



DHCP Server Status Dashboard

The Cisco Prime IP Express server status dashboard in the web user interface (web UI) presents a graphical view of the system status, using graphs, charts, and tables, to help in tracking and diagnosis. These dashboard elements are designed to convey system information in an organized and consolidated way, and include:

- Significant protocol server and other metrics
- Alarms and alerts
- Database inventories
- Server health trends

The dashboard is best used in a troubleshooting desk context, where the system displaying the dashboard is dedicated for that purpose and might be distinct from the systems running the protocol servers. The dashboard system should point its browser to the system running the protocol servers.

You should interpret dashboard indicators in terms of deviations from your expected normal usage pattern. If you notice unusual spikes or drops in activity, there could be communication failures or power outages on the network that you need to investigate.

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Opening the Dashboard

Starting from Cisco Prime IP Express 9.0, the Dashboard feature is available on the regional cluster also. It provides System Metrics chart by default. It allows you to display the server specific (DHCP, DNS, and CDNS) charts for various clusters. This can be configured in the Chart Selections page.

To open the dashboard in the web UI, from the **Operate** menu, choose **Dashboard**.

Display Types

Provided you have DHCP and DNS privileges through administrator roles assigned to you, the preset display of the dashboard consists of the following tables (See the table below for an example):

- **System Metrics**—See the "DHCP General Indicators" section in *Cisco Prime IP Express 9.0 Administrator Guide*.
- **DHCP General Indicators**—See [DHCP Server Status Dashboard, on page 1](#).
- **DNS General Indicators**—See the "DNS General Indicators" section in *Cisco Prime IP Express 9.0 Authoritative and Caching DNS User Guide*.



Tip These are just the preset selections. See [Selecting Dashboard Elements to Include, on page 7](#) for other dashboard elements you can select. The dashboard retains your selections from session to session.

Figure 1: Preset Dashboard Elements



Each dashboard element initially appears as a table or a specific chart type, depending on the element:

- **Table**—See [Tables, on page 3](#).
- **Line chart**—See [Line Charts, on page 4](#).
- **Stacked area chart**—See [Stacked Area Charts, on page 4](#).

General Status Indicators

Note the green box next to each dashboard element name in the above image. This box indicates that the server sourcing the information is functioning normally. A yellow box indicates that server operation is less than optimum. A red box indicates that the server is down. These indicators are the same as for the server health on the Manage Servers page in the regular web UI.

Graphic Indicators for Levels of Alert

Graphed lines and stacked areas in the charts follow a standard color and visual coding so that you can immediately determine key diagnostic indicators at a glance. The charts use the following color and textural indicators:

- **High alerts or warnings**—Lines or areas in red, with a hatched texture.
- **All other indicators**—Lines or areas in various other colors distinguish the data elements. The charts do not use green or yellow.

Magnifying and Converting Charts

If Magnified Chart is the selected Chart Link, you can magnify a chart in a separate window by clicking the chart. In magnified chart view, you can choose an alternative chart type from the one that comes up initially (see [Other Chart Types, on page 5](#)).



Note Automatic refresh is turned off for magnified charts. To get the most recent data, click the **Refresh** icon next to the word Dashboard at the top left of the page.

To convert a chart to a table, see the *"Displaying Charts as Tables"* section. You cannot convert tables to a graphic chart format.

Legends

Each chart initially includes a color-coded legend. To turn off the legend display on the main dashboard page, see the *"Displaying or Hiding Chart Legends"* section. Removing the legend renders the graphic chart size relatively larger, which can be helpful if you have many charts displayed. You cannot remove legends in magnified views.

Tables

Dashboard elements rendered as tables have data displayed in rows and columns. The following dashboard elements are preset to consist of (or include) tables:

- System Metrics
- DHCP DNS Updates
- DHCP Address Current Utilization
- DHCP General Indicators
- DNS General Indicators
- Caching DNS General Indicators



Note If you view a table in Expert mode, additional data might appear.

Line Charts

Dashboard elements rendered as line charts can include one or more lines plotted against the x and y axes. The three types of line charts are described in the following table.

