

## Application Note

### Network Optimization with Exinda Optimizer

Network traffic optimization reduces the reliance of business upon costly capacity bandwidth upgrades. Optimization is delivered either by prioritization of critical traffic flows or by blocking non-essential traffic. Optimization requires knowledge of the *composition* of network traffic for maximum results. Exinda Networks provides intelligent optimization functionality with three steps:

**Step 1: Traffic Monitoring and Analysis:** Exinda Optimizer allows you to “*look under the bonnet*” of your network and see what is really happening so you can:

- a) Diagnose performance issues *before* end-users complain,
- b) Decide on a strategy to optimize your network, and
- c) Identify unusual, inefficient and inappropriate use of network resources.

**Step 2: Traffic Shaping and Traffic Filtering for Optimization:** Exinda Optimizer allows you to take control of your network, increasing throughput efficiency by:

- a) *Traffic Shaping*, prioritization of traffic flows to guarantee continual operation of critical applications regardless of network congestion. For example, prioritizing time-critical applications such as SSH (telnet) over time invariant applications such as SMTP (Email) will result in an improved end-user experience of the network without loss of connectivity.
- b) *Traffic filtering* inappropriate traffic – reducing congestion to improve your network performance and security.

**Step 3: Evaluation of Traffic Policies and Network Performance:** Exinda Optimizer is self-evaluating (Exinda Optimizer collects data to assess its own performance), allowing you to easily determine that it is functioning correctly and to determine any further configuration improvements.

We now examine some specific methods by which Exinda Optimizer can be used to allow you to intelligently optimize your network:

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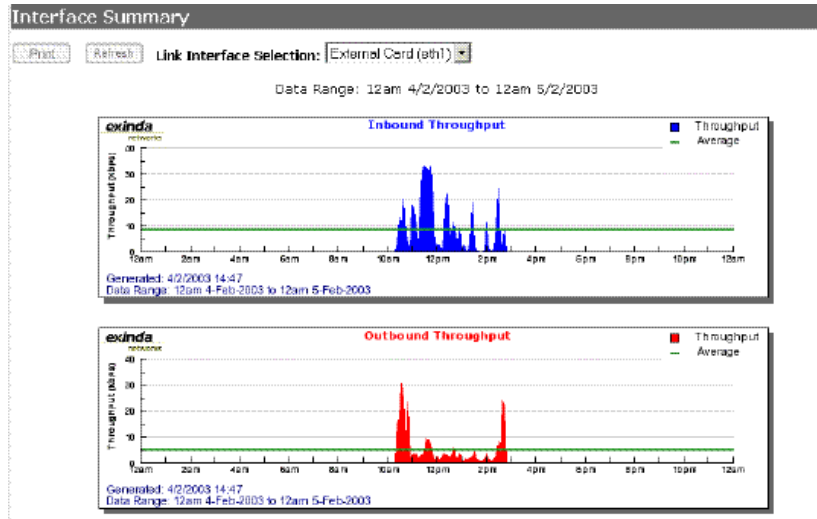
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**Question: How can I know the times during the day when my network is busy?**

Network traffic patterns vary depending on the time of day: your network carries more data during business hours than at night. With these changing network patterns, how can you see whether you have enough network capacity (bandwidth) to satisfy your user's demands? Some knowledge of what times in the day your network is congested is necessary.



**Figure 1.** Exinda Optimizer allows you to see how traffic conditions vary over time.

Exinda Optimizer provides a simple graphical presentation of the data your network has carried over time (see Figure 1). This presentation of time variant data transfers or *throughput* allows you to spot:

- a) Periods where your network capacity has been reached, and
- b) Peak traffic periods.

One use for this information would be to determine times when non-critical applications should be blocked or de-prioritized. For example, observing that peak traffic conditions occur between 2pm and 3pm, scheduling a network data backup during this time would degrade the performance of the network. Using Exinda Optimizer you can block the data backup application between 2pm and 3pm, reserving capacity for more time-critical applications. Alternatively, you may decide that the network data backup is too important to delay – and prioritize so that the data backup application is guaranteed a throughput level or quality of service (QoS). Either way, Exinda Optimizer gives you the capability to understand and control your network congestion patterns.

Alternatively, you can use this information (see Figure 1) to determine whether your network capacity is insufficient and requires an upgrade. So Exinda Optimizer can also be used for *capacity planning*.

