Valencia Systems

Solutions White Paper

Performance, Scalability, & Integration

Valencia Systems Aruba Suite™ for Server Consolidation Management

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Table of Contents

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Section 1: Introduction

Server consolidation is a popular corporate and IT goal, as the vast amount of servers in enterprises continues to grow. Most companies add servers to manage new computing problems and do not effectively leverage their existing IT assets. Typically, each new corporate application resides on a new piece of computer hardware. Remote offices manage independent applications and data without a central control point for security and support. These problems are endemic with organizations that are growing at a high rate, in constant firefighting mode, and have not been able to manage or plan for growth. IT management does its best to keep up but often the best, least burdensome, answer is to just buy new hardware.

When IT planning becomes a strategic initiative, automated infrastructure management is adopted to determine how to implement new projects, reduce cost and improve overall performance. Management is always asked "how can IT do more with less?" and "how can we utilize our existing IT assets more efficiently and more effectively?" Server consolidation is one area where, with the right information and the right plan, companies can generate real, bottom line, Return on Investment.

Section 2: Components of Server Consolidation

To effectively implement a server consolidation project, key areas need to be addressed.

Key areas are:

- Developing a plan to maximize the return while minimizing the risk
- Match consolidation to business process and application needs
- Evaluate Network Requirements
- Coordinate as a part of the total IT plan/budget
- Evaluate licensing or contracts issues
- Get corporate buy in

Developing a plan

Like most IT implementations, server consolidation requires a well thought out and documented plan. Microsoft ® Corporation recommends nine steps to server consolidation:

1. Assess current infrastructure
2. Identify server consolidation goals
3. Design new environment

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4. Develop a migration plan
5. Implement new pilot environment
6. Finalize user and data migration plan
7. Implement new production environment
8. Migrate users and data to new environment
9. Evaluate and review project

Match consolidation to Business process and application needs

Giga Group indicates most companies will find they have realized 90% of the cost savings without consolidation applications

The consolidation of infrastructure cannot come at the cost of critical business applications and processes. To ensure that critical process' are not impacted, a thorough understanding of internal services and critical components in the service path must be understood. IT must understand which servers are currently in production that are critical to business applications like email, ecommerce, web, VPN, backup, security, and Voice over IP telephony-VoIP According to the Giga Group, most companies will find they have realized 90% of the savings they can hope to achieve without consolidating applications but by

1. The Centralization of geographic distributed servers into one or more centralized data centers and by

2. Data Consolidation and/or storage to make data more accessible and manageable.

Evaluating Network Components

It is critical to identify the vital service components that make up a service. What systems are supporting the service delivery? What network components are involved? How is the network currently being utilized? What other traffic flows are using the network? Are there any security issues? What business units and locations are using the resources? Who is using the service?

Coordinate as part of IT plan/budget

Server consolidation should be done as part of the total IT plan. If IT plans to roll-out a new application or service like Voice over IP (VoIP), it is an opportune time to look at how to roll the new service by leveraging existing infrastructure. This will reduce the time and cost required to implement a new service and ensure that the organization is maximizing their IT ROI. Quantify the total cost of existing support costs, downtime, mean-time-to-repair, and efficiency gains.

Evaluate licensing or contracts issues

With the advent of corporate governance it has never been more important to understand what the status of your current licenses are and how they can be effectively managed. Prior to server consolidation it is necessary to understand your

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contractual relationships and if more or less cost is involved in making server consolidation changes.

Get corporate buy in

Make sure everyone is on board with the changes. You do not want to be in the middle when your remote location has a problem with IT centralizing their applications and servers and they have a problem loosing perceived control.

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Section 3: Aruba Suite Architecture & Features

The Aruba Suite leverages a Highly Scalable data collection capability and database to provide a "carrier-class" consolidated IT performance management reporting solution. Aruba collects extensive raw SNMP data from hundreds of different networked devices to isolate "hot spots" and report on real-time conditions for troubleshooting, Capacity Planning, Service Level Management (SLM), Business Service Management (BMS), Quality of Service (QoS), financial-bill back, and operational needs. Raw data is rolled-up into historical reports for current time periods or mutli-year analysis. Aruba is easily configured and installed. Aruba ships with hundreds of preconfigured reports and can be easily customized (using XML) for individual requirements for specific users (IT Managers, Operations, Engineering, etc). Aruba's' powerful base lining capability allows enterprises and service providers to determine typical vs. a-typical behavior, trending and predicting behavior and identifying security or policy breakdowns. Aruba is designed to be integrated with existing IT applications to provide a comprehensive, scalable, IT performance management solution.