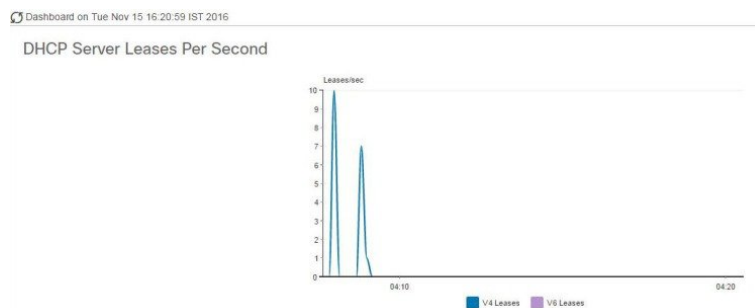
Table 1: Line Chart Types

Type of Line Chart	Description	Dashboard Elements Rendered
Raw data line chart	Lines plotted against raw data.	<ul style="list-style-type: none"> Java Virtual Machine (JVM) Memory Utilization (Expert mode only) DHCP Buffer Capacity DHCP Failover Status (two charts) DNS Network Errors DNS Related Servers Errors
Delta line chart	Lines plotted against the difference between two sequential raw data.	<ul style="list-style-type: none"> DNS Inbound Zone Transfers DNS Outbound Zone Transfers
Rate line chart	Lines plotted against the difference between two sequential raw data divided by the sample time between them.	<ul style="list-style-type: none"> DHCP Server Request Activity (see the image below) DHCP Server Response Activity DHCP Response Latency DNS Query Responses DNS Forwarding Errors



Tip To get the raw data for a chart that shows delta or rate data, enter Expert mode, set the Chart Link to Data Table, then click the chart. The Raw Data table is below the Chart Data table.

Figure 2: Line Chart Example



Stacked Area Charts

Dashboard elements rendered as stacked area charts have multiple related metrics plotted as trend charts, but stacked one on top of the other, so that the highest point represents a cumulative value. The values are independently shaded in contrasting colors. (See the image below for an example of the DHCP Server Request Activity chart shown in [Figure 2: Line Chart Example, on page 4](#) rendered as a stacked area chart.)

Figure 3: Stacked Area Chart Example

Dashboard on Tue Nov 15 16:20:13 IST 2016

DHCP Server Leases Per Second



They are stacked in the order listed in the legend, the left-most legend item at the bottom of the stack and the right-most legend item at the top of the stack. The dashboard elements that are pre-set to stacked area charts are:

- DHCP Server Request Activity
- DHCP Server Response Activity
- DHCP Response Latency
- DNS Outbound Zone Transfers
- DNS Inbound Zone Transfers

Other Chart Types

The other chart types available for you to choose are:

- **Line**—One of the line charts described in [Table 1: Line Chart Types, on page 4](#).
- **Stacked Area**—Charts described in the [Stacked Area Charts, on page 4](#).
- **Pie**—Shows a single percentage pie chart of the data averaged over the time sampled.
- **Bar**—Multiple related current value metrics plotted side by side as groups of bars that show the actual data sampled.
- **Stacked Bar**—Addition total of the actual samples. This chart shows more distinct data points than the stacked area chart.



Tip Each chart type shows the data in distinct ways and in different interpretations. You can decide which type best suits your needs.

Getting Help for the Dashboard Elements

You can open a help window for each dashboard element by clicking the title of the element.

Customizing the Display

To customize the dashboard display, you can:

- Refresh the data and set an automatic refresh interval.
- Expand a chart and render it in a different format.
- Convert a graphic chart to a table.
- Download data to comma-separated value (CSV) output.
- Display or hide chart legends.
- Configure server chart types.
- Reset to default display

Each chart supports:

- Resizing
- Drag and drop to new cell position
- Minimizing
- Closing

Each chart has a help icon with a description of the chart and a detailed help if you click the chart title.



Note

The changes made to the dashboard/chart will persist only if you click **Save** in the Dashboard window.

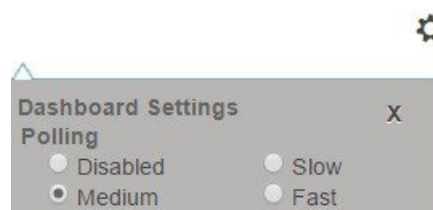
Refreshing Displays

Refresh each display so that it picks up the most recent polling by clicking the **Refresh** icon.

Setting the Polling Interval

You can set how often to poll for data. Click the **Dashboard Settings** icon in the upper-right corner of the dashboard display. There are four options to set the polling interval of the cached data, which polls the protocol servers for updates. (See the image below)

Figure 4: Setting the Chart Polling Interval



You can set the cached data polling (hence, automatic refresh) interval to:

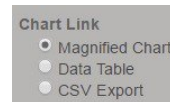
- **Disabled**— Does not poll, therefore does not automatically refresh the data.
- **Slow**— Refreshes the data every 30 seconds.

