PROMISE® TECHNOLOGY, INC.

Vess A2000 Series

NVR Storage Appliance

AxxonSoft Surveillance Solution

Version 1.0

Contents

INTRODUCTION

Overview

This document provides an overview of the Promise Vess A2000 Series NVR Storage Appliance. It includes a test case that simulates a large scale network based surveillance solution. The test case utilizes Axxonsoft, Axxon Next VMS to determine performance results.

This document also includes key performance indicators and test results for reference and comparison.

Purpose

Purpose of this document is to demonstrate the capabilities of Vess A2000 Series platform, in optimally utilizing the resources for NVR usage.

This note gives the detailed understanding of overall Vess A2000 Series platform and **Axxonsoft**, **Axxon Next** VMS-based surveillance solution.

The monitor data indicates the improved performance results using same/similar hardware components.

Scope

The scope of this document is to create and test an IP camera based surveillance solution using the Promise Vess A2000 Series NVR Storage Appliance with the Promise RAID platform running an Axxonsoft, Axxon Next VMS software solution.

This note limits itself within the resource intense test configurations intended to simulate a real use large scale surveillance application environment. It does not test and verify every given matrix of video and hardware variables.

Audience

The intended audience for this document includes design and deployment Engineers, as well as persons involved in sale and marketing of Vess A2000 Series based Axxonsoft, Axxon Next solutions.

Components

Key components involved in technical note are:

- Promise Vess A2200 NVR Storage Appliance and Vess A2600 NVR Storage Appliance, hardware and Promise RAID platform
- Axxon Next video surveillance software

Promise Vess A2000 Series System

The Vess A2000 NVR storage appliance is specially engineered for medium to large scale IP video surveillance deployment. The subsystems provide continuous recording and playback operation for networked installations of 32 to 100 High-Definition IP cameras.

The Vess A2000 Series includes the robust and market tested Promise RAID engine, Intel based server platform, industrial grade housing, smart sensors thermal and electrical enclosure protection, N+1 power redundancy, a choice of Linux or Windows operating systems, and intuitive web-based graphical user interface and command line utility for simplified system administration.

Promise Technology Inc is a longtime market leader of RAID based storage solution.

Hardware Components

This document presents two systems for testing:

- Vess A2600 NVR Storage Appliance 3U 16-Bay system that includes:

- Intel Xeon E3-1245V2 (CPU Benchmark: 8942)

- 8GB DDR3 RAM.

- Four gigabit network ports

Vess A2200 NVR Storage Appliance2U 6-Bay system that includes:

- Intel i3-3225 (CPU benchmark: 4360)

- 4GB DDR3 RAM.

- Four gigabit network ports

Operating System

- 64bit Windows Embedded Standard 7 + Service Pack 1

RAID Engine

This test utilizes all drives in single Logical Drive in a RAID 5 arrangement.

Axxonsoft VMS

AxxonSoft is a leading software developer that combines IP-based physical security information management (PSIM), intelligent video analytics, video management software, facial recognition, POS and road traffic monitoring, and an enterprise-wide platform into fully integrated vertical and horizontal solutions.

Axxon software are divided into two categories: "Axxon Next", video recording and management software, and "Axxon Intellect Enterprise", video analytics software.

All tests in this document are done using only Axxon Next video recording and management software.

Axxon Next Application Host

The Axxon Next application host is the recording and management process. This software module is installed on Vess A2000 systems and managed remotely.

Axxon Next Client Application

The Axxon Next client application is the host management and viewer application. This module can be installed on the same host system, as well as on a remote system.

The Axxon Next client can connect to multiple Application Host systems, meaning that it is the central management client.

