Integer <i>Range:</i> ≥ 500 <i>Default:</i> 2000 <i>Unit:</i> bytes	Size of application events buffer. This parameter is used only if STATS-DB-APPLICATION-EVENTS-MULTIPLE-VALUES is set to YES.
STATS-DB-TRANSPORT- EVENTS-TABLE <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> NO	Indicates whether the Transport Segment Events table is to be generated.
STATS-DB-NETWORK-EVENTS- TABLE <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> NO	Indicates whether the Network Packet Events table is to be generated.
NETWORK-STATS-DB-CONTROL <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> NO	Indicates whether control events should be included in the Network Packet Events table.
NETWORK-STATS-DB-INCOMING <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> YES	Indicates whether incoming events should be included in the Network Packet Events table.
NETWORK-STATS-DB-OUTGOING <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> YES	Indicates whether outgoing events should be included in the Network Packet Events table.
STATS-DB-NETWORK-EVENTS- MULTIPLE-VALUES <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> YES	Indicates whether multiple Network Packet Events table entries can be inserted in the MySQL database with a single INSERT operation.

TABLE 3-13. Events Tables Configuration Parameters (Continued)

Parameter	Value	Description
STATS-DB-NETWORK-EVENTS-BUFFER-SIZE <i>Optional</i> <i>Scope:</i> Global	Integer <i>Range:</i> ≥ 500 <i>Default:</i> 1000 <i>Unit:</i> bytes	Size of network events buffer. This parameter is used only if STATS-DB-NETWORK-EVENTS-MULTIPLE-VALUES is set to YES.
STATS-DB-MAC-EVENTS-TABLE <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> NO	Indicates whether the MAC Frame Events table is to be generated.
STATS-DB-PHY-EVENTS-TABLE <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> NO	Indicates whether the PHY Signal Events table is to be generated.
STATS-DB-QUEUE-EVENTS-TABLE <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> NO	Indicates whether the Queue Events table is to be generated.

Table 3-14 describes the parameters for configuring optional columns of Events tables. These parameters are described in the same format as the parameters for optional columns of Description tables (see Section 3.1.2).

TABLE 3-14. Parameters for Configuring Optional Columns of Events Tables

Table	Column	Configuration Parameter	Default Value
Application Message Events Table	MessageSeqNum	STATS-DB-APPLICATION-EVENTS-MSG-SEQUENCE-NUM	YES
	SocketMessageld1	STATS-DB-APPLICATION-EVENTS-SOCKET-INTERFACE-MESSAGE-IDS	NO
	SocketMessageld2		NO
	Priority	STATS-DB-APPLICATION-EVENTS-PRIORITY	YES
	MessageFailureType	STATS-DB-APPLICATION-EVENTS-FAILURE-TYPE	YES
	Delay	STATS-DB-APPLICATION-EVENTS-DELAY	YES
	Jitter	STATS-DB-APPLICATION-EVENTS-JITTER	YES

TABLE 3-14. Parameters for Configuring Optional Columns of Events Tables (Continued)

Table	Column	Configuration Parameter	Default Value
Transport Segment Events Table	MessageSeqNum	STATS-DB-TRANSPORT-EVENTS-MSG-SEQUENCE-NUM	YES
	ConnectionType	STATS-DB-TRANSPORT-EVENTS-CONNECTION-TYPE	YES
	DataHeaderSize	STATS-DB-TRANSPORT-EVENTS-DATA-HEADER-SIZE	YES
	SegmentType	STATS-DB-TRANSPORT-EVENTS-SEGMENT-TYPE	YES
	EventType	STATS-DB-TRANSPORT-EVENTS-EVENT-TYPE	YES
	MessageFailureType	STATS-DB-TRANSPORT-EVENTS-FAILURE-TYPE	YES
Network Packet Events Table	MessageSeqNum	STATS-DB-NETWORK-EVENTS-MSG-SEQUENCE-NUM	YES
	DataHeaderSize	STATS-DB-NETWORK-EVENTS-DATA-HEADER-SIZE	YES
	PacketType	STATS-DB-NETWORK-EVENTS-MESSAGE-TYPE	YES
	ProtocolType	STATS-DB-NETWORK-EVENTS-PROTOCOL	YES
	Priority	STATS-DB-NETWORK-EVENTS-PRIORITY	YES
	PacketFailureType	STATS-DB-NETWORK-EVENTS-FAILURE-TYPE	YES
	HopCount	STATS-DB-NETWORK-EVENTS-HOP-COUNT	YES
MAC Frame Events Table	SequenceNumber	STATS-DB-MAC-EVENTS-MSG-SEQUENCE-NUM	YES
	ChannelIndex	STATS-DB-MAC-EVENTS-CHANNEL-INDEX	YES
	FrameType	STATS-DB-MAC-EVENTS-MSG-FRAME-TYPE	YES
	FailureType	STATS-DB-MAC-EVENTS-MSG-FAILURE-TYPE	YES
PHY Signal Events Table	ChannelIndex	STATS-DB-PHY-EVENTS-CHANNEL-INDEX	YES
	ControlSize	STATS-DB-PHY-EVENTS-PREAMBLE-SIZE	YES
	FailureType	STATS-DB-PHY-EVENTS-FAILURE-TYPE	YES
	SignalPower	STATS-DB-PHY-EVENTS-SIGNAL-POWER	YES
	Interference	STATS-DB-PHY-EVENTS-INTERFERENCE-POWER	YES
	PathLoss	STATS-DB-PHY-EVENTS-PATHLOSS	YES

3.1.8 Configuration Parameters for Connectivity Tables

Table 3-15 describes the parameters for configuring the Connectivity tables (except optional columns).

Table 3-16 describes the parameters for configuring optional columns of Connectivity tables.

TABLE 3-15. Connectivity Tables Configuration Parameters

Parameter	Value	Description
STATS-DB-CONNECTIVITY-TABLE <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> YES	Indicates whether Connectivity tables are to be generated.
STATS-DB-CONNECTIVITY-PRINT-END-SIMULATION <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> YES	Indicates if the Connectivity table statistics will be inserted into the database at the end of simulation. Connectivity table statistics are inserted into the database at intervals controlled by parameters STATS-DB-APPLICATION-CONNECTIVITY-INTERVAL, STATS-DB-TRANSPORT-CONNECTIVITY-INTERVAL, STATS-DB-NETWORK-CONNECTIVITY-INTERVAL, STATS-DB-MAC-CONNECTIVITY-INTERVAL, and STATS-DB-PHY-CONNECTIVITY-INTERVAL. If STATS-DB-CONNECTIVITY-PRINT-END-SIMULATION is set to YES, then Connectivity table statistics will also be inserted into the database at the end of simulation.
STATS-DB-APPLICATION-CONNECTIVITY-TABLE <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> NO	Indicates whether the Application Connectivity table is to be generated.
STATS-DB-APPLICATION-CONNECTIVITY-INTERVAL <i>Optional</i> <i>Scope:</i> Global	Time <i>Range:</i> > 0S <i>Default:</i> 600S	Time between consecutive entries in the Application Connectivity tables.
STATS-DB-TRANSPORT-CONNECTIVITY-TABLE <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> NO	Indicates whether the Transport Connectivity table is to be generated.
STATS-DB-TRANSPORT-CONNECTIVITY-INTERVAL <i>Optional</i> <i>Scope:</i> Global	Time <i>Range:</i> > 0S <i>Default:</i> 600S	Time between consecutive entries in the Transport Connectivity tables.

TABLE 3-15. Connectivity Tables Configuration Parameters (Continued)

Parameter	Value	Description
STATS-DB-NETWORK-CONNECTIVITY-TABLE <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> NO	Indicates whether the Network Layer Connectivity table is to be generated.
STATS-DB-NETWORK-CONNECTIVITY-INTERVAL <i>Optional</i> <i>Scope:</i> Global	Time <i>Range:</i> > 0S <i>Default:</i> 600S	Time between consecutive entries in the Network Layer Connectivity table.
STATS-DB-MULTICAST-CONNECTIVITY-TABLE <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> NO	Indicates whether the Multicast Connectivity table is to be generated.
STATS-DB-MULTICAST-CONNECTIVITY-INTERVAL <i>Optional</i> <i>Scope:</i> Global	Time <i>Range:</i> > 0S <i>Default:</i> 600S	Time between consecutive entries in the Multicast Connectivity tables.
STATS-DB-MAC-CONNECTIVITY-TABLE <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> NO	Indicates whether the MAC Connectivity table is to be generated.
STATS-DB-MAC-CONNECTIVITY-INTERVAL <i>Optional</i> <i>Scope:</i> Global	Time <i>Range:</i> > 0S <i>Default:</i> 600S	Time between consecutive entries in the MAC Connectivity tables.
STATS-DB-PHY-CONNECTIVITY-TABLE <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> NO	Indicates whether the Physical Layer Connectivity table is to be generated.
STATS-DB-PHY-CONNECTIVITY-INTERVAL <i>Optional</i> <i>Scope:</i> Global	Time <i>Range:</i> > 0S <i>Default:</i> 600S	Time between consecutive entries in the PHY Connectivity tables.

