



Vess A2000 Series NVR Storage Appliance


SeeTec Surveillance Solution





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Introduction

Overview

This document provides an overview of the PROMISE VessA2000 Series NVR Storage Appliance. It includes a test case that simulates a large scale network based surveillance solution. The test case utilizes **SeeTec Cayuga R3** 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 SeeTec Cayuga R3 VMS based surveillance solution.

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

Scope

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 SeeTec Cayuga R3 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

Audience of this document includes design and deployment Engineers, as well as persons involved in sale and marketing of Vess A2000 Series based SeeTec Cayuga 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
 - SeeTec Cayuga R3 video surveillance software
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Promise Vess A2000 Series System

The Vess A2000 NVR storage appliance is specially engineered for medium to large scale IP video surveillance deployment. The Vess A2000 functions as both a surveillance recording server and scalable RAID storage system on the surveillance network. 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 Appliance 2U 6-Bay system that includes:

- Intel i3-3245 (CPU benchmark: 4402)
- 8GB 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.





SeeTec VMS Cayuga R3 VMS

SeeTec AG is a leading vendor of manufacturer-neutral full IP video management software, supporting a wide range of edge device from all well-known hardware manufacturers and providing the SeeTec Multi Solution Platform with integrated vertical solutions and interfaces to numerous third party applications. In addition to the standard video surveillance products made in Germany such as SeeTec Cayuga S50, S100 and Infinity, SeeTec offers additional modules such as license plate recognition or video analytics.

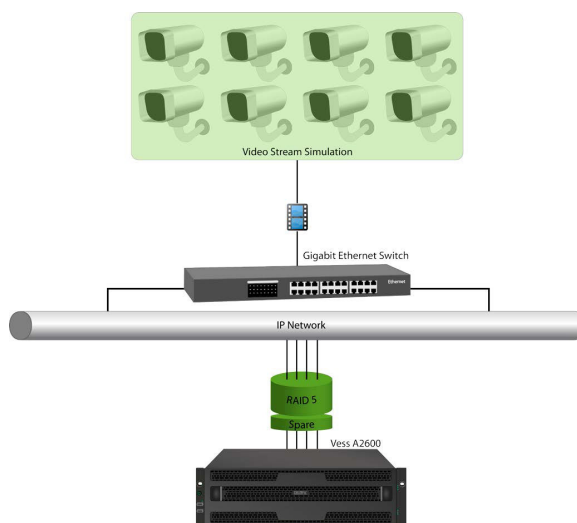
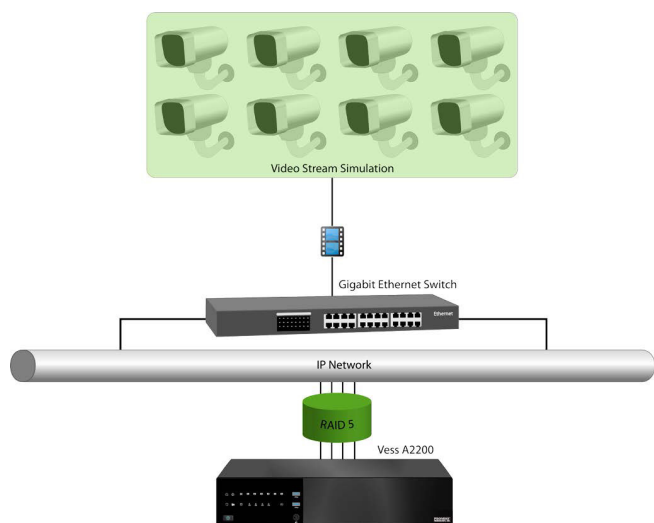
Test Environment