Test Environment

Machine Under Test (MUT) System configuration

	Vess A2600	**Vess A2200**
VMS	Axxon Next	Axxon Next
OS	Windows Embedded Standard 7 SP1 64bit	Windows Embedded Standard 7 SP1 64bit
CPU	Xeon E3-1245V2 CPU Benchmark: 8942	i3-3225 CPU benchmark: 4360
RAM	8GB DDR3	4GB DDR3
HDD	16SATA HDD	6SATA HDD
RAID CFG	R5 + Spare	R5
Install PKG	1.00.0000.53	1.00.0000.53
DOM	32GB	32GB

Topology

Test Topology Includes the Vess A2000 and a Virtual Video Stream feed server. All software components are installed on the Vess A2000.
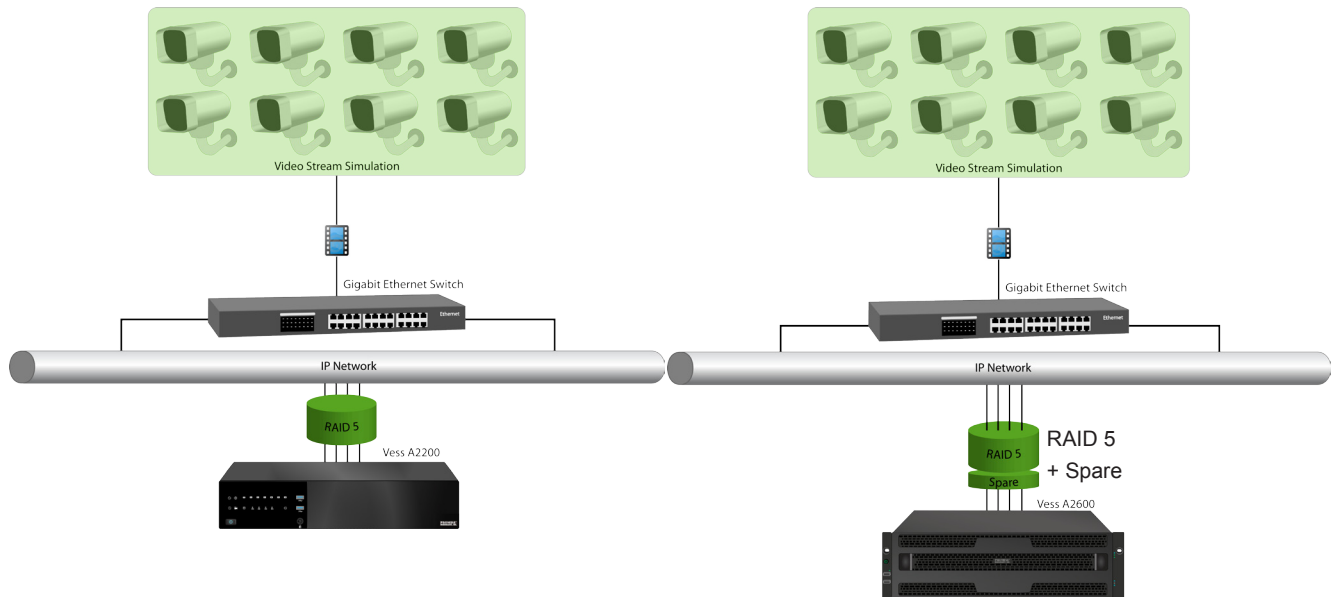
Test Matrix and Criteria

To evaluate different aspects of the solution, the test is divided into multiple parts:

VA System	Test Purpose	Video Stream Variables
VA2600	Platform Performance Test	Codec: H.264; Res: 1280x720; FPS: 30; Bitrate: 4Mbps.
VA2200	Platform Performance Test	Codec: H.264; Res: 1280x720; FPS: 30; Bitrate: 4Mbps.
VA2600	Throughput Test	Codec: MJPEG; Res: 1920x1440; FPS: 30; Max Bandwidth: 4Mbps.
VA2200	Throughput Test	Codec: MJPEG; Res: 1920x1440; FPS: 30; Max Bandwidth: 4Mbps.

The focus of the platform stress test is to test the system using real world user settings.

The throughput test demonstrates the capability of the Vess A2000 system in handling large volume data streams.

Conditions to obtain the results includes:

- CPU utilization must remain below 60%.

- No FPS drops is when the counter is lower for 2FPS. (Medium FPS – FPS < 2 FPS).

