

NUUO Crystal™ Performance Guide

The Performance Guide provides performance test result of individual Recording Server, Metadata Server, IVS Server, and NuClient display; this guide shall help users to design system architecture. NUUO Calculator (<http://nucalculator.nuuo.com/>) is also a great tool for project design.

This guide is only for reference. The real server performance on the field depends on video source, network environment and all kind of variables.

The updated parts are marked as yellow and tested in RAID 6.

Recording Server

The following is the performance result for system with single volume in RAID 5 or RAID 6. The system is operating live view, playback, record and recycle simultaneously, but not doing backup.

The recording throughput of CT-8000R/CT-8000RP could reach 200 Mbps even with single 5900 RPM HDD. Below table provides the detail of Crystal Titan's optimal use case.

Without Local Display

R3-1600CT/ R3-1600CT-HR

Camera Parameter: H.264, high quality, and moderate traffic.

HDD Spindle Speed (RPM): 7200 RPM*

Volume Group: 1 Volume Group

Resolution (NTCS)	Bitrate/ CH	FPS	Remote Connections (Stream out)		Optimal Recording
			Playback	Live view	
2M	2M	30	16 CH	128 CH	128 CH

CT-8000R/ CT-8000RP

Camera Parameter: H.264, high quality, and moderate traffic.

HDD Spindle Speed (RPM): 7200 RPM*

Volume Group: 1 Volume Group

Resolution (NTCS)	Bitrate/ CH	FPS	Remote Connections (Stream out)		Optimal Recording
			Playback	Live view	
2M	2M	30	16 CH	128 CH	128 CH
5M	5M	10	16 CH	128 CH	64 CH

Performance of Volume Group:

Volume Group	Total Throughput
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	7200 RPM HDD	5900 RPM HDD
1 Volume Group	250 mbps	200 mbps
2 Volume Group	400 mbps	330 mbps
3 Volume Group	550 mbps	460 mbps

TR-0400CT/ R1-0400CT

Camera Parameter: H.264, high quality, and moderate traffic.

Volume Group: 1 Volume Group

HDD Spindle Speed (RPM): 7200 RPM*

Resolution (NTCS)	Bitrate/ CH	FPS	Remote Connections (Stream out)		Optimal Recording
			Playback	Live view	
2M	4 Mbps	30	4 CH	128 CH	36 CH
2M	4 Mbps	30	1 CH	128 CH	48 CH
2M	4 Mbps	30	0 CH	128 CH	64 CH
2M	4 Mbps	30	1 CH	64 CH	64 CH
5M	5 Mbps	30	0 CH	64 CH	64 CH

With Local Display (Complicated Scene)

H.264

CT-8000R/ CT-8000RP/ CT-8000EX/ CT-8000EX-RP

Camera Parameter: H.264, high quality, and moderate traffic.

Volume Group: 1 Volume Group

HDD Spindle Speed (RPM): 7200 RPM*

Resolution (NTSC)	Bitrate/ CH	FPS	Remote Connections (Stream out)		Optimal Recording	Local Display
			Playback	Live View		
VGA/D1	1 Mbps	30	16 CH	128 CH	64 CH	4X4 CH, totally 64 CH by tour
2M	4 Mbps	30	16 CH	128 CH	64 CH	4X4 CH, totally 64 CH by tour
2M	4 Mbps	9	16 CH	128 CH	64 CH	4X4 CH, totally 64 CH by tour
5M	5 Mbps	10	16 CH	128 CH	64 CH	4X4 CH, totally 64 CH by tour

TR-0400CT/ R1-0400CT

Camera Parameter: H.264, high quality, and moderate traffic.

Volume Group: 1 Volume Group

HDD Spindle Speed (RPM): 7200 RPM*

Resolution	Bitrate/ CH	FPS	Remote Connections	Optimal Recording	Local Display
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(NTCS)			(Stream out)			
			Playback	Live view		
2M	4 Mbps	30	4 CH	128 CH	32 CH	1X1 CH
2M	4 Mbps	30	4 CH	64 CH	32 CH	2X2 CH ^{*2}
3M/5M/10M	Not Recommended					

H.265

TR-0400CT/ R1-0400CT

Camera Parameter: H.265, high quality, and moderate traffic.