- **Medium**— Refreshes the data every 20 seconds.
- **Fast** (the preset value)— Refreshes the data every 10 seconds.

Displaying Charts as Tables

You can choose to display a graphic chart as a table when you magnify the chart by clicking it. At the middle of the top of the dashboard display are the controls for the chart links (see the image below)

Figure 5: Specifying Chart Conversion to Table Format



Click the **Data Table** radio button. When you click the chart itself, it opens as a table. The preset display format is Magnified Chart.

Exporting to CSV Format

You can dump the chart data to a comma-separated value (CSV) file (such as a spreadsheet) when you magnify the chart by clicking it. In the Chart Link controls at the top of the page (see the above image), click the **CSV Export** radio button, then click the chart. A Save As window appears, where you can specify the name and location of the CSV file.

Displaying or Hiding Chart Legends

You can include or exclude the color-coded legends for charts on the main dashboard page. You might want to remove the legends as you become more familiar with the data and track it on a slightly larger chart display. In the upper-right of the dashboard display are the controls for the legend display (see the image below). The preset value is Visible.

Figure 6: Displaying or Hiding Chart Legends and Selecting Chart



Selecting Dashboard Elements to Include

You can decide how many dashboard elements you want to display on the page. At times, you might want to focus on one server activity only, such as for the DHCP server, and exclude all other metrics for the other servers. In this way, the dashboard becomes less crowded, the elements are larger and more readable. At other times, you might want an overview of all server activities, with a resulting smaller element display.

You can select the dashboard elements to display from the main Dashboard page by clicking **Chart Selections** in the Dashboard Settings dialog. Clicking the link opens the Chart Selection page (see [Figure 7: Selecting Dashboard Elements, on page 8](#)).

Configuring Server Chart Types

You can set the default chart types on the main dashboard view. You can customize the server charts in the dashboard to display only the specific chart types as default.

To set up default chart type, check the check box corresponding to the Metrics chart that you want to display and choose a chart type from the **Type** drop-down list. The default chart types are consistent and shared across different user sessions (see the image below).



Note You can see either the CDNS or DNS Metrics in the **Dashboard Settings > Chart Selection** page based on the service configured on the server.



Tip The order in which the dashboard elements appear in the Chart Selection list does not necessarily determine the order in which the elements will appear on the page. An algorithm that considers the available space determines the order and size in a grid layout. The layout might be different each time you submit the dashboard element selections. To change selections, check the check box next to the dashboard element that you want to display.

Figure 7: Selecting Dashboard Elements

Chart Selections

Change Chart Selection Default Chart Columns 2

▼ Host Metrics

Chart System Metrics

▼ DHCP Metrics

Chart	Type	Clusters
DHCP		
DNS	Table	localhost
CDNS		
All		
None		
<input type="checkbox"/> DHCP Address Current Utilization	Table	
<input type="checkbox"/> DHCP Buffer Capacity	Stacked Area Chart	
<input type="checkbox"/> DHCP DNS Updates	Table	
<input type="checkbox"/> DHCP Failover Status	Stacked Area Chart	
<input type="checkbox"/> DHCP General Indicators	Table	
<input type="checkbox"/> DHCP Response Latency	Stacked Area Chart	
<input type="checkbox"/> DHCP Server Leases Per Second	Stacked Area Chart	
<input checked="" type="checkbox"/> DHCP Server Request Activity	Line Chart	
<input type="checkbox"/> DHCP Server Response Activity	Stacked Area Chart	

OK Close

The above image displays the Charts Selection table in the regional web UI. The Clusters column is available only in regional dashboard and it displays the list of local clusters configured. You can add the local cluster by clicking the Edit icon and then by selecting the local cluster name from the Local Cluster List dialog box.

To change selections, check the check box next to the dashboard element that you want to display.

