

Ruckus LTE AP KPI Guide Release SC 3.0

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Document Conventions

The following table lists the text conventions that are used throughout this guide.

TABLE 1 Text Conventions

Convention	Description	Example
monospace	Identifies command syntax examples	<code>device(config)# interface ethernet 1/1/6</code>
bold	User interface (UI) components such as screen or page names, keyboard keys, software buttons, and field names	On the Start menu, click All Programs .
<i>italics</i>	Publication titles	Refer to the <i>Ruckus Small Cell Release Notes</i> for more information.

Notes, Cautions, and Safety Warnings

Notes, cautions, and warning statements may be used in this document. They are listed in the order of increasing severity of potential hazards.

NOTE

A NOTE provides a tip, guidance, or advice, emphasizes important information, or provides a reference to related information.

ATTENTION

An ATTENTION statement indicates some information that you must read before continuing with the current action or task.



CAUTION

A CAUTION statement alerts you to situations that can be potentially hazardous to you or cause damage to hardware, firmware, software, or data.



DANGER

A DANGER statement indicates conditions or situations that can be potentially lethal or extremely hazardous to you. Safety labels are also attached directly to products to warn of these conditions or situations.

Command Syntax Conventions

Bold and italic text identify command syntax components. Delimiters and operators define groupings of parameters and their logical relationships.

Convention	Description
bold text	Identifies command names, keywords, and command options.

Preface

Document Feedback

Convention	Description
<i>italic text</i>	Identifies a variable.
[]	Syntax components displayed within square brackets are optional. Default responses to system prompts are enclosed in square brackets.
{ x y z }	A choice of required parameters is enclosed in curly brackets separated by vertical bars. You must select one of the options.
x y	A vertical bar separates mutually exclusive elements.
< >	Nonprinting characters, for example, passwords, are enclosed in angle brackets.
...	Repeat the previous element, for example, <i>member</i> [<i>member</i> ...].
\	Indicates a “soft” line break in command examples. If a backslash separates two lines of a command input, enter the entire command at the prompt without the backslash.

Document Feedback

Ruckus is interested in improving its documentation and welcomes your comments and suggestions.

You can email your comments to Ruckus at #Ruckus-Docs@commscope.com.

When contacting us, include the following information:

- Document title and release number
- Document part number (on the cover page)
- Page number (if appropriate)

For example:

- Ruckus SmartZone Upgrade Guide, Release 5.0
- Part number: 800-71850-001 Rev A
- Page 7

Ruckus Product Documentation Resources

Visit the Ruckus website to locate related documentation for your product and additional Ruckus resources.

Release Notes and other user documentation are available at <https://support.ruckuswireless.com/documents>. You can locate the documentation by product or perform a text search. Access to Release Notes requires an active support contract and a Ruckus Support Portal user account. Other technical documentation content is available without logging in to the Ruckus Support Portal.

White papers, data sheets, and other product documentation are available at <https://www.ruckuswireless.com>.

Online Training Resources

To access a variety of online Ruckus training modules, including free introductory courses to wireless networking essentials, site surveys, and Ruckus products, visit the Ruckus Training Portal at <https://training.ruckuswireless.com>.

Contacting Ruckus Customer Services and Support

The Customer Services and Support (CSS) organization is available to provide assistance to customers with active warranties on their Ruckus products, and customers and partners with active support contracts.

For product support information and details on contacting the Support Team, go directly to the Ruckus Support Portal using <https://support.ruckuswireless.com>, or go to <https://www.ruckuswireless.com> and select **Support**.

What Support Do I Need?

Technical issues are usually described in terms of priority (or severity). To determine if you need to call and open a case or access the self-service resources, use the following criteria:

- Priority 1 (P1)—Critical. Network or service is down and business is impacted. No known workaround. Go to the **Open a Case** section.
- Priority 2 (P2)—High. Network or service is impacted, but not down. Business impact may be high. Workaround may be available. Go to the **Open a Case** section.
- Priority 3 (P3)—Medium. Network or service is moderately impacted, but most business remains functional. Go to the **Self-Service Resources** section.
- Priority 4 (P4)—Low. Requests for information, product documentation, or product enhancements. Go to the **Self-Service Resources** section.

