



## Enforcement of Licensing Models

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This chapter describes the enforcement of transactions per second (TPS) based licensing and session based licensing models introduced in Cisco Prime Access Registrar (Prime Access Registrar).

In TPS based licensing model, the license is based on the number of transactions per second that are handled by the server. In session based licensing model, the license is managed based on the number of sessions that resides in Prime Access Registrar. During Prime Access Registrar startup, you can either load TPS based licensing or session based licensing, but not both at the same time.

This chapter contains the following sections:

- [TPS Licensing Features](#)
- [Concurrent Session License Features](#)



**Note**

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The type of licensing will determine the applicable features and its corresponding enforcement.

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## TPS Licensing Features

The following are the features of TPS licensing:

- License will enable features but with restriction enforced on the TPS.
- TPS is the number of packets flowing into Prime Access Registrar. This is accounted by Prime Access Registrar irrespective of the feature being used.

This section contains the following topics:

- [Enforcement Rules](#)
- [Notification Logs](#)
- [Notification - SNMP Traps](#)
- [TPS Logging Feature](#)

## Enforcement Rules

Any license enforcement is triggered only after Prime Access Registrar has observed increasing steady state in TPS. Increasing steady state is marked by the steady increase in incoming traffic (measured in TPS) beyond 80% of the licensed TPS for any 15 minutes of a 20 minute interval.

The following are the enforcement rules applied on reaching increasing steady state:

- When the incoming traffic (measured in TPS) is greater than 80% of the licensed TPS, SNMP Trap will be generated for the first time on reaching the increased steady state. The warning message on the current license usage is logged for every 5 minutes.
- When the incoming traffic (measured in TPS) is greater than 90% of the licensed TPS, SNMP Trap will be generated for the first time on reaching the increased steady state. Warning message on the current license usage is logged for every 5 minutes.
- When the incoming traffic (measured in TPS) is greater than 100% of the licensed TPS, SNMP Trap will be generated for the first time on reaching the increased steady state. Error message on the current license usage is logged for every 5 minutes.
- When the incoming traffic (measured in TPS) is greater than 110% of the licensed TPS, SNMP Trap will be generated for the first time on reaching the increased steady state.

**Note**

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Steady state denotes continuous increase or decrease in the TPS within a given TPS range. For the purpose of enforcement of licensing in Prime Access Registrar, the range is always 80% and above. The enforcement begins after TPS reaches and is greater than 80% for a steady state of 20 minutes.

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## Notification Logs

A warning message is logged for every 5 minutes when the TPS count reaches an increased steady state, where, the TPS count is in the range of 80% to 100% of the licensed TPS.

An error message is logged for every 5 minutes when the TPS count reaches an increased steady state, where, the TPS count is in the range of 100% to 110% of the licensed TPS.

## Notification - SNMP Traps

The `carLicenseUsage` traps are generated only once in an increasing phase. The incoming traffic slabs are defined as 80%, 90%, 100%, and 110% of the licensed TPS. When the incoming traffic slabs reaches an increasing steady state of 80% or above for the first time, the respective trap is generated for the slab.

If the TPS count drops below 80% of the licensed TPS for a steady state period of 20 minutes, Prime Access Registrar marks it as decreased or normal steady state. Traps will be regenerated again only if Prime Access Registrar observes a decreased steady state followed by an increased steady state of TPS falling under the slab (say 80%).

## TPS Logging Feature

The properties in Advanced Object such as TPSSamplingPeriodInSecs, LogTPSActivity, TPSLogFilenamePrefix and TPSLogFileCount enable logging of TPS in the Prime Access Registrar server. TPS log file is located in **/cisco-ar/logs**. It creates one file per day to hold the TPS information for the day. The TPS samples are collected for every TPSSamplingPeriodInSecs. The file is updated only once for every 10\* TPSSamplingPeriodInSecs. If there is no inflowing traffic, Prime Access Registrar logs zero TPS once for every 10\* TPSSamplingPeriodInSecs. See the “Configuring and Monitoring the RADIUS Server” chapter of the *Cisco Prime Access Registrar 9.2 Administrator Guide* for more information on TPSSamplingPeriodInSecs, LogTPSActivity, TPSLogFilenamePrefix, and TPSLogFileCount properties.

