



Executive Summary

Abstract: This certification report presents the results of benchmark and load tests performed on the Quantum StorNext® fibre channel SAN storage solution. This product was used as the primary storage location for the video database of an XProtect surveillance system during this certification test. Test scenarios included a system built with five Recording Servers and 250 total video cameras, and a system built with eleven Recording Servers and 935 video cameras. The Milestone Technology Partner (MTP) Certification program seeks to confirm that server, storage, and network solutions provided by qualified MTP vendors meet the performance benchmarks required to support the Milestone XProtect VMS applications, and to measure the maximum performance available to Milestone customers if they choose to build a solution using certified MTP products. MTP certification efforts include building a test surveillance system using the subject MTP product and gathering performance data while the system is in operation at the benchmark levels, and capacity testing to determine the upper limits of performance for the certified MTP solution. Certification of the Quantum StorNext solution will ensure that any surveillance system built using this product in combination with the Milestone XProtect components will be able to record and archive an amount of video consistent with the recommendations of the Milestone Server and Storage Calculator.

Certified Products:

- Quantum StorNext M662 Metadata Appliance
- Quantum StorNext QXS-412
- Milestone XProtect Corporate 2014 (7.0c)
 - The listed Quantum storage solutions are certified for use with the entire XProtect product line.

Key Findings: The Quantum StorNext solution provides a high-performance, scalable, video storage solution for the Milestone XProtect VMS system at a level of performance twice that indicated by the benchmark determined by the Milestone Server and Storage Calculator. The calculator indicates the StorNext QXS-412 should support approximately 20 cameras per recording server at the benchmark level, and it was able to support at least 50 cameras per server. In extended testing the system was able to increase the total number of cameras to 85 per server. The system performs at a very high level of data throughput, and with near zero read/write latency. The Quantum StorNext storage product is a certified MTP solution. The maximum performance of the StorNext QXS-412 is listed below; in each of these scenarios there were five or 11 XProtect Recording Servers installed in the system which were recording video directly to the video databases on the QXS-412 storage array.

In the first test scenario there were five recording servers recording more than twice as much data per video stream and one-third more data per server compared to the second scenario with eleven servers. The increased number of servers, and cameras per server in the second scenario pushed the total array throughput to an impressive average of nearly 300 MBps. Integrators and end users designing, installing, and operating surveillance systems which incorporate these solution components should have complete confidence that the system will record large amounts of megapixel resolution video very reliably.

Solution Architecture

Topology: A scalable topology was constructed to serve as the test bed for the full scope of the certification test scenarios. The primary components in this topology included the following:

- Two host servers where all of the XProtect applications and services would be running in a virtual server environment
- The Quantum StorNext QXS-412 storage solution connected to an 8GB fibre storage network
- The Quantum StorNext M662 Metadata Appliance functioning as controller for the storage volumes created in the QXS-412

Test Scenario	Stream Profile	Number of Cameras	Disk Latency	Video Stream Size	Video Data Per Server	Total Array Disk I/O
1	H.264, 1280x720, 30 FPS	250	12.5 milliseconds	5.13 Mbps	32.54 MBps	130 MBps
2	H.264, 1280x720, 10 FPS	935	12.5 milliseconds	1.95 Mbps	20 MBps	300 MBps

Test Plan Summary

Test Process: After installation and configuration of all required system components, The XProtect surveillance system was configured to support the chosen number of Recording Servers and simulated video cameras based upon the goals defined by both Quantum and Milestone engineers for the first test scenario: 250 total cameras with a video stream profile including the H.264 codec, a resolution of at least one megapixel, full 30 frames per second and 60 percent video compression. The first test scenario started at a performance level (50 cameras per server) already more than twice the benchmark level of performance determined based upon the configuration of the disk system used by the QXS-412. After conclusion of the first scenario, the system was expanded to support the scale of the second scenario, and the test proceeded again once the storage databases were filled. The second test scenario used an increased number of servers (11) and cameras (85), and used the same video stream profile.

During each test, the performance of the array was monitored for unacceptable levels of write latency, CPU consumption, or video frame loss. If any of these criteria were measured, the data load was reduced, and the performance was monitored again. If the system operated at the reduced level of data load within acceptable parameters, then a full data capture took place and the maximum performance of the storage array was defined to be at the observed levels of data and video stream parameters. Acceptable levels of operation are defined according to the following statistics:

- Less than 0.1% video frame loss
- CPU values under 70% average
- Write latency values under 200 milliseconds

Performance Results

Quantum StorNext Scenario 1: The data load used in the first scenario included the following parameters:

Individual Video Stream Size	5.13 Mbps
Disk Array Video Data Throughput	130 MBps
Maximum Disk Array Video Latency	12.5 ms
Average Recording Server CPU Utilization	16.98%
Average % Frames Lost	0.0%
Average Database Write Throughput	32.542

All average values include data taken from all recording servers; values which aren't averaged were measured directly on the StorNext QXS-412 solution.

Quantum StorNext Scenario 2: The data load used in the second scenario included the following parameters:

Individual Video Stream Size	1.95 Mbps
Disk Array Video Data Throughput	300 MBps
Maximum Disk Array Video Latency	12.5 ms
Average Recording Server CPU Utilization	18.58%
Average % Frames Lost	0.0016%
Average Database Write Throughput	20.735 MBps

The test scenario was conducted in a slightly unrealistic scenario which included 100% recording. In most traditional usage scenarios video motion detection is used to save on total storage consumption, network bandwidth, and disk throughput. However, in our tests we were interested in stressing the disk throughput, and the best way to reliably stress disk throughput is to stream with a consistently large amount of data.

Conclusion

The Quantum StorNext solution is a certified storage solution for use with Milestone XProtect VMS systems. This solution was able to reliably store large amounts of video without impacting the performance of the Milestone system. The solution exceeds the benchmark values indicated by the Milestone server and storage calculator by at least a factor of two. Placed in a real-world scenario, outside a lab specifically designed to stress the system, there is no doubt it would be able to exceed the numbers of cameras and Recording Servers documented herein. Quantum storage solutions are ideal for any system that requires high-performance video recording using hundreds of multi-megapixel video streams. Quantum StorNext and Milestone XProtect combine to create a solution that is highly scalable, high performance, standards based, and easy to use.