Evaluation of sync. accuracy with Sync. Cable Expansion Unit

About this book

This document describes the evaluation results of synchronization characteristics in a multi-device sync. configuration using Sync. Cable Extension Unit.

Structure of this document

This document includes the following.

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1. Introduction

Before reading this document, please review the following information in advance.

1-1. Related materials

This document aims to compare the evaluation results obtained here with those obtained using the single synchronization cable (length: 3m) shown in the “BothView Sample code ‘Multi-device Sync’”.

“BothView Sample code ‘Multi-device Sync’” is a resource available on our website. Please see it via the link below.

- BothView Sample code ‘Multi-device Sync’
- SilkyEvCam Sync. Cable Expansion Unit Brochure

1-2. Test environment

Item	Description
Test location	Our office
Lighting conditions	Standard office lighting (ceiling KED lights, approx. 1000 lx)
Test patterns	**Pattern[1]** (BothView – BothView) Measure the timestamp difference between master and slave raw data corresponding to the start and end of the external trigger for the RGB frame camera. (The RGB frame cameras operate at 60 fps.) **Pattern[2]** (BothView - SilkyEvCam HD) Illuminate the center of a Siemens star chart with a laser pointer, and measure the illumination timing with a time resolution of 1 µs.
Device arrangement	(see figure)
Configuration of Sync. Cable Expansion Unit	Cameras: 2 units (1 Master / 1 Slave) Camera connection cable: Master side 1m / Slave side 1m Sync. cable: Master side 100m / Slave side 100m

The next section describes the latency measurement results.

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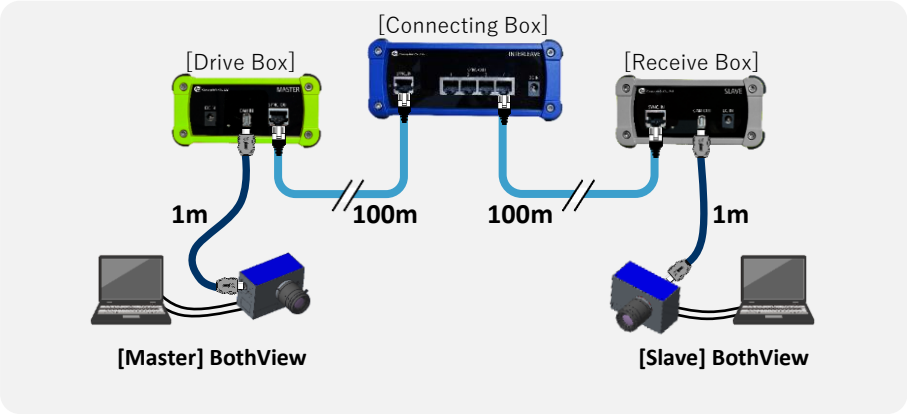
2. Evaluation pattern [1] : BothView - BothView

This section describes the latency measurement results conducted for Evaluation Pattern [1].



2-1. External trigger latency

Master Raw (BothView)

Using a tool for retrieving information about RAW.

```
Microsoft Windows [Version 10.0.26200.7623]
(c) Microsoft Corporation. All rights reserved.

D:\20260109_同期Boxテスト （BtoB録画）\03.100x100m@Free(OK)\master>metavision_file_info -i recording_260109_151102_174.raw
--disable-timestamp-shifting
================================================================================

Name                recording_260109_151102_174.raw
Path                D:\20260109_同期Boxテスト （BtoB録画）\03.100x100m@Free(OK)\master\recording_260109_151102_174.raw
Duration            5m 9s 144ms 975us
Integrator          CenturyArks
Plugin name         silky_common_plugin
Data encoding       EVT3
Camera generation   4.2
Camera serial       00011032

================================================================================

Type of event       Number of events    First timestamp     Last timestamp      Average event rate
--------------------------------------------------------------------------------
CD                  1275922521          1926784             309144975           4.1 Mev/s
External triggers   36372               5035259             308032582           118 ev/s
```

