



# **Axxon One Performance and Validation Report on Dell Technologies PowerEdge\* R750**

**Report**

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*August 2023*



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## Revision History

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Date	Revision	Description
August 2023	1.0	Initial release.

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## 1.0 Overview

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This document provides an overview and performance results for validation of a production ready version of Axxon One by AxxonSoft running on an enterprise server solution; Dell Technologies PowerEdge\* R750.

The focus of this report will be performance results running Axxon One software on only the CPU.

Configuration for multi-stream in-process analytics includes a pipeline process of video decode, video analytics via AI model with video analytics metadata creation, and injection of metadata into reporting and visualization platform.

### 1.1 Objective

The objective of the validation process is to:

- i. Validate and Size the system configuration for concurrent multi-stream video analytics.
- ii. Validate that the application's inferencing model is evenly distributed across all compute units:
  - The balancing load across all CPU cores is validated.
- iii. Confirm that maximum video analytics channel density is achieved at about 60% of maximum compute capacity:
- iv. Confirm that overall software/hardware solution is steady and operates without fail(s) for the duration of the testing.
- v. Measure and log key system running parameters:
  - Overall system CPU load: average and standard deviation.
  - Video analytic inference performance in frames per second and inference time captured in milliseconds.

### 1.2 Axxon One Overview

Axxon One is a limitlessly scalable video management software that combines comprehensive support for 10,000+ IP devices and a streamlined user interface. Axxon One supports the latest ONVIF standards, such as Profile M, and delivers unique value through integrated solutions, customizable AI video analytics, and fast, intelligent search in video footage from multiple cameras.

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## 2.0 System Configuration

Table 1. System Configuration

Components	
<b>Hardware</b>	
Chassis	Dell Technologies PowerEdge R750
CPU	2x Intel® Xeon® Gold 6338N CPU @ 2.20 GHz, 32 Core(s), 64 Logical Processor(s)
Memory	Installed Physical Memory (RAM) of 256 GB
Hard drives	512GB Total Storage but not leveraged for storage
Network card	Intel® Ethernet Network Adapter E810-DA4 QP 25GbE SFP28 OCP 3.0
<b>Software</b>	
BIOS	Dell Inc. 1.4.4
iDRAC	5.00.20.00 (Build 22)
Operating System	Microsoft Windows Server 2019 v.10.0.17763, x64
Video Analytics Application	AxxonSoft Axxon One VMS Version 2.0.0.102 Axxon DetectorPack Version 3.10.2.117 Drivers Pack Version 3.76.28
OpenVINO™	OpenVINO™ Toolkit v.2021.3 LTS
Others	Disabled Hyper-Threading (Logical Processor in BIOS)
Others	Enabled Dynamic CPU Frequency

## 2.1 Processor Details

System	Name	Processor	Current Speed	Core Count
1	CPU1	Intel® Xeon® Gold 6338N CPU @ 2.20 GHz	2.20 GHz	32
	CPU2	Intel® Xeon® Gold 6338N CPU @ 2.20 GHz	2.20 GHz	32

## 2.2 Dell BIOS Settings

Dell iDRAC Processor Settings	
Logical Processor	Enabled
CPU Interconnect Speed	Maximum data rate
Virtualization Technology	Disabled
Directory Mode	Enabled
Adjacent Cache Line Prefetch	Enabled
Hardware Prefetcher	Enabled
DCU Streamer Prefetcher	Enabled
DCU IP Prefetcher	Enabled
Sub NUMA Cluster	Disabled
MADT Core Enumeration	Linear
UPI Prefetch	Enabled
XPT Prefetch	Enabled
LLC Prefetch	Disabled
Dead Line LLC Alloc	Enabled
Directory AtoS	Disabled
AVX P1	Normal
RAPL Prioritization (line18)	Disabled
AVX ICCP Pre-Grant License	Disabled
Number of Cores per Processor	All
Local Machine Check Exception	Disabled
Controlled Turbo (line 22)	Disabled
Optimizer Mode (line 23)	Auto
Embedded SATA Mode (line 24)	AHCI
Security Freeze Lock	Enabled
Write Cache	Disabled
BIOS NVME Driver	Dell Qualified Drives
Boot Mode ( line 28)	UEFI
Boot Sequence Retry	Enabled
Generic USB Boot	Disabled
HDD Placeholder	Disabled
SysPrep Clean	None
SetBootOrderEn	AHCI.SL.6-2,Disk.USBBack.1-1
SetBootOrderDis	NIC.PxeDevice.1-1
PxeDev1EnDis	Enabled

<b>PxeDev2EnDis</b>	Disabled
<b>PxeDev3EnDis</b>	Disabled
<b>PxeDev4EnDis</b>	Disabled
<b>HttpDev1EnDis</b>	Disabled
<b>HttpDev2EnDis</b>	Disabled
<b>HttpDev3EnDis</b>	Disabled
<b>HttpDev4EnDis</b>	Disabled
<b>USB Ports</b>	All On
<b>USB Managed Port</b>	On
<b>IntegratedNetwork1</b>	Enabled
<b>EmbNic1Nic2</b>	Enabled
<b>IoatEngine</b>	Disabled
<b>EmbVideo</b>	Enabled
<b>SnoopHldOff</b>	Roll256Cycles
<b>SriovGlobalEnable</b>	Disabled
<b>OsWatchdogTimer</b>	Disabled
<b>PCIRootDeviceUnhide</b>	Disabled
<b>MMIO Above 4GB</b>	Enabled
<b>MemoryMappedIOH</b>	56TB
<b>DellAutoDiscovery</b>	Platform Default
<b>Slot1</b>	Enabled
<b>Slot2</b>	Enabled
<b>Slot3</b>	Enabled
<b>Slot4</b>	Enabled
<b>Slot5</b>	Enabled
<b>Slot6</b>	Enabled
<b>Slot7</b>	Enabled
<b>Slot8</b>	Enabled
<b>SerialComm</b>	Off
<b>SerialPortAddress</b>	Com1
<b>FailSafeBaud</b>	115200
<b>ConTermType</b>	Vt100Vt220
<b>RedirAfterBoot</b>	Enabled
<b>SysProfile</b>	PerfOptimized
<b>PasswordStatus</b>	Unlocked
<b>TpmSecurity</b>	On



