FUJITSU

Technical White paper

Certification of ETERNUS DX in Milestone video surveillance environment

This white paper describes the certification tasks for Milestone video surveillance solutions with ETERNUS DX storage systems

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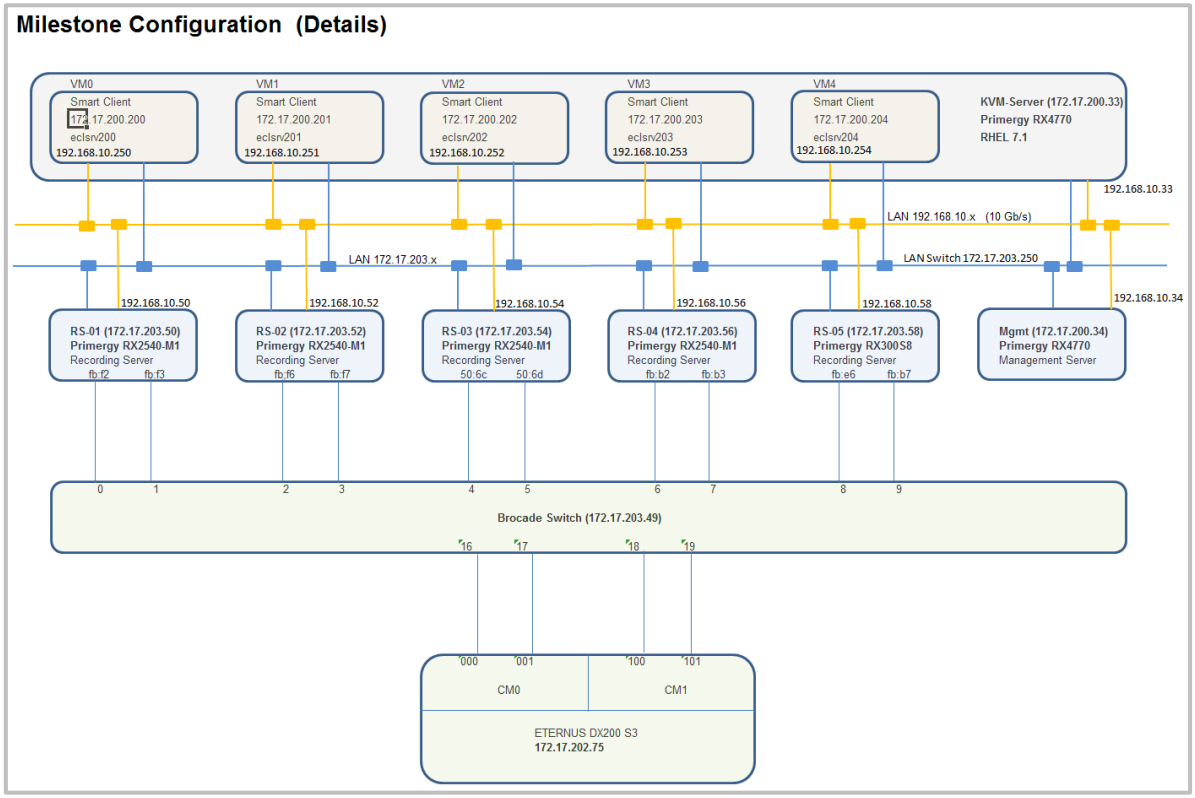
1. Introduction

Milestone XProtect Corporate is the ultimate software for video surveillance in large-scale and high-security areas, such as airports and city surveillance. XProtect Corporate is powerful IP video management software (VMS) designed for large-scale and high-security deployments. Its single management interface enables the efficient administration of the system including all cameras and security devices regardless of its size or if it is distributed across multiple sites. For systems demanding supreme situational awareness and precise response to incidents, XProtect Corporate features interactive maps linked to alarms and included support for XProtect® Smart Wall. XProtect Corporate provides the ultimate system reliability for high-security installations. Edge Storage support combined with failover recordings and redundant management servers ensure video recordings are never interrupted.

This white paper describes the required tasks to have ETERNUS DX storage systems certified for Milestone environment.

2. Configuration

Fujitsu provided Milestone technical information about ETERNUS DX200 S3 and ETERNUS DX600 S3 and got a recommendation for Storage and Server configuration. Five recording server, one management server and 180 disks within ETERNUS DX200 S3 are planned for the configuration. Additional five virtual machines for Smart Clients are used to view the cameras stream from the Live-DB and Archive-DB. The Smart Clients use a dedicated network (orange lines, 10Gb/s) for viewing the stored video streams.



2.1 Recording Server

The recording servers are based on four PRIMERGYs RX2540M1 and one PRIMERGY RX300S8 with the following configuration:

PRIMERGY RX2540 M1

- 2 x Intel® Xeon® CPU E5-2620 v3 @2.40Ghz
- 128 GB MEM
- Emulex LPe16002
- Windows Server 2012 R2

PRIMERGY RX300 S8

- 2 x Intel® Xeon® CPU E5-2630L v2 @2.40Ghz
- 64 GB MEM
- Emulex LPe16002
- Windows Server 2012 R2

The recording servers are connected with 2 ports of 16Gb/s Emulex fibre channel HBAs to the Brocade switch. A "crossover" zoning is done on the switch, so each HBA port can access 4 ports on the ETERNUS DX storage system.

2.2 Management Server

The management server is based on one PRIMERGY RX4770 M1 with the following configuration:

PRIMERGY RX4770 M1

- 4 x Intel® Xeon® CPU E&-4880 v2 @2.50Ghz
- 128 GB MEM

2.3 ETERNUS DX200 S3

The ETERNUS DX200 S3 is connected with four 16Gb/s fibre channel ports to the Brocade switch.
The raid configuration is done as follow:

Live-DB

- 2 x Raid10 Raid Group (16+16 disks) ➔ total 64 disks (300 GB SAS, 10Krpm)
- Vol00 and Vol01 are created in each RAID10 raid group and provided to Recording Server RS-01
- Vol10 and Vol11 are created in each RAID10 raid group and provided to Recording Server RS-02
- Vol20 and Vol21 are created in each RAID10 raid group and provided to Recording Server RS-03
- Vol30 and Vol31 are created in each RAID10 raid group and provided to Recording Server RS-04
- Vol40 and Vol41 are created in each RAID10 raid group and provided to Recording Server RS-05