Aruba Product Features

The Aruba Report/Server

- ❑ Carrier-class scalability
- ❑ Historical trending & predictive analysis
- ❑ Hardware & network capacity planning
- ❑ Comprehensive System Management reporting
- ❑ Resource utilization & optimization reports
- ❑ Efficient provisioning of carrier capacity reports
- ❑ Proactive problem area detection
- ❑ Verify/Audit QoS goals
- ❑ Verify/Audit SLA goals
- ❑ Automatic Baseline comparisons
- ❑ Threshold based exceptions and alarms
- ❑ Secure Access
- ❑ ODBC compliant database
- ❑ XML- customization

The Aruba Distributed Flow Collector

- ❑ Unprecedented scalability, millions of concurrent flows
- ❑ Automatic Baseline comparisons
- ❑ Service Level (SLA) assurance
- ❑ Measure service quality (QoS)
- ❑ Utilization
- ❑ Congestion
- ❑ Errors
- ❑ Real-Time Analysis
- ❑ Historical trending & predictive analysis
- ❑ XML-Web based reporting
- ❑ Comprehensive picture of Network Usage, raw & aggregate data
  - ○ Top N Talkers, Hosts, Listeners
  - ○ Top N Conversations
  - ○ Top N Ports
  - ○ Top N Applications

The Aruba Distributed Poller

- ❑ Distributed remotely or centralized
- ❑ Add modularly as requirements grow n-tier architecture
- ❑ Multithreaded, high speed, polling of SMNP data cache
- ❑ Standards-based SNMP polling

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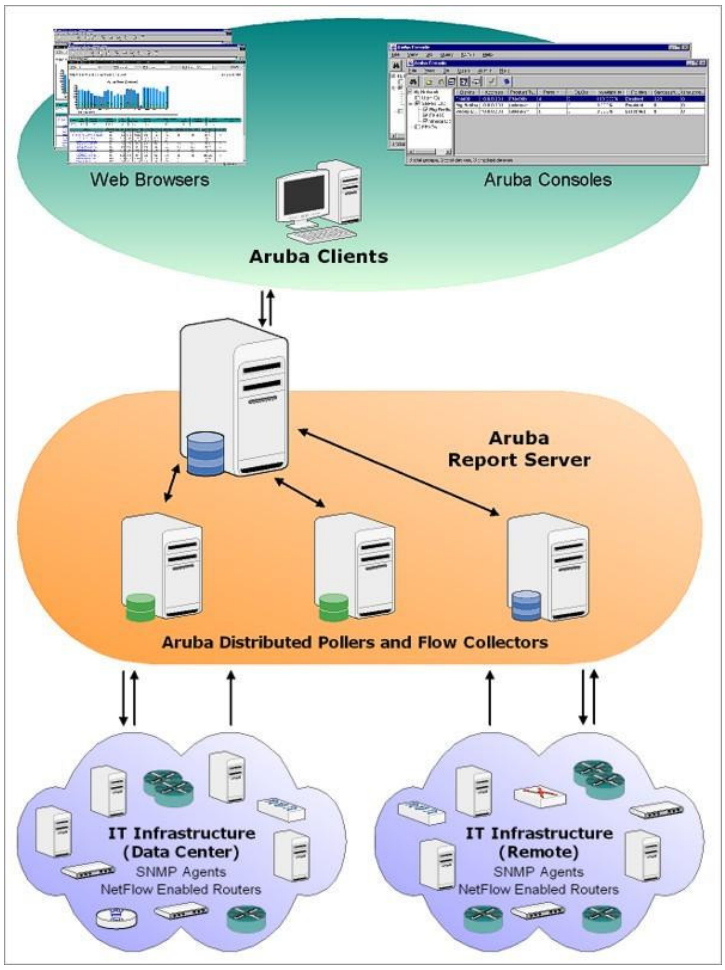
The general Aruba Architecture is a scalable architecture which supports the remote/distributed collection of data from routers, hubs, switches, computer systems and other SNMP capable devices (i.e. firewall, or traffic shaping appliances). By distributing the polling function the data may be consolidated from the distributed collectors in a central data warehouse. Data is analyzed against preconfigured or customized report formats to produce actionable, information-based, web reports. Reports are easily categorized and grouped by function, location, priority and detail allowing Network Operations-to-Management utilize performance information for IT troubleshooting or financial and business planning.

Aruba was specifically architected to support very large-scale SNMP/NetFlow data collection and reporting. The architecture is both multi-tiered and distributed. Aruba can be divided into three logically separate layers: Client layer, Server layer, and Collection layer.