Specific group controls are available in the drop-down list, **Change Chart Selection**, at the top of the page. To:

- Uncheck all check boxes, choose **None**.
- Revert to the preset selections, choose **Default**. The preset dashboard elements for administrator roles supporting DHCP and DNS are:
 - Host Metrics: System Metrics
 - DHCP Metrics: General Indicators
 - DNS Metrics: General Indicators
- Select the DHCP metrics only, choose **DHCP** (see the "DHCP Metrics" section in *Cisco Prime IP Express 9.0 DHCP User Guide*).
- Select the DNS metrics only, choose **DNS** (see the "Dashboard and Authoritative DNS Metrics" section in *Cisco Prime IP Express 9.0 Authoritative and Caching DNS User Guide*).
- Select the DNS metrics only, choose **CDNS** (see the "Caching DNS Metrics" section in *Cisco Prime IP Express 9.0 Authoritative and Caching DNS User Guide*).
- Select all the dashboard elements, choose **All**.

Click **OK** at the bottom of the page to save your choices, or **Cancel** to cancel the changes.

DHCP Metrics

These DHCP metric elements are available in the dashboard:

- **DHCP Server Request Activity**—See [DHCP Server Request Activity](#), on page 9
- **DHCP Server Response Activity**—See [DHCP Server Response Activity](#), on page 10
- **DHCP Buffer Capacity**—See [DHCP Buffer Capacity](#), on page 11
- **DHCP Response Latency**—See [DHCP Response Latency](#), on page 11
- **DHCP DNS Updates**—See [DHCP DNS Updates](#), on page 12
- **DHCP Address Current Utilization**—See [DHCP Address Current Utilization](#), on page 12
- **DHCP Failover Status**—See [DHCP Failover Status](#), on page 13
- **DHCP General Indicators**—See [DHCP General Indicators](#), on page 14
- **DHCP Server Lease Data**—See [DHCP Server Lease Data](#), on page 14

DHCP Server Request Activity

The DHCP Server Request Activity dashboard element rendered as a stacked area chart traces the totals in the change rate of incoming DHCP packet activity. The chart is available if you choose **DHCP Metrics: DHCP Server Request Activity** in the Chart Selection list.

The resulting stacked area chart plots the following trends:

- **V4 Discovers**—Number of DHCPv4 discover packets.
- **V4 Requests**—Number of DHCPv4 request packets.

- **V4 Other**—Number of DHCPv4 release, decline, or info-request packets.
- **V4 Lease Queries**—Number of DHCPv4 lease query packets.
- **V6 Solicits**—Number of DHCPv6 solicit packets.
- **V6 Requests/Renews/Rebinds**—Number of DHCPv6 request, renew, and rebind packets.
- **V6 Other**—Number of DHCPv6 release, decline, or information-request packets.
- **V6 Lease Queries**—Number of DHCPv6 lease query packets.
- **Invalid Packets**—Combined number of invalid DHCPv4 and DHCPv6 packets.

How to Interpret the Data

The DHCP Server Request Activity data shows the pattern of server traffic based on incoming DHCP requests. The trend should be fairly consistent, with spikes in the number of Invalid packets being a sign that there is some misconfigured data on the network. Note that DHCPv4 and DHCPv6 invalid packet activity is grouped together.

Troubleshooting Based on the Results

Check your DHCP server configurations if there is a sudden spike in activity, especially in the number of invalid request packets. Set your server logging to report where the activity is occurring. Spikes or drops in activity can indicate network or power outages that are worth investigating. Spikes in activity can also indicate a faulty client, malicious client activity, or a recovery after a power failure or outage that results in pent-up requests.

DHCP Server Response Activity

The DHCP Server Response Activity dashboard element rendered as a stacked area chart traces the totals in the change rate of outgoing DHCP packet activity. The chart is available if you choose **DHCP Metrics: DHCP Server Response Activity** in the Chart Selection list.

The resulting stacked area chart plots the following trends:

- **V4 Offers**—Number of DHCPv4 offer packets.
- **V4 Acks**—Number of DHCPv4 acknowledgment packets.
- **V4 Other Client**—Number of other outgoing DHCPv4 client packets.
- **V4 Lease Queries**—Number of outgoing DHCPv4 lease query packets.
- **V6 Advertises**—Number of DHCPv6 advertise packets.
- **V6 Replies**—Number of DHCPv6 reply packets.
- **V6 Reconfigures**—Number of DHCPv6 reconfigure packets.
- **V6 Lease Query Replies**—Number of DHCPv6 lease query reply packets.
- **Total Dropped**—Combined number of dropped DHCPv4 and DHCPv6 packets.