Slave Raw (BothView)

```
Microsoft Windows [Version 10.0.26200.7623]
(c) Microsoft Corporation. All rights reserved.

D:\20260109_同期Boxテスト （BtoB録画）\03.100x100m@Free(OK)\slave>metavision_file_info -i recording_260109_151103_118.raw
 --disable-timestamp-shifting
================================================================================

Name                recording_260109_151103_118.raw
Path                D:\20260109_同期Boxテスト （BtoB録画）\03.100x100m@Free(OK)\slave\recording_260109_151103_118.raw
Duration            5m 11s 406ms 783us
Integrator          CenturyArks
Plugin name         silky_common_plugin
Data encoding       EVT3
Camera generation   4.2
Camera serial       00011049

================================================================================

Type of event       Number of events    First timestamp     Last timestamp      Average event rate
--------------------------------------------------------------------------------
CD                  1277555998          2306784             311406783           4.1 Mev/s
External triggers   36372               5035285             308032612           117 ev/s
```

+26us

+30us

As can be seen from the latency difference between the First timestamp and Last timestamp shown in the figure above, the latency values are not constant. Therefore, direct comparison is difficult, but while actual measurements using a single sync. cable ranged from 20 to 50 µs, the results of this measurement all fell within that range. Therefore, it can be concluded that this pattern has no significant impact on latency.

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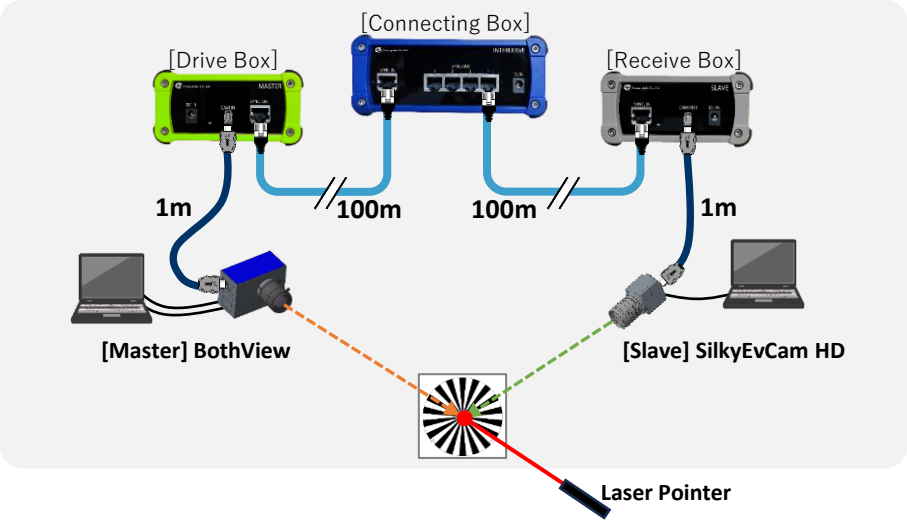
3. Evaluation pattern [2] : BothView – SilkyEvCam HD

This section describes the timestamp integrity measurement results conducted for Evaluation Pattern [2].
When connecting a SilkyEvCam HD (or VGA) to the Slave using the Sync. Cable Expansion Unit, the Slave side event camera cannot receive the trigger signal emitted from the Master side RGB frame camera due to specification limitations. On the other hand, since synchronization between event cameras is maintained, this measurement focused on verifying the timestamp integrity based on actual video footage rather than evaluating the latency of the external trigger signal.



3-1. Verifying timestamp integrity

The figure on the next page shows the moment of laser light irradiation extracted in 1 μs increments from the raw data acquired by the Master and Slave event cameras. Due to the differing shooting positions, a precise pixel-level comparison cannot be made. However, it can be confirmed that the changes in events at each timestamp generally occur at the same time. Therefore, it can be considered that timestamp integrity between the Master and Slave event cameras is maintained.

