


AirWave 7.7



Server Sizing Guide

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This document provides information for selecting hardware. Note that this document is current with supported information for AirWave 7.7.

This section includes the following topics:

- "CPU, Memory, and Storage Matrix" on page 5
- "Choosing Your CPU" on page 7
- "Choosing Your Memory" on page 7
- "Choosing Your RAID Controller" on page 7
- "Choosing Your Hard Drives" on page 8

CPU, Memory, and Storage Matrix

The following table lists the recommended specifications for optimum AMP server performance.

Table 1: *Recommended CPU, Memory, and Storage*

| Devices | CPU | RAM (GB) | Disk Config | IOs Needed by AMP | Storage (GB) |
|---------------|-----------------------------------|----------|-----------------------|-------------------|--------------|
| Less than 500 | | 8 | | 50 | 75 |
| 500 | Intel® Core™ i3-2220 @ 3.30GHz | 16 | 6x 146GB 15k RAID 10 | 300 | 410 |
| 1000 | Intel Core i5-3570 @ 3.40GHz | 32 | 10x 146GB 15k RAID 10 | 600 | 685 |
| 1500 | Intel® Xeon® E5-2660 @ 2.20GHz | 48 | 12x 146GB 15k RAID 10 | 900 | 821 |
| 4000 | Dual Intel Xeon E5-2660 @ 2.20GHz | 80 | 16x 146GB 15k RAID 10 | 2400 | 1095 |
| 5000 | Dual Intel Xeon E5-2690 @ 2.90GHz | 96 | 18x 146GB 15k RAID 10 | 3000 | 1232 |
| 5000 SSD | Dual Intel Xeon E5-2690 @ 2.90GHz | 96 | 6x 500GB SSD RAID 10 | 3000 | 1397 |



Ensure that the disk subsystem can sustain 4KB random write rates. Sustained sequential write rates will not help because AMP writes are primarily random.

The following table lists the minimum specifications required to run AMP.

Table 2: *Minimum CPU, Memory, and Storage*

| Devices | Appliance Name | CPU | RAM (GB) | Disk Config | IOPs | Storage (GB) |
|---------------|----------------|-----------------------------------|----------|----------------------|------|--------------|
| Less than 500 | | | 4 | | 30 | 75 |
| 500 | | Intel Core i3 550 @ 3.20GHz | 8 | 4x 146GB 15k RAID 10 | 300 | 273 |
| 1000 | | Intel Xeon E5-1603 @ 2.8 GHz | 16 | 6x 146GB 15k RAID 10 | 600 | 410 |
| 1500 | AW-HW-PRO* | Intel Xeon E5-2640 @ 2.50GHz | 32 | 6x 146GB 15k RAID 10 | 900 | 410 |
| 4000 | AW-HW-ENT* | Dual Intel Xeon E5-2640 @ 2.50GHz | 64 | 8x 146GB 15k RAID 10 | 2400 | 548 |

* These systems represent appliances that are available from Aruba.

Assumptions

The recommendations provided in this document are based on extensive testing scenarios run in house. The following assumptions are common across these tests. If your particular environment differs significantly in any of these dimensions, then this *Server Sizing Guide* might not be appropriate for your situation.

Table 3: *Assumptions used during testing*

| Item | Assumption |
|---|--|
| % Switches | 20%. Note that doubling the wired switch/total device ratio from 20% to 40% results in a 20% decrease in the number of devices for which the system can process data. (For example, the ENT system is rated for 3200 devices at 40% wired switches.) |
| Syslog messages per second (continuous) | PRO: 125 messages per second ENT: 250 messages per second |
| Client traps per second (continuous) | PRO: 50 ENT: 100 |
| Roaming Rate per second | This value should equal approximately 1/3 the value of client traps that result in actionable items. <ul style="list-style-type: none">PRO: 17 (approximately)ENT: 33 (approximately) |
| Client historical retention | In AMP Setup > General , the Client Association and VPN History option is set to 14 days. |
| Reporting rate | AMP default reports and reporting rate. |

AMP includes the 64-bit CentOS operating system based on Red Hat Enterprise Linux (RHEL), and that is installed by default. If you choose to install RHEL instead of the supplied CentOS, you will need to purchase your own RHEL license and support separately.

Your hardware should incorporate margins for WLAN expansion as well as for future AMP features and modules. These recommended specifications are formulated to keep AMP running on the same hardware platform for up to three years.