Aruba is a highly scaleable architecture utilizing a client, server, collection layers and an Oracle™ database

The Client layer provides the user interface to the system. The Aruba Console allows the administrator to configure and maintain the system, as well as perform real-time and custom reports.



The Server layer (*Aruba Report Server*) is responsible for generating and publishing reports, storing configuration information, and managing the underlying Pollers and Flow Collectors. There is a single Report Server in an Aruba system.

The Collection layer consists of one or more Pollers and/or Flow Collectors which automatically gather data from the network devices. These clean, normalize and store raw data, as well as aggregating and aging historical data.

The Client, Server and Collection may all be collapsed onto a single machine or they may be distributed on separate computers. For small networks, a single Client,

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Report Server, and Poller running on the same machine will be appropriate. Larger networks may require multiple Clients simultaneously connecting to the Report Server, that in turn, managing data from several distributed Pollers and/or Flow Collectors. Aruba's architecture will scale from small to very large distributed installations, without sacrificing simplicity and ease of use.

Why a multi-tiered, distributed architecture?

The optimal solution must minimize data movement by pre-processing the data at the collectors

A monolithic approach, a data collection engine and reporting engine both hosted on a single platform, will eventually be limited by processor performance, available bandwidth, and storage capacity. And long before these thresholds are reached, the user experience is impacted - continuous polling and database processing will consume much of the available machine cycles. Just adding more machines introduces a new problem - each machine now has its own collection and reporting domain. The user must know which machine is responsible for each device, and groups of devices can not span the domains.

An alternative approach is to separate the administrative and reporting functions from the data collection engines. This still gives the user a single machine to access for a holistic view of the entire network, for both reporting and administration. The CPU/bandwidth-intensive collection functionality is distributed across as many machines as needed. An additional benefit is that a collector can now be located close to the data sources, reducing SNMP polling across the WAN.

The downside of this approach, if the collectors rely on the server layer to actually process and store all the data that is collected, is the problem has not been solved. In fact, this only makes it worse, since the data is essentially moved twice. Many solutions which started with a monolithic architecture have been "scalability enhanced" by adding a "server layer" using this approach and must manipulate the data across platforms.

Valencia System feels the optimal solution must minimize data movement by pre-processing the data at the collectors - only summarized data is sent up to the server layer. Granular data (for example, raw polled data) is retained in the collector database, and is only moved to the server if user requested.

Reducing the ongoing maintenance burden is a major factor in a solution's scalability. To reduce maintenance burden the client layer must be distributed as well. The administrators console should tear away, and multiple administrators must be able to simultaneously make changes. In addition, grouping must be integrated into the administrative functions as well as the reports.

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Section 4: Server Consolidation Reports in Action

In order to launch a consolidation project it is imperative to have accurate, reliable data for service delivery, the network, and the servers. This intelligence can be gained through IT intelligence and performance management reporting. The Aruba Suite offers consolidated information to allow users to understand the existing environment, develop a plan, and measure the results of the implementation.

Network Service Level

Daily WAN Service Quality Report for North East — **Tuesday, April 12, 2005**

Collection Hours

Group	Average Availability	Average Daily Uptime	Average Daily Downtime	Data Unavailable	Server Down	Interface Failures	MTTR	MTBF	Average Round Trip Delay	Average Daily Interface Count
North East	100.000%	18h 30m	0	0	5h 30m	0	No Failures	No Failures	177 ms	20