Machine Under Test (MUT) System configuration

	Vess A2600	Vess A2200
VMS	SeeTec Cayuga R3	SeeTec Cayuga R3
OS	Windows Embedded Standard 7 SP1 64bit	Windows Embedded Standard 7 SP1 64bit
CPU	Xeon E3-1245V2 CPU Benchmark: 8942	i3-3245 CPU benchmark: 4402
RAM	8 GB DDR3	8 GB DDR3
HDD	16 SATA HDD	6 SATA HDD
RAID CFG	R5 + Spare	R5
Install PKG	1.02.0000.29	1.02.0000.29
DOM	64GB	64GB

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:

Test	Test Purpose
Pure Recording	Platform Performance Test.
Local liveview	System performance test while local live view.
Local playback	System performance test while local playback.
Remote liveview	System performance test while remote live view.
Remote playback	System performance test while remote playback.
System Critical	System performance test while Vess A2000 system is in critical condition.
System Rebuild	System performance test while Vess A2000 system is rebuilding.

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:

Resource	Criteria
CPU Utilization	Less than 70%
Data loss	Less than 5%
Disk Write latency	The maximum of the disk write latency is less than 1000ms.

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:

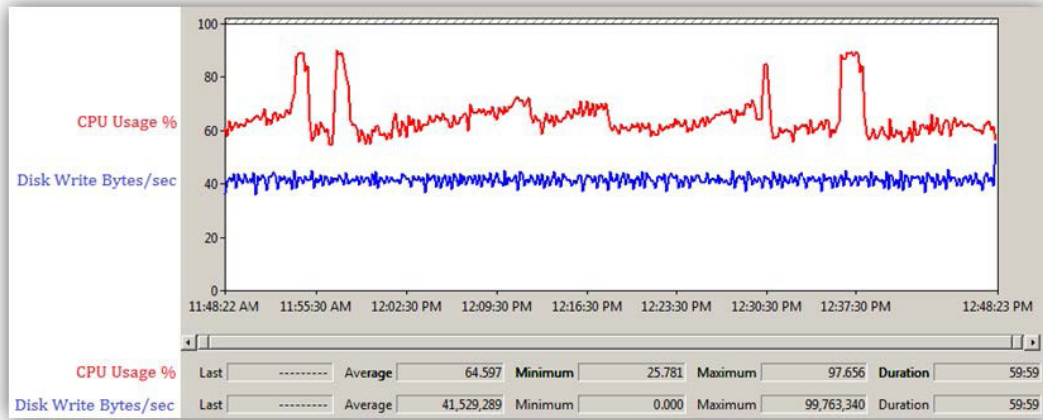
- Codec: H.264
- Res: 1280 x 720
- FPS: 30

Observation and Highlights

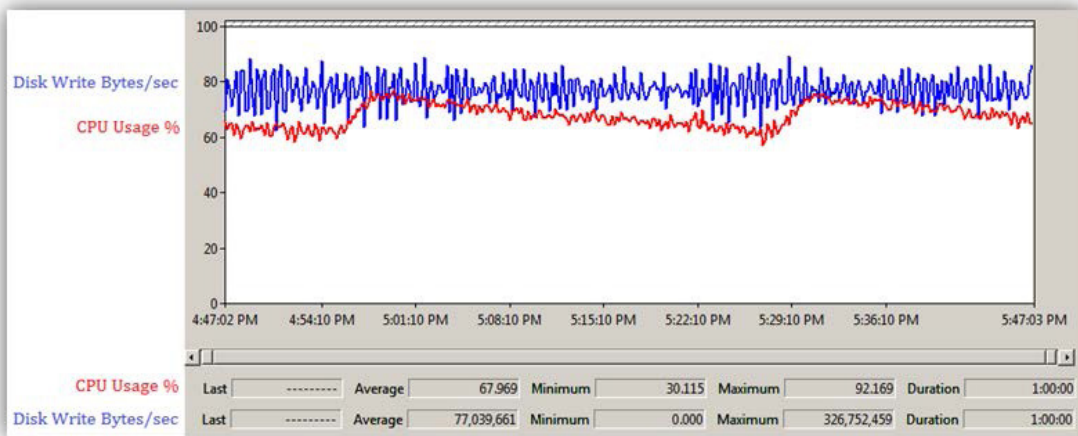
It is observed that PROMISE Vess A2200 and Vess A2600 system perform stable within the criteria defined.