Link Interface Summary

Link Status	Data Direction	Total Data (MB)	Throughput (kbps)		
			Min	Avg	Max
Monitored	Inbound	17.717	0.000	8.959	32.974
	Outbound	10.437	0.000	5.278	30.456

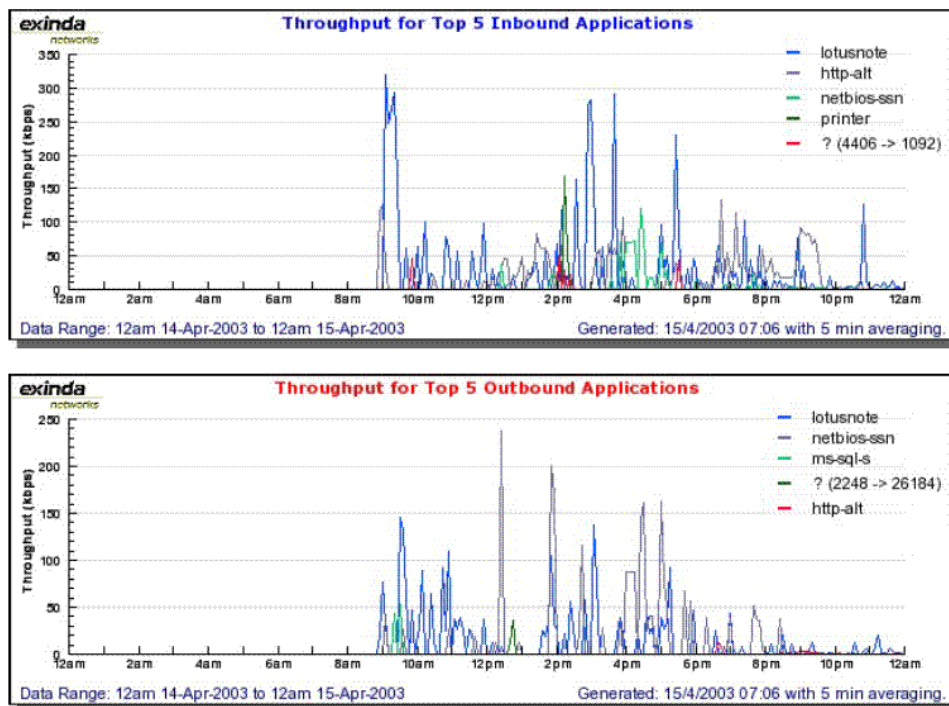
**Figure 2.** Exinda Optimizer provides gross data transfer statistics in and out of your network.

Exinda Optimizer also provides you with a summary of how much data that has been transmitted over your network link (see Figure 2), broken down according to the direction that the traffic is flowing. To illustrate how traffic direction is determined, consider a simple download from a website whereby traffic is sent into your network from the Internet: this is an incoming traffic flow. Conversely, traffic sent from your network (i.e. an FTP upload to a web server) comprises an outgoing traffic flow.

Most ISP bills are itemized by total bandwidth, allocated bandwidth and volume of data. Exinda Optimizer verifies that your actual data transfers correspond to those charged by your ISP. Exinda Optimizer delivers the information required for you to verify your ISP's performance.

**Question: How can I see which Applications, Hosts and Conversations are consuming capacity at different times during the day?**

*Sometimes you need to look inside the aggregate data shown in Figure 1 to see the kinds of traffic that consume the majority of your network resources at different times of the day. This allows you to see inappropriate applications that may be congesting your network during business hours, or simply show the times when particular applications require more bandwidth. Some idea of how your different network applications operate over the day is needed.*



**Figure 3.** Exinda Optimizer Displays the top Applications in your network over a time period.

Exinda Optimizer gives you the power to find the top applications, hosts and conversations on your network over a time interval. To define these terms:

- a) An **application** is a service that operates over your network such as SSH (telnet), HTTP (web), SMTP (e-mail).
- b) A **host** is a computer that either receives or transmits data. Hosts may be either *internal* or *external* depending on whether or not they are part of or *local* to your network (internal Hosts are local).

