



# Smarten

**Advanced Data Discovery**

Powered by ElegantJ BI

# Guidelines for Network Performance Testing

Business Intelligence & Advanced Data Discovery

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### **Disclaimer**

This document is intended to support administrators, technology managers or developers using and implementing Smarten. The business needs of each organization will vary and this document is expected to provide guidelines and not rules for making any decisions related to Smarten. The overall performance of Smarten depends on many factors, including but not limited to hardware configuration and network throughput.

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## 1 Introduction

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The purpose of this document is to serve as a guide, providing an indicative plan for testing network performance for networks running Smarten.

This document references third party tools and the procedures for using them. These tools have no relation to Smarten. Procedures discussed here are to be considered as guidelines. Actual documentation for these products is available on their respective websites. It is recommended that the most recent documentation which accompanies these tools be reviewed to ensure proper testing.

## 2 Role of Network Performance in an Enterprise Environment

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Networks in which enterprise applications are expected to deliver results are complex. These networks have multiple remote locations, modes of connectivity and hybrid networks, supported by several service providers using a wide range of equipment embedded in the network. Comprehensive security of IT networks and other dynamic factors of the industry also add to the complexity of the network.

It is important to carry out network performance testing to identify available throughput, data transfer rates, hops, latency, drops, connectivity and other parameters that determine network quality. This testing will help identify root causes hampering network performance. Bottlenecks identified in such tests can then be modified, resulting in improved application performance.

Methods of resolving network problems are not discussed in this document as these should be addressed by a network specialist who has an understanding of the network under study.

## 3 Objective

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The objective is to test the performance of the network to ascertain if it is capable of providing and maintaining acceptable performance criteria.

Acceptable criteria are typically defined in two key areas:

- Response time
- Bandwidth / Network throughput

### 3.1 Response Time

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Response Time = processing time + latency

Latency is the delay incurred in communicating a message or the time the message spends “on the wire”. Latency is a direct function of the competence of the network.

Assuming processing time is 0 ms, the typical response time without any user activity on the server is expected to be:

Network	Typical Response Time
LAN /WAN	less than 5ms

Wi-Fi	less than 10 ms
Internet	less than 500 ms

**TYPICAL RESPONSE TIME ON NETWORK****Note:**

The above data is based on generally available information about networks however, as a typical network is a combination of multiple factors, there can be no single standard for all networks.

### 3.2 Bandwidth/Network Throughput

Measuring the throughput will determine the actual available bandwidth on the network. Network throughput is the average rate of successful data delivery over the identified network.

A network involves many components which will affect the bandwidth.

Typical Network Throughput Range	Network Specification
<b>LAN</b>	
200- 700 Mbps	1 Gbps Network
50-75 Mbps	100 Mbps Network
<b>WiFi</b>	
20-30 Mbps	B Router Type network
50-75 Mbps	GRouters Type Network
75-100 Mbps	N Router Type Network
<b>Internet</b>	
1-10 Mbps	Varies from ISP and hosted server environment

**TYPICAL NETWORK THROUGHPUT RANGE ON NETWORK****Test**

- Identify key locations in the network at which the test is to be conducted
  - These are geographical locations where the application will be accessed. Network connectivity modes must also be considered when selecting the test locations. The locations could be based on their functional importance in the network and/or the importance of the business functions being supported at a particular location. It could also be a key location due the importance of the data being transferred to and from the location.
- Network Audit at all Key locations
  - Measure throughput at various locations in the network
  - Measure transfer rates at various locations in the network
  - Measure throughput and transfer rates at the various locations at different times during the day
- Test the load from all Key locations

- Analyze the Results
  - Analyze the data generated from the network audit and load testing from different locations on the network. The identified access points where the throughput is lower than the expected needs of the user are suitable for action

## 4 Suggested Tools and Procedures for Network Audit

### 4.1 IPerf

Iperf is open source software which runs on multiple platforms and can be used for network testing. It is capable of running tests over any network to get a standardized output.

The tool can create TCP and UDP data streams and measure throughput of the network. It has a client-server functionality and hence is capable of measuring throughput at both ends, either unidirectional or bi-directionally.

There is a Graphical User Interface (GUI) front end for Iperf available called Jperf. The interface helps select the server and time to transmit and generates the performance data subsequently.

This tool can be downloaded at [https://sourceforge.net.\\*](https://sourceforge.net.*)

Testing of the network is done by installing Iperf on the server and running Jperf (GUI client of Iperf) on the client site to send data packets over a period of time. The result is shown in graphical format and can be exported to excel too.

A typical Iperf output contains a time stamped report of the amount of data transferred and the throughput measured at a particular location. As the tool is required in multiple locations, it is recommended to install it on a laptop connected at various points in the network.



JPERF USER INTERFACE SHOWING DETAILED NETWORK THROUGHPUT

\*Since this is a tool is not connected to Smarten in anyway, the link mentioned above may change. The Wikipedia page on Iperf is kept up to date and can be referred to in case the link is disabled.  
<http://en.wikipedia.org/wiki/Iperf>

## 4.2 Load Testing

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The process of load testing involves simulating an environment where a defined number of users concurrently transfer large amounts of data from the server over the network.