Name	Address	Interface Type	Speed	Availability	Daily Uptime	Daily Downtime	Data Unavailable	Server Down	Interface Failures	MTTR	MTBF	Average Round Trip Delay
157.130.4.58_1	157.130.4.58	LAP-B	1.5M	100.000%	18h 30m	0	0	5h 30m	0	No Failures	No Failures	189 ms
157.130.4.58_4	157.130.4.58	Proprietary Point-To-Point Serial	0	100.000%	18h 30m	0	0	5h 30m	0	No Failures	No Failures	154 ms
157.130.6.114_3	157.130.6.114	Frame Relay	320K	100.000%	18h 30m	0	0	5h 30m	0	No Failures	No Failures	181 ms
157.130.6.114_4	157.130.6.114	Frame Relay	320K	100.000%	18h 30m	0	0	5h 30m	0	No Failures	No Failures	203 ms
CS-New_Jersey_Warehouse-USA_To UUNET (u93425	157.130.2.170	Frame Relay	1.5M	100.000%	18h 30m	0	0	5h 30m	0	No Failures	No Failures	152 ms
Fel-Lodi-INET.it.felician.edu_To UUNET (u52192)	157.130.10.134	Frame Relay	1.5M	100.000%	18h 30m	0	0	5h 30m	0	No Failures	No Failures	156 ms
GW.HDPublishing.com_MFR1	157.130.5.214	Frame Relay	3.1M	100.000%	18h 30m	0	0	5h 30m	0	No Failures	No Failures	96 ms
Mahwah Internet_2	157.130.10.70	Frame Relay	1.5M	100.000%	18h 30m	0	0	5h 30m	0	No Failures	No Failures	171 ms
Mahwah Internet_3	157.130.10.70	Frame Relay	1.5M	100.000%	18h 30m	0	0	5h 30m	0	No Failures	No Failures	162 ms
Mahwah Internet_4	157.130.10.74	Frame Relay	1.5M	100.000%	18h 30m	0	0	5h 30m	0	No Failures	No Failures	155 ms
Mahwah Internet_7	157.130.10.70	Frame Relay	1.5M	100.000%	18h 30m	0	0	5h 30m	0	No Failures	No Failures	119 ms
Super Duper Parrot Router_1	157.130.12.86	Frame Relay	64.1K	100.000%	18h 30m	0	0	5h 30m	0	No Failures	No Failures	293 ms
the-dma-gw.ALTER.NET_To UUNET (u09585)	157.130.12.18	Frame Relay	1.5M	100.000%	18h 30m	0	0	5h 30m	0	No Failures	No Failures	187 ms
UUNET-3640a_LINK TO UUNET	157.130.8.158	Frame Relay	1.5M	100.000%	18h 30m	0	0	5h 30m	0	No Failures	No Failures	253 ms

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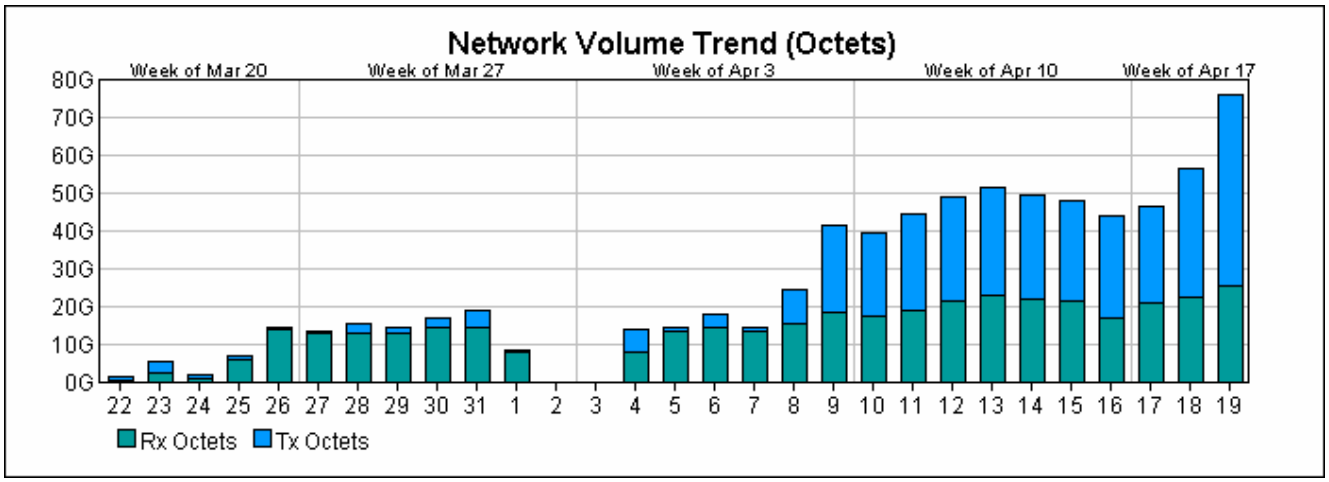
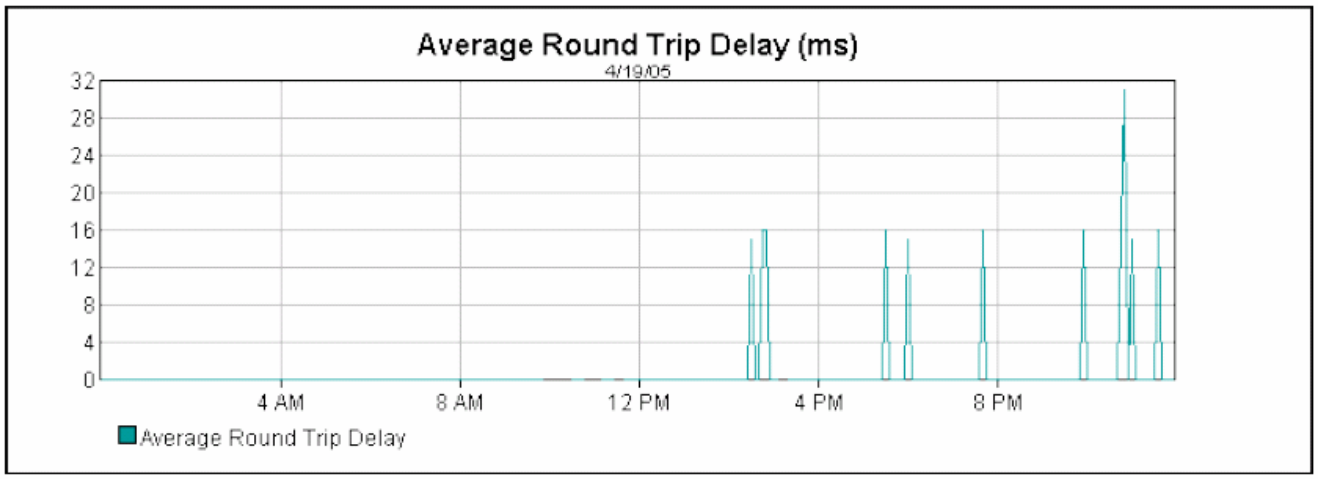
Network Volume