Open a Case

When your entire network is down (P1), or severely impacted (P2), call the appropriate telephone number listed below to get help:

- Continental United States: 1-855-782-5871
- Canada: 1-855-782-5871
- Europe, Middle East, Africa, Central and South America, and Asia Pacific, toll-free numbers are available at <https://support.ruckuswireless.com/contact-us> and Live Chat is also available.
- Worldwide toll number for our support organization. Phone charges will apply: +1-650-265-0903

We suggest that you keep a physical note of the appropriate support number in case you have an entire network outage.

Self-Service Resources

The Ruckus Support Portal at <https://support.ruckuswireless.com> offers a number of tools to help you to research and resolve problems with your Ruckus products, including:

- Technical Documentation—<https://support.ruckuswireless.com/documents>
- Community Forums—<https://forums.ruckuswireless.com/ruckuswireless/categories>
- Knowledge Base Articles—<https://support.ruckuswireless.com/answers>
- Software Downloads and Release Notes—https://support.ruckuswireless.com/#products_grid
- Security Bulletins—<https://support.ruckuswireless.com/security>

Using these resources will help you to resolve some issues, and will provide TAC with additional data from your troubleshooting analysis if you still require assistance through a support case or RMA. If you still require help, open and manage your case at https://support.ruckuswireless.com/case_management.

About This Guide

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Introduction

This Ruckus LTE AP KPI Reference Guide provides a number of statistics that you can use to establish key performance indicators (KPIs) for the network.

This guide is written for service operators and system administrators who are responsible for managing, configuring, and troubleshooting Ruckus Wireless devices. Consequently, it assumes a basic working knowledge of local area networks, wireless networking, and wireless devices.

NOTE

This guide assumes that Ruckus LTE AP has already been installed as described in Getting Started Guide.

Terminology

The following table lists the terms used in this guide.

TABLE 2 Terms used in this guide

Term	Description
EIRP	Effective Isotropic Radiated Power
EUTRAN	Evolved UMTS Terrestrial Radio Access Network
HO	Handover
KPI	Key Performance Indicator
RF	Radio Frequency
RRC	Radio Resource Control
UE	User Equipment

Ruckus LTE AP Statistics

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Ruckus LTE AP Statistics Overview

Ruckus LTE AP provides a number of statistics to establish Key Performance Indicators (KPIs) to evaluate the performance of the small cell.

Statistics that are used to calculate Ruckus LTE AP KPIs are described in the following sections.

Statistics Supported in Ruckus LTE AP Release SC 2.4.1

The following tables provide information about statistics supported in Ruckus LTE AP Release SC 2.4.1.

TABLE 3 Ruckus LTE Statistics

Statistics	Description
networkTenantId	This counter is used for reporting the identification number of network tenant.
networkName	This counter is used for reporting the name of the network.
networkClientsCount	This counter is used for reporting the total number of network clients.
radioFreq	This counter is used for reporting the radio band indicator.
radioFreqId	This counter is used for reporting the identity of LTE AP.
plmnid	This counter is used for reporting the PLMN identity of Ruckus LTE AP.
Number of Dropped Calls (erabRelEnbNbrSum)	This counter is used for reporting the total number of dropped calls. The sum of this counter from all Ruckus LTE APs can be used to calculate per venue/system KPI.
RRC Connection Establishment Attempts (rrcConnEstabAttSum)	This counter is used for reporting the total number of RRC connection establishment attempts. The sum of this counter from all Ruckus LTE APs can be used to calculate per venue/system KPI.
RRC Connection Establishment Successes (rrcConnEstabSuccSum)	This counter is used for reporting the number of successful RRC connections. The sum of this counter from all Ruckus LTE APs can be used to calculate per venue/system KPI.
RRC Connection Reestablishment Attempts (rrcConnReEstabAttSum)	This counter is used for reporting the number of reestablishment attempts for RRC connection. The sum of this counter from all Ruckus LTE APs can be used to calculate per venue/system KPI.
RRC Connection Reestablishment Successes (rrcConnReEstabSuccSum)	This counter is used for reporting the number of reestablishment successes for RRC connection. The sum of this counter from all Ruckus LTE APs can be used to calculate per venue/system KPI.
Initial E-RABs Setup Attempts (erabEstabInitAttNbrSum)	This counter is used for reporting the number of initial E-RABs establishment attempts. The sum of this counter from all Ruckus LTE APs can be used to calculate per venue/system KPI.
Initial E-RABs Setup Successes (erabEstabInitSuccNbrSum)	This counter is used for reporting the number of initial E-RABs establishment successes. The sum of this counter from all Ruckus LTE APs can be used to calculate per venue/system KPI.
Additional E-RAB Setup Attempts (erabEstabAddAttNbrSum)	This counter is used for reporting the number of additional E-RABs establishment attempts. The sum of this counter from all Ruckus LTE APs can be used to calculate per venue/system KPI.
Additional E-RAB Setup Successes (erabEstabAddSuccNbrSum)	This counter is used for reporting the number of additional E-RABs establishment successes. The sum of this counter from all Ruckus LTE APs can be used to calculate per venue/system KPI.
Handover Attempts(eutranToEutranHoOutAttTargetSum)	This counter is used for reporting the number of HO attempts. The sum of this counter from all Ruckus LTE APs can be used to calculate per venue/system KPI.