There are two options for load testing:

- Test generic data transfer performance, independent of Smarten
  - Configure Iperf or equivalent tool as per the instructions.
  - Create a large data file on the server
  - Download the file from various access points in the network
  - Monitor the network throughput by measuring the time required to complete the download from various access points
  - Analyze the data

This approach will test network performance related to generic data transfer and will not simulate actual scenario Smarten usage on the network. It can, however, provide a good indication of network performance and its deviation from standard performance expectations.

- Test data transfer performance by simulating Smarten usage in your network
  - Install Smarten on the server. Create various BI objects on Smarten
  - Design and/or write script on the load testing tool as required
  - Configure Iperf or equivalent tool
  - Run load testing tool script to simulate Smarten usage with different values of usage from various access points in the network
  - Monitor the network throughput from various access points

Using Smarten for load testing would be rather realistic and would involve understanding some of the tools and writing scripts. These scripts would be run from different access points.

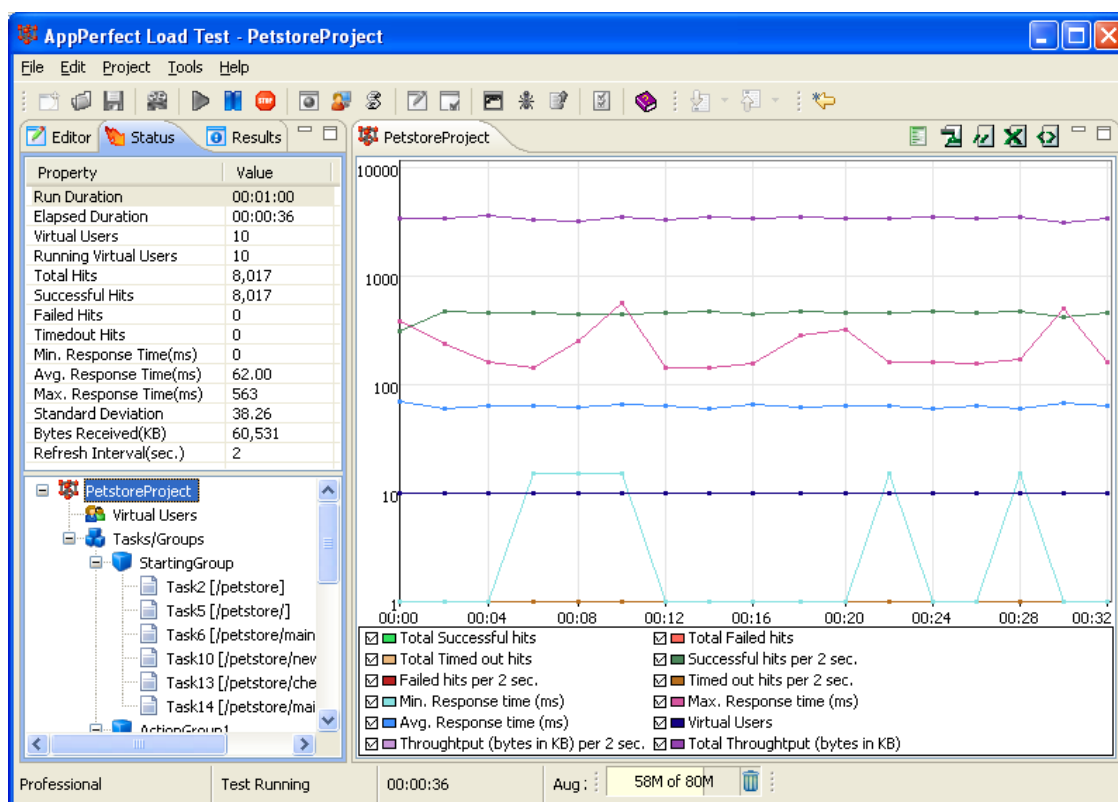
The Smarten technical team can provide assistance to simulate a multi-user environment for testing Smarten.

## 4.3 Common Load Testing Tools

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Load testing tools allow you to determine the performance of an application based on the number of concurrent users and requests in your network and within the infrastructure.

- Apache Jmeter <http://jmeter.apache.org/>
- AppPerfect Load test <http://www.appperfect.com/products/load-test.html>
- AppPerfect Load Test is a fully automated load test, stress test and performance test framework, allowing for customized user design and simulation.
- <http://www.appperfect.com/products/index.html> - Product overview.
- <http://www.appperfect.com/download/index.html> - Product download.



#### INTERFACE OF APPPERFECT LOAD TESTING TOOL

There are other tools which can effectively perform load testing. Choose a tool the testing team is familiar with or has used before. Alternatively, test a few popular tools to identify the one with which the team is most comfortable.