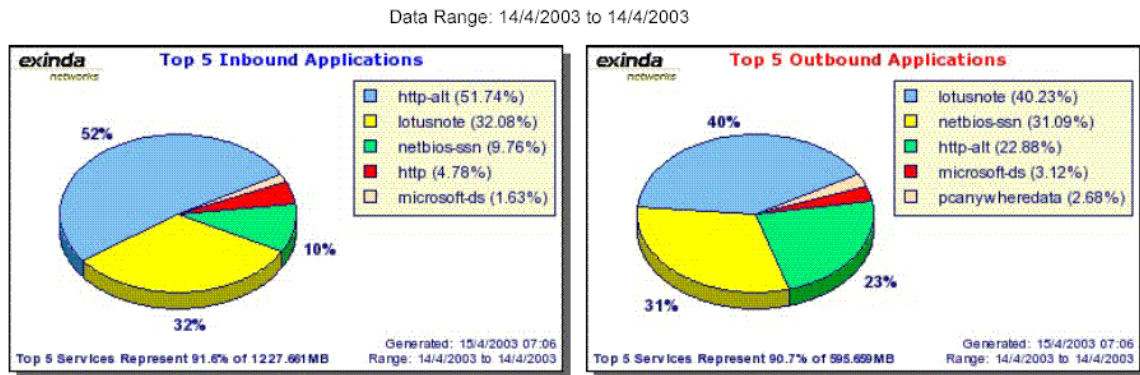
- c) A **conversation** is a transaction of data from one host to another using the same application (i.e. a VoIP telephony call from Host 172.14.1.94 to Host 131.170.40.30 using SIP).

Exinda Optimizer plots each of these classifications of data traffic over time to allow you to determine their peaks and transfer speeds (*throughput*) at any time. This enables you to find which Applications, Hosts or Conversations consume the most network capacity (bandwidth) at any one particular time. You can take action based on this information to prioritize or block certain types of traffic as mentioned above (Section 1).

In addition, Figure 3 allows you to confirm that scheduled applications (eg. An automated data backup) are executing correctly. With Exinda Optimizer, you can stop guessing about your network activity and see for yourself.

**Question: How can I determine which are the most resource demanding Applications, Hosts and Conversations?**

*Although traffic conditions vary according to the time of day, sometimes it is more useful just to see a total aggregate display of the traffic transmitted over your network. This helps you to measure the reliance of your business upon certain applications, as well as which hosts are transferring the most data. Such an overall view of the composition of your network traffic gives you a “top down” perspective of how your network is performing.*



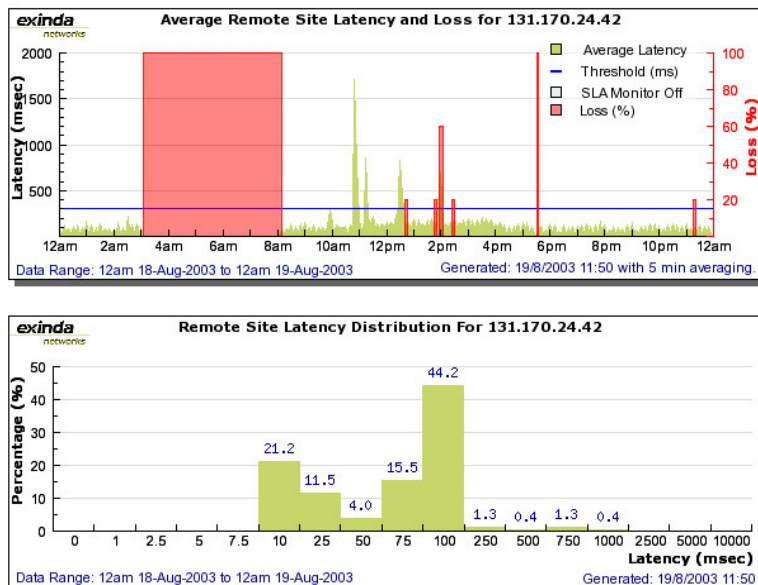
**Figure 4.** Exinda Optimizer displays the overall top applications in your network.

Exinda Optimizer provides an overview of which Application, Host and Conversation transfers over your network as shown in Figure 4. This aggregate representation allows you to see which traffic types make up the majority of your network data transfers, so you can observe overall trends of data transfers. This allows greater precision to detect problem traffic for de-prioritization or filtering.

As an example, Exinda Optimizer allows you to detect large peer to peer (P2P) data transfers from file sharing applications such as Morpheus. Through detection, you can take the next step to remove such inappropriate network usage so that capacity is allocated only to appropriate applications. This gives you the power to enforce an acceptable use policy, as well as to define improvements to your Exinda Optimizer configuration.

