

# DEMS 360 Considerations

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<b>Description</b>	The intention of this document is to provide information regarding the IT requirements for DEMS 360.
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<b>Author</b>	OLIVER GIBBS

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<b>Position:</b>	CS	HoE									
<b>Approved by:</b>			AF								
<b>Position:</b>			CEO								

Reveal Media Ltd.  
 Endeavour II Becketts Wharf,  
 Lower Teddington Road,  
 Hampton Wick,  
 Surrey KT1 4ER  
 Helpdesk Tel: +44 (0) 203 890 2000  
 Email: helpdesk@revealmedia.com

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## Introduction

### What is DEMS 360?

DEMS 360 is the industry leading digital evidence management platform built on Reveal technology that has been used for over a decade by police forces, local authorities, security services and prisons in 35+ countries worldwide.

DEMS 360 is powerful enough to securely store, manage and export any amount of digital evidence, large or small, whilst always remaining incredibly simple and easy to use.

### Why use DEMS 360?

DEMS allows you to:

- ✓ Access media from any device on any platform.
- ✓ Password control access to content and features for active directory support.
- ✓ Securely store all media with a unique digital fingerprint.
- ✓ Keep track of any action performed in the system with an extensive audit trail attached to all digital evidence.
- ✓ Securely export digital evidence and deliver it quickly where and how you need it.
- ✓ Create ISO files for evidential media that can be burnt to a DVD or CD.

DEMS is easy to set up, incredibly simple to use and easy to manage; automated processes allow users to simply plug in a camera and let DEMS 360 do the rest. This design philosophy allows all the benefits of body worn cameras to be realised without placing a burden on your organisation.

## DEMS Deployment Scenarios

DEMS 360 can be deployed in different ways to reflect the infrastructure of your operation.

### Standalone

Stand Alone is the most basic deployment with DEMS 360 running on a single computer. Up to 18 Cameras can upload concurrently to a standalone instance (this is a limitation of Windows). The uploaded media files can be stored either on this computer or on an external storage device. This means that the files cannot be viewed from any other computer, but DVD copies can easily be made for the purpose of sharing.

A dedicated computer should be allocated to running DEMS 360 and should not be utilised to perform other tasks as this may affect performance of operations such as file transfer and decryption.

### Workgroup

Workgroup is a larger scale version of standalone, with DEMS 360 running on 2 or 3 computers connected via a mini network with one acting as the server and the others as clients. This scenario is suitable for relatively small deployments on a network (normally within the same building). The uploaded media files can be stored either on the computer acting as the server or on an external device. This means that the files cannot be viewed from any other computer, but DVD copies can easily be made.

### Enterprise

Enterprise is a more complex deployment with DEMS 360 running on a central server over a wide area network. The database is installed on the central server or on a dedicated database server. Multiple client machines can be used for video upload, so there is no practical limit to the number of Cameras that can be used.

Media files will be transferred over the corporate network, so sufficient bandwidth must be available. The uploaded media files can be stored either on the central server or on an external storage device. This means that the files can be viewed on any machine connected to the network.

### Hybrid

Hybrid is the most complex deployment and is similar to Enterprise with all database information held on a central server that is connected to two or more sites, where the sites are mini networked separately. Each site has a gateway computer and multiple client upload computers and, to reduce bandwidth consumption, media files are not transferred over the network to the main server instead remaining on the gateway computers or a local external device. This means the files can only be viewed at the location where they were uploaded.

This playback limitation is usually overcome by employing the Transcoding Service to create a low-resolution copy of each media file to allow viewing media from other sites without consuming much network bandwidth since the transcoded version can be as low as 20% of the original video size.

### Cloud Storage

Cloud storage can be utilised for the storage of media files but is limited to Microsoft Azure Blob Storage.

## DEMS Components

DEMS comprises of several Windows Services, Applications and Storage folders.

### Windows Services

Service	Description
<b>DEMS 360 Uploader Service</b>	Moves media files from their camera to the local cache, the first stage of uploading to DEMS 360. The service also verifies video integrity. Moves media files from the local cache to the BITS folder. Sends settings, firmware and book out details to the camera.
<b>DEMS Sync Service</b>	Monitors BITS folder for new media files, records them in the DB and then flags those requiring decryption. Moves media files into the appropriate storage folder according to their evidence flag and generates a thumbnail.
<b>Decryption Service</b>	Decrypts media files once they have arrived in the BITS folder.
<b>DEMS Sec Service</b>	Moves media files to the evidential folder when they are marked as evidential, and deletes media files once their retention period expires.
<b>DEMS XCoder Service</b>	Transcodes videos to low resolution. Used in enterprise and hybrid instances to reduce network bandwidth utilisation.
<b>DEMS Web Host Service</b>	(Stand Alone only) Interface between DEMS UI and DB or storage.

