Dell PowerConnect W AirWave 7.2

Sizing Guide

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Contents

About this Guide

This preface provides an overview of this guide and contact information for Dell, and includes the following sections:

Document Organization

This document provides guidelines for purchasing new hardware which hosts the Dell PowerConnect W AirWave Wireless Management System (AWMS).

Table 1 *Chapter Organization and Purposes*

Chapter	Description
Chapter 1, "Sizing Overview" on page 5	Provides an overview of the sizing information.
Chapter 2, "CPU, BIOS, Operating Systems, and Storage" on page 7	Details information about the CPU, BIOS, Operating systems, and storage systems of AWMS.
Chapter 3, "Virtualization and Scalability" on page 11	Discusses virtual machines and scaling of AWMS.
Appendix A, "Miscellaneous Sizing Information" on page 15	Includes specifications on AMD Hardware.

Note, Caution, and Warning Icons

This document uses the following icons to emphasize advisories for certain actions, configurations, or concepts:

NOTE: Indicates helpful suggestions, pertinent information, and important things to remember.

CAUTION: Indicates a risk of damage to your hardware or loss of data.

WARNING: Indicates a risk of personal injury or death.

Contacting Support

Table 2 *Website contact*

Web Site	
Main Website	dell.com
Support Website	support.dell.com
Documentation Website	support.dell.com/manuals

Chapter 1

Sizing Overview

This overview chapter includes the following topics:

Your hardware should incorporate margin for WLAN expansion as well as future AWMS features and modules. These specifications are formulated to keep AWMS running on the same hardware platform for up to two years.

Factors which influence the processing requirements for your AWMS server:

- How many devices will the server manage?
- How often will AMP communicate these devices?
- How many wireless clients will the server monitor?
- Will this server run the RAPIDS (IDS and WIPS) modules?
- Will this server run VisualRF and provide location services?

CPU and Memory Matrix

Table 3 *CPU and Memory*

Managed Devices	CPU Class	Clock Speed (GHz)	CPUs	Total Cores	AWMS Memory	RAPIDS Memory	VisualRF Memory
Pilot 1-25 APs	Quad Core Intel® Xeon X3430	2.4	1	4	3 GB	.5 GB	.5 GB
100	Quad Core Intel® Xeon X3440	2.53	1	4	4 GB	1 GB	1 GB
200	Quad Core Intel® Xeon X3460	2.8	1	4	4 GB	2 GB	2 GB
500	Quad Core Intel® Xeon X5540	2.53	1	4	4 GB	2 GB	2 GB
1,000	Quad Core Intel® Xeon X5560	2.8	1	4	6 GB	3 GB	3 GB
2,500	Quad Core Intel® Xeon X5560	2.8	2	8	16 GB	4 GB	4 GB
2,500 +	Hex Core Intel® Xeon X5680	3.33	2	12	24 GB	6 GB	6 GB

Storage Matrix

Table 4 *Storage*

Number of Devices	Min. AWMS Storage	Max. AWMS Storage	*IOPS 2 x random writes to reads	Storage System
100	*75 GB	75 GB	60	(1) Drive 15K RPM
200	75 GB	75 GB	120	(1) Drive 15K RPM
500	75 GB	75 GB	300	Multiple 15K RPM RAID Drives
1,000	75 GB	150 GB	600	Multiple 15K RPM RAID Drives
2,500	187 GB	375 GB	1,500	Multiple 15K RPM RAID Drives
2,500 +	300 GB	600 GB	3,000	Multiple 15K RPM & SSD RAID Drives

* The 75 GB requirement on the smaller installation (100-500) accounts for the OS and swap overhead, and it is very difficult to install a single disk with less than 75 GB capacity.

NOTE: Please ensure the disk subsystem can sustain these random write rates. Sustained sequential write rates will not help because AWMS writes are primarily random.

Chapter 2

CPU, BIOS, Operating Systems, and Storage

This chapter explains sizing information for the following topics:

CPU and BIOS

Intel Nehalem and Westmere Architecture Information

With the advent of Nehalem, Intel now supports NUMA (Non Uniform Memory Access). In NUMA, memory on the same processor board as the CPU (local memory) is accessed faster than memory on other processor boards (shared memory), hence the "non-uniform" nomenclature. As a result, NUMA architecture scales much better to higher numbers of CPUs/cores than SMP.

- 32-bit - ensure NUMA is disabled.
- Some vendors' BIOS refer to non NUMA as "Memory Node Interleaving". Ensure "Memory Node Interleaving" is enabled on 32-bit operating systems.
- By default, most vendors disable this setting in their BIOS.
- 64-bit - ensure NUMA is enabled. Some vendors' BIOS have NUMA Enabled or NUMA-Aware OS options.