**Question: How can I check that a remote site is reachable from my network and validate my network performance?**

The purpose of any data network is to transfer data from one location to another. Central is the requirement for appropriate availability and latency for business critical applications across public or private IP networks. Since network links can fail unpredictably, it is important for you to be able to measure the availability of important remote hosts (such as a remote branch office).



**Figure 5.** Graphical visualization of SLA statistics collected by Exinda Optimizer.

Site Name	Site IP	Availability	Jitter (msec)	Latency (msec)			End-to-End Throughput
				Min	Avg	Max	
DNS	172.14.1.244	98.56%	17.55	0.10	18.74	204.97	27.31 kbps

**Figure 6.** Summary of remote site reach-ability statistics provided by Exinda Optimizer.

Internet Service Provider’s (ISP) often enter into a contract with companies to guarantee the provision of a level of service (transfer speed) to a particular remote location. This contract is termed a Service Level Agreement (SLA) and is used either to guarantee performance of a virtual private network (VPN) or simply to guarantee critical sites are reachable. As Figure 5 and Figure 6 show, Exinda Optimizer allows you to check that the terms of an SLA are being adhered to, allowing you to collect availability statistics for any remote site (such as a remote branch office), including:

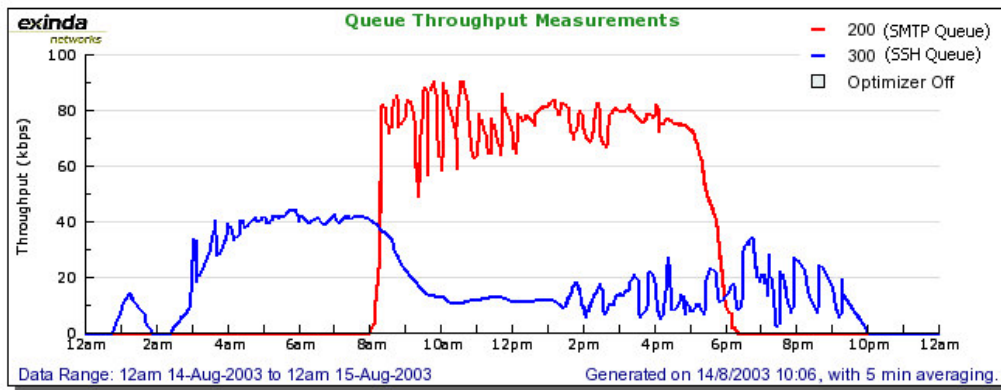
- **Remote Site Availability:** Low remote site availabilities reduce the ability for you to communicate with a remote site.
- **Remote Site Latency (transmission delay):** High latencies reduce the responsiveness of certain applications (i.e. long delay between keystrokes in SSH).
- **Remote Site Jitter (variation in delay over time):** Changes in network latency experienced by applications may affect the performance of time critical applications such as VoIP or streaming video.

With these statistics, you can verify that a remote site can be reached from your network with confidence, with a satisfactory latency for SLA verification or otherwise. Automated verification can be implemented by specifying a latency threshold (maximum tolerable latency) so that an alert email is generated when the latency to the remote site becomes too large.

**Question: How can I see the immediate benefit of optimizing my network?**

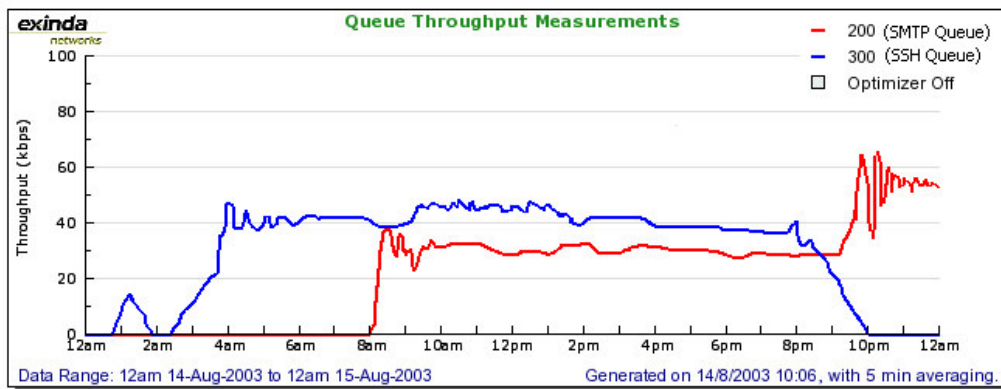
*While the idea of network optimization sounds good, it is important that you are able to measure the immediate changes to your network due to your optimization policy. This allows you to determine that your optimization policy is working correctly, as well as to compare the traffic in your network before optimization and after. This on demand measurement capability is very important to verify that your policy is operating as expected after your optimization policy comes into affect.*