The following is the sample configuration of tps license:

```
/cisco-ar/bin/aregcmd -s
set /Radius/Advanced/LogTPSActivity TRUE
set /Radius/Advanced/TPSLogFilenamePrefix tps
set /Radius/Advanced/TPSLogFileCount 5
set /Radius/Advanced/TPSSamplingPeriodInSecs 30
save
```

The following is the sample output of the log file:

```
[root@ar-lnx-vm020 logs]# tail -f sm-04-24-2016.csv
04-24-2016,18:36:30,2998,1000
04-24-2016,18:36:51,2997,1000
04-24-2016,18:37:11,996,408
04-24-2016,18:37:32,3532,1263
04-24-2016,18:37:53,2763,1000
04-24-2016,18:38:14,4749,1669
```

In the above example, the first numerical value (2998) in the log entry denotes the total TPS traffic and the second value (1000) denotes the SIGTRAN-M3UA traffic.

For TPS measurement in Prime Access Registrar server, you can run the TPS calculator script when you want to monitor the TPS during the peak period or run the TPS for 24 hours.

## Concurrent Session License Features

In Concurrent Session based license, the licensing is done based on the number of sessions that resides in Prime Access Registrar.



### Note

During startup of the Prime Access Registrar, the default session manager must be enabled for RADIUS and the EnableStickySession must be set to TRUE for Diameter. This is applicable only for session based license.

The sticky sessions is enabled during the initialization of Prime Access Registrar for Diameter based license to track the session counts in the diameter service. The server level count is calculated by adding all the sessions maintained across all the session managers and the sticky sessions of all the diameter services in the server. This session count is used by licensing module for license enforcement. The session count is either increased or decreased based on the action performed.

This section contains the following topics:

- [Sessions Enforcement Rules](#)

- [Notification Logs](#)
- [Notification - SNMP Traps](#)
- [Session Logging Feature](#)

## Sessions Enforcement Rules

The following are the enforcement rules applied on concurrent session based license:

- When the session count (measured in concurrent session) reaches 80% of the licensed sessions, SNMP Trap will be generated for the first time on reaching the increased steady state. The warning message on the current license usage is logged for every 5 minutes.
- When the session count (measured in concurrent session) reaches 90% of the licensed sessions, SNMP Trap will be generated for the first time on reaching the state. The warning message on the current license usage is logged for every 5 minutes.
- When the session count (measured in concurrent session) attains 100% of the licensed sessions, SNMP Trap will be generated for the first time on reaching the state. The error message on the current license usage is logged for every 5 minutes.
- When the session count (measured in concurrent session) attains 110% of the licensed sessions, SNMP Trap will be generated for the first time on reaching the state.

**Note**

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The steady state period is not applicable for Concurrency Session based licensing.

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## Notification Logs

A warning message is logged for every 5 minutes when the session count reaches 80% and 90% of the licensed Concurrent Session.

An error message is logged when the session count reaches the range of 100% to 110% of the licensed Concurrent Session.

## Notification - SNMP Traps

The **carLicenseUsage** trap is generated when the Prime Access Registrar server reaches 80%. The incoming traffic slabs defined for trap generation are 80%, 90%, 100%, and 110% of the licensed Concurrent Sessions. These traps are generated once for every slab during the increasing steady state.

**Note**

Logging Feature is applicable for session based license as like TPS logging feature. The warning messages are displayed corresponding to session logging feature. See [TPS Logging Feature, page 7-3](#) for more information.

## Session Logging Feature

The properties in Advanced Object such as `SessionSamplingPeriodInSecs`, `LogSessionActivity`, `SessionLogFilenamePrefix` and `SessionLogFileCount` enable logging of session count in the Prime Access Registrar server. The session log file is located in `/cisco-ar/logs`. It creates one file per day to hold the session information for the day. The session samples are collected for every `SessionSamplingPeriodInSecs`. The file is updated only once for every `10 * SessionSamplingPeriodInSecs`. See the “Configuring and Monitoring the RADIUS Server” chapter of the [Cisco Prime Access Registrar 9.2 Administrator Guide](#) for more information on `SessionSamplingPeriodInSecs`, `LogSessionActivity`, `SessionLogFilenamePrefix`, and `SessionLogFileCount` properties.

The following is a sample configuration of session license:

```
/cisco-ar/bin/aregcmd -s
set /Radius/Advanced/LogSessionActivity TRUE
set /Radius/Advanced/SessionLogFilenamePrefix sm
set /Radius/Advanced/SessionLogFileCount 5
set /Radius/Advanced/SessionSamplingPeriodInSecs 10
save
```

The following is the sample output of the log file:

```
[root@ar-lnx-vm020 logs]# tail -f sm-08-09-2016.csv

08-09-2016, 5:18:52,100, 20
08-09-2016, 5:19:22,130, 45
08-09-2016, 5:19:52,160, 60
08-09-2016, 5:20:22,175, 70
08-09-2016, 5:20:52,210, 85
08-09-2016, 5:21:22,195, 83
08-09-2016, 5:21:52,225, 95
```

