

# HP Network Node Manager iSPI Performance for Metrics Software

Software Version: 9.10

Using Baselines



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## Using Baselines

The NNM iSPI Performance for Metrics is capable of monitoring network elements by using a calculated baseline for use in reporting, forecasting, and thresholds. You can use deviation from historical baseline as a threshold (instead of a fixed threshold value). Baselines are calculated based on previously collected values for each network element, taking into account variations based on the time of the day and the day of the week. The NNM iSPI Performance for Metrics creates exceptions and sends incidents to the NNMi Incident View when the monitored metric value violates the baseline threshold.

Baselines provide effective monitoring of network elements for which the pattern of usage varies over a period of time. For example, network usage during peak business hours is much higher than the network usage on weekends.

While using a baseline, the NNM iSPI Performance for Metrics uses the following workflow:


1. Analyzes the historical data (all the data samples polled over the monitoring cycle)
2. Computes a baseline for the metric by using the Triple Exponential Smoothing technique:

**Key features of the smoothing technique used by the NNM iSPI Performance for Metrics:**

- Uses an initialization period of three weeks from the start of the monitoring; during this period, no incidents are generated
  - Uses a seasonality cycle of one week (with 5-minute granularity)
  - Uses the number of deviations (above and below) from the values specified in the Baseline Settings form to compute the range of normal values or the **baseline sleeve**
3. Determines exceptions; you can view these exceptions by choosing the special *baseline exception count* and *baseline exception rate* metrics on reports.
  4. Sends incidents to the Incident View of the NNMi console.

For an example, see "[Example](#)" (on page 8).

## Step-by-Step Procedure to Configure a Baseline

1. Log on to the NNMi console as an administrator.
2. Click **Configuration > Monitoring Configuration**. The Monitoring Configuration form opens.
3. Go to the Interface Settings or Node Settings tab, select the interface or node group for which you want to configure a baseline, and then click  **Open**. The Interface Settings or Node Settings form opens.

**Tip:** If monitoring settings are not already configured for the group, fill out the forms in the left pane.

If you want to create a baseline for input or output utilization, make sure to select the Enable Interface Performance Polling check box. To create baselines for any other metrics (see "[List of Metrics for Baselines](#)" (on page 3)), make sure to select the Node Performance Polling check box.

4. In the Interface Settings or Node Settings form, go to the Baseline Setting tab.
5. Click **\* New**. The Baseline Setting form opens.
6. In the Baseline Threshold Settings section, specify the details with the help of [Table: Baseline Settings](#).
7. In the Baseline Deviation Settings tab, specify the details with the help of [Table: Baseline Deviation Settings](#).

### Baseline Settings

| Attribute                    | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Monitor Attribute            | Select a metric from the Monitored Attribute list (one of the metrics listed in " <a href="#">List of Metrics for Baselines</a> " (on page 3)).                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Threshold Enabled            | Select this option if you want to send incidents to the NNMi's Incident View.<br><br><b>Note:</b> If you do not select this check box, the NNM iSPI Performance for Metrics does not send incidents in NNMi's Incident View. However, you can still monitor exceptions with the help of reports.                                                                                                                                                                                                                                                                              |
| Duration <sup>a</sup>        | Designate the minimum time within which the value must remain out of the configured Baseline Range before the state changes to Abnormal Range and (optionally) an incident is generated. Use the Baseline Deviation Settings tab to set the upper and lower limits of the baseline range.<br><br>Note the following: <ul style="list-style-type: none"> <li>• If you do not configure a Baseline Range, the NNM iSPI Performance for Metrics uses the default value of 3 deviations.</li> <li>• The Polling Interval should be less than or equal to the Duration.</li> </ul> |
| Duration Window <sup>a</sup> | Designate the window of time in which the Upper Baseline Limit or Lower Baseline Limit criteria must be met.<br><br><b>Note:</b> The value must be greater than 0 (zero) and can be the same as the Duration value.                                                                                                                                                                                                                                                                                                                                                           |

<sup>a</sup>The Duration and Duration Window values are used for detecting exceptions and sending incidents to the NNMi Incident View. If you select a duration of  $A$  seconds and a duration window of  $B$  seconds ( $A < B$ ), the NNM iSPI Performance for Metrics registers an exception and triggers an incident when the metric value lies outside of the calculated baseline sleeve for  $A$  seconds (or longer) during the last  $B$  seconds. For more details, see "[Example](#)" (on page 8).