### Applications

Application	Description
<b>DEMS Web Service</b>	(Enterprise and Hybrid) Interface between DEMS UI and DB or storage.
<b>DEMS Web Application</b>	Main evidence management application includes Library, Administration, Cases etc.
<b>DEMS Web API</b>	Interface between different applications and DEMS Database or storage.
<b>DEMS 360 Uploader Application</b>	Displays camera upload status and allows Cameras to be booked out

### DEMS Storage

Folder(s)	Description (DEMS File/Folder Conventions)
<b>BITSFolder</b>	Temporary storage for media files arriving from the Uploading machines. Files are decrypted in the BITSFolder before the Sync service moves them to Root or Secroot.
<b>Root</b>	Non-Evidential media files.
<b>Secroot</b>	Media files classified as evidence (evidential).
<b>LowRes</b>	Videos (evidential or non-evidential) with lower resolution to review on restricted low bandwidth. Used in Enterprise and Hybrid installations.

## Requirements

The table below details the minimum requirements for running DEMS 360 under each of the four deployment scenarios.

Specification(s)	Standalone Mode	Workgroup Mode	Enterprise Mode	Hybrid Mode
Server O/S	N/A		Windows 2012 R2 Server SE and above	Windows 2012 R2 Server SE and above
Authentication	DEMS 360		Integrated Microsoft Active Directory Authentication 2000 or above	
Client O/S	Windows 10* * For Drive Encryption via BitLocker Windows 10 Pro is required	Windows 10	Windows 10	Windows 10 (Inc Gateway)
Server Machine Hardware	N/A		<ul style="list-style-type: none"> <li>- Intel/AMD CPU 3.3 GHz Quad Core</li> <li>- Memory 12GB</li> </ul>	
Client Machine Hardware	<ul style="list-style-type: none"> <li>- Intel/AMD CPU 2GHz</li> <li>- Memory 4GB</li> <li>- DVD±RW (for DVD burning)</li> <li>- 3 x USB2 ports (for uploading up to 18 cameras using docking stations)</li> <li>- USB End points - Sufficient to run up to 18 cameras plus any other connected USB devices such as mouse or keyboard.</li> <li>- Video card capable of playing HD video</li> </ul>			
Disc Space	<ul style="list-style-type: none"> <li>- Pre-Requisites: 1 - 1.2GB (SQL Server, Visual C Runtimes, Roles and Features)</li> <li>- Installed: 1GB (DEMS)</li> <li>- Media Cache on Uploader Clients: 500GB - dependant on usage * *see Limitations and Consideration/Media Cache section</li> <li>- Media Storage: Dependent on usage * **see Limitations and Consideration/Media Storage section *** (Fault tolerant raid 5 array highly recommended)</li> </ul>			
Server Software	N/A		<ul style="list-style-type: none"> <li>- Microsoft .NET Framework 4.5 or above</li> <li>- Visual C++ redistributable 2010 &amp; 2013 x86 (32 Bit)</li> <li>- Microsoft SQL Server 2012 (or above) with Management Studio</li> <li>- Web Server (IIS)</li> <li>- Web Server (IIS) Support Management Tools <ul style="list-style-type: none"> <li>→ IIS 6 Management Compatibility</li> <li>→ IIS 6 Metabase Compatibility</li> </ul> </li> <li>- .Net Framework Features <ul style="list-style-type: none"> <li>→ WCF Services</li> <li>→ HTTP Activation</li> </ul> </li> <li>- Background Intelligence Transfer Service (BITS)</li> <li>- URL Rewrite Module 2 to access DEMS Web over https connection</li> </ul>	

Specification(s)	Standalone Mode	Workgroup Mode	Enterprise Mode	Hybrid Mode
<b>Client Software</b>	<ul style="list-style-type: none"> <li>- Microsoft SQL Express Server 2012 or above</li> <li>- Microsoft .NET Framework 4.5 or above</li> <li>- Visual C++ redistributable 2010, 2012, 2013 &amp; 2015 x86 (32 Bit)</li> </ul>		<ul style="list-style-type: none"> <li>- Microsoft .NET Framework 4.5 or above</li> <li>- Visual C++ redistributable 2010, 2012, 2013 &amp; 2015 x86 (32 Bit)</li> </ul>	
<b>Recommended Network connectivity</b>	N/A	Multiple Ethernet cables with a hub or router connecting the computer.	Through the organization's existing network infrastructure.	The central server is connected to the different sites through the organization's existing network infrastructure. We recommend you set the internal connection within the sites to be using a dedicated network.
<b>Ports</b>	N/A	<ul style="list-style-type: none"> <li>- HTTP 80 and 443</li> <li>- FTP 21 and 990</li> </ul>		
<b>Notes</b>	It is recommended that DEMS is installed on a new machine that doesn't have any existing instances of SQL Server			

## Browsers

### Desktop

Desktop DEMS 360 Supports the following Desktop web browsers:

- Internet Explorer 10 or above
- Edge
- Chrome

### Mobile

DEMS 360 supports the following Mobile Browser/Operating System combinations

- Safari on Apple IOS
- Chrome on Apple IOS
- Chrome on Android

### Screen Size

Full DEMS 360 functionality requires a device of minimum 7 inches screen size.