Average Server/Network delay



group	Total Network Octets	Baseline Total Octets	Average Availability	Average CPU Utilization	Average Physical Memory Utilization	Average Virtual Memory Utilization	Reboots	Server Count
Network	75.9G	38.2G	93.279%	4.2%	73.1%	35.4%	4	11

Exceptions

Marginal Exceptions	Critical Exceptions	Total Exceptions
25	13	38

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Server Performance Summary

Server Detail

Server	Address	Product Type	Rx Octets	Tx Octets	CPU Utilization	Peak Interval CPU Utilization	CPU Balance	Physical Memory Utilization	Virtual Memory Utilization	Reboots	# Ports	# CPUs	# Partitions
ASHEVILLE	10.0.0.135	Microsoft Windows NT Workstation	28.8 M	21.8 M	1.8%	87%				0	1	1	2
GOTHAM	10.0.0.19	Microsoft Windows NT Workstation	11.1 M	3.1M	1.3%	11%				0	1	1	1
Greenville	10.0.0.22	Microsoft Windows NT Server	19.0 G	1.5G	22.4%	78%	88	91.3%	60.7%	3	2	4	1
HOLLYWOOD	10.0.0.52	Microsoft Windows NT Server	38.7 M	10.3 M	0.1%	15%	100	83.0%	53.8%	0	1	2	2
MADISON_renamed	10.0.0.16	Microsoft Windows NT Workstation	119.6 M	22.1 M	1.1%	33%		80.4%	29.0%	0	1	1	1
OCRACOKE	10.0.0.2	Microsoft Windows NT Workstation	28.6 M	17.8 M	1.2%	12%		78.0%	27.4%	0	1	1	1
RALEIGH	10.0.0.26	Microsoft Windows NT Server	12.0 M	5.5M	0.0%	1%	99	21.5%	8.7%	0	1	6	2
SYDNEY	10.0.0.27	Microsoft Windows NT Workstation	5.7G	48.0 G	7.3%	26%	88			0	1	4	2
TE-ANAU	10.0.0.102	Microsoft Windows NT Workstation	85.0 M	20.5 M	4.7%	91%		91.0%	38.9%	1	1	1	1
VSI_FILE_SRVR	10.0.0.51	Microsoft Windows NT	298.2 M	848.0 M	1.8%	16%		60.4%	28.6%	0	1	1	1