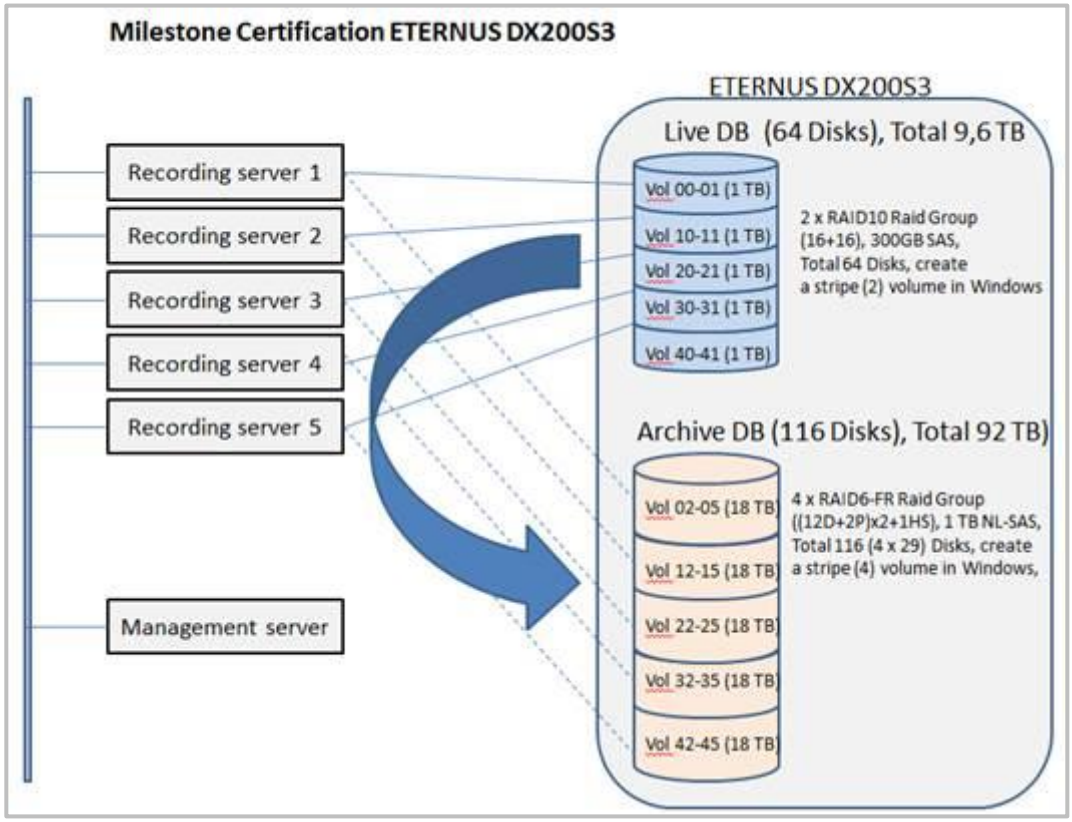
The two volumes are "software striped" within each recording server. The benefit of the software stripe is that access to the volume is done via the preferred path. This guaranteed a proper I/O load balancing and equal distributed cache memory on each controller module (CM). The internal stripe size for RAID10 is 64KB.

Archive-DB

- 4 x RAID6-FR Raid group ((12D+2P)x2+1HS disks) ➔ total 116 disks (1 TB NL-SAS, 7200rpm)
- Vol02 - Vol05 are created in each RAID6-FR raid group and provided to Recording Server RS-01
- Vol12 - Vol15 are created in each RAID6-FR raid group and provided to Recording Server RS-02
- Vol22 - Vol25 are created in each RAID6-FR raid group and provided to Recording Server RS-03
- Vol32 - Vol35 are created in each RAID6-FR raid group and provided to Recording Server RS-04
- Vol42 - Vol45 are created in each RAID6-FR raid group and provided to Recording Server RS-05

The four volumes from the RAID6-FR Raid group are "software striped" within each recording server. The benefit of the software stripe is that access to the volume is done via the preferred path. This guaranteed a proper I/O load balancing and equal distributed cache memory on each controller module (CM). RAID6-FR is a special raid group in ETERNUS DX storage systems and is used to have a fast rebuild in case of a disk failure within RAID6. The internal stripe size for RAID6-FR is 64KB.

The picture below shows the disk configuration.



2.4 Smart Clients

Additional virtual machines are created on a PRIMERGY server RX4770 M1 with RHEL 7.1 operating system. The virtual machines are based on KVM hypervisor and are used for Smart Clients. With Smart Clients you can view the live recording data or playback data from the past.

3. Test Types

The load tests which are included in the basic scope of the certification tests includes

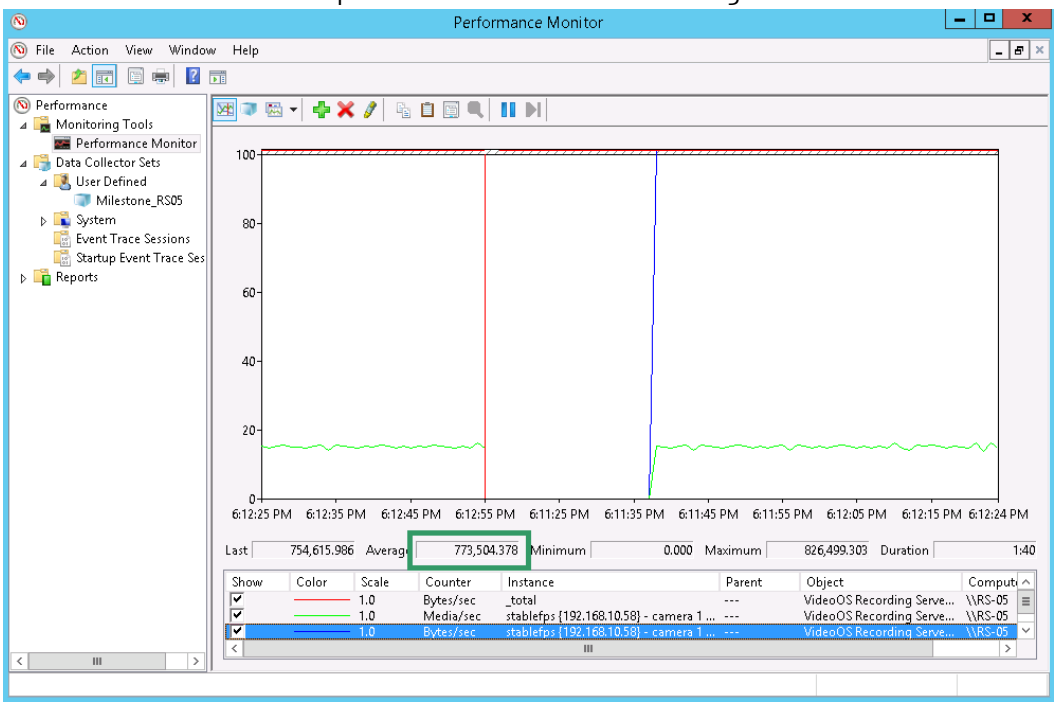
- Benchmark test
- Maximum performance tests