Volume Group: 1 Volume Group

HDD Spindle Speed (RPM): 7200 RPM^{*}

Resolution (NTCS)	Bitrate/ CH	FPS	Remote Connections (Stream out)		Optimal Recording	Local Display
			Playback	Live view		
2M	4 Mbps	30	4 CH	128 CH	36 CH	1X1 CH
3M/5M/10M	Not Recommended					

^{*} The total throughput of 7200 RPM HDD is 250 mbps for single Volume Group. If the HDD spindle speed is 5900 RPM, the recording throughput will become 200 mbps for 1 Volume Group.

^{*2} Without Auto-Scan.

Metadata Server

H.264

R3-1600CT/ R3-1600CT-HR

Transaction Frequency	Playback (Metadata w/ Video)	Live View (Metadata w/ Video)	Optimal Recording (2M/ 30 FPS)	Total Metadata Channel
1 transaction/ 5 sec	16 CH	128 CH	128CH	80 CH

CT-8000R/CT-8000RP/ CT-8000EX/ CT-8000EX-RP

Transaction Frequency	Playback (Metadata w/ Video)	Live View (Metadata w/ Video)	Optimal Recording (2M/ 30 FPS)	Total Metadata Channel
1 transaction/ 5 sec	16 CH	128 CH	128CH	80 CH

TR-0400CT/R1-0400CT

Transaction Frequency	Playback (Metadata w/ Video)	Live View (Metadata w/ Video)	Optimal Recording (2M/ 30 FPS)	Total Metadata Channel
1 transaction/ 5 sec	4 CH	128 CH	36 CH	70 CH

IVS Server

Below is the performance test result of IVS services.

IVS shall get 2nd or 3rd streaming for analysis in order to allow server to have more IVS channels.

Frame rate is crucial; lower frame rate could increase IVS channels.

All network services enabled in one server

Condition: CPU below 90%; Live view/playback - difference ± 1.5 fps

H.264

CT-8000EX/CT-8000EX-RP

Record Resolution/ FPS(NTSC)	IVS Resolution /FPS(NTSC)	Remote Connections (Stream out)		Optimal Recording	IVS Channel	Recording Total Bitrate	IVS Bitrate/ Channel
		Playback	Live view				
2M/30 FPS	CIF/ 15 FPS	16 CH	128 CH	128 CH	12 CH	256 Mbps	1 Mbps
2M/30 FPS	CIF/ 15 FPS	16 CH	96 CH	96 CH	13 CH	192 Mbps	1 Mbps
2M/30 FPS	CIF/ 15 FPS	16 CH	64 CH	64 CH	16 CH	128 Mbps	1 Mbps
2M/30 FPS	CIF/ 15 FPS	16 CH	32 CH	32 CH	16 CH	64 Mbps	1 Mbps

CT-8000RP/CT-8000RP

Record Resolution/ FPS(NTSC)	IVS Resolution/ FPS(NTSC)	Remote Connections (Stream out)		Optimal Recording	IVS Channel	Recording Total Bitrate	IVS Bitrate/ Channel
		Playback	Live view				
2M/ 30 FPS	2M/ 30 FPS	16 CH	128 CH	64 CH	3 CH	250 Mbps	4 Mbps
2M/ 30 FPS	1.3M/ 30 FPS	4 CH	32 CH	16 CH	6 CH	64 Mbps	3 Mbps
2M/ 30 FPS	D1/ 30 FPS	16 CH	128 CH	64 CH	6 CH	250 Mbps	1 Mbps
2M/ 30 FPS	D1/ 15 FPS	16 CH	128 CH	64 CH	11 CH	250 Mbps	1 Mbps
2M/ 30 FPS	CIF/ 15 FPS	16 CH	128 CH	128 CH	4 CH	256 Mbps	1 Mbps
2M/ 30 FPS	CIF/ 15 FPS	16 CH	96 CH	96 CH	8 CH	192 Mbps	1 Mbps
2M/ 30 FPS	CIF/ 15 FPS	16 CH	64 CH	64 CH	13 CH	128 Mbps	1 Mbps
2M/ 30 FPS	CIF/ 15 FPS	16 CH	32 CH	32 CH	13 CH	64 Mbps	1 Mbps
1.3M/ 30 FPS	1.3M/ 30 FPS	4 CH	32 CH	16 CH	8 CH	48 Mbps	3 Mbps
D1/ 30 FPS	D1/ 30 FPS	16 CH	128 CH	64 CH	10 CH	64 Mbps	1 Mbps