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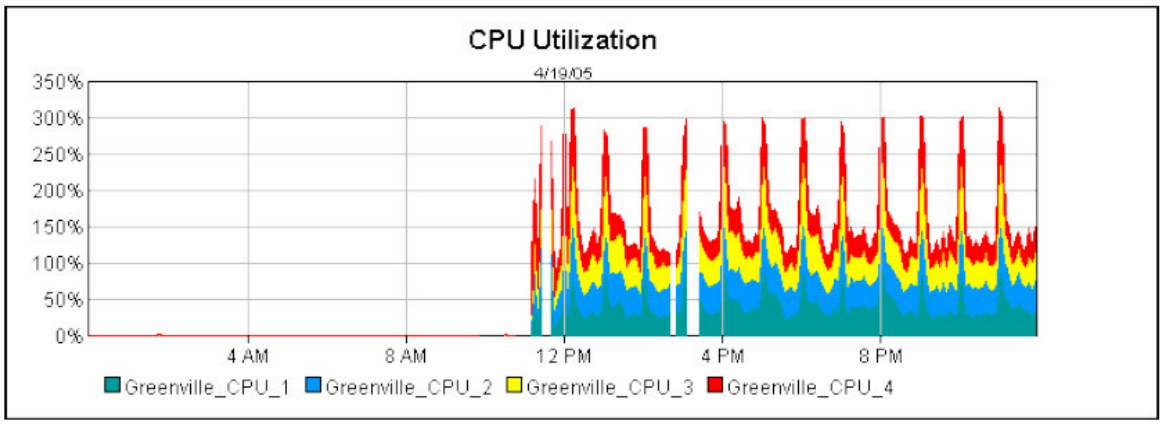
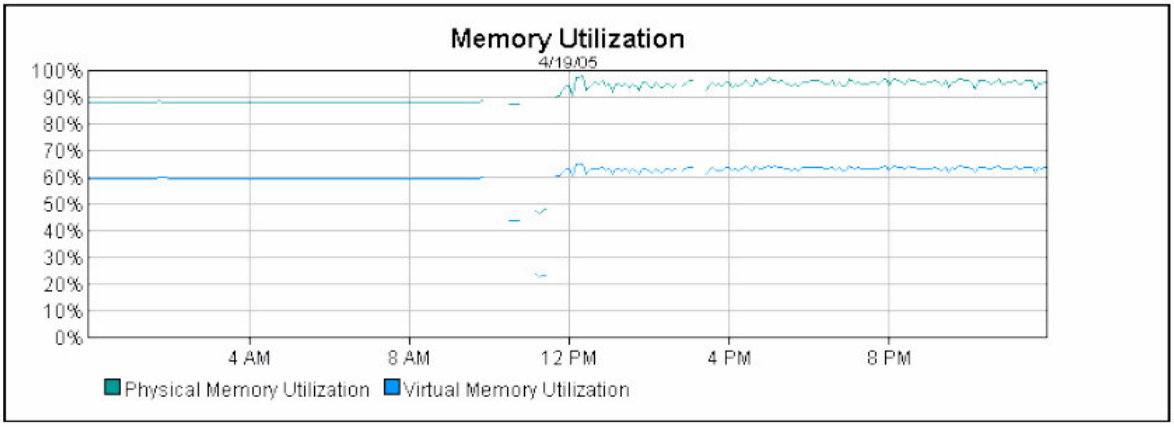
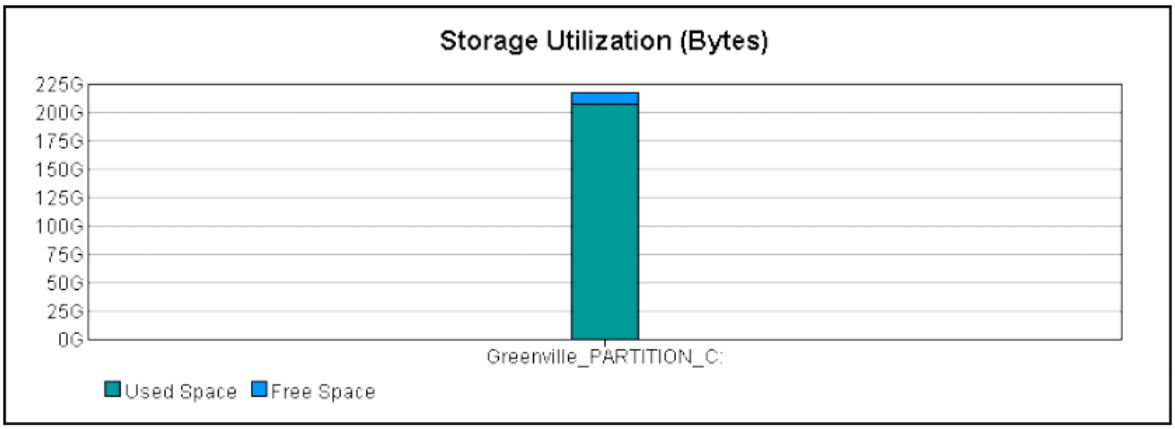
System Device Summary-CPU