To ensure hardware capability, purchase server hardware that is certified to be compatible with Red Hat Enterprise Linux 5 (RHEL5).

Additional factors that can influence the processing requirements for your AMP server:

- How many devices will the server manage?
- How often will AMP communicate with these devices?

Choosing Your CPU

For most AirWave installations, Aruba recommends selecting high-performance Xeon E-series CPUs.

Aruba performs scalability testing using Intel based hardware at this time. See [Table 1](#) in "CPU, Memory, and Storage Matrix" on [page 5](#) for recommendations on CPU selection based on clock speed and core type.

Choosing Your Memory

AirWave's memory recommendations scale linearly with the managed device count.

With AirWave servers running at full load for those device counts with a large number of floorplans, the recommended memory usually results in best overall performance.

Best performance is defined by minimal disk reads due to sufficient caching, thus allowing for maximum disk write performance and minimal CPU I/O wait time.

Choosing Your RAID Controller

RAID 1+0 is the ONLY supported RAID configuration for AirWave.



Software RAID and SATA drives are NOT SUPPORTED for any configuration of AirWave.

RAID Configuration Information

For RAID 1+0:

- Dedicated Hardware RAID controller with caching and battery backup or non volatile (NV) cache.
- RAID controller should be configured for Write-Back caching with battery backup (unless NVcache is selected, then Force Write-Back without Battery backup is recommended).
- Individual Drive Caching should be enabled.
- Ensure that all disks are assigned and configured to a single volume.



Improper RAID configuration can result in drastically reduced server performance.

200 Devices and Below

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

500 Devices

RAID 1+0 configuration of four (4) or more 15K SAS drives in a single volume with dedicated Hardware RAID controller with minimum 256MB of cache and battery backup.

1,000 Devices

RAID 1+0 configuration of four (4) or more 15K SAS drives in a single volume with dedicated Hardware RAID controller with minimum 256MB of cache and battery backup.

1,750 Devices

RAID 1+0 configuration of six to eight (6-8) or more 15K SAS drives in a single volume with dedicated Hardware RAID controller with minimum 512MB of cache and battery backup.

2,500 Devices

RAID 1+0 configuration of six to eight (6-8) or more 15K SAS drives in a single volume with dedicated Hardware RAID controller with minimum 1GB of cache and battery backup.

5,000 Devices - Non-SSD Drives

RAID 1+0 configuration of sixteen (16) or more 15K SAS drives in a single volume with dedicated Hardware RAID controller with minimum 1GB of cache and battery backup.

5,000 Devices - SSD Drives

AWMS 2,500 - 5,000 device installations with SSDs require **Single Level Cell (SLC) Enterprise class SSD drives**.



Do not use Multi Level Cell (MLC) Consumer class drives. Use of MLC drives can result in drastically reduced SSD drive lifespan and data loss/volume failure due to write exhaustion.

A minimum of six (6) Enterprise SSDs in a RAID 1+0 configuration are required, (Refer to "[CPU, Memory, and Storage Matrix](#)" on page 5 for minimum needed storage capacity information.) Eight (8) or more SSDs in a RAID 1+0 configuration are recommended.

The target random write 4KB IOP Performance is at minimum 3,000 sustained IOPS for 5,000 device monitoring.

The actual disk IOP requirement can vary depending on the configuration of the AirWave server.



If you have any questions regarding hardware compatibility or selection, contact Aruba support.



AirWave servers servicing more than 2,500 devices require 64-bit OS and AirWave 7.1 or higher. Do not use software RAID systems or SATA disk drives.

Choosing Your Hard Drives

15K SAS drives are the highest performance spinning platter drives available today. Serial ATA and 10K SAS are vastly outperformed by 15K SAS and should not be used in an AirWave server.

You will need to select the appropriately sized hard drive to meet your desired storage volume after taking into account RAID 1+0 reduction on overall storage capacity.

RAID 1+0 reduces your single volume available drive space by ½ because of the redundancy introduced. An example would be 16x 146GB 15K SAS hard drives in a RAID 1+0 volume will result in approximately 1.1 TB of storage space $[(16 \times 146\text{GB}) / 2]$.

SSDs vs 15K SAS

Solid State Drives are becoming more affordable and are being offered as a high performance drive option by many vendors. SSDs offer performance that far outstrips 15K SAS, but at a significant cost premium.