3.1 Benchmark test

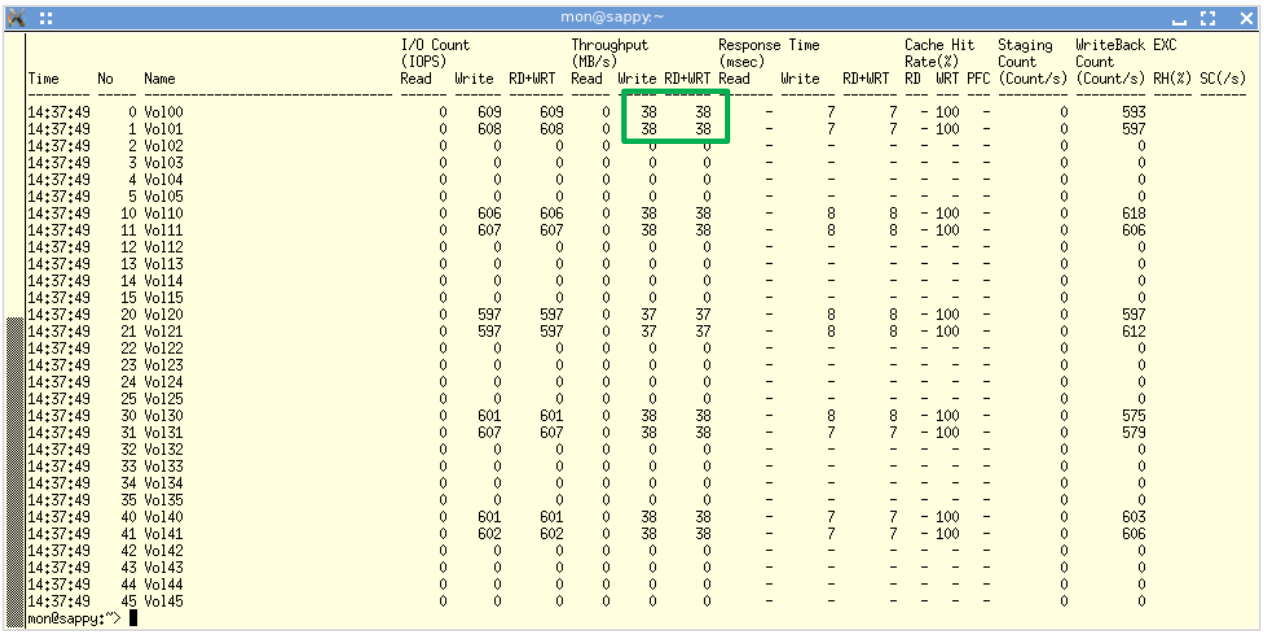
The benchmark tests are performed with 100 cameras on each recording server with the following parameter:

General	
Codec	**H264**
Compression	30
Deliver frames before time	0
Frames per second	**15**
Motion duration	0
Motion duration HMS	Seconds
Motion interval	0
Motion interval HMS	Seconds
Motion mode	Never
Remote path	
Resolution	**1280x720**
Use % CPU idle time	0

Each simulated camera created a data stream of about 780 KB/s. For 100 cameras on each recording server 78 MB/s are created. The picture below shows an average bandwidth of 773.504 bytes for one camera.



When activating 100 cameras on each recording server, the ETERNUS performance monitoring tools PMCC shows that each recording server generates roughly 76 MB/s (2 x 38 MB/s) write I/O. The response time is about 7-8 ms for write I/O.



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Time	No	Name	I/O Count (IOPS) Read	Write	RD+WRT	Throughput (MB/s) Read	Write	RD+WRT	Response Time (msec) Read	Write	RD+WRT	Cache Hit Rate(%) RD	WRT	PFC	Staging Count (Count/s)	WriteBack Count (Count/s)	EXC RH(%)	EXC SC(/s)
14:37:49	0	Vol00	0	609	609	0	38	38	-	7	7	-	100	-	0	593		
14:37:49	1	Vol01	0	608	608	0	38	38	-	7	7	-	100	-	0	597		
14:37:49	2	Vol02	0	0	0	0	0	0	-	-	-	-	-	-	0	0		
14:37:49	3	Vol03	0	0	0	0	0	0	-	-	-	-	-	-	0	0		
14:37:49	4	Vol04	0	0	0	0	0	0	-	-	-	-	-	-	0	0		
14:37:49	5	Vol05	0	0	0	0	0	0	-	-	-	-	-	-	0	0		
14:37:49	10	Vol10	0	606	606	0	38	38	-	8	8	-	100	-	0	618		
14:37:49	11	Vol11	0	607	607	0	38	38	-	8	8	-	100	-	0	606		
14:37:49	12	Vol12	0	0	0	0	0	0	-	-	-	-	-	-	0	0		
14:37:49	13	Vol13	0	0	0	0	0	0	-	-	-	-	-	-	0	0		
14:37:49	14	Vol14	0	0	0	0	0	0	-	-	-	-	-	-	0	0		
14:37:49	15	Vol15	0	0	0	0	0	0	-	-	-	-	-	-	0	0		
14:37:49	20	Vol20	0	597	597	0	37	37	-	8	8	-	100	-	0	597		
14:37:49	21	Vol21	0	597	597	0	37	37	-	8	8	-	100	-	0	612		
14:37:49	22	Vol22	0	0	0	0	0	0	-	-	-	-	-	-	0	0		
14:37:49	23	Vol23	0	0	0	0	0	0	-	-	-	-	-	-	0	0		
14:37:49	24	Vol24	0	0	0	0	0	0	-	-	-	-	-	-	0	0		
14:37:49	25	Vol25	0	0	0	0	0	0	-	-	-	-	-	-	0	0		
14:37:49	30	Vol30	0	601	601	0	38	38	-	8	8	-	100	-	0	575		
14:37:49	31	Vol31	0	607	607	0	38	38	-	7	7	-	100	-	0	579		
14:37:49	32	Vol32	0	0	0	0	0	0	-	-	-	-	-	-	0	0		
14:37:49	33	Vol33	0	0	0	0	0	0	-	-	-	-	-	-	0	0		
14:37:49	34	Vol34	0	0	0	0	0	0	-	-	-	-	-	-	0	0		
14:37:49	35	Vol35	0	0	0	0	0	0	-	-	-	-	-	-	0	0		
14:37:49	40	Vol40	0	601	601	0	38	38	-	7	7	-	100	-	0	603		
14:37:49	41	Vol41	0	602	602	0	38	38	-	7	7	-	100	-	0	606		
14:37:49	42	Vol42	0	0	0	0	0	0	-	-	-	-	-	-	0	0		
14:37:49	43	Vol43	0	0	0	0	0	0	-	-	-	-	-	-	0	0		
14:37:49	44	Vol44	0	0	0	0	0	0	-	-	-	-	-	-	0	0		
14:37:49	45	Vol45	0	0	0	0	0	0	-	-	-	-	-	-	0	0		