Table 3-16 describes the parameters for configuring optional columns of Connectivity tables. These parameters are described in the same format as the parameters for optional columns of Description tables (see Section 3.1.2).

TABLE 3-16. Parameters for Configuring Optional Columns of Connectivity Tables

Table	Column	Configuration Parameter
Network Layer Connectivity Table	NextHopAddr	STATS-DB-NETWORK-CONNECTIVITY-NEXT-HOP-ADDRESS
	OutgoingInterfaceIndex	STATS-DB-NETWORK-CONNECTIVITY-OUTGOING-INTERFACE-INDEX
	RoutingProtocolType	STATS-DB-NETWORK-CONNECTIVITY-ROUTING-PROTOCOL

3.1.9 Configuration Parameters for Model-specific Statistics Tables

Table 3-17 describes the parameters for configuring the Model-specific statistics tables.

TABLE 3-17. Model-specific Tables Configuration Parameters

Parameter	Value	Description
STATS-DB-MULTICAST-IGMP-SUMMARY-TABLE <i>Optional</i> <i>Scope: Global</i>	List: • YES • NO <i>Default: NO</i>	Indicates whether the IGMP Summary table is to be generated. The time between consecutive entries in the IGMP Summary table is determined by the parameter STATS-DB-SUMMARY-INTERVAL.
STATS-DB-MULTICAST-MOSPF-SUMMARY-TABLE <i>Optional</i> <i>Scope: Global</i>	List: • YES • NO <i>Default: NO</i>	Indicates whether the MOSPF Summary table is to be generated. The time between consecutive entries in the MOSPF Summary table is determined by the parameter STATS-DB-SUMMARY-INTERVAL.
STATS-DB-OSPF-AGGREGATE-TABLE <i>Optional</i> <i>Scope: Global</i>	List: • YES • NO <i>Default: NO</i>	Indicates whether the OSPF Aggregate table is to be generated.
STATS-DB-OSPF-AGGREGATE-INTERVAL <i>Optional</i> <i>Scope: Global</i>	Time <i>Range: > 0S</i> <i>Default: 600S</i>	The time between consecutive entries in the OSPF Aggregate statistics table.
STATS-DB-OSPF-EXTERNAL-LSA-TABLE <i>Optional</i> <i>Scope: Global</i>	List: • YES • NO <i>Default: NO</i>	Indicates whether the OSPF External LSA table is to be generated.

TABLE 3-17. Model-specific Tables Configuration Parameters (Continued)

Parameter	Value	Description
STATS-DB-OSPF-EXTERNAL-LSA-INTERVAL <i>Optional</i> <i>Scope: Global</i>	Time <i>Range: > 0S</i> <i>Default: 600S</i>	The time between consecutive entries in the OSPF External LSA table.
STATS-DB-OSPF-INTERFACE-STATE-TABLE <i>Optional</i> <i>Scope: Global</i>	List: <ul style="list-style-type: none"> • YES • NO <i>Default: NO</i>	Indicates whether the OSPF Interface State table is to be generated.
STATS-DB-OSPF-INTERFACE-STATE-INTERVAL <i>Optional</i> <i>Scope: Global</i>	Time <i>Range: > 0S</i> <i>Default: 600S</i>	The time between consecutive entries in the OSPF Interface State table.
STATS-DB-OSPF-NEIGHBOR-STATE-TABLE <i>Optional</i> <i>Scope: Global</i>	List: <ul style="list-style-type: none"> • YES • NO <i>Default: NO</i>	Indicates whether the OSPF Neighbor State table is to be generated.
STATS-DB-OSPF-NEIGHBOR-STATE-INTERVAL <i>Optional</i> <i>Scope: Global</i>	Time <i>Range: > 0S</i> <i>Default: 600S</i>	The time between consecutive entries in the OSPF Neighbor State table.
STATS-DB-OSPF-NETWORK-LSA-TABLE <i>Optional</i> <i>Scope: Global</i>	List: <ul style="list-style-type: none"> • YES • NO <i>Default: NO</i>	Indicates whether the OSPF Network LSA table is to be generated.
STATS-DB-OSPF-NETWORK-LSA-INTERVAL <i>Optional</i> <i>Scope: Global</i>	Time <i>Range: > 0S</i> <i>Default: 600S</i>	The time between consecutive entries in the OSPF Network LSA table.
STATS-DB-OSPF-ROUTER-LSA-TABLE <i>Optional</i> <i>Scope: Global</i>	List: <ul style="list-style-type: none"> • YES • NO <i>Default: NO</i>	Indicates whether the OSPF Router LSA table is to be generated.

TABLE 3-17. Model-specific Tables Configuration Parameters (Continued)

Parameter	Value	Description
STATS-DB-OSPF-ROUTER-LSA-INTERVAL <i>Optional</i> <i>Scope:</i> Global	Time <i>Range:</i> > 0S <i>Default:</i> 600S	The time between consecutive entries in the OSPF Router LSA table.
STATS-DB-OSPF-SUMMARY-LSA-TABLE <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> NO	Indicates whether the OSPF Summary LSA table is to be generated.
STATS-DB-OSPF-SUMMARY-LSA-INTERVAL <i>Optional</i> <i>Scope:</i> Global	Time <i>Range:</i> > 0S <i>Default:</i> 600S	The time between consecutive entries in the OSPF Summary LSA table.
STATS-DB-OSPF-SUMMARY-TABLE <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> NO	Indicates whether the OSPF Summary statistics table is to be generated.
STATS-DB-OSPF-SUMMARY-INTERVAL <i>Optional</i> <i>Scope:</i> Global	Time <i>Range:</i> > 0S <i>Default:</i> 600S	The time between consecutive entries in the OSPF Summary statistics table.
STATS-DB-MULTICAST-PIM-DM-SUMMARY-TABLE <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> NO	Indicates whether the PIM-DM Summary table is to be generated. The time between consecutive entries in the PIM-DM Summary table is determined by the parameter STATS-DB-SUMMARY-INTERVAL.
STATS-DB-MULTICAST-PIM-SM-STATUS-TABLE <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> NO	Indicates whether the PIM-SM Status table is to be generated. The time between consecutive entries in the PIM-SM Status table is determined by the parameter STATS-DB-STATUS-INTERVAL.
STATS-DB-MULTICAST-PIM-SM-SUMMARY-TABLE <i>Optional</i> <i>Scope:</i> Global	List: <ul style="list-style-type: none"> • YES • NO <i>Default:</i> NO	Indicates whether the PIM-SM Summary table is to be generated. The time between consecutive entries in the PIM-SM Summary table is determined by the parameter STATS-DB-SUMMARY-INTERVAL.

TABLE 3-17. Model-specific Tables Configuration Parameters (Continued)

Parameter	Value	Description
STATS-DB-URBAN-PROP-TABLE <i>Optional</i> <i>Scope: Global</i>	List: <ul style="list-style-type: none">• YES• NO <i>Default: NO</i>	Indicates whether the Urban Propagation Statistics table is to be generated.

3.2 GUI Configuration

This section describes how to configure the statistics database parameters in the GUI. The general parameters for configuring the statistics database are described in [Section 3.2.1](#). Parameters for configuring different types of statistics tables are described in [Section 3.2.2](#) through [Section 3.2.9](#). See [Section 1.4.1.3](#) for a description of the format used for the parameter tables.

3.2.1 Configuring General Parameters for Statistics Database

To configure the general parameters for the statistics database in the GUI, do the following:

1. Go to **Scenario Properties Editor > Statistics and Tracing > Statistics Database**.
2. To enable the statistics database, set **Enable Statistics Database** to Yes and set the dependent parameters listed in [Table 3-18](#). Note that the default **Statistics Database Engine Type** is set to *SQLite*.