- Memory usage for AppHost and AxxonNext cannot exceed 2GB

Vess A2000 Platform Performance

Recording Performance Test
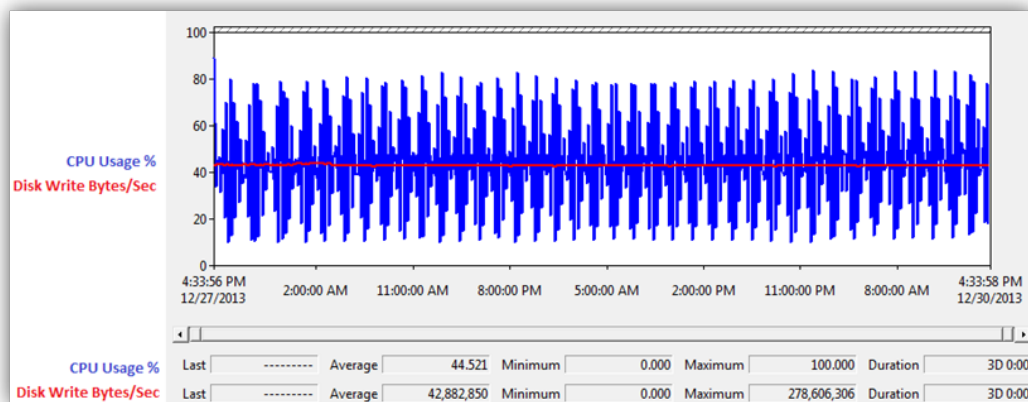
Overview

This test simulates real world user settings. It is intended to check the stability and performance of Vess A2600 and Vess A2200 systems.
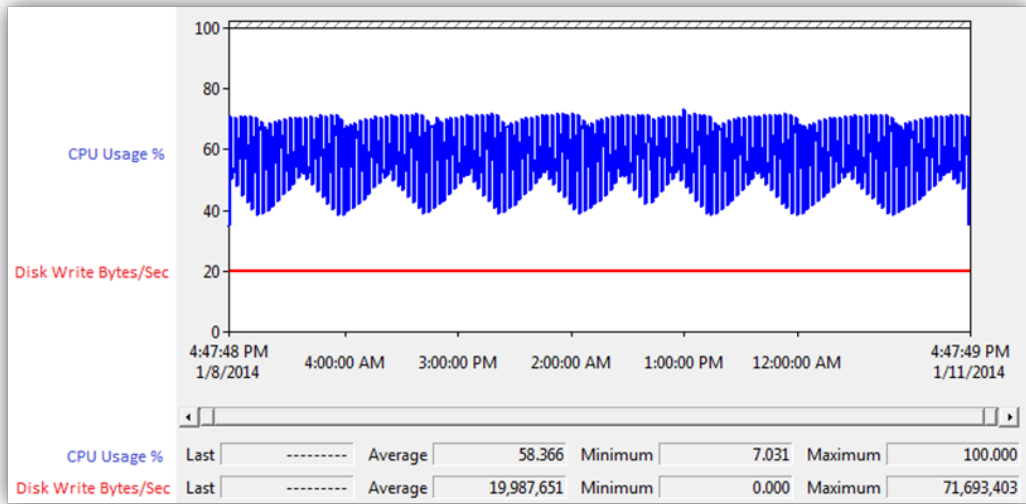
Video stream configurations used in this test are:

- Codec: H.264

- Res: 1280x720

- FPS: 30

- Bitrates: 1, 4 and 8 Mbit/sec

Observation and Highlights

Bitrate (Mbits/Sec)	A2200		A2600	
	Cameras	Throughput (MB/s)	Cameras	Throughput (MB/s)
1	40	5.28	150	18.38
4	28	19.05	76	41.23
8	16	20.29	40	50.73

Throughput Performance Test

Overview

This test is conducted to determine the maximum achievable throughput.

Video stream configurations used in this test are:

- Codec: MJPEG

- Res: 1920x1440

- FPS: 30

- Max Bandwidth: 4 Mbit/sec

Observation and Highlights

Maximum Bandwidth (Mbits/Sec)	A2200		A2600	
	Cameras	Throughput (MB/s)	Cameras	Throughput (MB/s)
4	7	43.45	23	142.92

RAID Mode Test

Overview

This test provides an overview of system performance under different RAID configurations.