### Baseline Deviation Settings

| Attribute                                       | Description                                                                                                                                                                                                                                                                                                                                                   |
|-------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Upper Baseline Limit Enabled                    | If <input checked="" type="checkbox"/> enabled, the NNM iSPI Performance for Metrics uses the Upper Baseline Limit attribute value to determine the number of deviations above the average that defines the upper baseline limit.<br><br>If <input type="checkbox"/> disabled, NNMi does not define the upper baseline limit.                                 |
| Upper Baseline Limit - Deviations above average | Enter the number of deviations above the average values that the NNM iSPI Performance for Metrics should use to determine the upper baseline limit.                                                                                                                                                                                                           |
| Lower Baseline Limit Enabled                    | If <input checked="" type="checkbox"/> enabled, the NNM iSPI Performance for Metrics uses the Lower Baseline Limit attribute value to determine the number of deviations below the average that defines the lower baseline limit.<br><br>If <input type="checkbox"/> disabled, the NNM iSPI Performance for Metrics does not define the lower baseline limit. |
| Lower Baseline Limit - Deviations below average | Enter the number of deviations below the average values that the NNM iSPI Performance for Metrics should use to determine the lower baseline limit.                                                                                                                                                                                                           |

After configuration is complete, the NNM iSPI Performance for Metrics starts computing the baselines by using the collected data. During the initialization period (the first three weeks), you will not see any exceptions.

### List of Metrics for Baselines

Irrespective of which network element (node or interface) you choose, all of the following metrics appear in the Baseline Settings form. You must carefully choose only the relevant metrics.

| Metric            | Interface/Node Monitoring | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input Utilization | Interface                 | The total number of incoming octets traversing the interface as a percentage of the total possible number of octets (based on the ifSpeed value). From Interface to Interface, the exact MIB variables queried vary based on interface speed and whether the system supports the high speed counters for interfaces. Each interface in an Interface Groups has its utilization calculated by taking the total traffic on all administratively up interfaces in the group and dividing that by the total possible bandwidth. |

| Metric                                | Interface/Node Monitoring | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------------------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Output Utilization                    | Interface                 | The total number of outbound octets traversing the interface as a percentage of the total possible number of octets (based on the ifSpeed value). From Interface to Interface, the exact MIB variables queried vary based on interface speed and whether the system supports the high speed counters for interfaces. Each interface in an Interface Group has its utilization calculated by taking the total traffic on all administratively up interfaces in the group and dividing that by the total possible bandwidth. |
| Backplane Utilization                 | Node                      | Percentage of backplane usage in relation to the total amount of backplane resources available.                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Buffer Utilization                    | Node                      | Percentage of buffer usage in relation to the number of buffers available.                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| CPU 1Min Utilization                  | Node                      | Percentage of CPU usage in relation to the total amount of CPU available. This percentage is measured at 1-minute intervals.                                                                                                                                                                                                                                                                                                                                                                                               |
| CPU 5Min Utilization                  | Node                      | Percentage of CPU usage in relation to the total amount of CPU available. This percentage is measured at 5-minute intervals.                                                                                                                                                                                                                                                                                                                                                                                               |
| CPU 5Sec Utilization                  | Node                      | Percentage of CPU usage in relation to the total amount of CPU available. This percentage is measure at 5-second intervals.                                                                                                                                                                                                                                                                                                                                                                                                |
| Disk Space utilization                | Node                      | Percentage of disk space usage in relation to the total amount of disk space available.                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Memory Utilization                    | Node                      | Percentage of memory usage in relation to the total amount of memory available.                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Management Address ICMP Response Time | Node                      | Indicates the Internet Control Message Protocol (ICMP) response time (in milliseconds) from the management station to the target node.                                                                                                                                                                                                                                                                                                                                                                                     |

## Using Reports to Monitor Baselines

The NNM iSPI Performance for Metrics enables you to monitor the baseline with the help of the Baseline Sleeve report to monitor baselines. This report highlights the baseline sleeve on a line graph and shows a table that lists the lower and upper limits at each display grain.

