# Testing 6x DS-CAM-600

## Gigabit-Ethernet Camera

# 1. System requirements

- o 6 x **independent** Gigabit-Ethernet ports

Used network cards at the testing:

- Intel® PRO/1000 PT Quad Port Low Profile Server Adapter
- Tenda TEL9901

- o Good PC performance (Core i5 CPU or better recommended, 4 GB RAM)
- o DEWESoft X or 7.1
- o Smartek GigE Vision SDK 2.6.2
- o DEWESoft GigE driver (cdv) 2.0
- o SIRIUS
- o 2 x SYNC BOX

For synchronization

We have measured difference between SSD and HDD.

- WD Black 1 TB SATA Hard Drives ( WD1002FAEX) with 64 MB buffer size
- Intel® SSD 520 Series (480GB)

## 2. Software setup

After we have connected the hardware (details are described in DS-CAM GigE1-600 technical manual ), we have set the proper network properties.
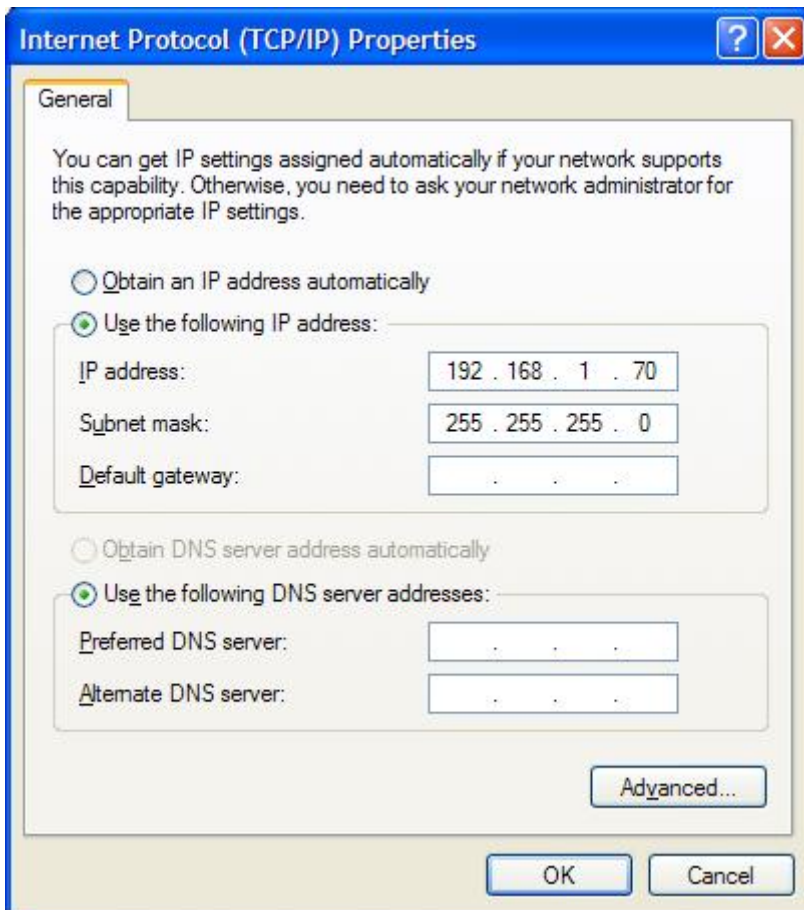


To set the right configuration of Local Area Connections we have changed the IP address and Subnet mask in Internet Protocol's (TCP/IP) Properties.

*Connect cameras one by one, otherwise you don't know on which ports they are.*

**Illustration 1 - TCP/IP Properties configuration**

Then we ran GigEVisionClient, where the camera is already connected, but with wrong IP adress. So we have changed the IP address of the camera to 192.168.1.**71.**

*The last numbers have to be different in GigEVisionClient and Internet Protocol setup*

For the next camera we have changed 3rd number of IP address, because Subnet mask is 255.255.255.0, which means it changes only 3 numbers.