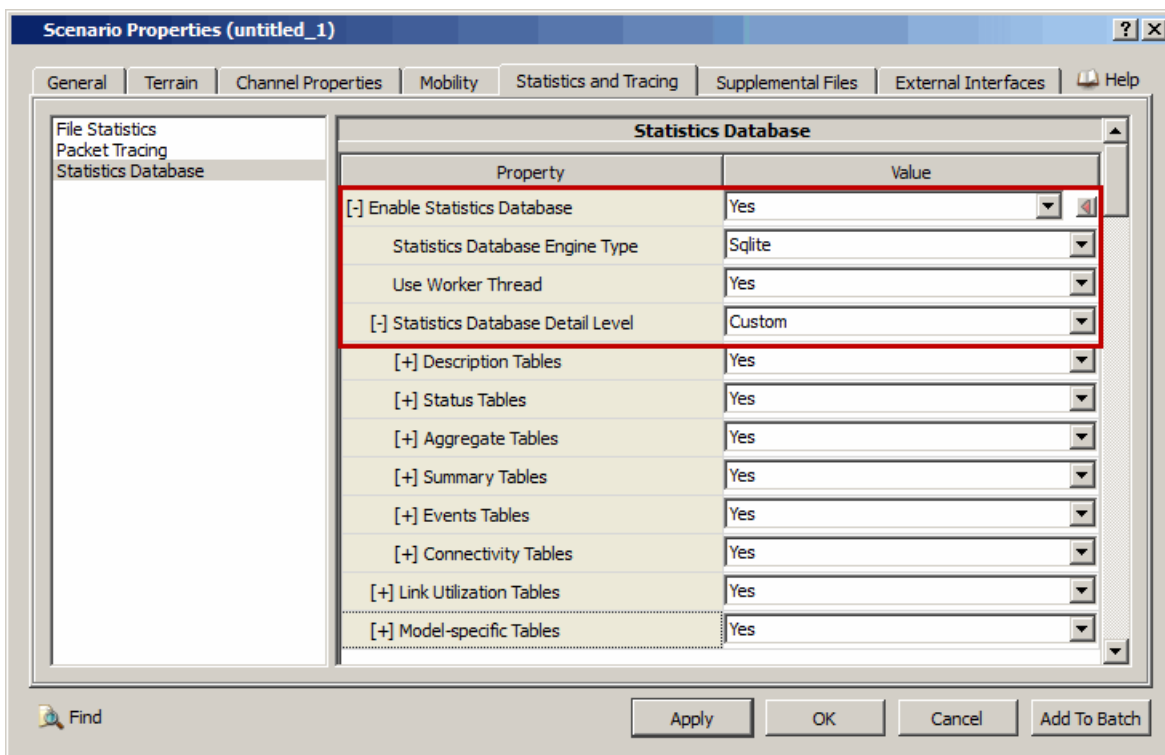


FIGURE 3-1. Configuring General Statistics Database Parameters

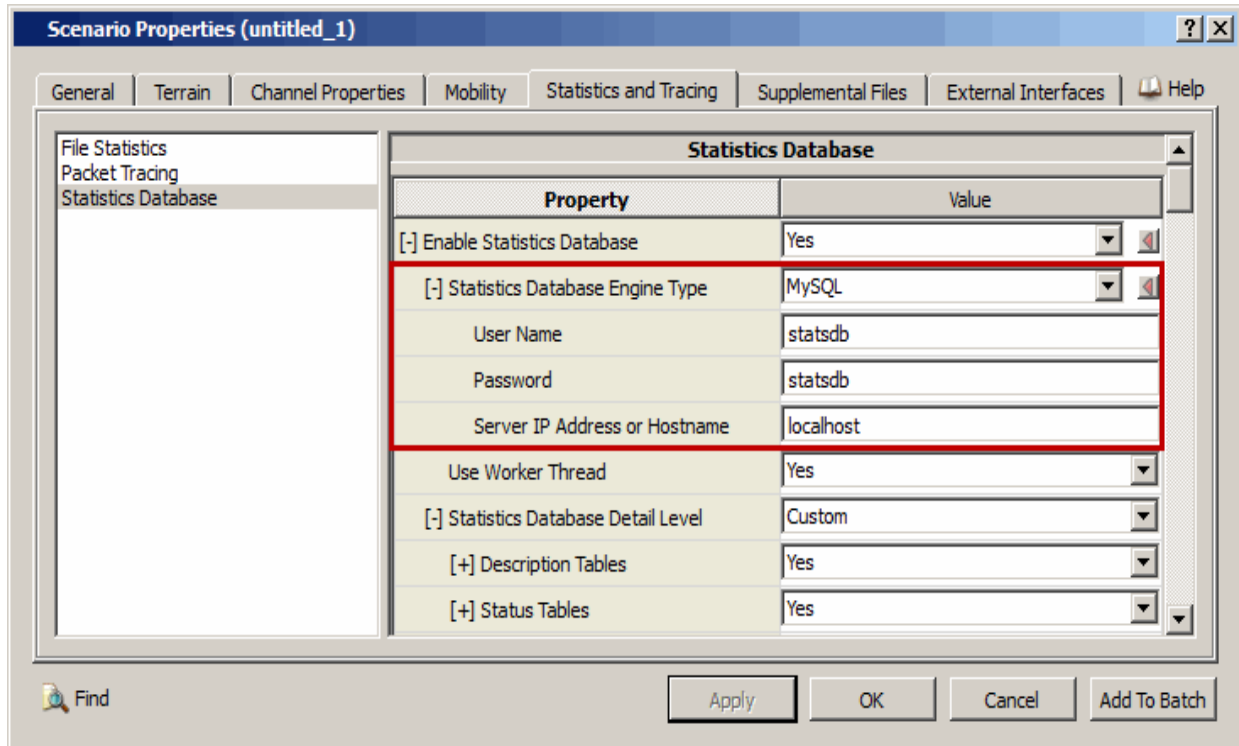
TABLE 3-18. Command Line Equivalent of General Statistics Database Parameters

GUI Parameter	Scope of GUI Parameter	Command Line Parameter
Enable Statistics Database	Global	STATS-DB-COLLECTION
Statistics Database Engine Type	Global	STATS-DB-ENGINE

TABLE 3-18. Command Line Equivalent of General Statistics Database Parameters (Continued)

GUI Parameter	Scope of GUI Parameter	Command Line Parameter
Use Worker Thread	Global	GESTALT-USE-WORKER-THREAD
Statistics Database Detail Level	Global	STATS-DB-DETAIL

3. If **Statistics Database Engine Type** is set to *MySQL*, set the dependent parameters listed in [Table 3-18](#).

**FIGURE 3-2. Configuring MySQL Parameters for MySQL****TABLE 3-19. Command Line Equivalent of MySQL Parameters**

GUI Parameter	Scope of GUI Parameter	Command Line Parameter
User Name	Global	STATS-DB-USERNAME
Password	Global	STATS-DB-PASSWORD
Server IP Address or Hostname	Global	STATS-DB-SERVER

3.2.2 Configuring Database Detail Level

The user can specify the level of detail of the generated database. One of three levels can be specified: High, Medium, or Low, each corresponding to a pre-defined set of statistics tables (see [Table 3-2](#)). Alternatively, the user can generate a custom set of tables by configuring them individually. If one of the pre-defined set of tables is selected, all tables (and all optional columns of each table) in that set are generated by default and need not be configured individually.

To select a detail level, set the parameter **Statistics Database Detail Level** (see [Figure 3-1](#)). All database tables for the selected detail level are enabled automatically along with all optional columns of each table.

Note: Model-specific tables are not enabled automatically and must be configured as described in [Section 3.2.9](#).

The user can also select a detail level and add tables to or remove tables from the set corresponding to that level. Parameters for configuring individual tables are described in [Section 3.2.3](#) through [Section 3.2.8](#).

For example, to generate all Description tables, the Node Status table, and all Aggregate tables except the Queue Aggregate table, do the following:

1. Configure the general statistics database parameters, as described in [Section 3.2.1](#).
2. Set **Statistics Database Detail Level** to *Low*.
3. Set **Status Tables** to Yes.
4. Set **Node Status Table** to Yes.
5. Set **Queue Aggregate Table** to *No*.

3.2.3 Configuring Description Tables

This section describes how to configure Description tables in the GUI using the Connection Description table as an example. The other Description tables can be configured in a similar way.

Configuring the Connection Description Table

To configure Connection Description table in the GUI, do the following:

1. Go to **Scenario Properties Editor > Statistics > Statistics Database**.
2. Set **Enable Statistics Database** to Yes.
3. Set **Description Tables** set to Yes.