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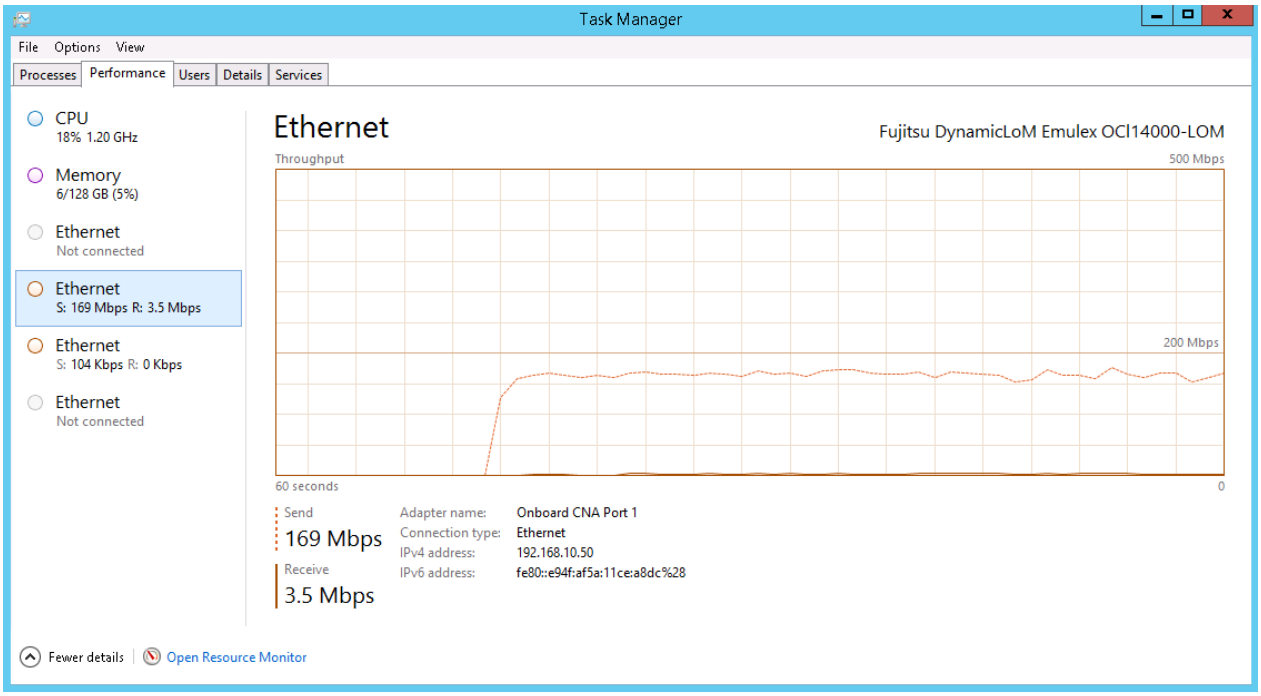
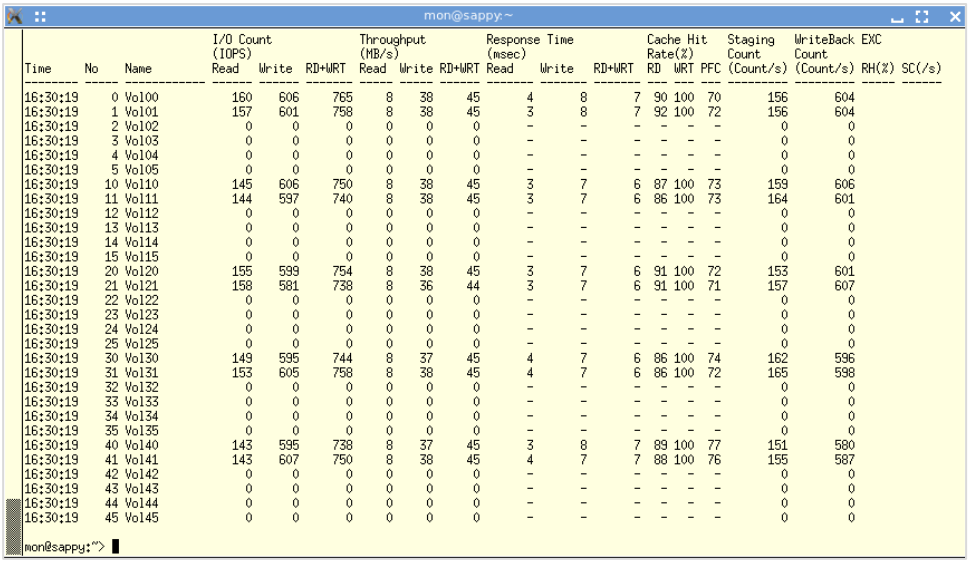
After establishing the write I/O to the Live-DB, 25 cameras were "Live viewed" on each smart client. This forced an additional LAN throughput of about 20 MB/s for each smart client. Below you can see the LAN performance for one smart client after starting the live view.



By starting the "playback function", 25 videos are read from the Live-DB on each recording server. This results in a read throughput of about 16 MB/s (2 x 8 MB/s) per recording server. The read latency is about 3-4 ms.



Time	No	Name	I/O Count (IOPS) Read	Write	RD+WRT	Throughput (MB/s) Read	Write	RD+WRT	Response Time (msec) Read	Write	RD+WRT	Cache Hit Rate(%) RD	WRT	PFC	Staging Count (Count/s)	WriteBack Count (Count/s)	RH(%)	SC(/s)
16:30:19	0	Vol00	160	606	765	8	38	45	4	8	7	90	100	70	156	604		
16:30:19	1	Vol01	157	601	758	8	38	45	3	8	7	92	100	72	156	604		
16:30:19	2	Vol02	0	0	0	0	0	0	-	-	-	-	-	-	0	0		
16:30:19	3	Vol03	0	0	0	0	0	0	-	-	-	-	-	-	0	0		
16:30:19	4	Vol04	0	0	0	0	0	0	-	-	-	-	-	-	0	0		
16:30:19	5	Vol05	0	0	0	0	0	0	-	-	-	-	-	-	0	0		
16:30:19	10	Vol10	145	606	750	8	38	45	3	7	6	87	100	73	159	606		
16:30:19	11	Vol11	144	597	740	8	38	45	3	7	6	86	100	73	164	601		
16:30:19	12	Vol12	0	0	0	0	0	0	-	-	-	-	-	-	0	0		
16:30:19	13	Vol13	0	0	0	0	0	0	-	-	-	-	-	-	0	0		
16:30:19	14	Vol14	0	0	0	0	0	0	-	-	-	-	-	-	0	0		
16:30:19	15	Vol15	0	0	0	0	0	0	-	-	-	-	-	-	0	0		
16:30:19	20	Vol20	155	599	754	8	38	45	3	7	6	91	100	72	153	601		
16:30:19	21	Vol21	158	581	738	8	36	44	3	7	6	91	100	71	157	607		
16:30:19	22	Vol22	0	0	0	0	0	0	-	-	-	-	-	-	0	0		
16:30:19	23	Vol23	0	0	0	0	0	0	-	-	-	-	-	-	0	0		
16:30:19	24	Vol24	0	0	0	0	0	0	-	-	-	-	-	-	0	0		
16:30:19	25	Vol25	0	0	0	0	0	0	-	-	-	-	-	-	0	0		
16:30:19	30	Vol30	149	595	744	8	37	45	4	7	6	86	100	74	162	596		
16:30:19	31	Vol31	153	605	758	8	38	45	4	7	6	86	100	72	165	598		
16:30:19	32	Vol32	0	0	0	0	0	0	-	-	-	-	-	-	0	0		
16:30:19	33	Vol33	0	0	0	0	0	0	-	-	-	-	-	-	0	0		
16:30:19	34	Vol34	0	0	0	0	0	0	-	-	-	-	-	-	0	0		
16:30:19	35	Vol35	0	0	0	0	0	0	-	-	-	-	-	-	0	0		
16:30:19	40	Vol40	143	595	738	8	37	45	3	8	7	89	100	77	151	580		
16:30:19	41	Vol41	143	607	750	8	38	45	4	7	7	88	100	76	155	587		
16:30:19	42	Vol42	0	0	0	0	0	0	-	-	-	-	-	-	0	0		
16:30:19	43	Vol43	0	0	0	0	0	0	-	-	-	-	-	-	0	0		
16:30:19	44	Vol44	0	0	0	0	0	0	-	-	-	-	-	-	0	0		
16:30:19	45	Vol45	0	0	0	0	0	0	-	-	-	-	-	-	0	0		

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On the right side you can see the disk busy rate for this benchmark test. In total 180 disks are involved, so you will only see an extract of all the disks. The disks with a busy rate of about 70% belong to the Live-DB.