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|  | TCP/IP address | GigEVisionClient IP address |
|---|---|---|
| **Local Area Connection 1** | 192.168.1.70 | 192.168.1.71 |
| **Local Area Connection 2** | 192.168.2.70 | 192.168.2.71 |
| **Local Area Connection 3** | 192.168.3.70 | 192.168.3.71 |
| **Local Area Connection 4** | 192.168.4.70 | 192.168.4.71 |
| **Local Area Connection 5** | 192.168.5.70 | 192.168.5.71 |
| **Local Area Connection 6** | 192.168.6.70 | 192.168.6.71 |

After we have done this part, we were ready for testing.

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# 3. Testing

For testing purposes we have done special table, with which we can measure single point with 6 cameras.



**Illustration 2 - Table with 6 Cameras**

On that point, we have used tuning fork, so we could actualy see the synchronization of 6 cameras. Our goal of testing was to measure different resolution's and then search for the highest frame frequency at each resolution. For each setup we have done at least 3 measurements. We have stopped the measurement when buffer usage was over 80%.

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# 4. Results

## 4.1. Synchronization

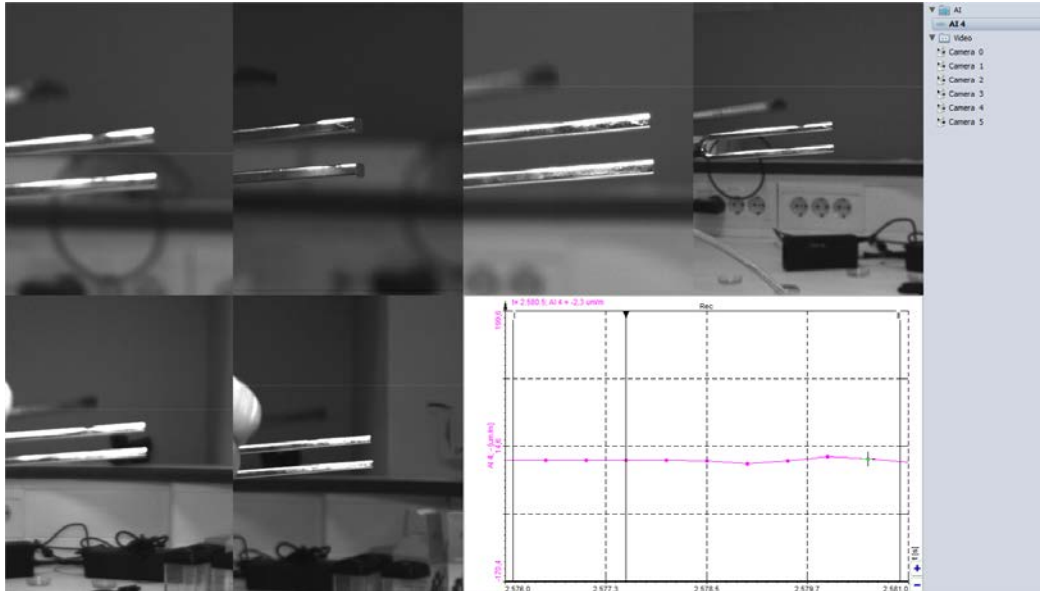To see that cameras are realy synchronized we have compared 2 following frames.



