

Application Note Extended Recording System (ERS)



IP Camera Family
20N758 / 21N758 Camera
60SV12VA / 61SV12VA Server Board
60SV12VA-B Server Box

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1. Document History

Revision	Issue Date	Reason	CN#
Rev A	07-30-08	Initial release	08-0150
Rev B	10-17-08	Added 60SV12VA, 60SV12VA-B	08-0173

2. Introduction

The Videology i-*NET*STREAM Family of Network Cameras is now available with special firmware allowing for continuous, uninterrupted, real time video recording to an internal SD card. A custom file management protocol allows for rapid data storage in a continuous loop fashion such that a complete and uninterrupted video archive is created, the duration of which is determined by the SD card capacity and data storage frame rate.

For normal IP cameras the internal SD card is used to record only short duration video clips, in response to motion detection or other alarm inputs.

The FAT12, FAT16 or FAT32 file management protocol typically used for such devices makes it impossible to record continuously for extended periods without incurring periodic loss of data.

Videology has designed a proprietary file system for our network camera family (hereinafter referred to as the VIDEO file system), which provides for continuous, uninterrupted recording of video in a loop type fashion.

The actual duration of the recording is determined by the SD card capacity, the frame rate at which the images are stored, and by degree of motion (if motion detection is enabled).

3. Implementation

Although VID is still based on FAT12/FAT16/FAT32 protocols at the lowest I/O levels, it overcomes the limitations of this system by creating large contiguous files of the maximum permissible size. These files which are named 'VIDEOxxx.DB' contain a special data structure in the file header.

Each time an SD card is inserted, the device will check the following status:

- Was this card formatted as a readable and correct FAT12/FAT16/FAT32?
- Is there any 'VIDEOxxx.DB' in the default folder?
- Is this file contiguous?
- Is this file almost maximum-allocated?
- Does this 'VIDEOxxx.DB' file contain a specific data structure on the file header?

If any of these conditions are not met, the device will show an SD card icon with a cross to its analog output, generate an error log in the event list and refuse to record until another SD card is inserted.

If configured incorrectly, the device will reboot when a user switches it to "VIDEO" mode. In order to provide a continuous record of the longest duration, the "VIDEO" system will overwrite the oldest files on the CD card first, when the card is full.

IN VID mode:

- If the device reboots,
- If the device restarts,
- If the power is lost and recovered,

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- If another SD card is inserted,

If the same SD card is removed and inserted

The network camera will check the card status according to the specification, and find the latest record and start recording if any event is triggered.

4. Card Type

The SD card must be SDHC Class 6 or above. Card must be formatted by the Panasonic SD card format utility. The Windows[®] Format Utility does not format the SD cards correctly for this application. This utility can be located at http://panasonic.jp/support/global/cs/sd/download/sd_formatter.html

5. Image Source

The digital image source is limited to Motion-JPEG for VID. The recording mode will be switched to AVI mode automatically if the device is configured to the MPEG4 mode.

6. Performance

6.1. Frame Rate

The recording frame rate of this file system can be:

- 1 FPS (frame per second)
- 0.5FPS (frame per second)
- 0.25 FPS (frame per second)
- 0.125 FPS (frame per second)

Recording cannot be any faster than 1 FPS for the system to maintain balance with respect to:

- The network throughput. If system spent more time in recording and then there is less time in network transmission.
- The cache system. The cache system. If the recording rate increases, the buffer time reduces in the same way. If the frame rate is set to '2fps', and the buffer time were down to '10 seconds' or lower, it is a critical issue and information is lost.
- The recording duration. If the recording frame is higher, the recording duration is less.

6.2. Event Triggering

The triggered event can be one of the following.

- Motion detection
- Alarm input
- Digital alarm input/Network alarm input
- Network disconnection
- Schedule

The recording period of the items listed above except the '**schedule**' is set by the '**alarm duration**'.

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6.3. Duration (see Note 3)

The recording duration for MPEG images of various image formats and SD card capacities are listed in tables 1 and 2.

The data is based upon a cluster size of 8 K bytes, and assumes files sizes of ~ 50 Kbytes for D1 (720 x 480) and 16 Kbytes for CIF (352 x 240) image formats. The two tables list the duration for motion probabilities of 100% and 20 % respectively.

Recording Duration for MJPEG images as a function of card capacity and image format for 100% motion probability.

SD Size	Cluster Numbers	D1 1FPS	D1 0.5FPS	D1 0.25FPS	CIF 1FPS	CIF 0.5FPS
1GB	131072	7 hours	14 hours	29 hours / 1 days	18 hours	36 hours
2GB	262144	14 hours	29 hours / 1 days	58 hours / 2.5 days	36 hours	72 hours / 3 Days
4GB	524288	29 hours/ 1 days	58 hours / 2.5 days	116 hours /5 days	72 hours / 3 days	145 hours /6 days
8GB	1048576	58 hour/ 2.5 days	116 hours /5 days	233 hours /10 days	145 hours /6 days	291 hours /12 days
16GB	2097152	116 hours/ 5 days	233 hours /10 days	466 hours/ 20 days	291 hours/ 12 days	582 hours /24 days

Table 1. Recording Duration for MJPEG images as a function of card capacity and image format for 20% motion probability.

SD Size	Cluster Numbers	D1 1FPS	D1 0.5FPS	D1 0.25FPS	CIF 1FPS	CIF 0.5FPS
1GB	131072	36 hours/ 1.5 days	72 hours/ 3 days	145hours / 6 days	91 hours / 4 days	182 hours / 7.5 Days
2GB	262144	72 hours/ 3 days	145hours / 6 days	291 hours /12 days	182 hours /7.5 Days	72 hours/ 3 Days
4GB	524288	145hours / 6 days	291 hours /12 days	582 hours/ 24 days	364 hours/ 15 days	728 hours/ 6 days
8GB	1048576	291 hours / 12 days	582 hours/ 24 days	1165 hours/ 1.5 months	728 hours/ 1 month	1456 hours/ 12 days
16GB	2097152	582 hours/ 24 days	1165 hours/ 1.5 months	2330 hours/ 3 months	1456 hours/ 2 months	2912 hours/ 4 months

Table 2. Recording Duration for MJPEG images as a function of card capacity and image format for 20% motion probability.

7. Webpage List

The filename created under "VIDEO" follows the same structure as that created by the FAT system, and includes both a time stamp and file size. An authorized user can access the SD card remotely to browse through the stored images.

8. PC Software

Although VID is based on FAT12/FAT16/FAT32, a custom utility is required to read the SD card content on a PC. This special program can be downloaded from the Videologyinc.com website upon demand. It will recognize the "VIDEO" header identification and cut the large 'VIDEOxxx.DB' files into numerous PC-readable MJPEG files so that it can be read using common viewers such as MS Paint™.

9. Limitation

There is no limitation on file number, SD card brand or SD card capacity because the context searching before opening any file is not necessary. However, minimum speed requirements dictate class 6 or faster.

The only limitation is that multiple users cannot access the SD card via the network while image data is being written.

10. Notes

1. Both the total throughput of the SD card as well as the CPU's performance are limiting resources; therefore, if multi users try to access the SD card through the network this may give rise to errors.
2. SD cards have a lifetime in terms of read write cycles. This lifetime is generally long, but can vary from manufacturer to manufacturer. Please check with the SD card manufacturer regarding replacement time recommendations.
3. Please note that the actual SD capacity is slightly different from that implied by the description, because one kilobyte is in actuality 1024 bytes.
4. SD Card must be Class 6 or above.

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11. Contact Information

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