### To monitor a baseline sleeve:

1. Log on to the NPS console.
2. From the navigation pane, launch the Baseline Sleeve report.
3. Click **Options**. This prompt enables you to choose one of the metrics that was configured for baselining during interface or component monitoring configuration.

4. Click **Confirm Selection**. The report shows a line graph of the selected metric and highlights a range of values that is computed as the baseline sleeve for the selected period of time.

You can also launch other reports like Top N or Chart Details to monitor different characteristics of the baseline for the monitored metric. [Table: Metrics to Monitor the Baseline](#) provides a list of metrics that help you monitor baseline characteristics.

### Metrics to Monitor the Baseline

| Metric             | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Baseline Average   | <p>Average value presenting the normal (expected) range of utilization for the selected topology filter based on the historical data</p> <p>Can analyze the following using this metric:</p> <ul style="list-style-type: none"> <li>• The actual utilization of the topology element as compared to the normal utilization ranges</li> <li>• Forecast the topology element utilization for a selected time range.</li> <li>• Identify the over-utilized and under-utilized topology elements before they violate the thresholds.</li> </ul>                                                                          |
| Baseline Deviation | <p>Deviation of the samples spread over a specific time range.</p> <p>Represents the extent of the range of values normally seen for the selected time range in the seasonal cycle, based on historical data.</p> <p>Can analyze the following using this metric:</p> <ul style="list-style-type: none"> <li>• Analyze the utilization pattern for the selected topology elements over a selected time range.</li> <li>• Identify the utilization values that are lower or higher than the mean utilization. This in turn enables you to identify the over-utilized and under-utilized topology elements.</li> </ul> |
| Lower Threshold    | The <a href="#">lower deviation</a> configured in the Baseline Settings form.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Upper Threshold    | The <a href="#">upper deviation</a> configured in the Baseline Settings form.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Upper Normal       | <p>Upper limit of the normal range for the sample. The normal range for the sample may vary for every iSPI Performance product.</p> <p>NNMi supplies the upper normal value based on values that you enter in the Threshold Configuration form. You can disable the upper normal value if you do not require to set the upper threshold for the metric.</p>                                                                                                                                                                                                                                                          |

| Metric            | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                   | <p>See the <i>HP Network Node Manager i Software Online Help for Administrators</i> for information about the Threshold Configuration form.</p> <p>The value is calculated using the following formula:</p> $\text{Upper Normal} = \text{Baseline Average} + (N1 * \text{Baseline Deviation})$ <p>where N1 is the upper sleeve width</p>                                                                                                                                                                                                                                                                                                                                             |
| Lower Normal      | <p>Lower limit of the normal range for the sample. The normal range for the sample can vary for every iSPI Performance product.</p> <p>NNMi supplies the lower normal value based on values you enter in the Threshold Configuration form. You can disable the lower normal value if you do not set the lower threshold for the metric.</p> <p>See the <i>HP Network Node Manager i Software Online Help for Administrators</i> for information about the Threshold Configuration form.</p> <p>The value is calculated using the following formula:</p> $\text{Lower Normal} = \text{Baseline Average} - (N2 * \text{Baseline Deviation})$ <p>where N2 is the lower sleeve width</p> |
| Days to Threshold | <p>Forecast for the topology element utilization to reach the upper or lower threshold limit.</p> <p>Represents the number of days left for the utilization to reach the threshold value.</p> <p>NPS calculates this metric based on the following:</p> <ul style="list-style-type: none"> <li>• Baseline Slope</li> <li>• The static upper and lower thresholds defined in NNMi Threshold Configuration form</li> </ul>                                                                                                                                                                                                                                                             |

## Using Reports to Monitor Exceptions

The NNM iSPI Performance for Metrics generates exceptions when a metric value is found to exceed the baseline sleeve. You can view those incidents in the Incident View in the NNMi console. In addition, you can use NPS reports to monitor exceptions detected by the NNM iSPI Performance for Metrics. Ideal reports to monitor exceptions are:

- **Top N or Top N Chart:** Shows Top N elements that reported most exceptions
- **Chart Details:** Shows a time-series chart to indicate total count of exceptions

**To monitor exceptions:**

1. Log on to the NPS console.
2. From the navigation pane, launch a report of your choice.
3. Click **Options**.
4. Select one of the metrics listed in [Table: Metrics for Monitoring Exceptions](#).
5. Click **Confirm Selection**.