AirWave supports deployment on SSD based storage arrays and can take advantage of the high speed disk access and stellar random write performance.

To select an appropriate SSD you'll want to ensure that the SSD is classified as "Enterprise" class. This generally indicates a drive that uses Single Level Cell (SLC) technology versus Multi Level Cell (MLC) technology. SLC technology is required for an AirWave server to avoid unexpected write exhaustion and/or poor performance due to write amplification.

Confirm with your vendor prior to purchasing SSDs that their offerings are appropriate for a 24/7 sustained high random write database server and are not a consumer-grade SSD.

In general, RAID 1+0 is still recommended for SSD deployments to allow for the best overall redundancy and performance. Any parity based RAID (5/6/etc) is not recommended.

For additional information, please contact Aruba support.

This section explains sizing information for the following topics:

- "CPU Configuration " on page 10
- "Disk Partitioning" on page 10
- "Filesystem Configuration" on page 10

CPU Configuration

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.

Disk Partitioning

AirWave automatically partitions the disk subsystem upon installation. You can override these values. [Table 4](#) below lists the default partitioning and provides guidance for more advanced scenarios.

Table 4: *Default Partitions*

| Default Partitions | Size |
|--------------------|-------------------------|
| boot | 100 MB |
| swap | 4 GB |
| / | Remainder of disk space |

Filesystem Configuration

For AirWave, the NOOP File I/O scheduler provides the best random write performance. If you are running AirWave 7.2 or later, AirWave should automatically manage this setting for you.

To check the currently assigned scheduler (if sda is not your device name, please replace with the correct device name):

```
# cat /sys/block/sda/queue/scheduler
noop anticipatory deadline [cfq] (Sample Output)
```

To configure noop as your preferred scheduler:

```
# echo noop > /sys/block/sda/queue/scheduler
```

And confirm that your change has been applied:

```
# cat /sys/block/sda/queue/scheduler
[noop] anticipatory deadline cfq (Expected Output)
```

This section includes the following topics:

- "Virtualization" on page 11
- "Scalability Assumptions" on page 11

Virtualization

AirWave can run in a VMware and Xen virtualized environment. To ensure scalability, dedicate the processing and memory. You must also ensure that the disk subsystem can maintain the IOPS throughput as detailed below.

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

For virtualized environment, use dedicated hardware. If you are using the specifications outlined in the "CPU, Memory, and Storage Matrix" on page 5 section, the hardware for virtualization should exceed these specifications by 20%.



Aruba recommends a 20% increase buffer for virtualized environments. Ensure you allocate enough extra disk space for the OS and swap when partitioning the virtual disk.

Scalability Assumptions

Using the specifications outlined in the "CPU, Memory, and Storage Matrix" on page 5 section, Aruba continually tests scalability based on the following assumptions. Deviations from these assumptions can impact overall scalability of your AirWave server.

Table 5: Wireless Scalability Test Values

| Category | |
|---|-----|
| AP Interface polling period | 10 |
| Device-to-device link period | 5 |
| CDP neighbor data polling | 30 |
| Ratio of switches/routers to access points | 25% |
| Read ARP polling (hours) | 4 |
| Read CDP table for device discovery polling (hours) | 4 |
| Read bridge forwarding table polling (hours) | 4 |
| Interface Up/Down polling period | 10 |



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

Table 6: Wired Scalability Test Values

| Category | |
|--|-----|
| Ratio of switches/routers to access points | 25% |
| 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 7: VisualRF Scalability Test Values

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

Master Console

Table 8: *Master Console Specifications*

| Environment Size | CPU Class | Clock Speed (GHz) | CPUs | Total Cores | Memory | Disk Subsystem |
|---------------------|-------------------------|-------------------|------|-------------|--------|--|
| Small (2-3 servers) | Intel Xeon E5-2640 | 2.5 | 1 | 6 | 32GB | 6x 146GB 15k RAID 10 (410GB usable disk space) |
| Large (>3 servers) | Dual Intel Xeon E5-2640 | 2.5 | 2 | 12 | 64GB | 8x 146GB 15k RAID 10 (548GB usable disk space) |

Failover Server

The Failover server should be as powerful as the most powerful AMP server that it monitors to ensure smooth operation in a failover situation.