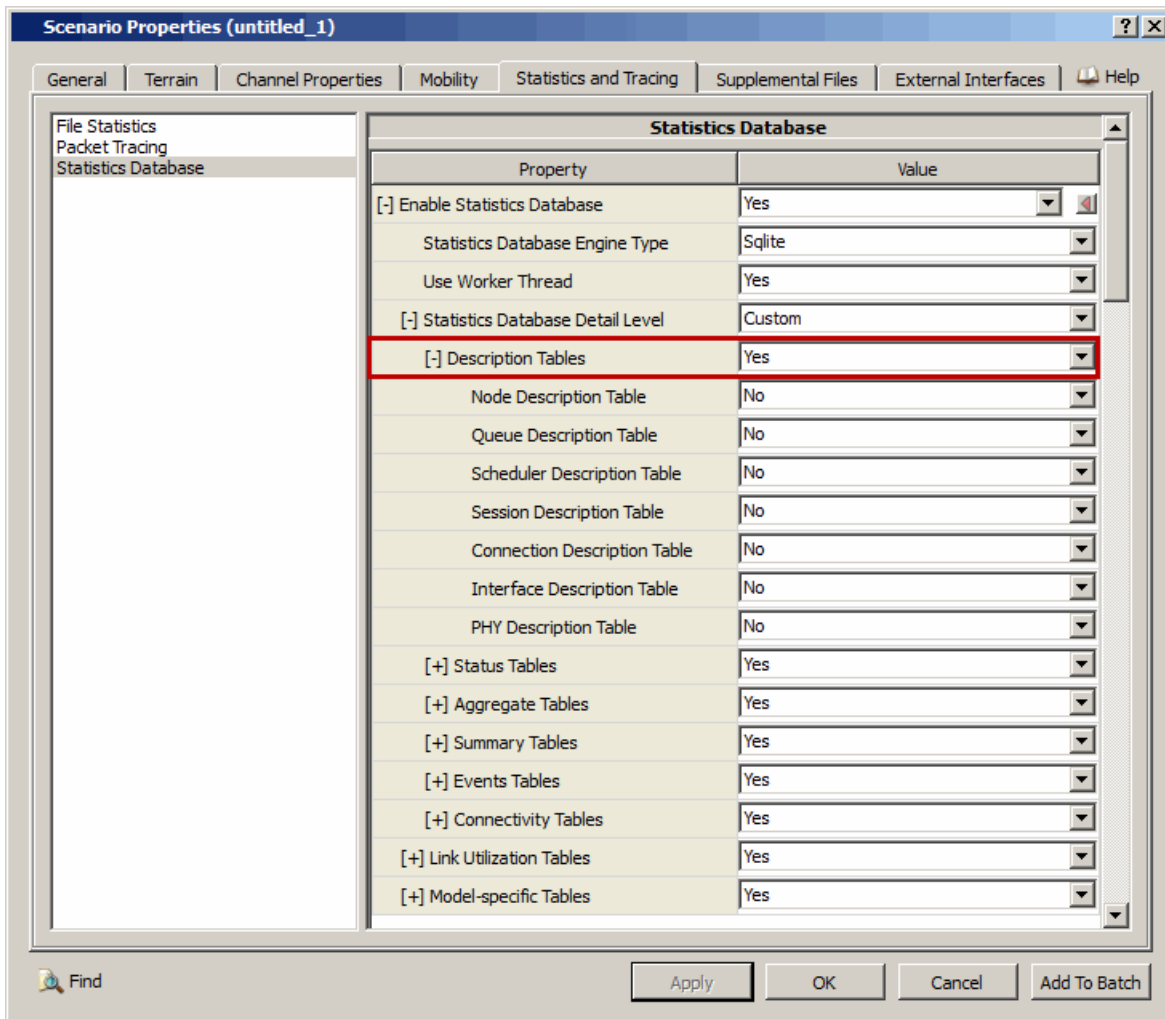


FIGURE 3-3. Configuring Description Tables

TABLE 3-20. Command Line Equivalent of Description Table Parameters

GUI Parameter	Scope of GUI Parameter	Command Line Parameter
Description Tables	Global	STATS-DB-DESCRIPTION-TABLE

4. Set **Connection Description Table** to Yes and set the dependent parameters listed in [Table 3-21](#).

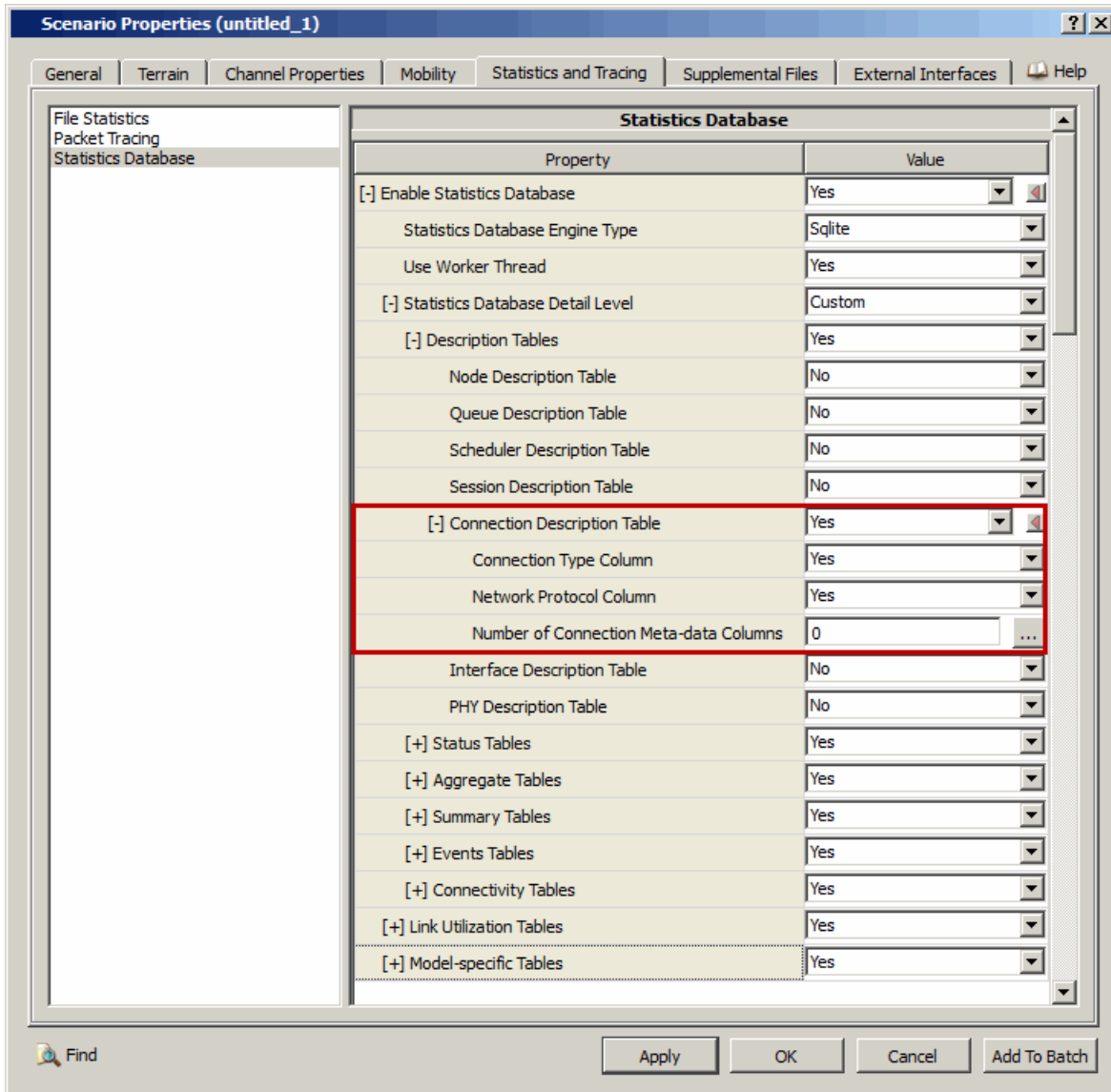



FIGURE 3-4. Configuring Connection Description Table

TABLE 3-21. Command Line Equivalent of Connection Description Table Parameters

GUI Parameter	Scope of GUI Parameter	Command Line Parameter
Connection Description Table	Global	STATS-DB-CONNECTION-DESCRIPTION-TABLE
Connection Type Column	Global	STATS-DB-CONNECTION-DESCRIPTION-CONNECTION-TYPE
Network Protocol Column	Global	STATS-DB-CONNECTION-DESCRIPTION-NETWORK-PROTOCOL
Number of Connection Meta-data Columns	Global	N/A

Setting Parameters

- To include an optional column of the selected table, set the corresponding parameter. For example, to include the Connection Type column in the Connection Description table, set **Connection Type Column** to Yes; otherwise, set **Connection Type Column** to No.
 - To configure meta-data columns in the Connection Description table, set **Number of Connection Meta-data Columns** to the number of meta-data columns.
5. If **Number of Connection Meta-data Columns** is set to a number greater than 0, then configure Connection Meta-data column names as follows:
- Click on the **Open Array Editor**  button in the **Value** column for **Number of Connection Meta-data Columns**. This opens the Array Editor.
 - Set the parameters listed in [Table 3-22](#) for each meta-data index.