Ensure that Power Management is configured for Maximum Performance. By default, most vendors configure BIOS to an eco-friendly setting.

Ensure that Memory Operating Mode is configured to Optimizer Mode, if available.

AMD Information

Scalability numbers are based on published performance data versus the Intel product line. See Appendix A, "Miscellaneous Sizing Information" on page 15 for details in the AMD Scalability Matrix.

Operating System

To ensure hardware capability, purchase server hardware that is certified by Red Hat Enterprise Linux.

- AWMS includes the CentOS operating system based on Red Hat Enterprise Linux and is installed by default. You may choose to use Red Hat Enterprise Linux.
- AWMS supports both 32-bit and 64-bit hardware platforms. An AWMS server servicing more than 2,500 devices requires 64-bit OS installation coupled with AWMS 7.1 or higher.
- AWMS 7.1 installs 64-bit CentOS by default.

Storage

AWMS stores most statistical data in special statistical flat files. This is a speed improvement over writing to a relational database. Additionally, it provides for a known, fixed amount of storage per managed device and consumes much less space than a traditional rational database. AMP spends much more time writing to the disk subsystem than reading from it.

- Here are some factors which influence storage requirements for your AWMS server:
- How many devices will the server manage?
- How much historical data will the server retain?
- How many wireless clients will the server monitor?
- Will this Server run VisualRF and RAPIDS?

RAID Configuration Information

200 Devices and Below

AWMS 100 and 200 models perform well on a single, fast (spindle speed) disk.

500 - 1,000 Devices

RAID configuration requires at least 4 SAS/SCSI disk drives in a RAID-10 configuration supplied via a hardware controller with at least 256 MB of cache. All disk drives must have 15K RPM spindle speeds. Do not use software RAID systems or SATA disk drives.

1,000 - 2,500 Devices

RAID configuration requires at least 6 SAS/SCSI disk drives in a RAID-10 configuration supplied via a hardware controller with at least 512 MB of cache. All disk drives must have 15K RPM spindle speeds.

2,500 - 5,000 Devices Non-SSD Drives

AWMS 2,500 - 5,000 device installations require at least 16 SAS/SCSI disk drives in a RAID-10 configuration supplied via a hardware controller with at least 1 GB of cache. All disk drives must have 15K RPM spindle speeds.

2,500 - 5,000 Devices SSD Drives

AWMS 2,500-5,000 device installations with SSDs require two distinct disk partitions. The first partition will need 10 SSDs (Solid State Disk) drives in RAID-10 configuration supplied via a hardware controller with at least 1 GB of cache. This partition is the high throughput data storage area "/var" described in the partition table below.

The second partition will require at least two (2) SAS/SCSI drives in a high availability configuration (mirrored or RAID), supplied via a hardware controller. Both drives must have 15K RPM spindle speeds. This partition will contain the boot and swap described in the partition tables below.

NOTE: Please contact support.dell.com when purchasing or configuring any hardware platform servicing more than 2,500 devices. AWMS servers servicing more than 2,500 devices require 64-bit OS and AWMS 7.1 or higher. Do not use software RAID systems or SATA disk drives.

Disk Partitioning

AWMS automatically partitions the disk subsystem upon installation. You can override these values. Table 5 and Table 6 below list the default partitioning and provides guidance for more advanced scenarios.

Table 5 *Default Partitions*

Default Partitions	Size
boot	100 MB
swap	Twice size of RAM
/	Rest of disk space

Table 6 *Advanced Partitions*

Default Partitions	Purpose	Recommended Size
boot	Boot partition	100 MB
swap	Swap partition	Twice size of RAM
/	AWMS	25% of total disk space
/alternative	Database backup location	10% of total disk space
/var/log	All log from all services	5% of total disk space
/var/lib/pgsql	PostgreSQL database files	25% of total disk space
/var/airwave/rrd	Statistical flat files	25% of total disk space
/var/airwave-backup	Nightly backup location	10% of total disk space

NOTE: Please ensure the disk subsystem can sustain these random write rates. Sustained sequential write rates will not help because AWMS writes are primarily random. For platforms servicing more than 2,500 devices, all "var" partitions should be located on SSDs.

You may experience upgrade or installation issues when manually partitioning your disk subsystem. Symbolic links are not recommended when configuring disk subsystem because of backup and restoration issues.