<b>Tpm2Hierarchy</b>	Enabled
<b>MemoryEncryption</b>	Disabled
<b>PwrButton</b>	Enabled
<b>AcPwrRcvry</b>	Last
<b>AcPwrRcvryDelay</b>	Immediate
<b>AcPwrRcvryUserDelay</b>	60
<b>UefiVariableAccess</b>	Standard
<b>InBandManageabilityInterface</b>	Enabled
<b>SmmSecurityMitigation</b>	Disabled
<b>SecureBoot</b>	Disabled
<b>SecureBootPolicy</b>	Standard
<b>SecureBootMode</b>	DeployedMode
<b>TpmPpiBypassProvision</b>	Disabled
<b>TpmPpiBypassClear</b>	Disabled
<b>Tpm2Algorithm</b>	SHA1
<b>RedundantOsLocation</b>	None
<b>MemTest</b>	Disabled
<b>MemOpMode</b>	OptimizerMode
<b>NodeInterleave</b>	Disabled
<b>MemoryTraining</b>	MemoryTrainingFast

**NOTES:**

1. iDRAC = Integrated Dell Remote Access Controller.

## 3.0 Axxon One System Configuration

### 3.1 Video Stream Configuration(s)

Component	Settings	Comments
Video Analytic Input video stream parameters	See section 5.1 Analysis Single-stream RTSP cameras are used to emulate real-world VMS configuration. RTSP cameras are receiving the video streams from remote RTSP server via network interface. Streams are constantly being recorded in any profile.	Each type of analytics is tested separately using various resolutions and codecs. Stream frame rate is set to 25 FPS. For each camera, 1 analytics instance is initialized, <u>except for the "RTSP streams recording to archive" profiles</u> – in that case no analytics is used, but the constant recording is still enabled.
Number of input video streams for analytics (virtual cameras)	See section 5.1 Analysis	Equals to the total number of currently active input video streams (each virtual camera stream has a single video stream)
Video analytic inference framerate per video channel	Depends on the type of analytics: Motion detection: 20 FPS Neural tracker: 6 FPS Personal protective equipment detection: 1 FPS Pose detection: 3 FPS Neural counter: 1 FPS Fire detection: 0.1 FPS Object tracker, tracker with neural filter: 25 FPS	Each AI service is set to process a certain portion of the total frames. These are the default (optimal) processing frame rate values for particular analytics tools. The processing frame rate should match these specified values during testing.
Number of active video analytics streams at maximum testing	See section 5.1 for details	Maximum Number of Streams where video analytics were applied.

## 4.0 Profiling

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### 4.1 Validation Steps

1. Deploy and Configure Dell Technologies\* PowerEdge\* R750 Server.
2. Install Windows\* Operating System and Analytics Platform with Testing Criteria.
  - a. Set up maximum virtual video streams with specified video sources for high-resolution streams.
  - b. Set up Axxon One video analytics to process the virtual video streams.
3. Run the profiler tools to record hardware usage and other metrics over a given period of time.
4. Process results to generate tabulated data using multiple readings.
5. Analyze results and report.

### 4.2 Checklist for Results Validation

- i. Axxon One is utilizing about 60% of the CPU without compromising the system accuracy.
- ii. Processing frame rate is matching the expectations.
- iii. CPU usage and Memory consumption values are consistent during the test.

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## 5.0 Performance Test Results

To measure system scalability, we sequentially increased the number of streams being processed in parallel while keeping records about hardware utilization and processing time for each stream.

### 5.1 Analysis

Test Profile	# of Streams based on CODEC	
	h.264	h.265
RTSP streams recording to archive (1920x1080)	1400	1500**
RTSP streams recording to archive (640x360)	2197	3300**
Motion Detection (1920x1080)	133	91
Motion Detection (1280x720)	280	228
Motion Detection (640x360)	590	494
AI Neural tracker (Resnet34) (1920x1080)	8	8
AI Neural tracker (Resnet34) (1280x720)	10	10
AI Neural tracker (Resnet34) (640x360)	10	10
AI Neural tracker (MobileNetV2) (1920x1080)	26	23
AI Neural tracker (MobileNetV2) (640x360)	32	32
Personal protective equipment detection (1920x1080)	15	14**
Personal protective equipment detection (1280x720)	22	21**
Pose Detection (1920x1080)	17	16
Pose Detection (640x360)	18	17
Object tracker (1920x1080)	65	63
Object tracker (640x360)	350	292
AI tracker with neural filter (1920x1080)	31	28**
AI tracker with neural filter (640x360)	33	32**
Fire detection (1920x1080)	110	80**
Fire detection (640x360)	250	205**
AI neural counter (1920x1080)	47	45**
AI neural counter (640x360)	56	55**

\*\*theoretical calculation

## 6.0 Conclusion

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Based on the analysis in this report, we have defined the specifications required per stream/camera to be deployed using the Dell Technologies PowerEdge R750 with the dual socket Intel® Xeon® Gold 6338N CPU.

To determine server hardware specifications for a given number and parameters of video streams, one can use the online [AxxonSoft Hardware Calculator](#) or this document for sizing purpose. Please consult with AxxonSoft technical sales to confirm sizing.

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