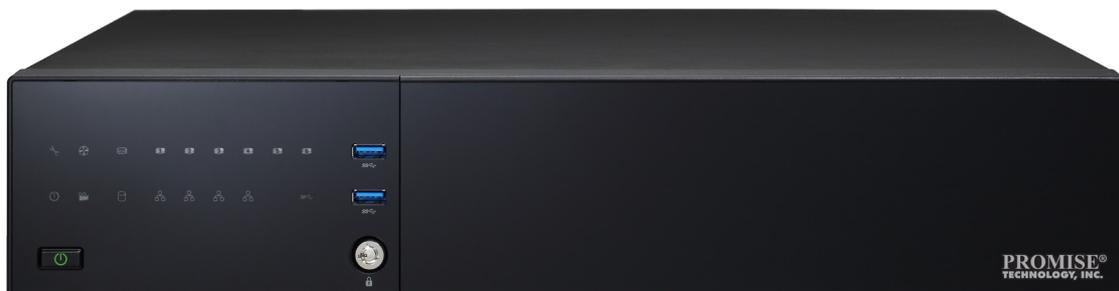




Vess A2000 Series NVR Storage Appliance

OnSSI Ocularis Surveillance Solution





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Introduction

Overview

This document provides an overview of the Promise Vess A2000 Series NVR Storage Appliance. It includes a test case that simulate a large scale network based surveillance solution. The test case utilizes **OnSSI Ocularis CS** 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 OnSSI Ocularis CS 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 a OnSSI Ocularis CS 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 OnSSI Ocularis CS 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.
- OnSSI Ocularis CS 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 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: 4360)
- 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.





OnSSI VMS

OnSSI offers breakthrough VMS technology that's field proven at thousands of installations globally. The company's flagship Ocularis IP security and surveillance platform delivers open architecture, scalability and process automation at reduced operating costs. And with the addition of **Ocularis-X**, utilizing OnSSI's **High Definition Interactive Streaming** (HDIS) OnSSI delivers the fastest and highest resolution mobile and web access video delivery solution available.





Test Environment

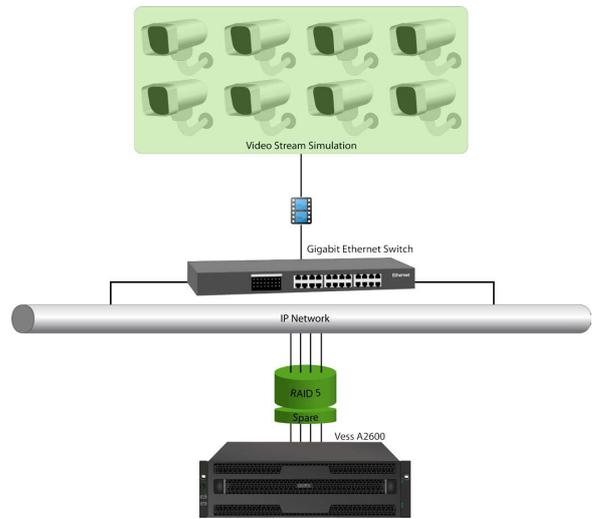
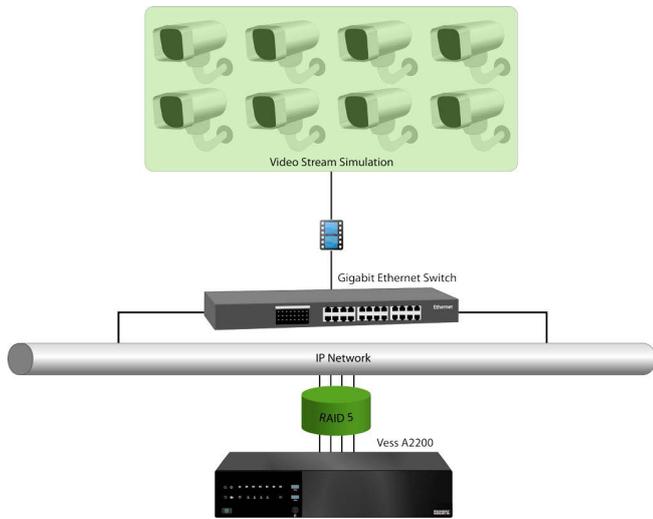
Machine Under Test (MUT) System configuration

	Vess A2600	Vess A2200
VMS	OnSSI Ocularis CS	OnSSI Ocularis CS
OS	Windows Embedded Standard 7 SP1 64bit	Windows Embedded Standard 7 SP1 64bit
CPU	Xeon E3-1245V2 CPU Benchmark: 8942	i3-3245 CPU benchmark: 4360
RAM	8GB DDR3	8GB DDR3
HDD	16SATA HDD	6SATA HDD
RAID CFG	RAID 5 + Spare	RAID 5
Install PKG	1.02.0000.00	1.02.0000.00
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:

Test	Test Purpose
Pure Recording	Platform Performance Test
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% $\text{Recording Data loss} = \frac{(\text{Expected throughput data}) - (\text{Disk Write data})}{\text{Expected throughput data}}$
Disk Write latency	The average of the disk write latency is less than 200 ms, and the maximum of the disk write latency is less than 1000 ms.
Recording status	Recording is under over-write status.
Test duration	1 hour



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 the Vess A2600 and Vess A2200 systems.