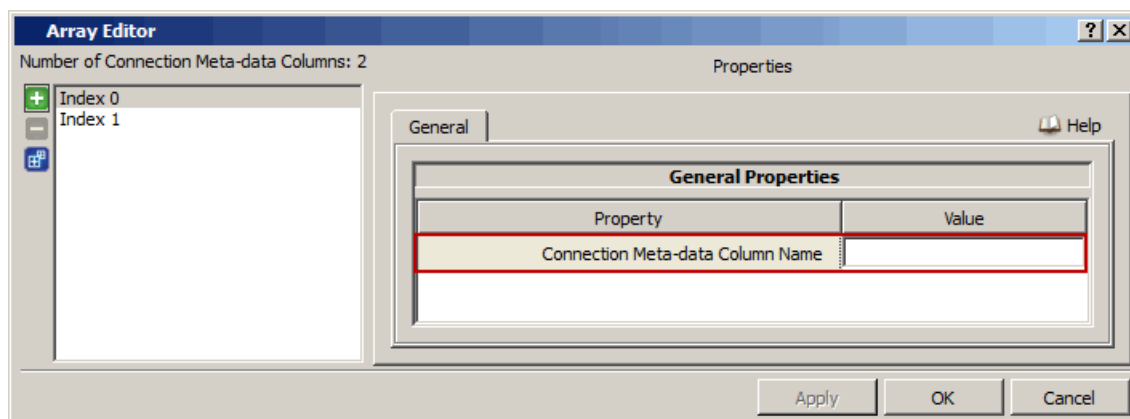


FIGURE 3-5. Setting Connection Meta-data Column Names

TABLE 3-22. Command Line Equivalent of Connection Meta-data Column Parameters

GUI Parameter	Scope of GUI Parameter	Command Line Parameter
Connection Meta-data Column Name	Global	CONNECTION-META-DATA-COLUMN-NAME

Configuring Connection Meta-data Values

The number and names of Connection Meta-data columns are configured in the Scenario Properties Editor, as described in the previous section. The meta-data values are assigned for each node in the Default Device Properties Editor, as described below.

To configure Connection meta data values for a node in the GUI, do the following:

1. Go to **Default Device Properties Editor > Node Configuration > Statistics Database**.
2. Set **Specify Meta Data for Description Tables** to Yes.

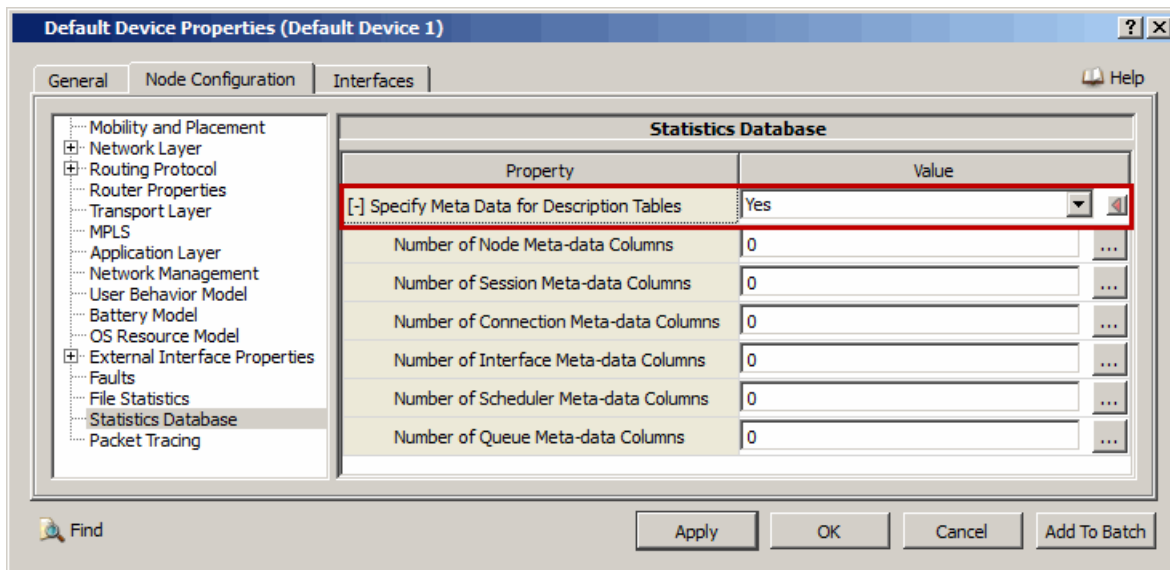


FIGURE 3-6. Configuring Meta-data

- Set **Number of Connection Meta-data Columns** to the number of Connection Meta-data columns.

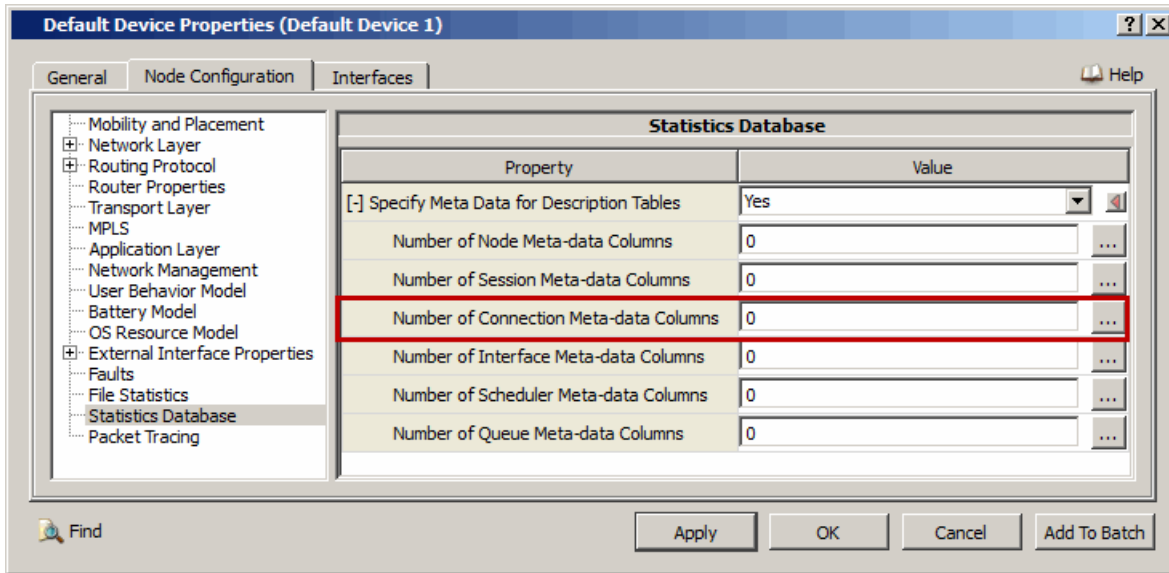



FIGURE 3-7. Configuring Number of Connection Meta-data Columns

TABLE 3-23. Command Line Equivalent of Number of Connection Meta-data Columns Parameters

GUI Parameter	Scope of GUI Parameter	Command Line Parameter
Number of Connection Meta-data Columns	Node	GUI - NUM - CONNECTION - META - DATA

Setting Parameters

- Set **Number of Connection Meta-data Columns** to the same value as **Enable Statistics Database** [= Yes] > **Description Tables** [= Yes] > **Connection Description Table** [= Yes] > **Number of Connection Meta-data Columns** in **Scenario Properties Editor** > **Statistics and Tracing** > **Statistics Database**.

4. To configure Connection Meta-data values, do the following:
 - a. Click on the **Open Array Editor**  button in the **Value** column for **Number of Connection Meta-data Columns**. This opens the Array Editor.
 - b. Set the parameters listed in [Table 3-24](#) for each meta-data index.

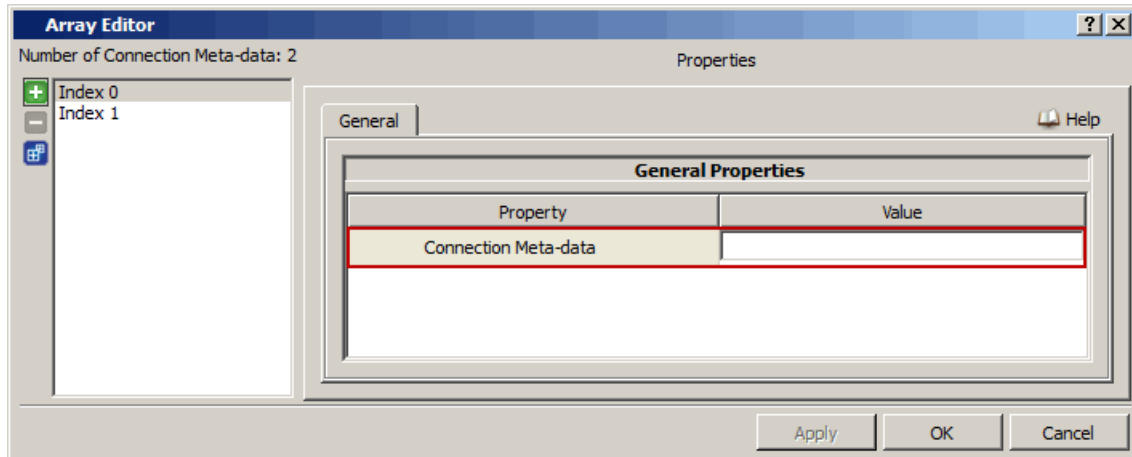


FIGURE 3-8. Setting Connection Meta-data Values

TABLE 3-24. Command Line Equivalent of Connection Meta-data Parameters

GUI Parameter	Scope of GUI Parameter	Command Line Parameter
Connection Meta-data	Node	CONNECTION-META-DATA

Configuring Other Description Tables

The other Description tables can be configured in the same way as the Connection Description table. [Table 3-25](#) lists the command line equivalent of configuration parameters for all Description tables (including Connection Description table). [Table 3-26](#) lists the command line equivalent of meta-data parameters for all Description tables that are configured at the node level.