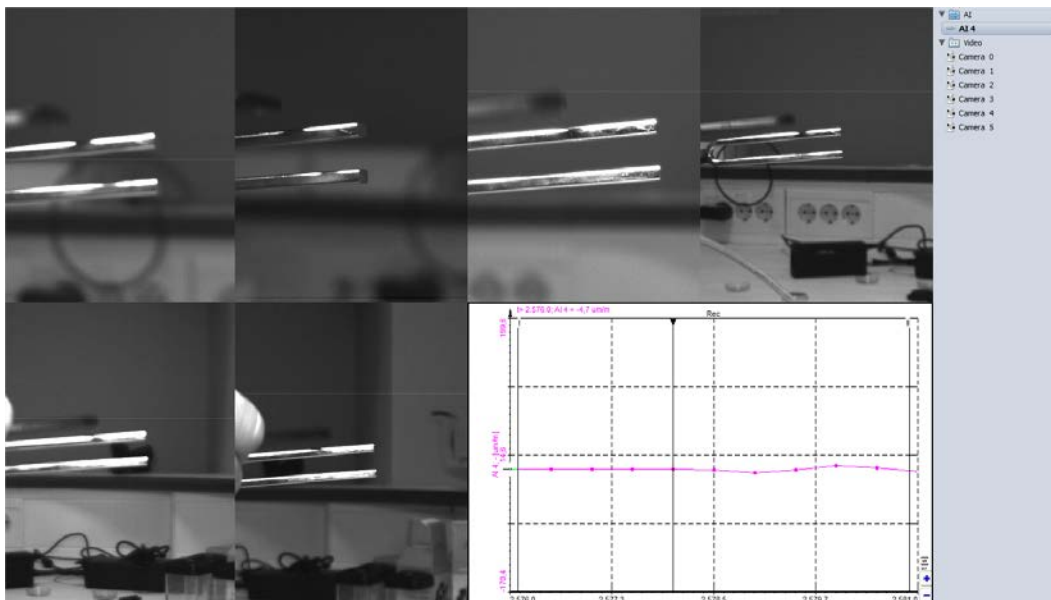**Illustration 3 - 6 x Camera 600 fps with tuning fork**



**Illustration 4 - Next frame of the same result**

If we look at Illustration 3 and Illustration 4 closely we can see perfect synchronization of all 6 cameras.

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## 4.2. Resolution vs frame frequency

At this part, we have done 2 separate measurements. One was with HDD (Hard Disk Drive) and the other was with SSD (Solid State Drive).



VS

### 4.2.1. Results for HDD (Hard Disk Drive)

| Number of camera | Resolution | Frame frequency [fps] | Storing time: (1 Analog ch. – 10 kHz) | Storing time: (1 Analog ch. – 100 kHz) |
|---|---|---|---|---|
| 6 | 640x480 | 600 | Working* | Working* |
| 6 | 800x600 | 600 | Up to 5 s | / |
| 6 | | 550 | Up to 10 s | / |
| 6 | | 500 | Up to 15 s | / |
| 6 | | 450 | Working* | Working* |
| 6 | 1024x768 | 500 | Not for use (picture is jumping) | |
| 6 | | 450 | Up to 5 s | / |
| 6 | | 400 | Up to 10 s | / |
| 6 | | 350 | Up to 15 s | / |
| 6 | | 300 | Working* | Working* |
| 6 | 1280x720 | 300 | Up to 10 s | |
| 6 | | 250 | Up to 15 s | |
| 6 | | 200 | Working* | Working* |
| 5 | 1920x1080 | 150 | Up to 10 s | |
| 5 | | 100 | Working* | Working* |

*storing tested longer than 1 minute – buffer stable

⚠️ *Using 2 Ports on motherboard and 4 on Intel network card*

⚠️ *Using 2 Ports on motherboard, 2-3 on Intel network card and 1 on Tenda network card*

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For test we have also used 1 color camera in different combinations with black-white camera. For all tests we have used 2 ports on motherboard, 2-3 on Intel network card and 1 on Tenda network card.

| Number of camera | Resolution | Frame frequency [fps] | Storing time: (1 Analog ch. – 10 kHz) | Storing time: (1 Analog ch. – 100 kHz) |
|---|---|---|---|---|
| 6 (5+1) | 640x480 | 600 | More than 1 minut | Working* |
| 6 (5+1) | 1280x720 | 300 | Not for use | / |
| 6 (5+1) | | 250 | Up to 15 s | / |
| 6 (5+1) | | 200 | More than 1 minut | Working* |
| 5 (4+1) | * | 150 | Up to 5 s | |
| 5 (4+1) | | 100 | More than 1 minut | Working* |