The LIBRARY, CASES and ANNOTATION features support smaller screen sizes as they are web responsive by design.

## Limitations and Considerations

### USB Endpoints

Windows allocates endpoints to USB devices and USB device drivers have a limited number of endpoints available. Depending on other system resources using USB endpoints you may not always be able to use 18 cameras simultaneously. In such cases adding a USB host plugin card will resolve the issue.

### Media Cache

Client Machines need to have adequate storage to cache media files during the upload from Camera to the BITS folder.

The amount of storage is dependent on:

- A) The model of Camera
- B) The number of Cameras
- C) How much media is stored on each Camera

The table below gives some examples on the basis that each camera's memory is full.

Camera Mode	Capacity Per Camera	Cameras uploading concurrently	Hard Disk Minimum Storage for Cache
RS2-X2 or RS2-X2L	8GB	5	250GB
		18	250GB
D3 or RS2-XL 32GB	32GB	5	250GB
		18	1TB
D5	64GB	5	500GB
		18	2TB

## Bandwidth

For Enterprise, Workgroup and Hybrid deployments, the bandwidth between the client computer and the DEMS database and server will influence the user experience in terms of responsiveness. Hardware speed requirements are proportional to the number of users accessing the system simultaneously.

There are many factors to consider but you can never really have too much of a good thing when it comes to memory and processor speed. When managing a handful of cameras, our clients have run DEMS on modern laptops quite happily

The information below shows the minimum bandwidth required on the client computers to have a pleasant user experience in using DEMS:

- 1 Mbps to use DEMS interface
  - 10 Mbps to use DEMS to playback original quality (high resolution) videos
  - 2 Mbps to playback transcoded videos
- (100 Mbps or higher for best performance)

## Media Storage

The table below gives three deployment examples and a calculation of the amount of storage required for a two year period.

Parameter	Example 1	Example 2	Example 3
Number of Cameras Deployed	10	30	80
Recording Resolution	720 High	1080 Standard	720 Standard
Average Recording per Camera Per Day	60 Minutes	30 Minutes	20 Minutes
Percentage of Video that is Evidential	15%	20%	30%
Retention Policy for Evidential Files	90 Days	60 Days	365 Days
Retention Policy for Non-Evidential Files	30 Days	30 Days	30 Days
Estimated Storage Required	1 TB	2 TB	13 TB

A Storage Calculator is available allowing different parameters to be entered to model alternative deployments.

## ISO Files and Disc Burning

When recording for long periods, Reveal Cameras create a new files every 40 minutes. When contiguous files are then uploaded to DEMS 360, they are “linked” together. The files remain 40 minutes (or less), but they are linked in the database and share common metadata (Incident ID, Notes and Retention Policy).

Depending on the Camera setting (resolutions, frame rate and quality) the approximately file size of a 40-minute video will be as shown in the table below.

It is not possible to create an ISO with a single video that is greater then 2GB in size. The table below shows the approximate file size of a 40 minute video for each combination of Resolution and Quality. As shown in the table, a 40 minute video recorded at 1080p resolution and at High quality will be too large to create an ISO file.

Resolution	Quality	Frame Rate	Approximate Bit Rate	File Size of 40 Min Video
480p	Standard	30 FPS	1.0	300 MB
480p	High	30 FPS	2.5	750 MB
720p	Standard	30 FPS	3.0	900 MB
720p	High	30 FPS	6.5	1,950 MB
1080p	Standard	30 FPS	5.0	1,500 MB
1080p	High	30 FPS	8.5	2,550 MB

**Note:** Reveal cameras use a variable bit rate encoder. Storage capacity is calculated based the target bit rate and the memory size. Actual performance will vary depending on light conditions, movement of subject and movement of camera.

## Back-ups

DEMS 360 is robust. Providing back-ups are made of both the Media Files and Database the Reveal Support team should be able to recover any system failure from the back-ups.

It is essential that your **organisation's** policies and procedures are adhered to when handling such material and we highly recommend that your information security and IT staff are involved in establishing appropriate data protection and backup procedures. It is advisable to make a risk assessment regarding how resilient your hardware and backup/restore facilities should be.