Data Range: 12am 14/8/2003 to 12am 15/8/2003



(a)

Data Range: 12am 14/8/2003 to 12am 15/8/2003



(b)

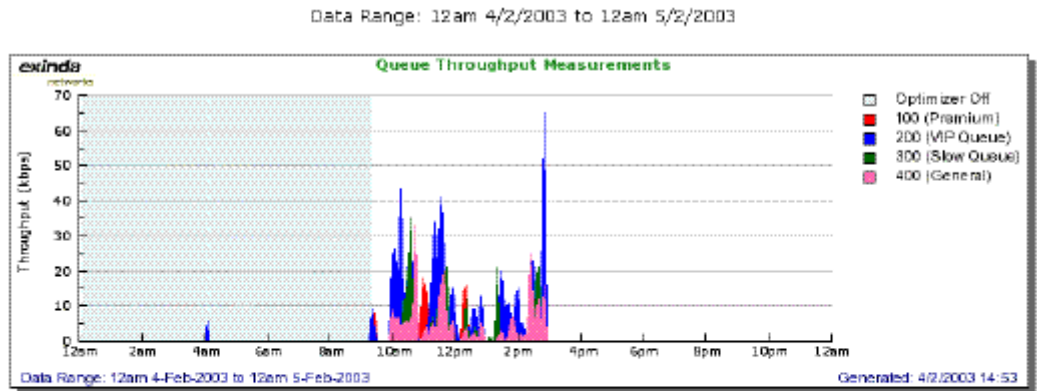
**Figure 7.** Your network traffic (a) before optimisation and (b) after optimisation. Here we can see that without optimisation, SMTP email traffic consumes most of your resources during business hours, reducing the efficiency of your SSH traffic (which is time critical). After optimisation this problem disappears as SMTP is capped to 40kbps.

To diagnose short-term problems with your network, or to determine the immediate impact of a new optimization configuration, Exinda Optimizer includes real-time snapshot capabilities. The above features of the Exinda Optimizer require some time to collect a complete set of data. In

the interim, the real-time snapshot capability can be used to gather a view of how your network is *currently* operating. For example, Figure 7(a) shows the throughput makeup of a network before SSH prioritization, whereas Figure 7(b) shows the throughput makeup immediately after. Note how the composition of the traffic has changed such that SSH has taken a much larger part of the network capacity.

**Question: How can I see how my Exinda Optimizer configuration is performing?**

*Whilst seeing the immediate short-term effect of enabling an optimization configuration is important, as time progresses, it becomes more important to see the long-term impact of your optimization upon the network. This allows you to check that the optimization policies in place is operating correctly at all times of the day.*



**Current Queue Transfer Statistics**

Queue Number and Name	Allocated BW	Allow Burst	Current Rate	Average Rate	Current Utilization
100 - Premium	2 kbps	YES	0.00 kbps	1.56 kbps	0.00%
200 - VIP Queue	1000 kbps	YES	50.55 kbps	11.89 kbps	5.05%
300 - Slow Queue	50 kbps	YES	0.07 kbps	3.58 kbps	0.14%
400 - General	150 kbps	NO	6.42 kbps	4.58 kbps	4.28%

**Figure 8.** Exinda Optimizer is self-evaluating, allowing you to see how your optimization configuration is performing.

As mentioned above, there are three steps to implementing traffic optimization on a network. The third step mentioned deals with ensuring that any optimization configuration is performing correctly. To achieve this, Exinda Optimizer provides a traffic shaping review facility to allow you to see the utilization of your optimization prioritization levels (known as policies). This presentation (as shown in Figure 8) provides you with a breakdown of the traffic that has been transferred in each queue over time. This view allows you to see which policies are active over any particular time to check that the optimization outcomes that were expected are being realized. Thus, Exinda Optimizer is self-validating - making it easier to use.

**Summary**

Traffic optimization delivers substantial productivity gains to a network through three simple user steps: a) monitoring, b) optimization and c) configuration validation. Exinda Optimizer provides substantial functionality for all three of these steps in a simple, easy to use and graphical manner, allowing you to make the most of your network through efficient and productive traffic optimization.