How to Interpret the Data

The DHCP Server Response Activity data shows the pattern of server traffic to answer DHCP requests. The trend should be fairly consistent, with spikes in the number of Total Dropped packets being a sign that there is some misconfigured data on the network. Note that DHCPv4 and DHCPv6 dropped packet activity is grouped together.

Troubleshooting Based on the Results

Check your DHCP server configurations if there is a sudden spike in activity, especially in the number of total dropped response packets. The response activity should match the request activity, except for the normal time shift, and the same diagnostics apply.

DHCP Buffer Capacity

The DHCP Buffer Capacity dashboard element rendered as a table shows the number of allocated requests and responses, and a line chart that plots the number of requests and responses in use. The element is available if you choose **DHCP Metrics: DHCP Buffer Capacity** in the Chart Selection list.

The resulting table and line chart plots:

- **Requests in Use**—Trend in the number of in-use request buffers.
- **Responses in Use**—Trend in the number of in-use response buffers.

How to Interpret the Data

The DHCP Buffer Capacity data shows the pattern in the use of DHCP request and response buffers. If the buffers begin to increase in an abnormal pattern, there are measures you can take without trying to compensate by increasing the number of allocated buffers.

Troubleshooting Based on the Results

If you see increasing and consistent exceeding of the buffer threshold, find the reason why the server is running slowly. Possible reasons include high degrees of logging, slow DHCP extensions or LDAP servers, or overload, such as with chatty clients or frequent rebooting of cable modem termination systems (CMTSs). You might need to increase the buffer sizes.

DHCP Response Latency

The DHCP Response Latency dashboard element rendered as a stacked area chart shows the trend in the response packet latency (the time interval between the request packet and its ensuing response). The chart is available if you choose **DHCP Metrics: DHCP Response Latency** in the Chart Selection list.



Tip You must also set the *collect-sample-counters* DHCP server attribute for this data to display, with the *enhanced-sample-counters* attribute also set for further granularity. These attribute values are preset. If you are concerned about achieving maximum performance, unset these attributes. (See the "Displaying Statistics" section in *Cisco Prime IP Express 9.0 Administrator Guide*.)

The resulting stacked area chart plots response latencies at the intervals:

- Less than 50 milliseconds
- 50 to 200 milliseconds
- 200 to 500 milliseconds
- 500 to 1000 milliseconds (note that if the *enhanced-sample-counters* attribute is not set, all values below 1 second appear in this grouping)
- 1 to 2 seconds
- 2 to 3 seconds

- 3 to 4 seconds
- More than 4 seconds

How to Interpret the Data

The chart shows the trend in response packet latency as an indicator of how long it takes to respond to incoming packets. The gradations in the latency periods are stacked.

Troubleshooting Based on the Results

High response packet latency is similar to high buffer usage for troubleshooting purposes. Look for slow LDAP servers or DHCP extensions, high levels of logging, or disk I/O bottlenecks.

DHCP DNS Updates

The DHCP DNS Updates dashboard element rendered as a table shows the related DNS server and its current state, and how many pending DNS updates are occurring between it and the DHCP server. The table is available if you choose **DHCP Metrics: DHCP DNS Updates** in the Chart Selection list.

The resulting table shows:

- **Server**—Related DNS server IP address
- **State**—Related DNS server state
- **Pending Updates**—Total number of pending updates

How to Interpret the Data

A high level of pending updates to a specific DNS server indicates that the server is unreachable or unavailable, or its address is wrong.

Troubleshooting Based on the Results

Check into the reachability of the associated DNS servers if the pending update rate spikes, or ensure that the address of the associated server is correct.

DHCP Address Current Utilization

The DHCP Address Current Utilization dashboard element rendered as a table shows the DHCPv4 address utilization (how many assigned addresses exist) for a particular address aggregation, which can be a scope, network, or network plus selection tag. The table is available if you choose **DHCP Metrics: DHCP Address Current Utilization** in the Chart Selection list.

The resulting table shows:

- **Name**—Aggregation name (or address).
- **In Use**—Number of in-use addresses.
- **Total**—Total number of addresses.
- **Utilization**—Percentage of utilized addresses.
- **Mode** (appears in Expert mode only)—Aggregation mode (scope, network, or selection-tags).

How to Interpret the Data

The chart shows a table with four columns: the scope name, its in-use and total addresses, and the percentage of address utilization based on the previous two columns. The chart is available only if the DHCP server *enhanced-sample-counters* attribute is enabled.

