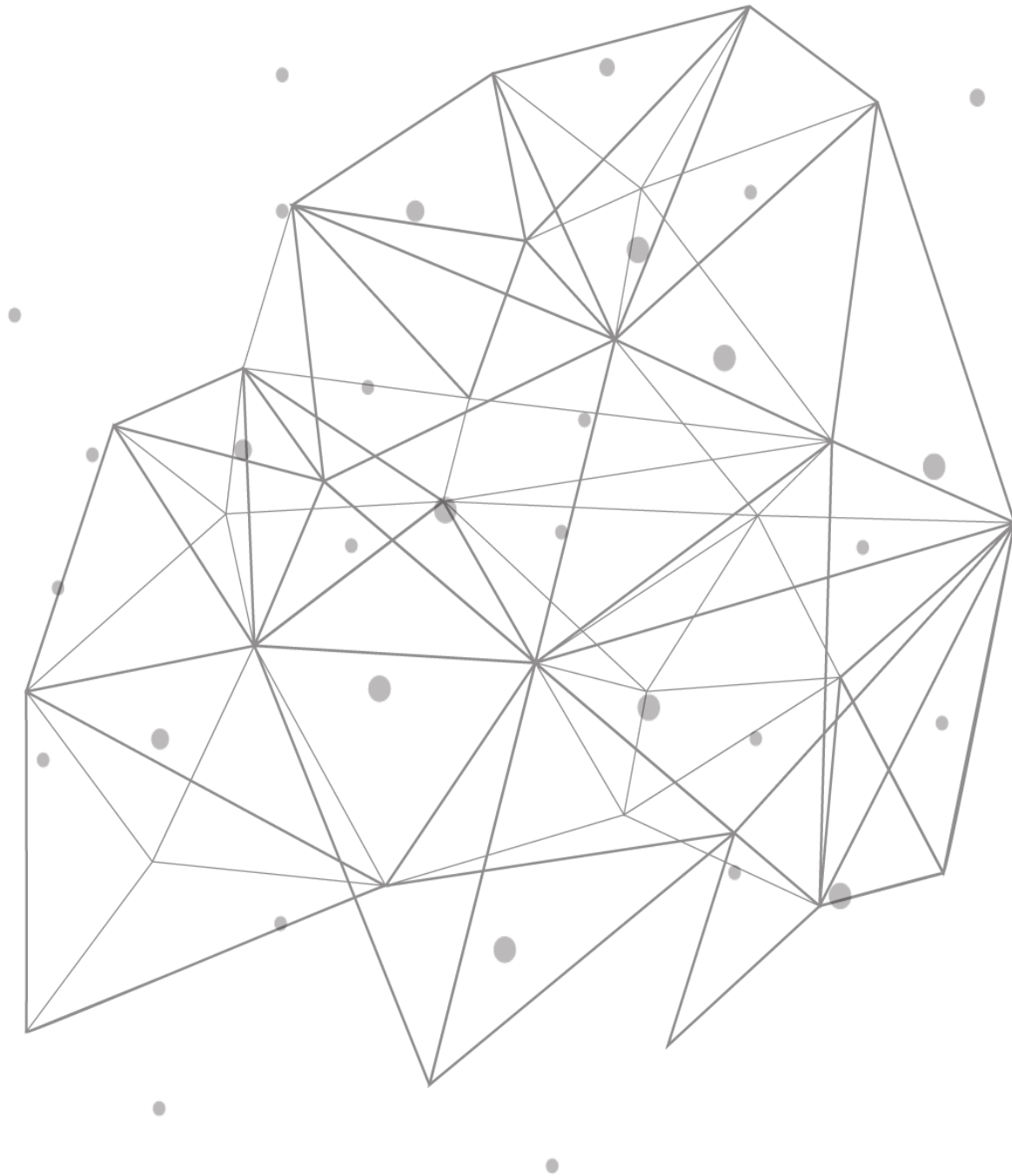

TCPWave DDI

Forecasting Charts Using Machine Learning



Introduction

In today's dynamic era, the allocation of resources has become a primary concern in network infrastructure monitoring. So, there is a need to monitor and predict the usage of the performance metrics such as CPU, disk, and memory of various appliances within the organization to avoid network performance issues, overprovisioning, and under-provisioning. Traditional forecasting methods are challenging to detect resource usage in real-time data. Hence the organizations look forward to a solution to assess their resource usage based on the historical pattern that helps them manage their IT infrastructure in a better way. This whitepaper provides insights into TCPWave's Forecasting Charts Using Machine Learning within the IPAM application.