TABLE 3-25. Command Line Equivalent of Description Table Parameters

GUI Parameter	Scope of GUI Parameter	Command Line Parameter
Description Tables	Global	STATS-DB-DESCRIPTION-TABLE
Node Description Table	Global	STATS-DB-NODE-DESCRIPTION-TABLE
Number of Node Meta-data Columns	Global	GUI-NUM-NODE-META-DATA
Node Meta-data Column Name	Global	NODE-META-DATA-COLUMN-NAME
Queue Description Table	Global	STATS-DB-QUEUE-DESCRIPTION-TABLE
Queue Discipline Column	Global	STATS-DB-QUEUE-DESCRIPTION-TABLE-DISCIPLINE
Queue Priority Column	Global	STATS-DB-QUEUE-DESCRIPTION-TABLE-PRIORITY
Queue Size Column	Global	STATS-DB-QUEUE-DESCRIPTION-QUEUE-SIZE
Number of Queue Meta-data Columns	Global	GUI-NUM-QUEUE-META-DATA
Queue Meta-data Column Name	Global	QUEUE-META-DATA-COLUMN-NAME
Scheduler Description Table	Global	STATS-DB-SCHEDULER-DESCRIPTION-TABLE
Scheduler Algorithm Column	Global	STATS-DB-SCHEDULER-DESCRIPTION-SCHEDULER-ALGORITHM
Number of Scheduler Meta-data Columns	Global	GUI-NUM-SCHEDULER-META-DATA
Scheduler Meta-data Column Name	Global	SCHEDULER-META-DATA-COLUMN-NAME
Session Description Table	Global	STATS-DB-SESSION-DESCRIPTION-TABLE
Application Type Column	Global	STATS-DB-SESSION-DESCRIPTION-APP-TYPE
Sender Address Column	Global	STATS-DB-SESSION-DESCRIPTION-SENDER-ADDRESS
Receiver Address Column	Global	STATS-DB-SESSION-DESCRIPTION-RECEIVER-ADDRESS
Sender Port Column	Global	STATS-DB-SESSION-DESCRIPTION-SENDER-PORT
Receiver Port Column	Global	STATS-DB-SESSION-DESCRIPTION-RECEIVER-PORT
Transport Protocol Column	Global	STATS-DB-SESSION-DESCRIPTION-TRANSPORT-PROTOCOL
Number of Session Meta-data Columns	Global	GUI-NUM-SESSION-META-DATA
Session Meta-data Column Name	Global	SESSION-META-DATA-COLUMN-NAME
Connection Description Table	Global	STATS-DB-CONNECTION-DESCRIPTION-TABLE
Connection Type Column	Global	STATS-DB-CONNECTION-DESCRIPTION-CONNECTION-TYPE

TABLE 3-25. Command Line Equivalent of Description Table Parameters (Continued)

GUI Parameter	Scope of GUI Parameter	Command Line Parameter
Network Protocol Column	Global	STATS-DB-CONNECTION-DESCRIPTION-NETWORK-PROTOCOL
Number of Connection Meta-data Columns	Global	GUI-NUM-CONNECTION-META-DATA
Connection Meta-data Column Name	Global	CONNECTION-META-DATA-COLUMN-NAME
Interface Description Table	Global	STATS-DB-INTERFACE-DESCRIPTION-TABLE
Interface Name Column	Global	STATS-DB-INTERFACE-DESCRIPTION-INTERFACE-NAME
Interface Address Column	Global	STATS-DB-INTERFACE-DESCRIPTION-INTERFACE-ADDRESS
Interface Subnet Mask Column	Global	STATS-DB-INTERFACE-DESCRIPTION-SUBNET-MASK
Routing Protocol Column	Global	STATS-DB-INTERFACE-DESCRIPTION-ROUTING-PROTOCOL
Multicast Protocol Column	Global	STATS-DB-INTERFACE-DESCRIPTION-MULTICAST-PROTOCOL
Number of Interface Meta-data Columns	Global	GUI-NUM-INTERFACE-META-DATA
Interface Meta-data Column Name	Global	INTERFACE-META-DATA-COLUMN-NAME
PHY Description Table	Global	STATS-DB-PHY-DESCRIPTION-TABLE
Number of PHY Meta-data Columns	Global	GUI-NUM-PHY-META-DATA
PHY Meta-data Column Name	Global	PHY-META-DATA-COLUMN-NAME

TABLE 3-26. Command Line Equivalent of Node-level Meta-data Parameters

GUI Parameter	Scope of GUI Parameter	Command Line Parameter
Number of Node Meta-data Columns	Node	GUI-NUM-NODE-META-DATA
Node Meta-data	Node	NODE-META-DATA
Number of Session Meta-data Columns	Node	GUI-NUM-SESSION-META-DATA
Session Meta-data	Node	SESSION-META-DATA
Number of Connection Meta-data Columns	Node	GUI-NUM-CONNECTION-META-DATA
Connection Meta-data	Node	CONNECTION-META-DATA
Number of Interface Meta-data Columns	Node	GUI-NUM-INTERFACE-META-DATA
Interface Meta-data	Node	INTERFACE-META-DATA
Number of Scheduler Meta-data Columns	Node	GUI-NUM-SCHEDULER-META-DATA
Scheduler Meta-data	Node	SCHEDULER-META-DATA

TABLE 3-26. Command Line Equivalent of Node-level Meta-data Parameters (Continued)

GUI Parameter	Scope of GUI Parameter	Command Line Parameter
Number of Queue Meta-data Columns	Node	GUI-NUM-QUEUE-META-DATA
Queue Meta-data	Node	QUEUE-META-DATA

3.2.4 Configuring Status Tables

Status tables can be configured in the same way as Description tables (see [Section 3.2.3](#)). [Table 3-27](#) lists the command line equivalent of configuration parameters for all Status tables.

TABLE 3-27. Command Line Equivalent of Status Table Parameters

GUI Parameter	Scope of GUI Parameter	Command Line Parameter
Status Tables	Global	STATS-DB-STATUS-TABLE
Update Status Tables at End of Simulation	Global	STATS-DB-STATUS-PRINT-END-SIMULATION
Status Update Interval	Global	STATS-DB-STATUS-INTERVAL
Node Status Table	Global	STATS-DB-NODE-STATUS-TABLE
Position Columns	Global	STATS-DB-NODE-STATUS-TABLE-POSITION
Velocity Columns	Global	STATS-DB-NODE-STATUS-TABLE-VELOCITY
Active State Column	Global	STATS-DB-NODE-STATUS-TABLE-ACTIVE-STATE
Damage State Column	Global	STATS-DB-NODE-STATUS-TABLE-DAMAGE-STATE
Interface Status Table	Global	STATS-DB-INTERFACE-STATUS-TABLE
Multicast Status Table	Global	STATS-DB-MULTICAST-STATUS-TABLE
Queue Status Table	Global	STATS-DB-QUEUE-STATUS-TABLE

3.2.5 Configuring Aggregate Tables

Aggregate tables can be configured in the same way as Description tables (see [Section 3.2.3](#)). [Table 3-28](#) lists the command line equivalent of configuration parameters for all Aggregate tables.

TABLE 3-28. Command Line Equivalent of Aggregate Table Parameters

GUI Parameter	Scope of GUI Parameter	Command Line Parameter
Aggregate Tables	Global	STATS-DB-AGGREGATE-TABLE
Update Aggregate Tables at End of Simulation	Global	STATS-DB-AGGREGATE-PRINT-END-SIMULATION
Aggregate Update Interval	Global	STATS-DB-AGGREGATE-INTERVAL
Application Aggregate Table	Global	STATS-DB-APPLICATION-AGGREGATE-TABLE

TABLE 3-28. Command Line Equivalent of Aggregate Table Parameters (Continued)