Video stream configurations used in this test are:

- Codec: H.264

- Res: 1280x720

- FPS: 30

- Bitrates: 4 Mbit/sec

- RAID Levels: 0, 10, 5 and 6

Observation and Highlights

RAID Level	A2200		A2600	
	Cameras	Throughput (MB/s)	Cameras	Throughput (MB/s)
RAID 5	28	19.05	76	41.23
RAID 0	32	17.48	123	66.04
RAID 6	28	15.71	103	54.82
RAID 10	32	17.91	130	68.29

Simultaneous Recording and Playing Back Test

Overview

This test evaluates system performance and stability while recording (data in) and streaming (data out).

Video stream configurations used in this test are:

- Codec: H.264

- Res: 1280x720

- FPS: 30

- Bitrate: 4 Mbit/sec

- Stream-Out Channels: All, if below 25 and 25 Max.

Observation and Highlights

View Type	A2200			A2600		
	Display Channels	**Cameras**	**Throughput (MB/s)**	**Display Channels**	**Cameras**	**Throughput (MB/s)**
Remote Live View	25	28	19.05	25	76	41.23
Remote Play Back	10	10	5.61	9	9	4.92

Background Activity Test

Recording during Rebuilding
Overview

This test is to verify system functioning and stability while the Logical Drive is Rebuilding.

When a Hard Disk Drive (HDD) within a Logical Drive fails, the rebuild process of the RAID system is triggered. The recovered data is written either onto a Spare HDD, or on the replacement HDD.

Expected behavior from the Recording Appliance is to be available for recording, while the rebuilding process works in the background. A minimal drop in performance is expected.

Video stream configurations used in this test are:

- Codec: H.264; Res: 1280x720; FPS: 30; Bitrate: 4 Mbit/sec.

Observation and Highlights

- Both Vess A2600 and Vess A2200 ran stable throughput the test
- Almost no impact of rebuilding processed on recording stream.

	Recording and Rebuilding		Recording Only	
	Throughput	**Cameras**	**Throughput**	**Cameras**
VA2600	44.97 MB/s	80	41.23 MB/s	76
VA2200	13.11 MB/s	24	19.05 MB/s	28

Recording While RAID is in Critical Mode

Overview

This test is to verify system functioning and stability during a Critical RAID condition.

Whenever an HDD of a RAID enclosure fails or stops working, the entire RAID volume is degraded and its status changes to Critical mode.

Note: For real applications, when a RAID goes into critical mode, the faulty hard disk drive should be replaced as soon as possible.

Expected behavior from the Recording Appliance is to be available for recording, while minimal drop in performance is expected.

Video stream configurations used in this test are:

- Codec: H.264; Res: 1280x720; FPS: 30; Bitrate: 4 Mbit/sec.

Observation and Highlights

- Throughput was stable for both Vess A2600 and Vess A2200.

- A small drop in throughput performance is observed.

	Recording and Rebuilding		Recording Only	
	Throughput	Cameras	Throughput	Cameras
VA2600	35.17 MB/s	80	41.23 MB/s	76
VA2200	12.54 MB/s	24	19.05 MB/s	28

Storage Expansion

Overview

Managing an archive of video data is one of the most important tasks for a video surveillance setup. In many cases, recorded footage is required by law to be kept for certain period of time.

Promise Technology provides a series of RAID subsystems used to archive the cold data. Typically this is done on a storage expansion unit or units.

This test uses the Promise RAID subsystem Vess R2600fiS as an expansion unit for the storage of cold date. The Vess A2000 units in the test are used as server only, the native storage on the units are not used.

Video stream configurations used in this test are:

- Codec: H.264; Res: 1280x720; FPS: 30; Bitrate: 4 Mbit/sec.

Topology

Test Topology Includes the Vess A2000 for video data management and a Virtual Video Stream feed server. All management software components are installed on the Vess A2000. The Vess A2000 unit is not used for storage in this test environment. It is however used for managing, reading and writing cold data stored on the Vess R2600 expansion unit. The Vess R2600fiS is used for all data storage.