Ruckus LTE AP Statistics

Statistics Supported in Ruckus LTE AP Release SC 2.4.1

TABLE 3 Ruckus LTE Statistics (continued)

Statistics	Description
Handover Successes (eutanToEutanHoOutSuccTargetSum)	This counter is used for reporting the number of successful HO. The sum of this counter from all Ruckus LTE APs can be used to calculate per venue/system KPI.
Cell Unavailable Time (cellUnavailableTime)	This counter is used for reporting the time for which Ruckus LTE AP is unavailable.
Average Number of Active UEs (numOfActiveUE)	This counter gives the instantaneous number of active UEs.
SAS Unavailability (sasUnavailableTime)	This counter is used for reporting the time for which SAS is unavailable.
GPS Unavailability (gpsUnavailableTime)	This counter is used for reporting the number of seconds elapsed between last GPS/GNSS unavailability until GPS availability.
Phase Sync Loss Time (phaseSyncLossTime)	This counter is used for reporting the number of seconds elapsed between last PTP phase sync loss until PTP phase sync lock.
Average DL Throughput (Mbps) (txKbps)	This counter is used for reporting the average downlink throughput. This counter is used to calculate per venue or system KPI using (\sum of all Ruckus LTE AP)/# of Ruckus LTE AP.
Average UL Throughput (Mbps) (rxKbps)	This counter is used for reporting the average uplink throughput. This counter is used to calculate per venue or system KPI using (\sum of all Ruckus LTE AP)/# of Ruckus LTE AP.
DL Traffic Volume (GBytes) (dlTrafficVolume)	This counter is used for reporting the volume of downlink traffic in bytes. The sum of this counter from all Ruckus LTE APs can be used to calculate per venue/system KPI.
UL Traffic volume (GBytes) (ulTrafficVolume)	This counter is used for reporting the volume of uplink traffic in bytes. The sum of this counter from all Ruckus LTE APs can be used to calculate per venue/system KPI.
Frequency Sync Loss Time (frequencySyncLossTime)	This counter is used for reporting the duration for which frequency synchronization is lost, including PTP ACQUIRING state. The sum of this counter from all Ruckus LTE APs can be used to calculate per venue/system KPI.
Percentage Phase Locked (percentagePhaseLocked)	This counter is used for reporting the percentage of the duration for which PTP phase is locked. The sum of this counter from all Ruckus LTE APs can be used to calculate per venue/system KPI.
cellUnavailableTimeInvalid	This counter is used for reporting whether cellUnavailable time recorded is valid or not.
sasUnavailableTimeInvalid	This counter is used for reporting whether sasUnavailable time recorded is valid or not.
gpsUnavailableTimeInvalid	This counter is used for reporting whether gpsUnavailable time recorded is valid or not.
erabRelActNbrSum	This counter is used for reporting the total number of connections released.
erabSessionTimeSum	This counter is used for reporting the sum of activity sessions over all ERABs.
rrcConnEstabFailCause_<0-7>	This counter is used for reporting RRC connection establishment failure. (0 - Emergency, 1 - highPriorityAccess, 2 - MT, 3 - MO Signaling, 4 - MO User Bearer, 5 - delayTolerantAccess-v1020)
rrcConnReEstabFailCause_<0-3>	This counter is used for reporting RRC connection re-establishment failure. (0 - reconfigurationFailure, 1 - handoverFailure, 2 - otherFailure)
configuredSyncSource	This counter is used for reporting the configured sync source of Ruckus LTE AP.
holdoverTime	This counter is used for reporting the Holdover time.
numOfTfcsStateTransToGpsLocked	This counter is used for reporting the number of times GPS is locked in TFCS state.
numOfTfcsStateTransToHoldover	This counter is used for reporting the number of holdover in TFCS state.
numOfTrackedSatellites	This counter is used for reporting the number of tracked satellites.
numOfPtpSlaves	This counter is used for reporting the number of PTP slaves.
numOfTfcsStateTransToPhaseLocked	This counter is used for reporting the number of time PTP is phase locked.
syncRecoveryTime	This counter is used for reporting the sync recovery time.
hoInterFreqAttempts	This counter is used for reporting the inter-frequency HO statistics.
hoIntraFreqSuccess	This counter is used for reporting the intra-frequency HO statistics.
numOfSCellAddAttempt	This counter is used for reporting the number of requests sent for addition of secondary cells.
numOfSCellAddSuccess	This counter is used for reporting the number of successful requests for addition of secondary cells.
numOfSCellAddFail	This counter is used for reporting the number of failed requests for addition of secondary cells.