System Device Summary-Memory



System Device Summary-Storage



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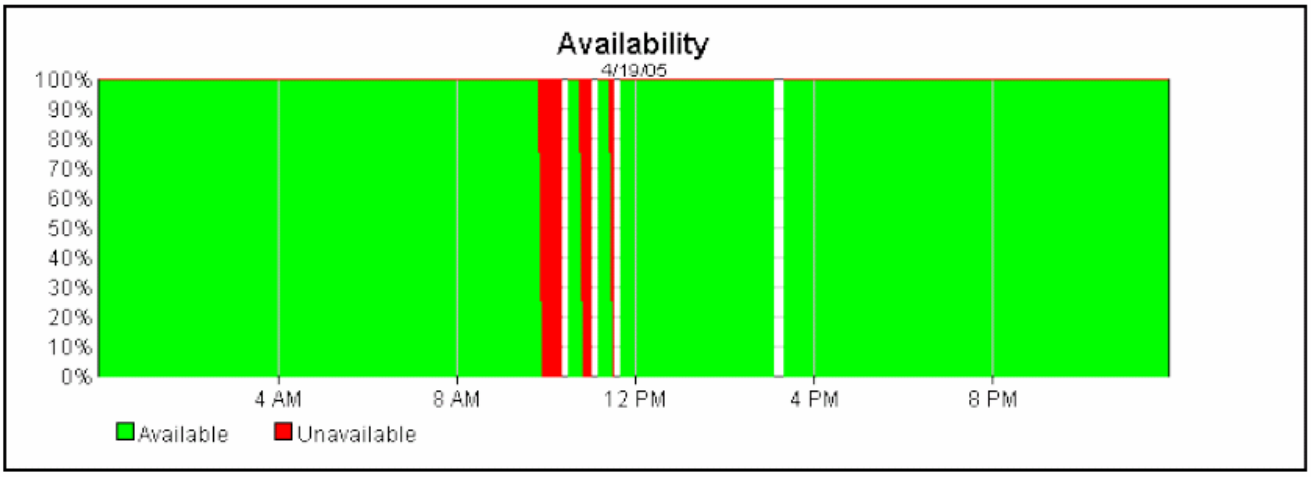
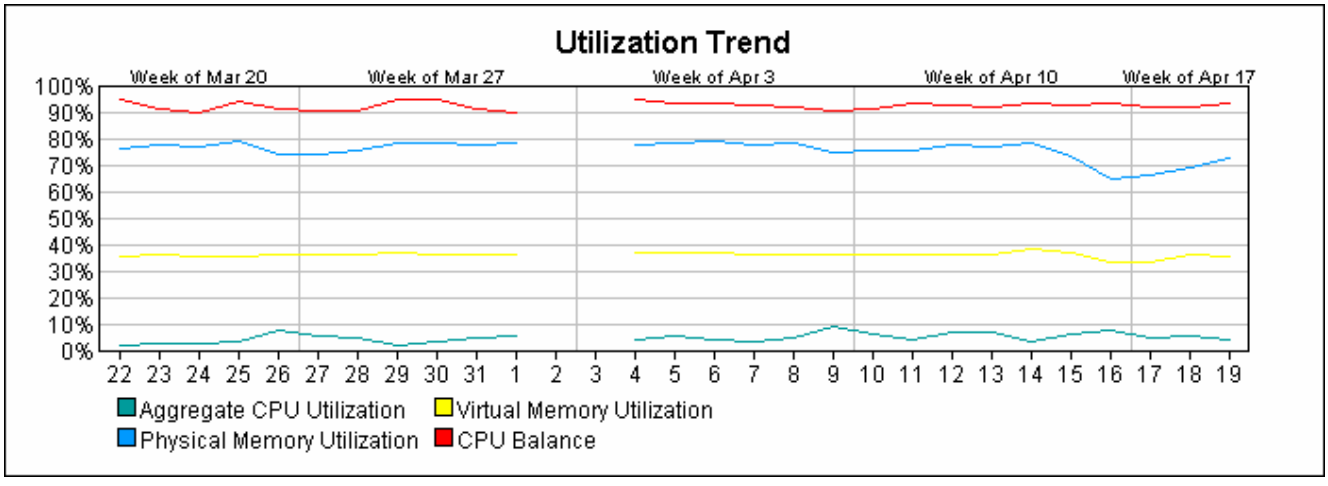
System Device Summary-Availability