TR-0400CT/R1-0400CT

Record Resolution/ FPS(NTSC)	IVS Resolution /FPS(NTSC)	Remote Connections (Stream out)		Optimal Recording	IVS Channel	Recording Total Bitrate	IVS Bitrate/ Channel
		Playback	Live view				
2M/30 FPS	VGA/30 FPS	3 CH	32 CH	16 CH	2	64 Mbps	1 Mbps
2M/30 FPS	VGA/15 FPS	2 CH	32 CH	16 CH	3	64 Mbps	1 Mbps
2M/30 FPS	QVGA/30 FPS	3 CH	32 CH	16 CH	2	64 Mbps	0.5 Mbps

H.265

CT-8000EX/CT-8000EX-RP

Record Resolution/ FPS(NTSC)	IVS Resolution /FPS(NTSC)	Remote Connections (Stream out)		Optimal Recording	IVS Channel	Recording Total Bitrate	IVS Bitrate/ Channel
		Playback	Live view				
2M/30 FPS	CIF/ 15 FPS	16 CH	128 CH	128 CH	12 CH	256 Mbps	1 Mbps
2M/30 FPS	CIF/ 15 FPS	16 CH	96 CH	96 CH	13 CH	192 Mbps	1 Mbps
2M/30 FPS	CIF/ 15 FPS	16 CH	64 CH	64 CH	15 CH	128 Mbps	1 Mbps
2M/30 FPS	CIF/ 15 FPS	16 CH	32 CH	32 CH	15 CH	64 Mbps	1 Mbps

CT-8000RP/CT-8000RP

Record Resolution/ FPS(NTSC)	IVS Resolution/ FPS(NTSC)	Remote Connections (Stream out)		Optimal Recording	IVS Channel	Recording Total Bitrate	IVS Bitrate/ Channel
		Playback	Live view				
2M/ 30 FPS	CIF/ 15 FPS	16 CH	128 CH	128 CH	3 CH	256 Mbps	1 Mbps
2M/ 30 FPS	CIF/ 15 FPS	16 CH	96 CH	96 CH	6 CH	256 Mbps	1 Mbps
2M/ 30 FPS	CIF/ 15 FPS	16 CH	64 CH	64 CH	10 CH	128 Mbps	1 Mbps
2M/ 30 FPS	CIF/ 15 FPS	16 CH	32 CH	32 CH	10 CH	64 Mbps	1 Mbps

TR-0400CT/R1-0400CT

Record Resolution/ FPS(NTSC)	IVS Resolution /FPS(NTSC)	Remote Connections (Stream out)		Optimal Recording	IVS Channel	Recording Total Bitrate	IVS Bitrate/ Channel
		Playback	Live view				
2M/30 FPS	VGA/30 FPS	3 CH	32 CH	16 CH	1	64 Mbps	1 Mbps
2M/30 FPS	VGA/15 FPS	2 CH	32 CH	16 CH	2	64 Mbps	1 Mbps
2M/30 FPS	QVGA/30 FPS	3 CH	32 CH	16 CH	1	64 Mbps	0.5 Mbps

Pure IVS server (only IVS/MDS enabled)

Condition: CPU below 90%; Live view/playback - difference ± 1.5 fps

CT-8000RP/CT-8000RP

Resolution	FPS (NTSC)	Bitrate/ Channel	IVS Channel
5M	15 FPS	4 Mbps	7 CH
2M	30 FPS	4 Mbps	6 CH
D1	30 FPS	1 Mbps	9 CH
D1	15 FPS	1 Mbps	16 CH
CIF	30 FPS	0.5 Mbps	9 CH

H.264

TR-0400CT/R1-0400CT

Resolution	FPS (NTSC)	Bitrate/ Channel	IVS Channel
VGA	30 FPS	1 Mbps	2 CH
VGA	15 FPS	1 Mbps	4 CH
QVGA	30 FPS	1 Mbps	2 CH

H.265

TR-0400CT/R1-0400CT

Resolution	FPS (NTSC)	Bitrate/ Channel	IVS Channel
VGA	30 FPS	1 Mbps	2 CH
VGA	15 FPS	1 Mbps	3 CH
QVGA	30 FPS	1 Mbps	1 CH

NuClient/NuMatrix

Camera Parameter: H.264, high quality, and moderate traffic.

CPU: i7-3770k, 80% loading

Resolution	Bitrate	FPS	Channel
D1	540 Kbps	20	83 CH
2M	1080 Kbps	10	30 CH
2M	4 Mbps	20	13 CH