Model	Cameras	Throughput (MB/s)	CPU Usage
Vess A2200	48	39.58	65%
Vess A2600	88	73.46	68%

Vess A2200 system performance monitor



Vess A2600 system performance monitor





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: 1280 x 720
- FPS: 30

Observation and Highlights

A significant increase in CPU usage was observed in the Vess A2200.

Model	Cameras	Throughput (MB/s)	CPU Usage
Vess A2200	7	65.12	56%
Vess A2600	7	64.44	38%

Simultaneous Recording and Local Live View / Playback

Overview

This test evaluates system performance and stability while recording (data in) and streaming (data out). Live View and Playback are done on same Vess A2000 system that records the video.

Video stream configurations used in this test are:

- Codec: H.264
- Res: 1280 x 720
- FPS: 30
- Stream-Out Channels: All

Observation and Highlights

The local display consumes lot of CPU capacity to decode the video stream which reduces system performance.

Model	Recording and Local Live View		Recording Only	
	Cameras	Throughput (MB/s)	Cameras	Throughput (MB/s)
Vess A2200	4	3.38	48	39.58
Vess A2600	12	10.13	88	73.46

Model	Recording and Local Playback		Recording Only	
	Cameras	Throughput (MB/s)	Cameras	Throughput (MB/s)
Vess A2200	4	3.37	48	39.58
Vess A2600	12	10.10	88	73.46

Simultaneous Recording and Remote Live View / Playback

Overview

This test evaluates system performance and stability while recording (data in) and streaming (data out). Live View and Playback are sent to remote display server.

Video stream configurations used in this test are:

- Codec: H.264
- Res: 1280 x 720
- FPS: 30
- Stream-Out Channels: All

Observation and Highlights

No significant impact on performance on the recording server was observed in Live View.

Model	Recording and Remote Live View		Recording Only	
	Cameras	Throughput (MB/s)	Cameras	Throughput (MB/s)
Vess A2200	42	35.41	48	39.58
Vess A2600	84	70.65	88	73.46

Almost 50% drop is observed while playing back the video.

Model	Recording and Remote Playback		Recording Only	
	Cameras	Throughput (MB/s)	Cameras	Throughput (MB/s)
Vess A2200	22	18.39	48	39.58
Vess A2600	48	40.46	88	73.46

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: 1280 x 720
- FPS: 30

Observation and Highlights

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

	Recording and Rebuilding		Recording Only	
	Cameras	Throughput (MB/s)	Cameras	Throughput (MB/s)
Vess A2200	43	35.41	48	39.58
Vess A2600	88	74.08	88	73.46

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: 1280 x 720
- FPS: 30

Observation and Highlights

- Throughput was stable for both Vess A2600 and Vess A2200.
- No drop in throughput performance is observed.

	Recording and Critical		Recording Only	
	Cameras	Throughput (MB/s)	Cameras	Throughput (MB/s)
Vess A2200	43	37.08	48	39.58
Vess A2600	84	70.65	88	73.46



Conclusion and Observation

Major requirement of surveillance recording servers are:

Stability: Stability of a surveillance recording server is very important for critical safety and security related applications. A surveillance recording server system should maintain stable operation for long periods of time.

RAID Storage Throughput: This is typically the first performance bottleneck encountered for surveillance recording servers. Surveillance network and video data storage systems generate complex data patterns that affect performance. The extent of performance degradation is especially influenced by three variables: the number of cameras, camera frame rate (fps) and data size (expressed as camera resolution). Recent advancements in recording technology have made HD format surveillance cameras economical for large scale deployments. The primary challenge for a storage server is to match the data size and complexity of HD camera network.

Test results show that Promise Vess A2000 Series NVR Storage Appliance operated with a high degree of stability throughout the test period.

The Vess A2000 Series also maintained high storage throughput with a reasonable level of resource usage.

Reference