Utilization Trend



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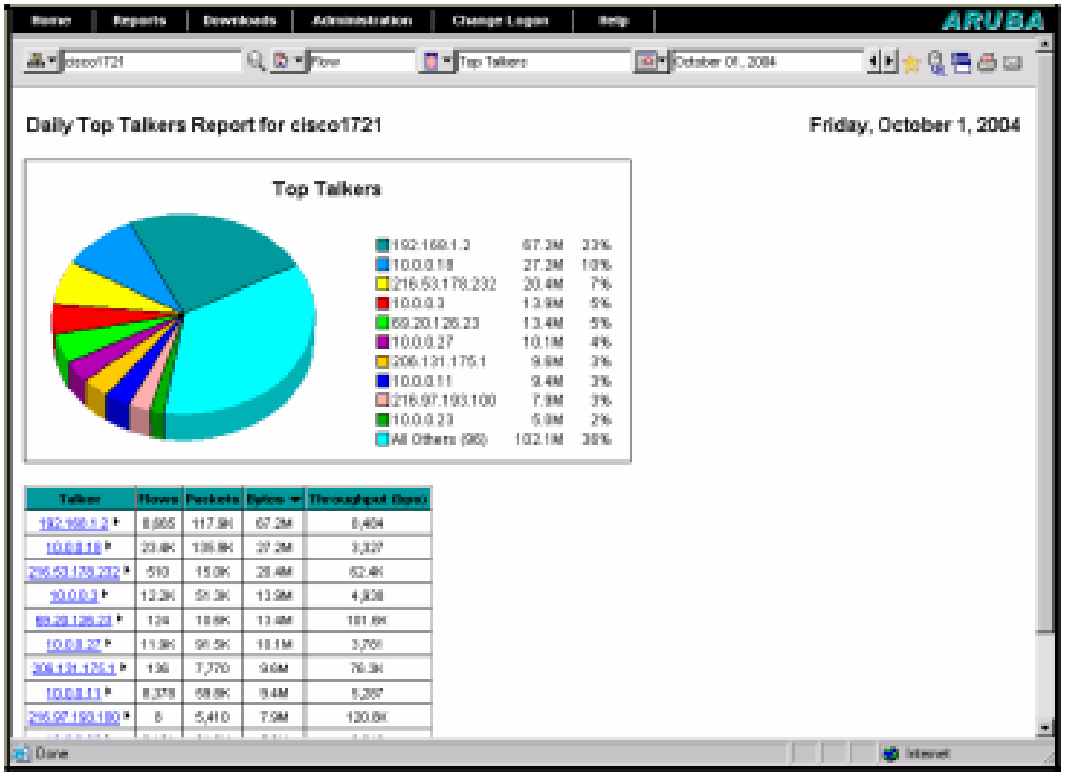
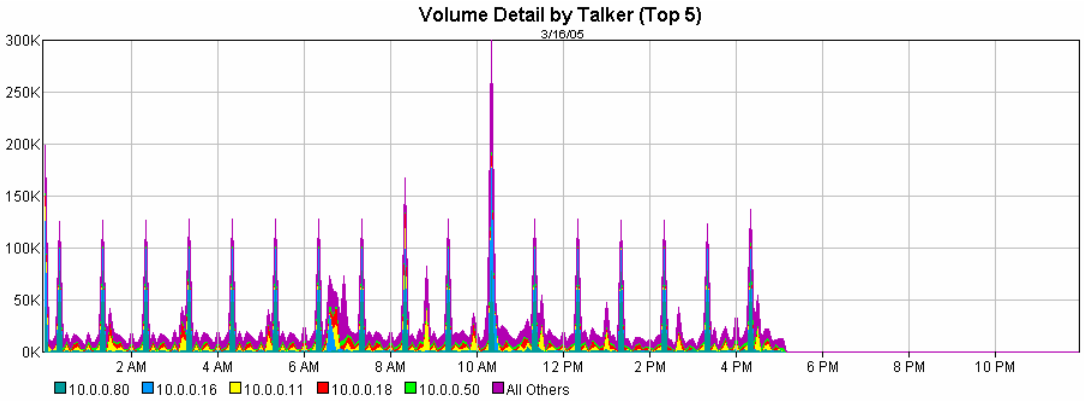
Traffic/Protocol Analysis (NetFlow)





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Section 5: Summary

To effectively implement a server consolidation strategy requires quality information regarding the systems, network and services that IT is supporting. With the Aruba Suite IT Managers can automate the collection of data and presentation of information for planning, understanding the business processes, evaluating network performance, supporting increased project scope, and making sound business decisions

To learn more about Valencia software solutions, please visit us on our web site at www.valenciasystems.com

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