#### Note:

None of the above tools are connected with Smarten. Check the documentation of the tool before using it in your network. The above links were valid at the time this document was created. Smarten does not guarantee the performance of these tools.

## 5 Test Results

### 5.1 Network Throughput

The end results of the network tests will provide information which can be tabulated for different access points in the network as in the table format below showing a sample of the average of results from Iperf.

Location (Access Point)			
<b>Simulated users &gt;&gt;&gt;</b>	<b>1</b>	<b>5</b>	<b>10</b>
	Average	Average	Average
<b>Sales Office ( Wi-Fi N Router 75 Mbps)</b>			
Bandwidth Throughput (MegaBits /sec)	15.54	12.97	10.01
<b>CEO ( Wi-Fi N Router 75 Mbps )</b>			
Bandwidth Throughput (MegaBits /sec)	10.2	3.2	2.2
<b>Production Office LAN 100 Mbps</b>			
Bandwidth Throughput (MegaBits /sec)	42.83	40.29	38.29
<b>Accounts Office LAN 100 Mbps</b>			



Bandwidth Throughput (MegaBits /sec)	31.1	24.29	18.58
<b>CEO Office IT LAB1 LAN 1 Gbps</b>			
Bandwidth Throughput (MegaBits /sec)	350	340	330

**SAMPLE DATA – BANDWIDTH THROUGHPUT**

The table above is populated with hypothetical data of bandwidth throughput at various locations in a corporation. One has to examine the network for inconsistencies in performance within similar environments to determine if the network is operating at an optimum level. As a general principle, throughput declines as the number of users increases beyond optimum level of users and/or data transfer. These tests must be conducted at different times to identify if there is variation.

One would notice the following inconsistencies in the sample data:

- A lower bandwidth throughput in the Wi-Fi network at the CEO Office as compared to the Sales Office
- A drop in bandwidth throughput between the Production Office and Accounts Office in the LAN network

Such inconsistencies and deviations can be resolved by a network specialist.

## 5.2 Load testing

The load testing results are expected to provide clarity as to whether the server and network are capable of supporting a number of concurrent users to their satisfaction.

Load testing is also connected with hardware configuration and tuning of the server. The Smarten document on hardware sizing provides guidelines for choosing the configuration of your server.

A sample result is tabulated below.

	<b>Server Specification</b>
Processor	Inter(R) Xeon(R) CPU E5 – 2620 @ 2.00 GHz
No. of Processor	1
RAM	72GB
Storage Device	SAN Type

**Figure 7: Server Specifications for a Sample Result**

Object Name	<b>Number of Users&gt;&gt;</b>	<b>1</b>	<b>5</b>	<b>10</b>
		<b>Resp. Time (Sec)</b>	<b>Resp. Time (Sec)</b>	<b>Resp. Time (Sec)</b>
<b>Sales Analysis</b>	Location 1	12.2	15.7	18.2
	Location 2	14.7	17.1	19.1
<b>CEO Dashboard</b>	Location 1	6.1	7.2	8.1
	Location 2	8.1	8.5	8.8
<b>Production Analysis</b>	Location 1	7	9	10.2
	Location 2	7.2	9.4	12.2

**LOAD TEST SAMPLE RESULT**

Interpretation of the table above will change based on the data.

- Overall, Location 1 has a lower response time as compared to Location 2
- As Location 2 has a higher response time, there is scope for further investigation and analysis of the network in that area
- The response time for 10 users for Sales Analysis is 18.2 seconds. If this is not meeting the desired expectation, server specification may have to be aligned as per the Smarten hardware sizing guidelines

## 6 Analysis and Action

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While each network or server will have its own nuances, the notes below may be used as a general guideline.

- Networking
  - Response time with negligible processing at the server should be within the limits indicated at the beginning of this document. Areas where there is a clear drop in throughput need to be examined by a network specialist.
  - Network throughput for a fixed number of users should be consistent across the network or be at acceptable levels in defined areas. If this is not the case, a networking expert should be consulted to make improvements.
- Load testing
  - Overall, longer response time in all locations, if network performance is acceptable as above, is an indication of the server not being able to process the request.
    - The server should be upgraded in line with Smarten hardware sizing document.
    - If server configurations are in line with the guidelines, the Smarten Object Design guidelines and Smarten Cube Design and Performance Impact document should be consulted.
  - If the same object requires dramatically different times to load in different locations, it is a network related inconsistency which needs to be explored by further network tests.
  - If the response time increases with the number of concurrent users beyond reasonable limits, the server needs to be upgraded in line with the Smarten hardware sizing document.

## 7 Product and Support Information

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Find more information about ElegantJ BI-Smarten and its features at [www.smartent.com](http://www.smartent.com)

Support: [support@smartent.com](mailto:support@smartent.com)

Sales: [sales@smartent.com](mailto:sales@smartent.com)

Feedback & Suggestions: [support@smartent.com](mailto:support@smartent.com)

Support & Knowledgebase Portal: [support.smartent.com](http://support.smartent.com)