It is essential they the Encryption PIN and Passwords set by DEMS 360 are backed-up.

Things to consider:

Operating Considerations	Operating Recommendations / Description
DRP / BCP	How long you can afford to have the system inoperable owing to system failure or disaster.
Disc Failure	<p>This can be mitigated by using a ** Raid array for the operating system, database and storage. Raid 5 is a popular choice and many raid controllers allow the failed disc to be replaced ("hot-swapped") without the system being powered down.</p> <p>Note that the disc array is vulnerable whilst a disc being replaced, and the raid array rebuilt. Most of our clients consider this to be a minimum protection level and the hardware quoted above has this facility.</p>
Data Backups	Most customers have well thought out policies regarding the backup of critical material which can include regular backups of the media and database using dedicated backup facilities that are not in the same vicinity. This provides significant protection in the case of local fire or flood etc. Some customers regard the fact that evidence is burned to disc promptly as being sufficient. Backup to an external hard drive regularly will provide a certain level of protection if this cannot be brought under normal IT procedures for some reason. Such discs can be bought from a variety of vendors including Buffalo and Netgear etc.
Other Hardware Failure	There are many things that can go wrong with a computer but in most cases the data remains intact and the system can be up and running again once the fault has been rectified either by the supplier or internal staff.
Support	You should stipulate a support arrangement with the vendor that provides the cover that you require. A "return to base" contract may be inappropriate owing to the sensitivity of the material likely to be on the system.

# Reveal Help Desk Contact

Type	Contact	Support Hours
<b>Software</b>	Email: <a href="mailto:helpdesk@revealmedia.com">helpdesk@revealmedia.com</a> Phone: +44 (0) 20 3890 2000	Monday → Friday 09:00am → 5:30pm UK
<b>Hardware</b>	Online: <a href="http://www.revealmedia.com/fault-report">www.revealmedia.com/fault-report</a> Email: <a href="mailto:support@revealmedia.com">support@revealmedia.com</a>	24/7

# APPENDIX 1 - Transcoding

## DEMS Transcoding facility (Enterprise and Hybrid only)

The Transcoding facility can be switched on to enable transcoding of high resolution videos to low resolution ones. This is done in order to save network bandwidth during playback.

Uploaded videos are transcoded once they arrive to the server storage (enterprise) or the gateway storage (hybrid). Transcoded videos are stored in the default media storage location which means that the storage size of media will increase.

By default, videos are transcoded to 640x360 resolution with 1Mbps bitrate, however this is configurable if needed. The original video will remain in DEMS 360 and will not be altered and DEMS 360 can be configured to playback the high resolution instead of the low resolution if needed.

Transcoding takes time to complete and requires computing resources. Therefore, the following questions should be considered;

- What is the capability of the servers performing the transcoding (see table later)?
  - What CPU load can be dedicate to transcoding on each server? (more on transcoding means less CPU available to other computational activities)
  - How many servers can be dedicated to transcoding?
- What is the acceptable time for transcoded material to be available (peaks in uploading will create longer transcoding queues therefore what does peak use look like)?
- What volume of material will be transcoded?
  - How many cameras will be used each day per shift?
  - How many shifts will there be?
  - How many minutes of video will be recorded per shift?
- Does all material need to be transcoded or just evidential material?
  - What proportion of recorded material is evidential?
- What resolution is being used for recording?

There is a great deal of difference in time taken to transcode on the server based on its particular CPU and memory etc. The example below is the performance measured on a virtual server with Intel Xeon 2.6 GHz CPU and 8GB RAM memory on Windows 2012 Server R2 for testing the transcode of 10 minutes video in 1280x720 resolution.

Number of Server Cores	Transcoding Threads	CPU Usage	Time taken to Transcode
8 cores	Auto	70% to 80%	2 mins secs
4 cores	1	25% to 30%	10 mins 42 secs
	2	55% to 60%	6 mins 40 secs
	3	65% to 70%	5 mins 53 secs
	4	90% to 95%	4 mins 8 secs

Real world testing of the intended configuration would be required to establish an accurate figure and the example above is for illustration purposes only.

# APPENDIX 2 - Streaming

## DEMS Streaming with D5 cameras

IT Areas	Spec
Hardware	I5 or better, 8GB RAM or better 128GB Hard drive or better 1Gb Ethernet port (should support several thousand streams)
Connection	Public facing IP address Single port connection into the DEMS server
Ports	1934,4100, 4443, 5544, 8410, 8420, 80
Security	A signed certificate from a Certificate authority
Viewing Device	OS: Windows or Android Browser: Internet Explorer 10, Edge or Chrome

# APPENDIX 3 – Reveal Media App

## Reveal Media App

The Reveal Media App runs on the Android platform and requires Android Version 5.01 or higher.