Time	No	DE	Slot	RGNo	Busy Rate (%)
16:30:19	0	0	0	0	71
16:30:19	1	0	1	0	71
16:30:19	2	0	2	0	71
16:30:19	3	0	3	0	71
16:30:19	4	0	4	0	72
16:30:19	5	0	5	0	72
16:30:19	6	0	6	0	69
16:30:19	7	0	7	0	70
16:30:19	8	0	8	0	69
16:30:19	9	0	9	0	69
16:30:19	10	0	10	0	68
16:30:19	11	0	11	0	72
16:30:19	12	0	12	0	71
16:30:19	13	0	13	0	71
16:30:19	14	0	14	0	71
16:30:19	15	0	15	0	71
16:30:19	23	0	23	-	2
16:30:19	256	1	0	0	72
16:30:19	257	1	1	0	72
16:30:19	258	1	2	0	72
16:30:19	259	1	3	0	72
16:30:19	260	1	4	0	72
16:30:19	261	1	5	0	72
16:30:19	262	1	6	0	69
16:30:19	263	1	7	0	69
16:30:19	264	1	8	0	69
16:30:19	265	1	9	0	70
16:30:19	266	1	10	0	70
16:30:19	267	1	11	0	72
16:30:19	268	1	12	0	71
16:30:19	269	1	13	0	71
16:30:19	270	1	14	0	71
16:30:19	271	1	15	0	72
16:30:19	279	1	23	-	2
16:30:19	512	2	0	1	69
16:30:19	513	2	1	1	69
16:30:19	514	2	2	1	69
16:30:19	515	2	3	1	69
16:30:19	516	2	4	1	68
16:30:19	517	2	5	1	70
16:30:19	518	2	6	1	67
16:30:19	519	2	7	1	65
16:30:19	520	2	8	1	65
16:30:19	521	2	9	1	65
16:30:19	522	2	10	1	66
16:30:19	523	2	11	1	69
16:30:19	524	2	12	1	68
16:30:19	525	2	13	1	58
16:30:19	526	2	14	1	69
16:30:19	527	2	15	1	68
16:30:19	768	3	0	1	69
16:30:19	769	3	1	1	68
16:30:19	770	3	2	1	68
16:30:19	771	3	3	1	67
16:30:19	772	3	4	1	68
16:30:19	773	3	5	1	68
16:30:19	774	3	6	1	66
16:30:19	775	3	7	1	67
16:30:19	776	3	8	1	65
16:30:19	777	3	9	1	66
16:30:19	778	3	10	1	65
16:30:19	779	3	11	1	70
16:30:19	780	3	12	1	67
16:30:19	781	3	13	1	68
16:30:19	782	3	14	1	67
16:30:19	783	3	15	1	68
16:30:19	791	3	23	-	1
16:30:19	1024	4	0	5	3
16:30:19	1025	4	1	5	3
16:30:19	1026	4	2	5	3
16:30:19	1027	4	3	5	3
16:30:19	1028	4	4	5	3
16:30:19	1029	4	5	5	3
16:30:19	1030	4	6	5	3
16:30:19	1031	4	7	5	3
16:30:19	1032	4	8	-	3
16:30:19	1033	4	9	-	3
16:30:19	1034	4	10	4	3

Result:

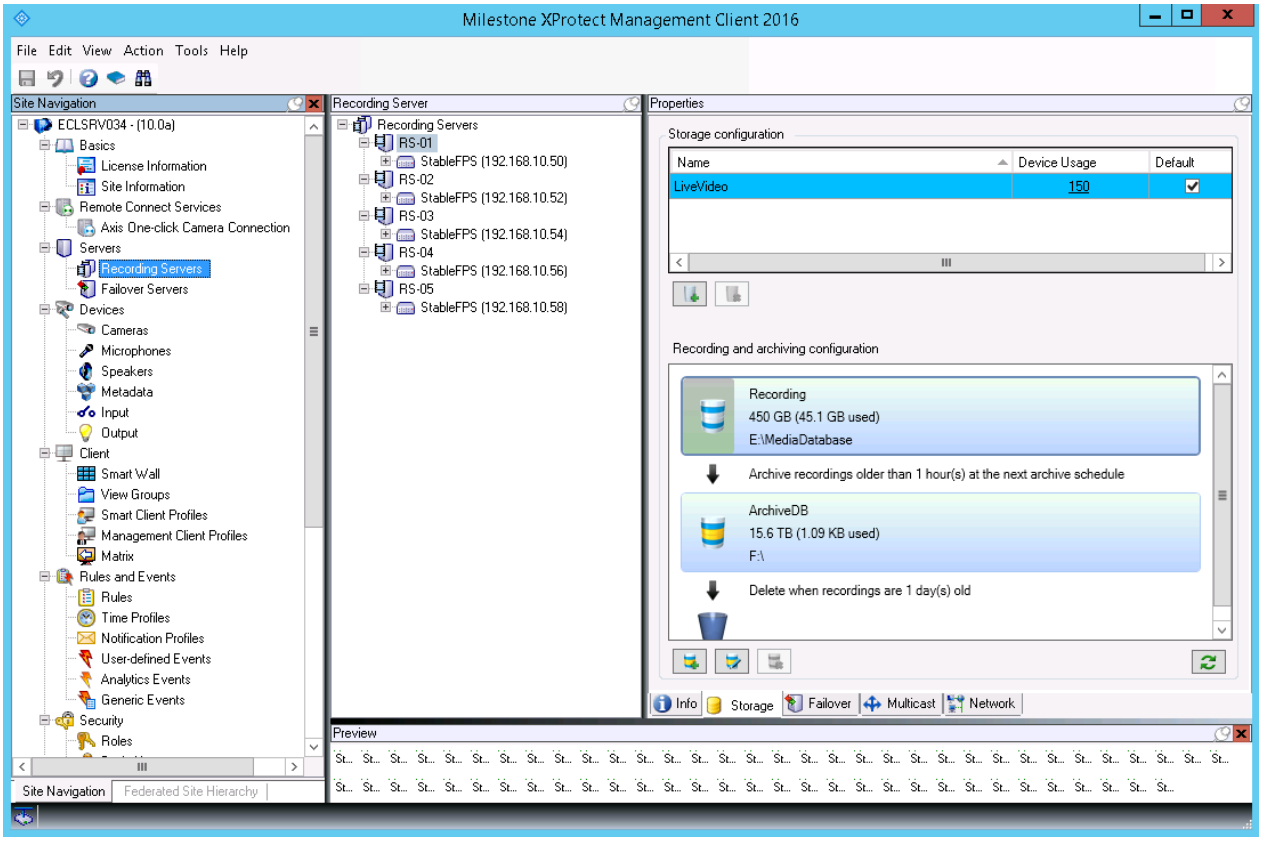
The result of the benchmark test is that write I/O of 500 cameras and playback read I/O from 100 cameras will cause an overall throughput of **450 MB/s**. The throughput on the LAN for communication with the smart clients is about **100 MB/s**. The disk busy rate is about 70 %, so much more bandwidth is available from ETERNUS DX point of view.