GUI Parameter	Scope of GUI Parameter	Command Line Parameter
Average Unicast Delay Column	Global	STATS-DB-APPLICATION-AGGREGATE-UNICAST-DELAY
Average Multicast Delay Column	Global	STATS-DB-APPLICATION-AGGREGATE-MULTICAST-DELAY
Average Delay Column	Global	STATS-DB-APPLICATION-AGGREGATE-AVERAGE-DELAY
Average Unicast Jitter Column	Global	STATS-DB-APPLICATION-AGGREGATE-UNICAST-JITTER
Average Multicast Jitter Column	Global	STATS-DB-APPLICATION-AGGREGATE-MULTICAST-JITTER
Average Jitter Column	Global	STATS-DB-APPLICATION-AGGREGATE-AVERAGE-JITTER
Average Unicast Hop Count Column	Global	STATS-DB-APPLICATION-AGGREGATE-UNICAST-HOP-COUNT
Average Multicast Hop Count Column	Global	STATS-DB-APPLICATION-AGGREGATE-MULTICAST-HOP-COUNT
Average Throughput Column	Global	STATS-DB-APPLICATION-AGGREGATE-AVERAGE-THROUGHPUT
Average Offered Load Column	Global	STATS-DB-APPLICATION-AGGREGATE-AVERAGE-OFFEREDLOAD
Application Aggregate Table Index	Global	STATS-DB-APPLICATION-AGGREGATE-INDEX
Transport Aggregate Table	Global	STATS-DB-TRANSPORT-AGGREGATE-TABLE
Average Delay Columns	Global	STATS-DB-TRANSPORT-AGGREGATE-DELAY
Average Jitter Columns	Global	STATS-DB-TRANSPORT-AGGREGATE-JITTER
Transport Aggregate Table Index	Global	STATS-DB-TRANSPORT-AGGREGATE-INDEX
Network Aggregate Table	Global	STATS-DB-NETWORK-AGGREGATE-TABLE
Unicast Packets Dropped for No Routes Column	Global	STATS-DB-NETWORK-AGGREGATE-UNICAST-IP-NO-ROUTES
Multicast Packets Dropped for No Routes Column	Global	STATS-DB-NETWORK-AGGREGATE-MULTICAST-IP-NO-ROUTES
Average Unicast Delay Column	Global	STATS-DB-NETWORK-AGGREGATE-UNICAST-DELAY
Average Multicast Delay Column	Global	STATS-DB-NETWORK-AGGREGATE-MULTICAST-DELAY
Average Broadcast Delay Column	Global	STATS-DB-NETWORK-AGGREGATE-BROADCAST-DELAY
Average Unicast Jitter Column	Global	STATS-DB-NETWORK-AGGREGATE-UNICAST-JITTER
Average Multicast Jitter Column	Global	STATS-DB-NETWORK-AGGREGATE-MULTICAST-JITTER
Average Broadcast Jitter Column	Global	STATS-DB-NETWORK-AGGREGATE-BROADCAST-JITTER
Network Aggregate Table Index	Global	STATS-DB-NETWORK-AGGREGATE-INDEX
MAC Aggregate Table	Global	STATS-DB-MAC-AGGREGATE-TABLE

TABLE 3-28. Command Line Equivalent of Aggregate Table Parameters (Continued)

GUI Parameter	Scope of GUI Parameter	Command Line Parameter
Average Delay Columns	Global	STATS-DB-MAC-AGGREGATE-DELAY
Average Jitter Columns	Global	STATS-DB-MAC-AGGREGATE-JITTER
MAC Aggregate Table Index	Global	STATS-DB-MAC-AGGREGATE-INDEX
PHY Aggregate Table	Global	STATS-DB-PHY-AGGREGATE-TABLE
Average Path Loss Column	Global	STATS-DB-PHY-AGGREGATE-PATHLOSS
Average Signal Power Column	Global	STATS-DB-PHY-AGGREGATE-SIGNAL-POWER
Average Delay Column	Global	STATS-DB-PHY-AGGREGATE-DELAY
PHY Aggregate Table Index	Global	STATS-DB-PHY-AGGREGATE-INDEX
Queue Aggregate Table	Global	STATS-DB-QUEUE-AGGREGATE-TABLE

3.2.6 Configuring Summary Tables

Summary tables can be configured in the same way as Description tables (see [Section 3.2.3](#)). [Table 3-29](#) lists the command line equivalent of configuration parameters for all Summary tables.

TABLE 3-29. Command Line Equivalent of Summary Table Parameters

GUI Parameter	Scope of GUI Parameter	Command Line Parameter
Summary Tables	Global	STATS-DB-SUMMARY-TABLE
Update Summary Tables at End of Simulation	Global	STATS-DB-SUMMARY-PRINT-END-SIMULATION
Summary Update Interval	Global	STATS-DB-SUMMARY-INTERVAL
Application Session Summary Table	Global	STATS-DB-APPLICATION-SUMMARY-TABLE
Average Delay Column	Global	STATS-DB-APPLICATION-SUMMARY-DELAY
Average Jitter Column	Global	STATS-DB-APPLICATION-SUMMARY-JITTER
Average Hop Count Column	Global	STATS-DB-APPLICATION-SUMMARY-HOP-COUNT
Application Summary Table Index	Global	STATS-DB-APPLICATION-SUMMARY-INDEX
Multicast Application Session Summary Table	Global	STATS-DB-MULTICAST-APPLICATION-SUMMARY-TABLE
Average Delay Column	Global	STATS-DB-MULTICAST-APPLICATION-SUMMARY-DELAY
Average Jitter Column	Global	STATS-DB-MULTICAST-APPLICATION-SUMMARY-JITTER
Average Hop Count Column	Global	STATS-DB-MULTICAST-APPLICATION-SUMMARY-HOP-COUNT
Multicast Application Summary Table Index	Global	STATS-DB-MULTICAST-APPLICATION-SUMMARY-INDEX
Transport Summary Table	Global	STATS-DB-TRANSPORT-SUMMARY-TABLE
Average Delay Columns	Global	STATS-DB-TRANSPORT-SUMMARY-DELAY
Average Jitter Columns	Global	STATS-DB-TRANSPORT-SUMMARY-JITTER
Transport Summary Table Index	Global	STATS-DB-TRANSPORT-SUMMARY-INDEX

TABLE 3-29. Command Line Equivalent of Summary Table Parameters (Continued)

GUI Parameter	Scope of GUI Parameter	Command Line Parameter
Network Summary Table	Global	STATS-DB-NETWORK-SUMMARY-TABLE
Average Data Delay Column	Global	STATS-DB-NETWORK-SUMMARY-DATA-DELAY
Average Control Delay Column	Global	STATS-DB-NETWORK-SUMMARY-CONTROL-DELAY
Average Data Jitter Column	Global	STATS-DB-NETWORK-SUMMARY-DATA-JITTER
Average Control Jitter Column	Global	STATS-DB-NETWORK-SUMMARY-CONTROL-JITTER
Network Summary Table Index	Global	STATS-DB-NETWORK-SUMMARY-INDEX
Multicast Network Summary Table	Global	STATS-DB-MULTICAST-NETWORK-SUMMARY-TABLE
MAC Summary Table	Global	STATS-DB-MAC-SUMMARY-TABLE
Average Delay Columns	Global	STATS-DB-MAC-SUMMARY-DELAY
Average Jitter Columns	Global	STATS-DB-MAC-SUMMARY-JITTER
PHY Summary Table	Global	STATS-DB-PHY-SUMMARY-TABLE
Average Path Loss Column	Global	STATS-DB-PHY-SUMMARY-PATHLOSS
Average Signal Power Column	Global	STATS-DB-PHY-SUMMARY-SIGNAL-POWER
Average Delay Column	Global	STATS-DB-PHY-SUMMARY-DELAY
Queue Summary Table	Global	STATS-DB-QUEUE-SUMMARY-TABLE

3.2.7 Configuring Events Tables

Events tables can be configured in the same way as Description tables (see [Section 3.2.3](#)). [Table 3-30](#) lists the command line equivalent of configuration parameters for all Events tables.

TABLE 3-30. Command Line Equivalent of Events Table Parameters

GUI Parameter	Scope of GUI Parameter	Command Line Parameter
Events Tables	Global	STATS-DB-EVENTS-TABLE
Application Message Events Table	Global	STATS-DB-APPLICATION-EVENTS-TABLE
Message Sequence Number Column	Global	STATS-DB-APPLICATION-EVENTS-MSG-SEQUENCE-NUM
Socket Interface Message ID Columns	Global	STATS-DB-APPLICATION-EVENTS-SOCKET-INTERFACE-MESSAGE-IDS
Priority Column	Global	STATS-DB-APPLICATION-EVENTS-PRIORITY
Message Failure Type Column	Global	STATS-DB-APPLICATION-EVENTS-FAILURE-TYPE
Average Delay Column	Global	STATS-DB-APPLICATION-EVENTS-DELAY
Average Jitter Column	Global	STATS-DB-APPLICATION-EVENTS-JITTER
Record Duplicate Messages	Global	STATS-DB-APPLICATION-EVENTS-RECORD-DUPLICATE
Record Out of Order Messages	Global	STATS-DB-APPLICATION-EVENTS-RECORD-OUT-OF-ORDER

TABLE 3-30. Command Line Equivalent of Events Table Parameters (Continued)