TABLE 3 Ruckus LTE Statistics (continued)

Statistics	Description
numOfSCellReleaseAttempt	This counter is used for reporting the number of requests sent for release of secondary cells.
numOfSCellReleaseSuccess	This counter is used for reporting the number of successful requests for release of secondary cells.
numOfSCellReleaseFail	This counter is used for reporting the number of failed requests for release of secondary cells.
numOfActiveUESCell	This counter is used for reporting the number of active users on a secondary cell.

KPIs Supported in Ruckus LTE AP SC Release 2.4.1

The following table provide information about KPIs supported in Ruckus LTE AP SC Release 2.4.1.

TABLE 4 System KPIs

KPI	Description
DCR (Dropped Call Rate)	To calculate Dropped Call rate, use the following formula: $(100 * A) / (B + C)$ A = Number of dropped calls B = Number of additional E-RABs successful to setup C = Number of initial E-RABs successful to setup To calculate per venue/system, use \sum of all Ruckus LTE APs.
RRC Connection Establishment Success rate	To calculate RRC Connection Establishment Success rate, use the following formula: $(\sum A / \sum B) * 100$ where A = Number of RRC connection establishment successes B = Number of RRC connection establishment attempts To calculate per venue/system, use \sum of all Ruckus LTE APs.
RRC Connection Re-establishment Success rate	To calculate RRC Connection Re-establishment Success rate, use the following formula: $(\sum A / \sum B) * 100$ where A = Number of RRC connection re-establishment successes B = Number of RRC connection re-establishment attempts To calculate per venue/system, use \sum of all Ruckus LTE APs.
Initial E-RAB Setup Success rate	To calculate initial E-RAB Setup Success rate, use the following formula: $(\sum A / \sum B) * 100$ where A = Number of initial E-RABs successful to setup B = Number of initial E-RABs attempted to setup
Additional E-RAB Setup Success rate	To calculate additional E-RAB Setup Success rate, use the following formula: $(\sum A / \sum B) * 100$ where A = Number of additional E-RABs successful to setup B = Number of additional E-RABs attempted to setup

TABLE 4 System KPIs (continued)