3.2 Maximum performance test

The maximum performance tests are used to prove the overall solution, including the Archive-DB.
The settings are done as follow:

- 75 cameras per recording server
- Check every full hour if data is older than 1 hour in the Live-DB
- Archive recordings older than 1 hour at the next archive schedule
- Use the following stream settings

General	
Codec	**H264**
Compression	30
Deliver frames before time	0
Frames per second	**15**
Motion duration	0
Motion duration HMS	Seconds
Motion interval	0
Motion interval HMS	Seconds
Motion mode	Never
Remote path	
Resolution	**1280x720**
Use % CPU idle time	0

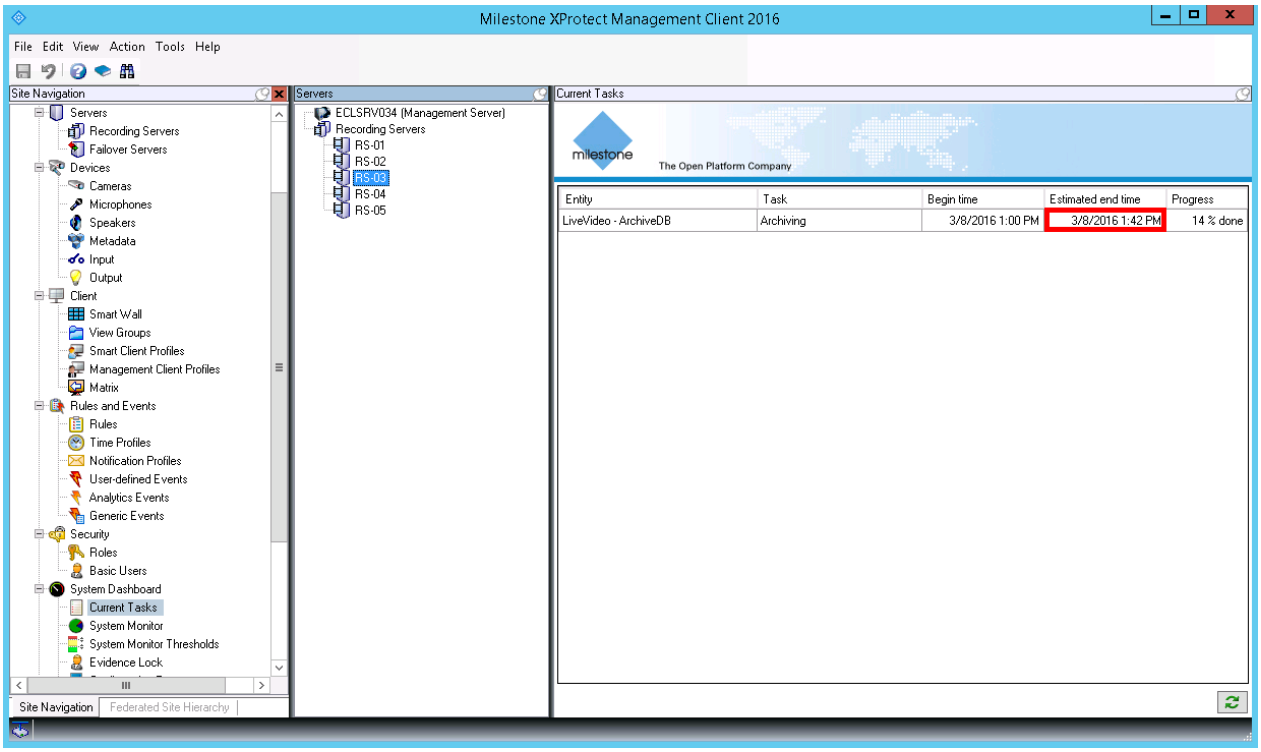


The test schedule is done as follow:

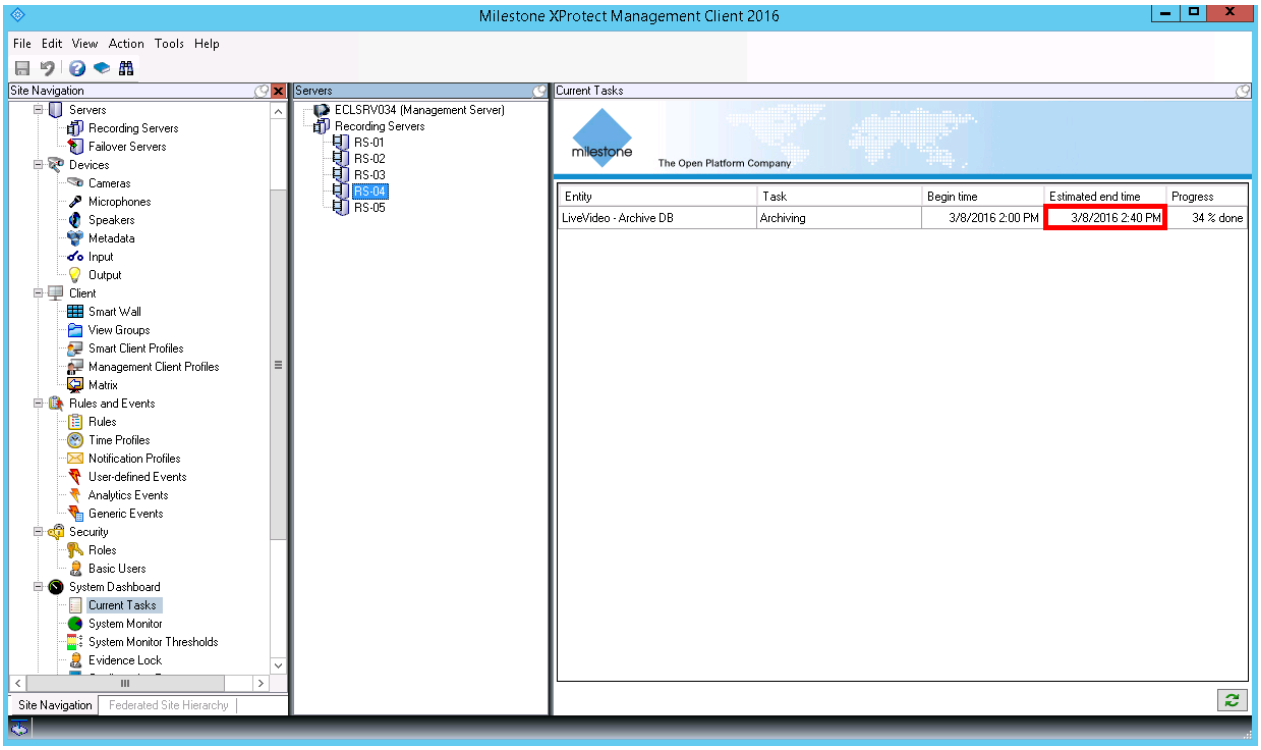
- 10:53 Start tests
- 11:00 Start performance monitoring (perfmon) and PMCC
- 12:00 Check if data is older than 1 hour in Live-DB → move data from 10:53 – 11:00 into Archive-DB
- 13:00 Check if data is older than 1 hour in Live-DB → move data from 11:00 – 12:00 into Archive-DB
  Confirm if estimated copy process takes no longer than 1 hour
- 14:00 Check if data is older than 1 hour in Live-DB → move data from 12:00 – 13:00 into Archive-DB
- 14:10 Start Playback function, view Videos from Archive (11:00 – 12:00)
- 15:00 End test

Below you can see an example of an archiving task. The copy process from Live-DB into Archive-DB started at 1:00 pm and the estimated end time is 1:42 pm. This means all data older than 1 hour is copied within 1 hour into Archive-DB. It is important that the estimated time is no longer than 1 hour. Otherwise the Live-DB will be overloaded and video streams may be lost.