### Metrics for Monitoring Exceptions

| Metric                   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Baseline Exception Rate  | Percentage of samples that has the exception flag set.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Baseline Exception Count | <p>Total number of sample counts marked for an exception.</p> <p>NPS raises an exception for the metric if a certain number of samples within a sample window is out of normal range.</p> <p>For example, NPS raises a baseline exception if 7 samples out of a sample window of 10 samples are beyond the upper normal range. You must configure NNMi for the upper and lower normal ranges to enable NPS to raise the exceptions.</p> <p>If the topology filter utilization is between Upper Normal and Lower Normal, the exception count is set to 0 (Zero) for the selected sample.</p> <p>If you disable the upper or lower normal thresholds in NNMi, NPS does not raise exceptions for the upper and lower normal ranges.</p> <p>The iSPI Performance products can analyze the following using this metric:</p> <ul style="list-style-type: none"><li>• Analyze the performance of the selected topology filter for a specific time range.</li><li>• Identify network performance problem if the exception count is persistently high for the selected time range.</li></ul> |



## Example

1. Configure a baseline threshold for nodes in the NNMi Baseline Setting configuration form.

Incidents are created if detected abnormal values persist for 15 minutes (or longer) in the last 30-minute window

The NNM iSPI Performance for Metrics will register an exception if it encounters 3 (or more) deviations above the baseline sleeve

The NNM iSPI Performance for Metrics will register an exception if it encounters 3 (or more) deviations below the baseline sleeve

You can select either the upper baseline limit or lower baseline limit or both

- a. Select CPU 1Min Utilization as the monitored attribute.
- b. Select Threshold Enabled.

This selection enables the NNM iSPI Performance for Metrics to send incidents to the NNMi Incident View.

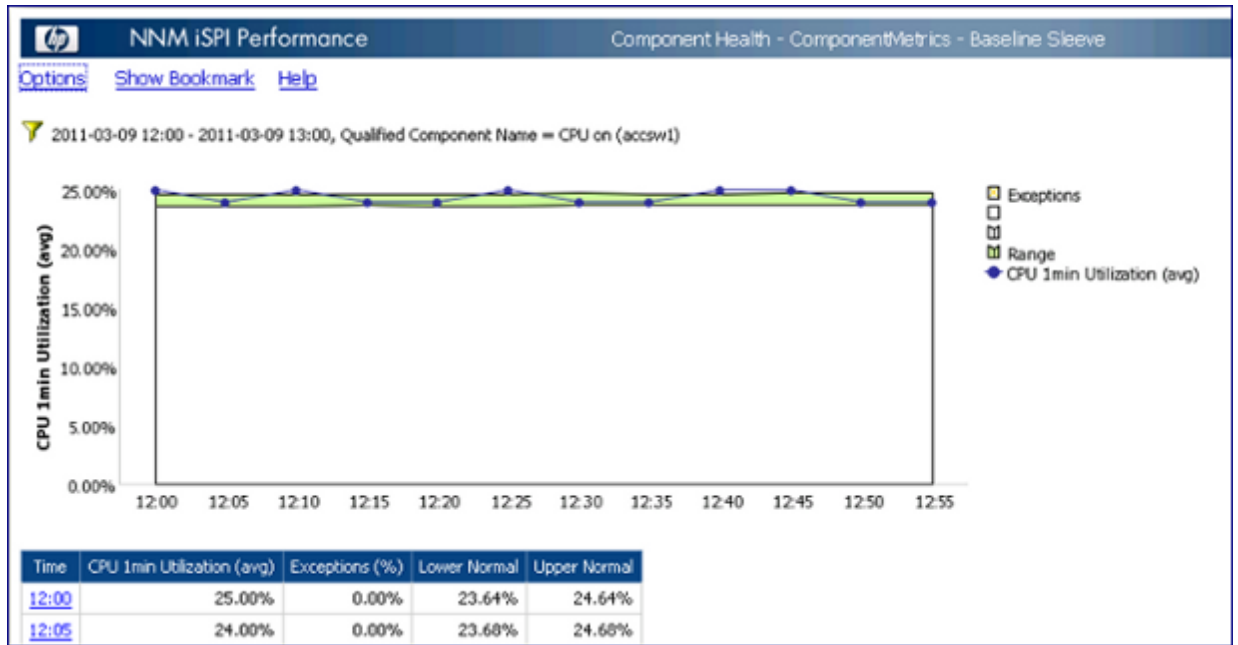
- c. Type a duration of 15 minutes.
- d. Type a duration window of 30 minutes.