Storage System Tuning

For RAID 10:

- Ensure that all disks are configured to "One Virtual Disk".
- If the RAID controller has battery-backed cache, ensure the Write Policy is configured to "Write-Back", otherwise ensure it is configured to "Write-Through".

CentOS and RH Linux include four custom schedulers to handle I/O:

- CFQ - Completely Fair Queuing is the default algorithm
- Deadline elevator - uses a deadline algorithm to minimize I/O latency
- NOOP scheduler -a simple FIFO
- Anticipatory elevator - introduces a small delay before dispatching the I/O

While CFQ works well in most installations, Dell has found changing scheduler to NOOP and allowing the hardware RAID controller to handle I/O queuing has produce significant I/O improvements. This is set via /sys/block/<device>/queue/scheduler.

NOTE: Contact **support.dell.com** prior to changing this setting.

Chapter 3

Virtualization and Scalability

This chapter includes the following topics:

Virtualization

AWMS can run in a VMWare and Xen virtualized environment. To ensure scalability, you need to dedicate the processing and memory as described in the table below. You must also ensure that the disk subsystem can maintain the IOPS throughput as detailed below.

Most virtualized environments use a shard disk subsystem assuming that each application will have bursts of I/O without a sustained high I/O throughput. AWMS requires a continuous sustained high data I/O rate.

Table 7 *Virtualized Processing and Disk IOPS Matrix*

Managed Devices	CPU Class	Clock Speed (GHz)	CPUs	Total Cores	Max Memory	Sustained IOPS
Pilot 1-25 APs	Quad Core Intel® Xeon X3430	2.4	1	4	3 GB	30
100	Quad Core Intel® Xeon X3440	2.53	1	4	6 GB	60
200	Quad Core Intel® Xeon X3460	2.8	1	4	8 GB	120
500	Quad Core Intel® Xeon X5540	2.53	1	4	8 GB	300
1,000	Quad Core Intel® Xeon X5560	2.8	1	4	12 GB	600
2,500	Quad Core Intel® Xeon X5560	2.8	2	8	24 GB	1,500
2,500 +	Hex Core Intel® Xeon X5680	3.33	2	12	48 GB	3,000

NOTE: There are always spikes that go beyond the Sustained IOPS numbers stated above. A 20% increase buffer is recommended for virtualized environments. Ensure you allocate enough extra disk space for the OS and swap when partitioning the virtual disk.

Scalability Assumptions

Scalability is continuously tested based on the following assumptions. Deviations from these assumptions can impact overall scalability of your AWMS server.

Table 8 *Wireless Scalability Test Values*

Category	Value
Average density of client devices per access point	5
Device configuration auditing interval	Daily
Up/Down status polling period (minutes)	5
User data polling period (minutes)	10
Thin AP discovery period (minutes)	15
Device-to-device link polling period (minutes)	20
Device bandwidth polling period (minutes)	10
802.11 counters polling period (minutes)	15
Rogue AP and device location data polling period (minutes)	30
CDP neighbor data polling period (minutes)	60

NOTE: Auditing more than once a day can have a tremendous impact on scalability.

Table 9 *Wired Scalability Test Values*

Category	Value
Ratio of switches/routers to access points	20%
Average port density of switches/routers	36
Read ARP polling period (hours)	8
Read CDP table for device discovery polling period (hours)	8
Read bridge forwarding table polling period (hours)	8
Interface polling period (minutes)	20

Table 10 *VisualRF Scalability Test Values*

Category	Value
Average floor plan size (feet)	62,500
Number of access points per floor plan	20
Number of clients per floor plan	100
Number of attenuation grid cells per floor plan	2,500
Number Rogue devices per floor plan	20
AMP Synchronization timer (minutes)	15

Table 10 *VisualRF Scalability Test Values (Continued)*

Category	Value
Rogue location timer (minutes)	30
Location calculation timer (min/max/number of samples)	90/360/3

Appendix A

Miscellaneous Sizing Information

AMD Hardware

Table 11 *AMD Hardware Matrix*

Managed Devices	CPU Class	Clock Speed (GHz)	CPUs	Total Cores	AWMS Memory	RAPIDS Memory	VisualRF Memory
500	Quad Core AMD Opteron™ 8387	2.8	1	4	4 GB	2 GB	2 GB
1,000	Quad Core AMD Opteron™ 8387	2.8	2	8	10 GB	3 GB	3 GB
2,000	Quad Core AMD Opteron™ 8435	2.6	2	12	12 GB	6 GB	6 GB

NOTE: Dell does not actively conduct scalability testing for the AMD processor product line. These numbers are based on published performance data.