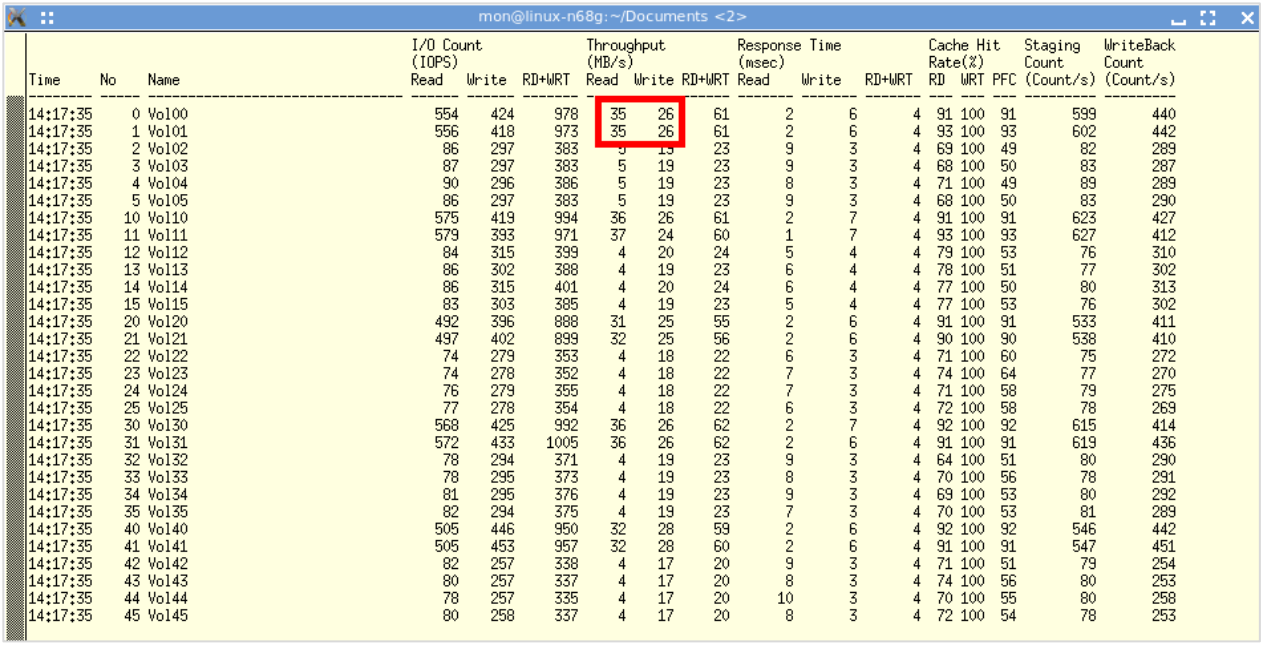
Notice:
The critical limit when copying data from Live-DB into Archive-DB is reached with 80 cameras. This time takes about 60 minutes, so it may happened that not all data are saved into Archive-DB. This limit is not related to storage or server bandwidth, but it is more related to the XProtect software pipeline. The software needs to analyze and provide metadata (time, device ID) for each frame before it is sent to disk.



At 14:10 additional playback streams are started. This means that videos stored in the archive are viewed. This process causes additional I/O traffic from the Archive-DB. Below is the confirmation that the backup is still possible within one hour (estimated end time = 2:40 PM).



The PMCC data shows that the read throughput from the Live-DB (Vol00 – Vol01) for storing the data into Archive-DB (Vol02-Vol05) is higher than the write throughput created from the cameras. The read throughput from the Archive-DB is caused by the playback function. This is about 20 MB/s for 25 cameras.



Time	No	Name	I/O Count (IOPS) Read	Write	RD+WRT	Throughput (MB/s) Read	Write	RD+WRT	Response Time (msec) Read	Write	RD+WRT	Cache Hit Rate(%) RD	WRT	PFC	Staging Count (Count/s)	WriteBack Count (Count/s)
14:17:35	0	Vol00	554	424	978	35	26	61	2	6	4	91	100	91	599	440
14:17:35	1	Vol01	556	418	973	35	26	61	2	6	4	93	100	93	602	442
14:17:35	2	Vol02	86	297	383	5	19	23	9	3	4	69	100	49	82	289
14:17:35	3	Vol03	87	297	383	5	19	23	9	3	4	68	100	50	83	287
14:17:35	4	Vol04	90	296	386	5	19	23	8	3	4	71	100	49	89	289
14:17:35	5	Vol05	86	297	383	5	19	23	9	3	4	68	100	50	83	290
14:17:35	10	Vol10	575	419	994	36	26	61	2	7	4	91	100	91	623	427
14:17:35	11	Vol11	579	393	971	37	24	60	1	7	4	93	100	93	627	412
14:17:35	12	Vol12	84	315	399	4	20	24	5	4	4	79	100	53	76	310
14:17:35	13	Vol13	86	302	388	4	19	23	6	4	4	78	100	51	77	302
14:17:35	14	Vol14	86	315	401	4	20	24	6	4	4	77	100	50	80	313
14:17:35	15	Vol15	83	303	385	4	19	23	5	4	4	77	100	53	76	302
14:17:35	20	Vol20	492	396	888	31	25	55	2	6	4	91	100	91	533	411
14:17:35	21	Vol21	497	402	899	32	25	56	2	6	4	90	100	90	538	410
14:17:35	22	Vol22	74	279	353	4	18	22	6	3	4	71	100	60	75	272
14:17:35	23	Vol23	74	278	352	4	18	22	7	3	4	74	100	64	77	270
14:17:35	24	Vol24	76	279	355	4	18	22	7	3	4	71	100	58	79	275
14:17:35	25	Vol25	77	278	354	4	18	22	6	3	4	72	100	58	78	269
14:17:35	30	Vol30	568	425	992	36	26	62	2	7	4	92	100	92	615	414
14:17:35	31	Vol31	572	433	1005	36	26	62	2	6	4	91	100	91	619	436
14:17:35	32	Vol32	78	294	371	4	19	23	9	3	4	64	100	51	80	290
14:17:35	33	Vol33	78	295	373	4	19	23	8	3	4	70	100	56	78	291
14:17:35	34	Vol34	81	295	376	4	19	23	9	3	4	69	100	53	80	292
14:17:35	35	Vol35	82	294	375	4	19	23	7	3	4	70	100	53	81	289
14:17:35	40	Vol40	505	446	950	32	28	59	2	6	4	92	100	92	546	442
14:17:35	41	Vol41	505	453	957	32	28	60	2	6	4	91	100	91	547	451
14:17:35	42	Vol42	82	257	338	4	17	20	9	3	4	71	100	51	79	254
14:17:35	43	Vol43	80	257	337	4	17	20	8	3	4	74	100	56	80	253
14:17:35	44	Vol44	78	257	335	4	17	20	10	3	4	70	100	55	80	258
14:17:35	45	Vol45	80	258	337	4	17	20	8	3	4	72	100	54	78	253