⚠️ *5 – black and white cameras,*
1 – color camera

*storing tested longer than 1 minute – buffer stable
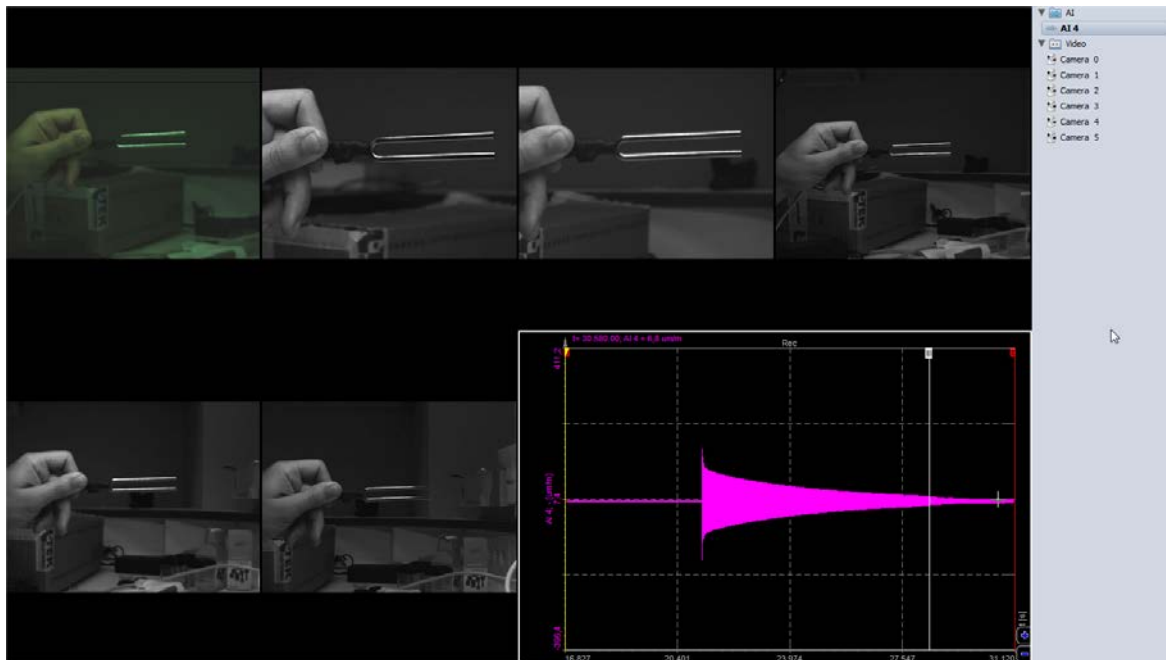**1920x1080 for black and white, 2048x2048 for color camera



**Illustration 5 - 5 black and white cameras and 1 color camera**

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Results of only 1 **color camera**:

| Resolution | Frame frequency [fps] | Storing time: (1 Analog ch. – 10 kHz) | Storing time: (1 Analog ch. – 100 kHz) |
|---|---|---|---|
| **640x480** | 600 | Working* | Working* |
| **1280x720** | 500 | Not for use (picture is jumping) | |
| | 497 | Working* | Working* |
| | 450 | Working* | Working* |
| **2084x2084** | 178 | Working* | Working* |