Because of this configuration, the NNM iSPI Performance for Metrics will send incidents to the NNMi Incident View if an exception persists for 15 minutes of the last 30-minute window.

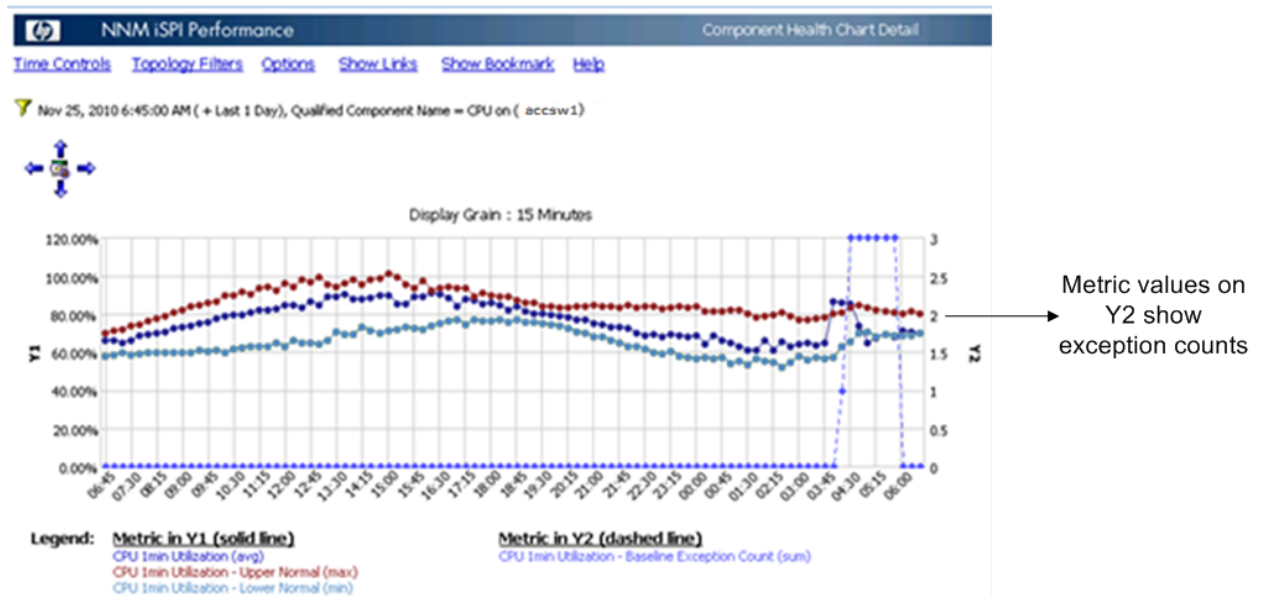
- e. In the Baseline Deviation Settings tab:
  - i. Select the Upper Baseline Limit Enabled check box.
  - ii. Type 3 for the deviation above average.
  - iii. Select the Lower Baseline Limit Enabled check box.
  - iv. Type 3 for the deviation below average.

**Tip:** You can choose either the upper baseline limit or lower baseline limit or both.

2. After the initialization period (three weeks), launch the Baseline Sleeve Component Health report and view the baseline.



- When the NNM iSPI Performance for Metrics detects a metric value that lies outside of the baseline sleeve for 15 minutes or longer within the last 30-minute window, the NNM iSPI Performance for Metrics raises an exception and sends an incident to the NNMi Incident View. You can view these exceptions on a Chart Detail report by selecting the CPU 1Min Utilization - Baseline Exception Count metric.



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