Video stream configurations used in this test are:

- Codec: H.264
- Res: 1280 x 720
- FPS: 30
- Quality: Q30

Observation and Highlights

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

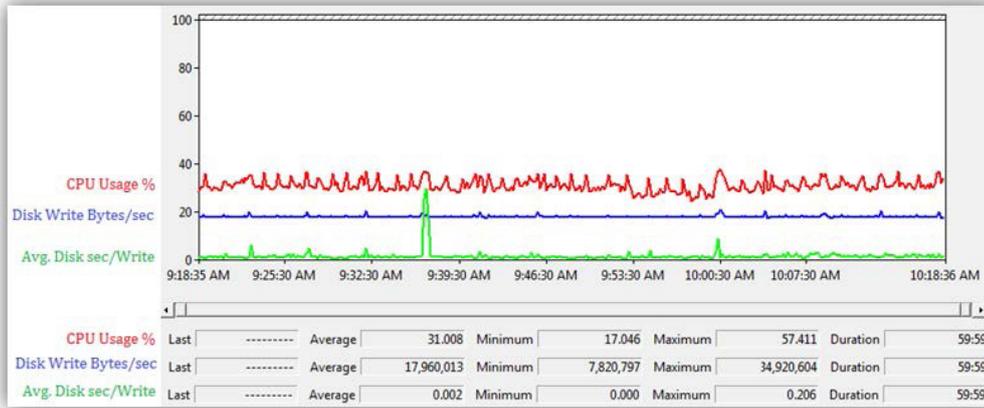
Model	Cameras	Throughput (MB/s)	CPU Usage
Vess A2200	13	17.13	31%
Vess A2600	40	52.46	29%

However, it the test also revealed that additional data writes (other than video recording data streams) done by the VMS, creates a highly random write pattern. This random write pattern causes delay in disk response which degrades system performance.

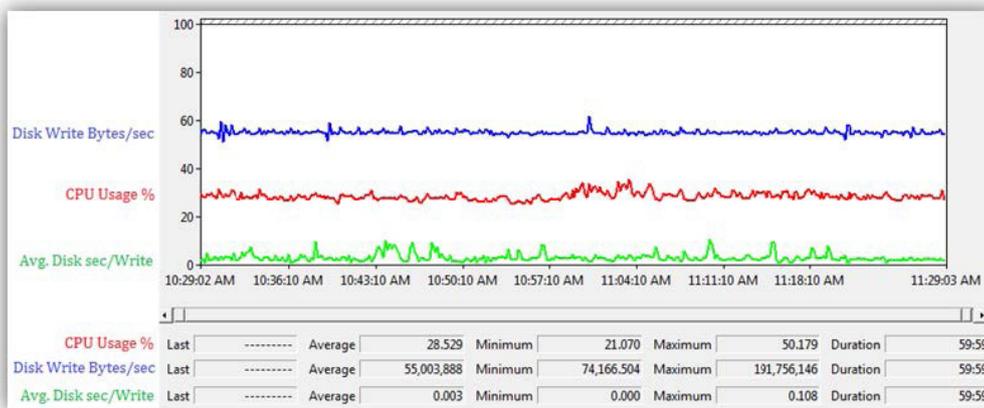




Vess A2200 system performance monitor



Vess A2600 system performance monitor





Recording and Remote Live View / Playback

Overview

This test evaluated the system performance and stability while recording (data in) and streaming (data out) simultaneously. Live View and Play Back streams are sent to remote display server.

Video stream configurations used in this test are:

- Codec: H.264
- Res: 1280 x 720
- FPS: 30
- Quality: Q30

Observation and Highlights

No change in performance was observed while live viewing and playing back recorded video.

	Recording and Remote Live View		Recording Only	
	Cameras	Throughput (MB/s)	Cameras	Throughput (MB/s)
Vess A2200	13	17.10	13	17.13
Vess A2600	40	52.58	40	52.46

	Recording and Remote Playback		Recording Only	
	Cameras	Throughput	Cameras	Throughput
Vess A2200	13	17.10	13	17.13
Vess A2600	35	45.76	40	52.46



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
- Quality: Q30

Observation and Highlights

- Throughput was stable for both Vess A2600 and Vess A2200.
- Performance of the Vess A2200 was significantly affected with a random data write pattern.
- A small drop in throughput performance is observed in the Vess A2600.

	Recording and Remote Play Back				Recording Only	
	Cameras	Throughput	Cameras	Throughput	Cameras	Throughput
Vess A2200	9	11.85	4	5.27	13	17.13
Vess A2600	35	43.78	23	30.24	40	52.46



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.

Note 1: It is observed that the additional data writes performed by the VMS (unrelated to the number of video streams), results in a highly random write pattern. This random write pattern causes delay in disk response, which reduces overall system performance.

Note 2: Creating separate volumes for recording and achieving does not solve the problem of random write.

Note 3: It is observed that overall performance increased by multiples of three or four times when HDD were replaced by SSD. It is highly recommended to use SSDs with OnSSI Ocularis CS VMS.