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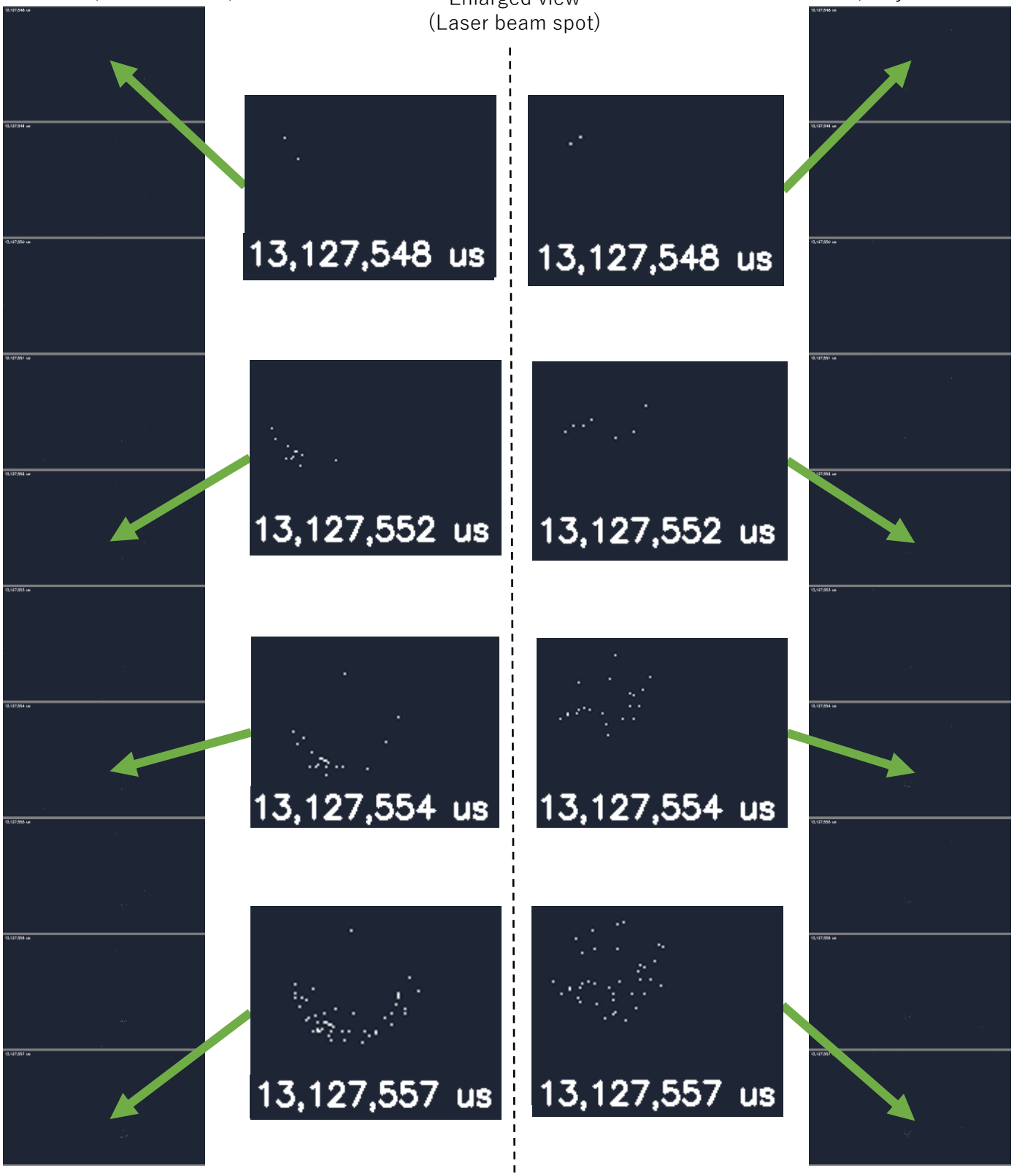
3. Evaluation pattern [2] : BothView – SilkyEvCam HD



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4. Conclusion

Here, we evaluated the synchronization characteristics in a multi-device sync. configuration using the Sync. Cable Expansion Unit.

- In the [BothView – BothView] configuration, the latency measured here was confirmed to be equivalent to the actual measurement when using a single sync. cable. In other words, no significant impact from the expansion unit was observed.

- In the [BothView – SilkyEvCam HD] configuration, Although latency evaluation of the external trigger signal cannot be performed due to specifications, we confirmed that timestamp integrity between Master and Slave is maintained through verification based on actual video footage.

Based on the above, it can be concluded that the Sync. Cable Expansion Unit has synchronization characteristics that are practically acceptable in multi-device sync. configurations.

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