Result:

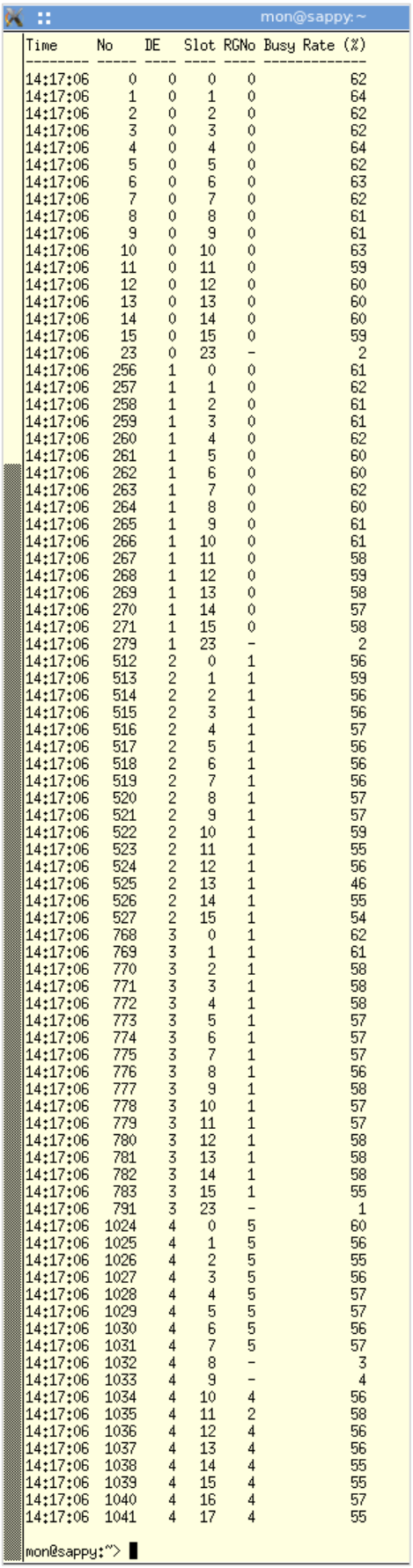
The overall result of the maximum performance test is as follow:

- 375 cameras write to Live-DB (10 x 26 MB/s): ~ 260 MB/s
- Archive process read from Live-DB (10 x 35 MB/s) and write into Archive-DB (20 x 18 MB/s): ~ 710 MB/s
- Read from Archive-DB via playback function (20 x 4Mb/s) ~ 80 MB/s

~ 1050 MB/s

The maximum performance tests created a total I/O bandwidth of about **1050 MB/s**. The throughput on the LAN is nearly **100 MB/s**. On the right side you can see the disk busy rate of about 60 %, so much more bandwidth is available from ETERNUS DX point of view.

Of course the I/O throughput is one important indication of the overall configuration, but the "frame loss" indication is more important. The Windows perfmon logs showed that the frame loss rate is in a really good shape, 0.11% or less for the benchmark tests and 0.06 % for the maximum performance tests. Milestone confirmed that these values are really good.



4. Calculation for DX200 S3 max configuration

Assumption:

1) In the normal operation phase the overall performance is 1050 MB/s
2) Disk busy rate is about 60%, but let's calculate with 70% to have more confidence. Disk busy factor (**DBF**) = 100% / 70 % = 1,42
3) 180 disks are used, 264 disks are possible, disk factor (**DFA**) 1,46 (264/180)
4) Cameras actual in use = 5 x 75 = 375 (**CAM**)

Formula for maximum cameras:

DBF x DFA x CAM = Max CAM
1,42 x 1,46 x 375 = 777

Result: DX200 S3 roughly may support **777** cameras.

5. Calculation for DX600 S3 max configuration

The tests for ETERNUS DX600 S3 are not performed because Milestone recommends more than 1000 disks for certification tests and at least 7 recording server. Based on the test result from ETERNUS DX200 S3 and the fact that DX600 S3 can have 4 times more disks installed (1056) and distributed over 4 backend loops, the following estimated performance may be reached with DX600 S3.

Assumption:

1) In the normal operation phase the overall performance is 1050 MB/s
2) Disk busy rate is about 60%, but let's calculate with 70% to have more confidence. Disk busy factor (DBF) = 100% / 70 % = 1,42
3) 180 disks are used, 1056 disks are possible, disk factor (DFA) 5,86 (1056/180)
4) Cameras actual in use = 5 x 75 = 375 (CAM)

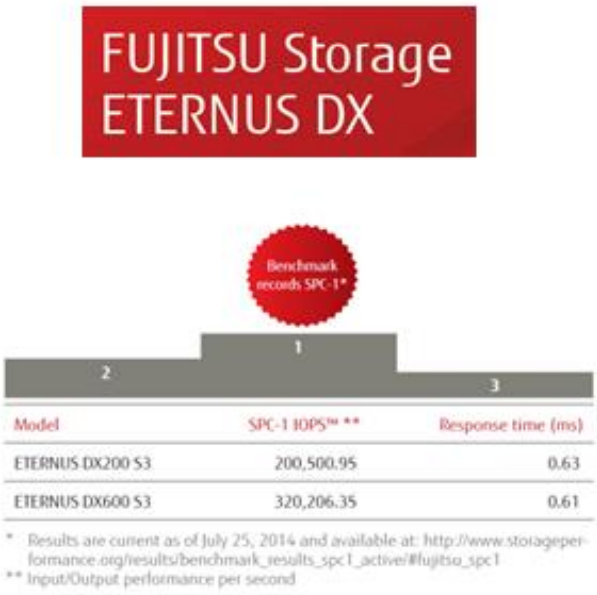
Formula for maximum cameras:

DBF x DFA x CAM = Max CAM
1,42 x 5,86 x 375 = 3120

Result: DX600 S3 roughly may support 3120 cameras

6. Conclusion

ETERNUS DX S3 storage systems completely fulfill the requirements to work in the Milestone XProtect Corporate environment for video surveillance on large-scale and high-security areas. The Live-DB and the Archive-DB can coexist within one ETERNUS DX system. A total capacity of 1584 TB (DX200 S3) or 6336 TB (DX600 S3) can be considered for planning the configuration. Please take into account that the throughput of Live-DB is higher compared with the throughput of Archive-DB. It is recommended that the Live-DB should be designed with SAS disk drives and the Archive-DB can be designed with NL-SAS disk drives.



Model	SPC-1 IOPS™ **	Response time (ms)
ETERNUS DX200 S3	200,500.95	0.63
ETERNUS DX600 S3	320,206.35	0.61

* Results are current as of July 25, 2014 and available at: http://www.storageperformance.org/results/benchmark_results_spc1_active/#fujitsu_spc1
** Input/Output performance per second

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