GUI Parameter	Scope of GUI Parameter	Command Line Parameter
Record Events for Fragments	Global	STATS-DB-APPLICATION-EVENTS-RECORD-FRAGMENT
Maximum Sequence Number Cache Size	Global	STATS-DB-APPLICATION-SEQUENCE-NUMBER-CACHE-SIZE
Insert Multiple Values with a Single INSERT	Global	STATS-DB-APPLICATION-EVENTS-MULTIPLE-VALUES
Application Events Buffer Size	Global	STATS-DB-APPLICATION-EVENTS-BUFFER-SIZE
Transport Segment Events Table	Global	STATS-DB-TRANSPORT-EVENTS-TABLE
Message Sequence Number Column	Global	STATS-DB-TRANSPORT-EVENTS-MSG-SEQUENCE-NUM
Connection Type Column	Global	STATS-DB-TRANSPORT-EVENTS-CONNECTION-TYPE
Header Size Column	Global	STATS-DB-TRANSPORT-EVENTS-DATA-HEADER-SIZE
Segment Type Column	Global	STATS-DB-TRANSPORT-EVENTS-SEGMENT-TYPE
Event Type Column	Global	STATS-DB-TRANSPORT-EVENTS-EVENT-TYPE
Message Failure Type Column	Global	STATS-DB-TRANSPORT-EVENTS-FAILURE-TYPE
Network Packet Events Table	Global	STATS-DB-NETWORK-EVENTS-TABLE
Message Sequence Number Column	Global	STATS-DB-NETWORK-EVENTS-MSG-SEQUENCE-NUM
Header Size Column	Global	STATS-DB-NETWORK-EVENTS-DATA-HEADER-SIZE
Packet Type Column	Global	STATS-DB-NETWORK-EVENTS-MESSAGE-TYPE
Protocol Type Column	Global	STATS-DB-NETWORK-EVENTS-PROTOCOL
Priority Column	Global	STATS-DB-NETWORK-EVENTS-PRIORITY
Packet Failure Type Column	Global	STATS-DB-NETWORK-EVENTS-FAILURE-TYPE
Hop Count Column	Global	STATS-DB-NETWORK-EVENTS-HOP-COUNT
Include Control Events	Global	NETWORK-STATS-DB-CONTROL
Include Incoming Data Events	Global	NETWORK-STATS-DB-INCOMING
Include Outgoing Data Events	Global	NETWORK-STATS-DB-OUTGOING
Insert Multiple Values with a Single INSERT	Global	STATS-DB-NETWORK-EVENTS-MULTIPLE-VALUES
Network Events Buffer Size	Global	STATS-DB-NETWORK-EVENTS-BUFFER-SIZE
MAC Frame Events Table	Global	STATS-DB-MAC-EVENTS-TABLE
Message Sequence Number Column	Global	STATS-DB-MAC-EVENTS-MSG-SEQUENCE-NUM
Channel Index Column	Global	STATS-DB-MAC-EVENTS-CHANNEL-INDEX
Message Frame Type Column	Global	STATS-DB-MAC-EVENTS-MSG-FRAME-TYPE
PHY Signal Events Table	Global	STATS-DB-PHY-EVENTS-TABLE
Channel Index Column	Global	STATS-DB-PHY-EVENTS-CHANNEL-INDEX
Preamble Size Column	Global	STATS-DB-PHY-EVENTS-PREAMBLE-SIZE

TABLE 3-30. Command Line Equivalent of Events Table Parameters (Continued)

GUI Parameter	Scope of GUI Parameter	Command Line Parameter
Failure Type Column	Global	STATS-DB-PHY-EVENTS-FAILURE-TYPE
Signal Power Column	Global	STATS-DB-PHY-EVENTS-SIGNAL-POWER
Interference Power Column	Global	STATS-DB-PHY-EVENTS-INTERFERENCE-POWER
Path Loss Column	Global	STATS-DB-PHY-EVENTS-PATHLOSS
Queue Events Table	Global	STATS-DB-QUEUE-EVENTS-TABLE

3.2.8 Configuring Connectivity Tables

Connectivity tables can be configured in the same way as Description tables (see [Section 3.2.3](#)). [Table 3-31](#) lists the command line equivalent of configuration parameters for all Connectivity tables.

TABLE 3-31. Command Line Equivalent of Connectivity Table Parameters

GUI Parameter	Scope of GUI Parameter	Command Line Parameter
Connectivity Tables	Global	STATS-DB-CONNECTIVITY-TABLE
Update Connectivity Tables at End of Simulation	Global	STATS-DB-CONNECTIVITY-PRINT-END-SIMULATION
Application Layer Connectivity Table	Global	STATS-DB-APPLICATION-CONNECTIVITY-TABLE
Application Connectivity Update Interval	Global	STATS-DB-APPLICATION-CONNECTIVITY-INTERVAL
Transport Layer Connectivity Table	Global	STATS-DB-TRANSPORT-CONNECTIVITY-TABLE
Transport Connectivity Update Interval	Global	STATS-DB-TRANSPORT-CONNECTIVITY-INTERVAL
Network Layer Connectivity Table	Global	STATS-DB-NETWORK-CONNECTIVITY-TABLE
Next Hop Address Column	Global	STATS-DB-NETWORK-CONNECTIVITY-NEXT-HOP-ADDRESS
Outgoing Interface Index Column	Global	STATS-DB-NETWORK-CONNECTIVITY-OUTGOING-INTERFACE-INDEX
Routing Protocol Type Column	Global	STATS-DB-NETWORK-CONNECTIVITY-ROUTING-PROTOCOL
Network Connectivity Update Interval	Global	STATS-DB-NETWORK-CONNECTIVITY-INTERVAL
Multicast Connectivity Table	Global	STATS-DB-MULTICAST-CONNECTIVITY-TABLE
Multicast Connectivity Update Interval	Global	STATS-DB-MULTICAST-CONNECTIVITY-INTERVAL
MAC Layer Connectivity Table	Global	STATS-DB-MAC-CONNECTIVITY-TABLE
MAC Connectivity Update Interval	Global	STATS-DB-MAC-CONNECTIVITY-INTERVAL
Physical Layer Connectivity Table	Global	STATS-DB-PHY-CONNECTIVITY-TABLE
Physical Layer Connectivity Update Interval	Global	STATS-DB-PHY-CONNECTIVITY-INTERVAL

3.2.9 Configuring Model-specific Tables

Model-specific tables can be configured in the same way as Description tables (see [Section 3.2.3](#)).

[Table 3-32](#) lists the command line equivalent of configuration parameters for all model-specific tables.

TABLE 3-32. Command Line Equivalent of Model-specific Table Parameters

GUI Parameter	Scope of GUI Parameter	Command Line Parameter
Model Specific Tables	Global	N/A
IGMP Summary Table	Global	STATS-DB-MULTICAST-IGMP-SUMMARY-TABLE
MOSPF Summary Table	Global	STATS-DB-MULTICAST-MOSPF-SUMMARY-TABLE
OSPF Aggregate Statistics Table	Global	STATS-DB-OSPF-AGGREGATE-TABLE
OSPF Aggregate Statistics Update Interval	Global	STATS-DB-OSPF-AGGREGATE-INTERVAL
OSPF External LSA Table	Global	STATS-DB-OSPF-EXTERNAL-LSA-TABLE
OSPF External LSA Update Interval	Global	STATS-DB-OSPF-EXTERNAL-LSA-INTERVAL
OSPF Interface State Table	Global	STATS-DB-OSPF-INTERFACE-STATE-TABLE
OSPF Interface State Update Interval	Global	STATS-DB-OSPF-INTERFACE-STATE-INTERVAL
OSPF Neighbor State Table	Global	STATS-DB-OSPF-NEIGHBOR-STATE-TABLE
OSPF Neighbor State Update Interval	Global	STATS-DB-OSPF-NEIGHBOR-STATE-INTERVAL
OSPF Network LSA Table	Global	STATS-DB-OSPF-NETWORK-LSA-TABLE
OSPF Network LSA Update Interval	Global	STATS-DB-OSPF-NETWORK-LSA-INTERVAL
OSPF Router LSA Table	Global	STATS-DB-OSPF-ROUTER-LSA-TABLE
OSPF Router LSA Update Interval	Global	STATS-DB-OSPF-ROUTER-LSA-INTERVAL
OSPF Summary LSA Table	Global	STATS-DB-OSPF-SUMMARY-LSA-TABLE
OSPF Summary LSA Update Interval	Global	STATS-DB-OSPF-SUMMARY-LSA-INTERVAL
OSPF Summary Statistics Table	Global	STATS-DB-OSPF-SUMMARY-TABLE
OSPF Summary Statistics Update Interval	Global	STATS-DB-OSPF-SUMMARY-INTERVAL
PIM-DM Summary Table	Global	STATS-DB-MULTICAST-PIM-DM-SUMMARY-TABLE
PIM-SM Status Table	Global	STATS-DB-MULTICAST-PIM-SM-STATUS-TABLE
PIM-SM Summary Table	Global	STATS-DB-MULTICAST-PIM-SM-SUMMARY-TABLE
Urban Propagation Statistics Table	Global	STATS-DB-URBAN-PROP-TABLE