- If an SNMP trap configuration in scope mode applies, the Name column displays the scope name. Otherwise, it shows the network IP address.
- If traps are not enabled (or if the DHCP server *default-free-address-config* or *v6-default-free-address-config* attribute is not set), the network address is appended with an asterisk (*).
- If a selection tag applies, its name is also appended. See the *"Handling SNMP Notification Events" section in Cisco Prime IP Express 9.0 Administrator Guide* for details on SNMP traps.
- If you do not define a *default-free-address-config* (or *v6-default-free-address-config*) attribute, Cisco Prime IP Express creates an internal, unlisted trap configuration named **default-aggregation-addr-trap-config**.

Because of this, do not use the name `default-aggregation-addr-trap-config` for a trap configuration you create.

Troubleshooting Based on the Results

If the percentage of utilized addresses is high, the addresses reached a saturation point. It might be necessary to reassign addresses from a different scope.

DHCP Failover Status

The DHCP Failover Status dashboard element rendered as two parallel trend charts that show the current and partner server state and the binding updates and acknowledgments sent and received between the two failover partners. The charts are available if you choose **DHCP Metrics: DHCP Failover Status** in the Chart Selection list.



Note The failover status is only for the first failover pair in the related servers list.

The display is a table along with two rate line trend charts that shows the failover status for the first failover pair for the related servers:

- **Local State**—Local DHCP server failover state along with when it occurred.
- **Partner State**—Partner server failover state along with when it occurred.
- **DHCP Failover Status Updates Received**—The first trend chart shows a comparison of the number of binding updates received and binding acknowledgments sent.
- **DHCP Failover Status Updates Sent**—The second trend chart shows a comparison of the number of binding updates sent and binding acknowledgments received.

How to Interpret the Data

Along with some state data, the display is split into two line trend charts that are inverses of each other. Each chart compares the binding updates with the acknowledgments. The top chart pairs the binding updates received with the acknowledgments sent; the bottom chart pairs the binding updates sent with the acknowledgments received.

Troubleshooting Based on the Results

If the Partner State value is other than 10, check the configuration of the partner server. The updates sent and received data should also be fairly level.

DHCP General Indicators

The DHCP General Indicators dashboard element rendered as a table shows the server state, reload data, and lease counts. The table is available if you choose **DHCP Metrics: DHCP General Indicators** in the Chart Selection list.

The resulting table shows:

- **Server State**—Up or Down (based on whether statistics are available) and its duration.
- **Last Reload**—Date and time of the last server reload.
- **Start Time**—Date and time of the last server process (Cisco Prime IP Express server agent) startup.
- **Total Scopes**—Total number of configured DHCPv4 scopes.
- **V4 Leased Leases**—Number of active DHCPv4 leases, including reservations.
- **V4 Configured Leases**—Number of configured DHCPv4 leases, including reservations and ranges.
- **Total Prefixes**—Number of configured DHCPv6 prefixes.
- **V6 Leased Leases**—Number of active DHCPv6 leases, including reservations and delegated prefixes (which each count as one lease).
- **V6 Allocated Leases**—Number of allocated DHCPv6 leases, including reservations and delegated prefixes (which each count as one lease).

How to Interpret the Data

The table indicates the server state, process start time (via the Cisco Prime IP Express server agent), and reload data, and also provides lease statistics. The top set of data compares the DHCPv4 leases actually in effect with those configured; the bottom set of data does the same for DHCPv6 leases.

Time of last reload is important for determining if recent changes to the server configuration occurred from a reload operation. It can also help pinpoint when server changes were last applied, if other indicators show a marked, unexpected behavioral change. Be sure to preserve log files since the last reload.

Troubleshooting Based on the Results

A drop or increase in leases might indicate a power or network outage, but it can also indicate a normal variation depending on lease times and usage patterns. The number of scopes or prefixes indicated might also require some evaluation and possible reconfiguration. If the server state is Down, all the DHCP chart indicators show a red status box, so no data will be available. In the case of a server that is down, restart the server.

DHCP Server Lease Data

The DHCP Server Lease Data dashboard element, rendered as chart, shows the number of leases per second for the DHCP server. This chart is available if you choose **DHCP Metrics: DHCP Server Lease Data** in the Chart Selection page.

The chart displays:

- **V4 Leases**—Number of IPv4 leases per second.
- **V6 Leases**—Number of IPv6 leases per second.