KPI	Description
Initial Bearer Setup Success Rate	To calculate Initial Bearer Setup Success rate, use the following formula: $(A*100)/B$ where A = Number of initial E-RABs successful to setup B = Number of initial E-RABs attempted to setup
Additional Bearer Setup Success Rate	To calculate Initial Bearer Setup Success rate, use the following formula: $(A*100)/B$ where A = Number of additional E-RABs successful to setup B = Number of additional E-RABs attempted to setup
Handover Success rate	To calculate Handover Success rate, use the following formula: $(\sum A/\sum B)*100$ where A= Number HO successes B = Number HO attempts
SAS Availability	To calculate SAS Availability, use the following formula: $[(A-B)/A]*100$ where A = Measurement Period B = SAS unavailable time
Cell Availability	To calculate cell availability, use the following formula: $[(A-B)/A]*100$ where <ul style="list-style-type: none"> • A = measurement_period • B = sum of cell unavailable time
Average Cell Availability	To calculate average cell availability per venue/system, use the following formula: $\{ 1 - (U/T) \} * 100 = \%$ where <ul style="list-style-type: none"> • U = average cell unavailability in seconds = (S/R) <ul style="list-style-type: none"> – S = sum of all Cell Unavailable time from all Ruckus LTE APs – R = total number of Ruckus LTE APs • Reporting interval in seconds To calculate average cell availability for plots, compute and display cell availability on the charts/Plots (if possible) or the reported Cell unavailability time.
Average number of Active UEs	To calculate average number of active UEs per venue/system, use sum of all UEs for Ruckus LTE APs.
Total DL Traffic Volume (GBytes)	To calculate total DL Traffic volume per Ruckus LTE AP, use the following formula: \sum of all dlTrafficVolume reported for the Ruckus LTE AP in given interval of reporting time.
Total UL Traffic Volume (GBytes)	To calculate total UL Traffic volume per Ruckus LTE AP, use the following formula: \sum of all ulTrafficVolume reported for the Ruckus LTE AP in given interval of reporting time.

TABLE 4 System KPIs (continued)

KPI	Description
Frequency Synchronized	<p>Frequency synchronized is reported as A or calculated in percentage value as $\text{Frequency Synchronization} = (1-A/T)*100$</p> <p>where</p> <p>A = \sum of all frequencySyncLossTime reports for all Ruckus LTE AP with GPS / # no. of Ruckus LTE AP with GPS</p> <p>T = Reporting Time interval</p>

TABLE 5 System Throughput KPIs

KPI	Description
Average DL Throughput (Mbps)	To calculate per venue/system, use $(\sum \text{ of all Ruckus LTE APs})/\# \text{ of Ruckus LTE APs}$.
Average UL Throughput (Mbps)	To calculate per venue/system, use \sum of all Ruckus LTE APs.
DL Traffic Volume (GBytes)	To calculate per venue/system, use \sum of all Ruckus LTE APs.
UL Traffic Volume (GBytes)	To calculate per venue/system, use \sum of all Ruckus LTE APs.

TABLE 6 System GPS KPIs

KPI	Description
GPS Availability	<p>GPS availability is reported as A or calculated in percentage value as $\text{GPS Availability} = (1-A/T)*100$</p> <p>where</p> <p>A = $(\sum \text{ of all gpsUnavailableTime reports for each Ruckus LTE AP with GPS as timing source} / \# \text{ no of Ruckus LTE AP with GPS}) - \text{Reporting Time}$</p> <p>T = Reporting Time interval</p>
Phase Locked	<p>To calculate Phase Locked, use the following formula: $[(A-B)/A]*100$</p> <p>where</p> <p>A = measurement_period</p> <p>B = Phase sync loss time</p> <p>For per venue KPI, use the following formula: $\text{Phase sync loss time} = \sum \text{ of all GPS Ruckus LTE AP} / \# \text{ no of Ruckus LTE AP with GPS}$</p>
Holdover	<p>To calculate Holdover, use the following formula: $100-A$</p> <p>where</p> <p>A = Percentage of time in Phase Locked</p> <p>To calculate per venue KPI, use the following formula: $\text{percentagePhaseLocked} = \sum \text{ of all percentageHoldover from Ruckus LTE AP with GPS} / \# \text{ no of Ruckus LTE AP with GPS}$</p>
Frequency Phase Recovery	<p>To calculate Frequency Phase Recovery, use the following formula: $(A/B)*100$</p> <p>where</p> <p>A = Frequency Sync Loss Time</p> <p>B= measurement_period</p> <p>To calculate per venue KPI, use the following formula: $\text{frequencySyncLossTime} = \sum \text{ of all GPS Ruckus LTE AP} / \# \text{ no of Ruckus LTE AP with GPS}$</p>