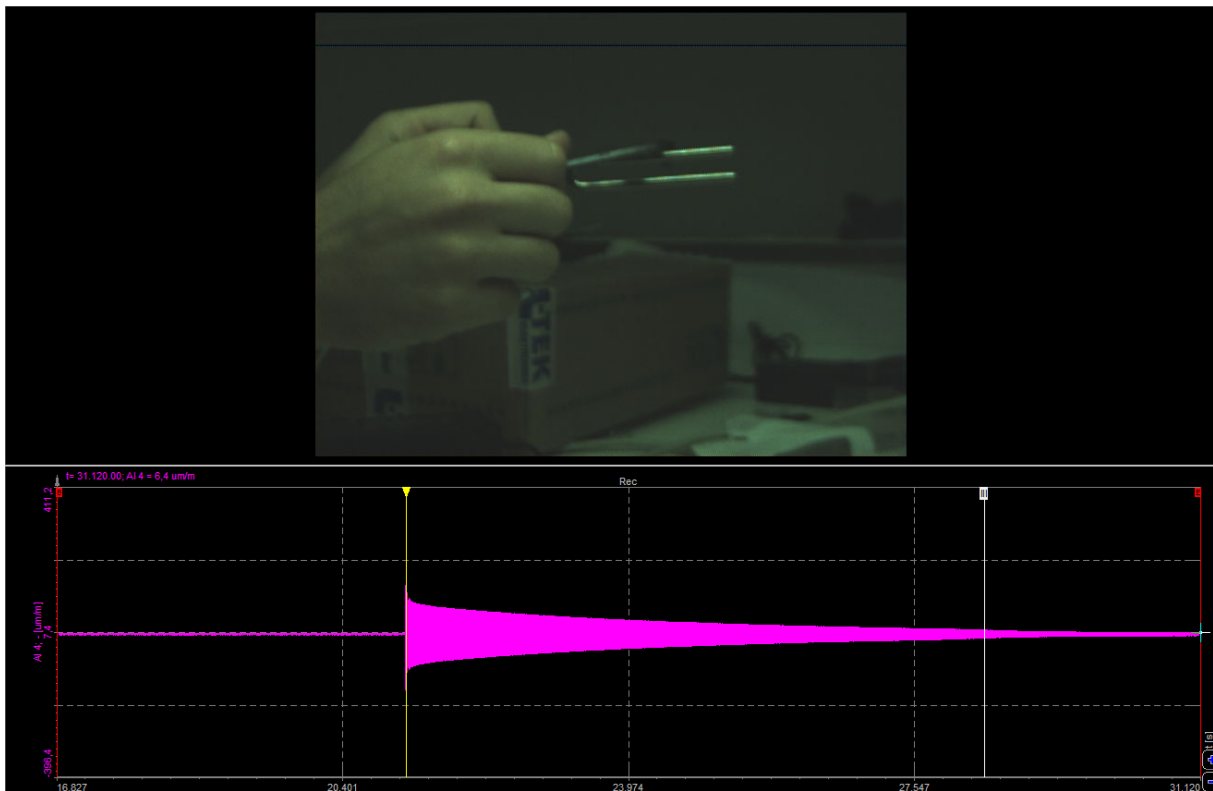*storing tested longer than 1 minute – buffer stable



**Illustration 6 – Color camera**

**Important finding:**

- no difference in size of files between black&white camera and color camera

## Additional testing with HDD:

- we were searching for maximum **24 x analog channel** frequency with highest performance of **6 x cameras**