One Ethernet port on the Vess A2000 is directly connected to the Vess R2000 Archive Expansion unit.
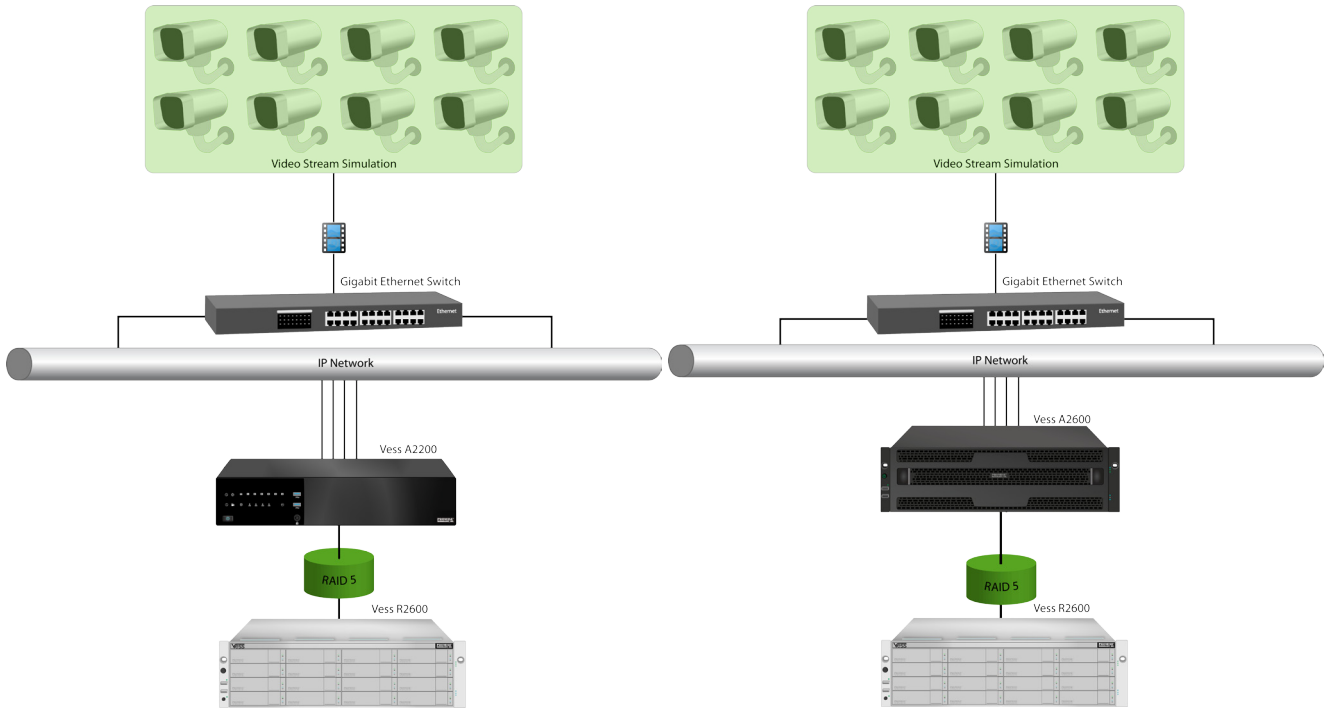
Observation and Highlights

Long term storage or archiving is more complex and puts more pressure on server resources. Reading (archiving) and writing (recording) simultaneously is a random access format. Ideally a storage system should be able to handle the random access read/write without significant performance degradation.

It is observed that there is minimum drop in collective throughput (read and write) while archiving the data.

	Recording server w/ expansion		*Recording Only*	
	Throughput Write	**Cameras**	**Throughput Write**	**Cameras**
VA2600	33.20 MB/s	61	41.23 MB/s	76
VA2200	20.39 MB/s	30	19.05 MB/s	28

Conclusion and Observation

Major requirement of Surveillance Recording Servers are:

Stability: Performance stability of the Surveillance Recording Server is very important for critical safety and security related applications. A Surveillance Recording Server System should maintain stable operation without interruption for long periods of time.

RAID Storage Throughput: Storage data throughput is typically the first performance bottleneck encountered in Surveillance Servers. A surveillance setup generates complex data patterns affected by three factors: the number of cameras, camera frame rate (fps) and data size (resolution). With advancements in recording technology, HD format surveillance cameras are available and affordable for large scale deployments. A storage server must match the data size and complexity of HD cameras on the network.

Test results show the Promise Vess A2000 Series NVR Storage Appliance operated with a high degree of stability throughout the test period. In addition, it also achieved high storage throughput with a reasonable level of resource usage.

Reference