TCPWave's Forecasting Charts Using Machine Learning

Network infrastructure monitoring with an automated forecasting system is an add-on for an organization to effectively manage network performance and business continuity. The following section explains the forecasting of IPAM, DNS, and DHCP Appliances performance metrics.

Process	Performance Metrics	Solution
IPAM Forecasting	CPU Usage Disk Usage Memory Usage	SARIMA Time Series Machine Learning Model
DNS Forecasting	CPU Usage Disk Usage Memory Usage Queries Per Second (QPS)	
DHCP Forecasting	CPU Usage Disk Usage Memory Usage Leases Per Second (LPS)	

SARIMA Time Series Machine Learning Model

Seasonal Autoregressive Integrated Moving Average (SARIMA) is a time series Machine learning model used to forecast future data points using past data points. The model has two sets of integer parameters, denoted by (p,d,q) and (P, D, Q, S). The second set is the seasonal parameters.

Parameters	Description
p and P	The number of autoregressive terms.
d and D	Indicate differencing to make data stationary.
q and Q	Indicate moving average terms.
S	Indicate seasonal length in the data.

The historical time series data is used to forecast the performance metrics of the appliances based on daily, weekly, and monthly frequencies.

Global Policy Configuration

To enable the prediction of the performance metrics in the TCPWave IPAM application in the chart format under the Performance Management >> Charts section, you must set the global option **Enable ML Forecasting Charts** to Yes by navigating to Administration >> Configuration Management >> Global Policy Management. By default, the global option is set to No. On setting the global option to Yes, you can view the ML forecasted data in the grey shade as shown:

Navigation	Sample Screenshot
<p>Infrastructure Management >> Performance Management >> IPAM Statistics >> Resource Utilization >> CPU Utilization, Memory Utilization, Disk Utilization</p>	<p>The screenshot shows three charts for 'Team 4' with a 'Weekly' duration. Each chart has a 'GENERATE' button and an 'Auto Refresh' checkbox. The 'CPU Utilization' chart shows a blue line for historical data and a grey shaded area for the 'CPU Forecast'. The 'Memory Utilization' chart shows a green line for historical data and a grey shaded area for the 'Memory Forecast'. The 'Disk Utilization' chart shows a yellow line for historical data and a grey shaded area for the 'Disk Forecast'. The x-axis for all charts shows dates from Jul 01 to Jul 07, 2022.</p>
<p>Infrastructure Management >> Performance Management >> DNS Statistics</p> <ul style="list-style-type: none"> • CPU, Disk, Memory Utilizations • QPS <p>Note: QPS forecasted data is displayed in the highlighted part.</p>	<p>The screenshot shows three charts for appliance 'qaremot2' with a 'Daily' duration. Each chart has a 'GENERATE' button and an 'Auto Refresh' checkbox. The 'qaremot2 CPU Utilization' chart shows a blue line for historical data and a grey shaded area for the 'CPU Forecast'. The 'qaremot2 Memory Utilization' chart shows a green line for historical data and a grey shaded area for the 'Memory Forecast'. The 'qaremot2 Disk Utilization' chart shows a yellow line for historical data and a grey shaded area for the 'Disk Forecast'. The x-axis for all charts shows dates from Jul 01 to Jul 07, 2022.</p>

Navigation

Sample Screenshot

Infrastructure Management >> Performance Management >> DHCP Statistics

- CPU, Disk, Memory Utilizations
- LPS

Note: LPS forecasted data is displayed in the highlighted part.

Scheduler Management

To get the instant plots, you must execute the schedule jobs for the first time after setting the global option to Yes. Otherwise, wait for the scheduled job to be executed at their scheduled time.

Navigation: Administration >> Scheduler Management >> Scheduled Tasks

Name of the Schedule Job	Description	Schedule Time
CPUQPSLPSForecastDaily	Runs SARIMA ML Model for Forecasting Charts.	Daily at 23:45:00 GMT.
CPUQPSLPSForecastHourly	Runs SARIMA ML Model for Forecasting Charts.	Hourly at X:00; X = 0 to 24hrs.
CPUQPSLPSDailybestparamwriter	Writes Best Parameters for Daily data for Forecasting Charts.	Sunday at 18:00 GMT.
CPUQPSLPSHourlybestparamwriter	Writes Best Parameters for Hourly data for Forecasting Charts.	Sunday at 21:00 GMT.

Conclusion

With TCPWave's forecasting charts, one can identify the trends and patterns using historical data. Using these trends, the network administrators can detect the outliers using Median Absolute Deviation statistical model that helps separate genuine insights from seasonal variations. It ensures enhanced security and reduced risks associated with excessive resource usage, safeguarding your organization's entire IT infrastructure, and is integral for meeting compliance needs. For a quick demo, contact the [TCPWave Sales Team](#).