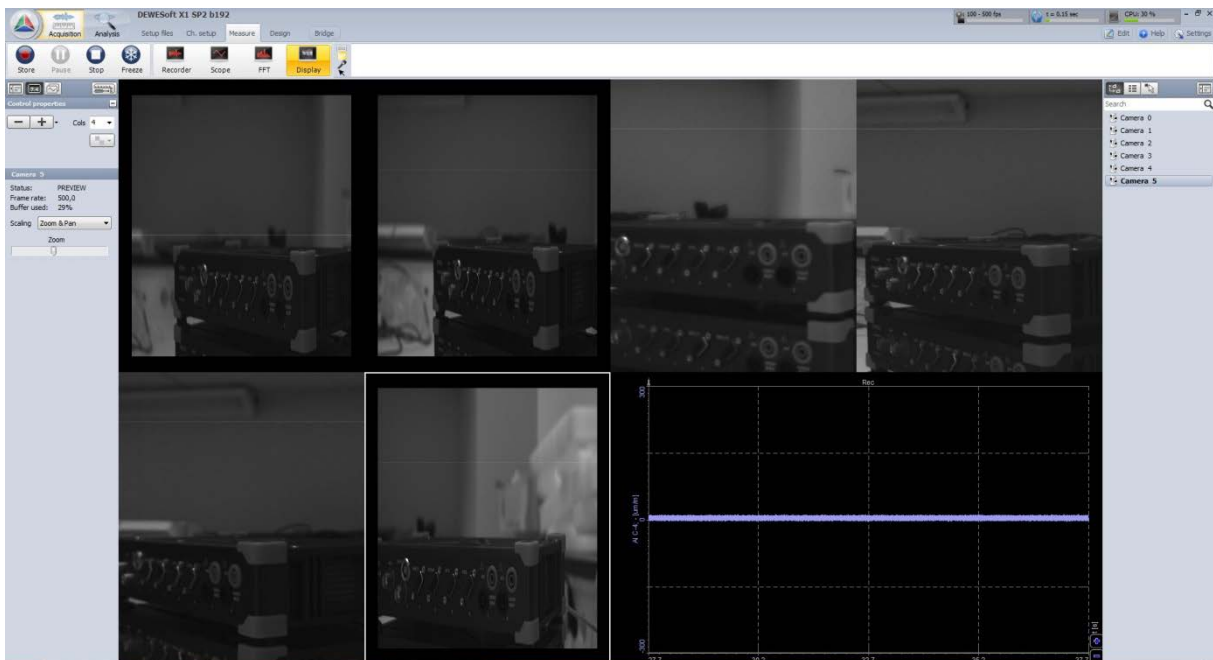| Number of camera | Resolution | Frame frequency [fps] | Storing time: (> 3 minutes + buffer stable) |
|---|---|---|---|
| 6 | 640x480 | 600 | 150 kHz |
| 6 | 800x600 | 450 | 10 kHz |
| 6 | | 350 | 150 kHz |
| 6 | 1024x768 | 200 | 50 kHz |
| 6 | | 150 | 150 kHz |
| 5 | 1280x720 | 250 | 150 kHz |
| 4 | 1920x1080 | 150 | 150 kHz |



**Illustration 7 - 6 x Camera - 1280x720 - 500 fps - 150 kHz with SSD**

### 4.2.2. Results for SSD (Solid State Drive)

With **SSD** inside the PC, we have done tests only with black-white cameras.

| Number of camera | Resolution | Frame frequency [fps] | Storing time: (1 Analog ch. – 10 kHz) | Storing time: (1 Analog ch. – 100 kHz) |
|---|---|---|---|---|
| 6 | 640x480 | 600 | Working* | Working* |
| 6 | 800x600 | 600 | Working* | Working* |
| 6 | 1024x768 | 500 | Not for use (picture is jumping) | |
| 6 | | 472 | Working* | Working* |
| 6 | 1280x720 | 550 | Not for use (picture is jumping) | |
| 6 | | 500 | Working* | Working* |
| 5 | 1920x1080 | 350 | Not for use (picture is jumping) | |
| | | 335 | Working* | Working* |

*storing tested longer than 1 minute – buffer stable

*Using 2 Ports on motherboard, 3-4 on Intel network card*

**Additional testing with SSD:**

- we were searching for maximum **24 x analog channel** frequency with highest performance of **6 x cameras**

| Number of camera | Resolution | Frame frequency [fps] | Storing time: (> 3 minutes + buffer stable) |
|---|---|---|---|
| 6 | 640x480 | 600 | 150 kHz |
| 6 | 800x600 | 600 | 150 kHz |
| 6 | 1024x768 | 473 | 150 kHz |
| 6 | 1280x720 | 500 | 150 kHz |
| 5 | 1920x1080 | 335 | 150 kHz |