HDF5 MCS Raw Data Definition

Aus Multi Channel Systems Wiki

Inhaltsverzeichnis

Definition of the HDF5 format for raw data

MCS-HDF5 Protocol Type: **RawData** (Raw-Data protocol)

Protocol Version: **3** based on the definitions of RawDataFileIO in version 10.

All strings are only ASCII-encoded

Changelog

Version 1:

- Initial draft

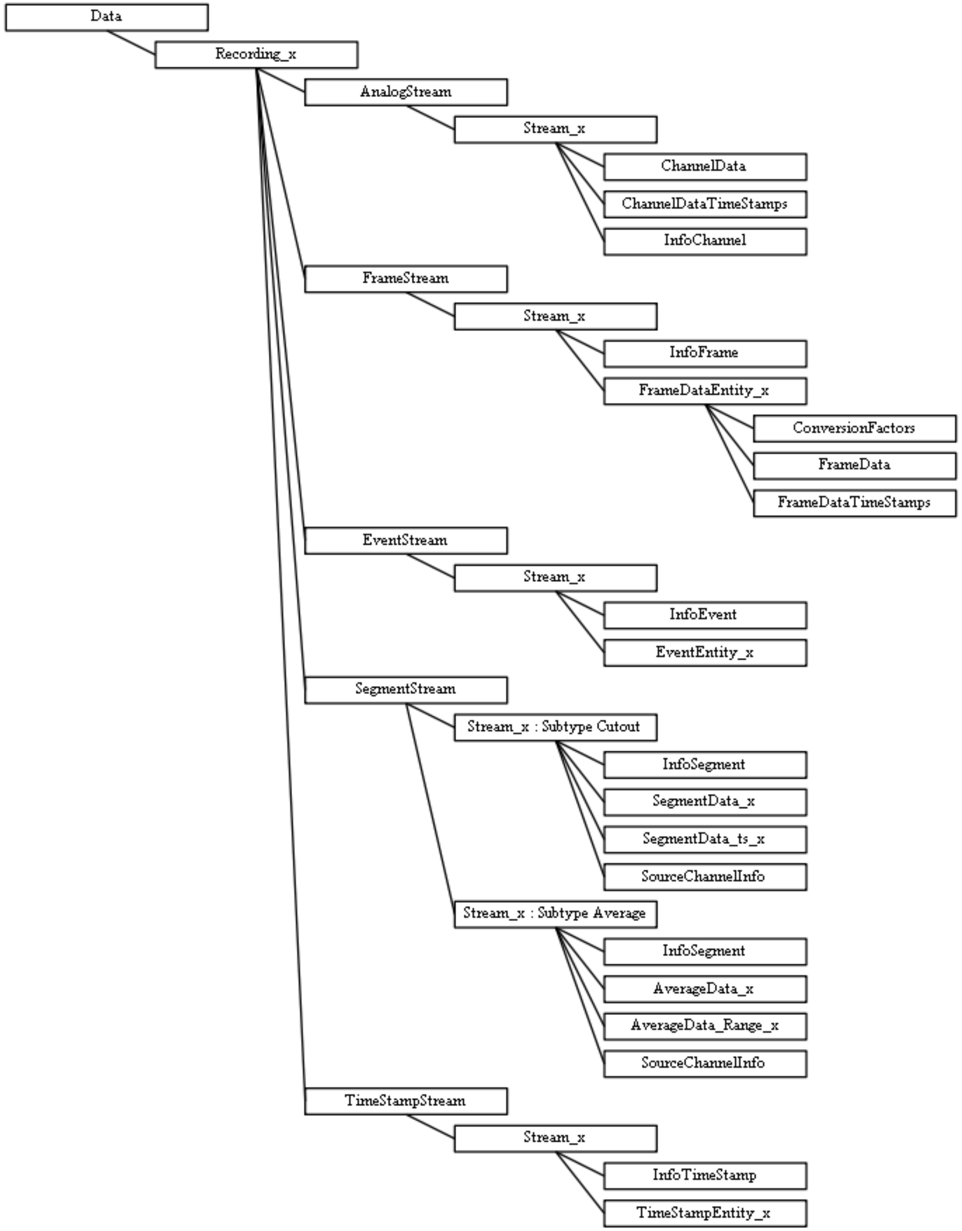
Version 2:

- New Root-Folder attributes added to detect name and version of the creating application and library

Version 3:

- Data structures for **DataSubType::Average** of **StreamType::Segment** added

Hierarchy



Root-Folder "/"

Contains all information for one experiment - measured data (inside the folder **Data**) and a description (possibly in the future) inside the folder **Experiment/Description/...**

Attributes:

Name	Description	Data Type	MCS-HDF5 Protocol Version
McsHdf5ProtocolType	Type of the used MCS-HDF5 protocol definition (e.g. **RawData** for the raw data MCS-HDF5 definitions)	[**String**,**Scalar**]	1 ≤
McsHdf5ProtocolVersion	Version number of the used MCS-HDF5 protocol	[**Integer**,**Scalar**]	1 ≤
GeneratingApplicationName	Name of the application that generated this HDF5 file	[**String**,**Scalar**]	2 ≤
GeneratingApplicationVersion	Version of the application that generated this HDF5 file	[**String**,**Scalar**]	2 ≤
McsDataToolsVersion	Version of the McsDataTools library that was used by the application to create the HDF5 file	[**String**,**Scalar**]	2 ≤

Datasets:

- none

Folder "Data"

Navigation: /Data

Contains all recordings for this experiment.

Attributes:

Name	Description	Data Type
ProgramName	Name of the recording program	[**String**,**Scalar**]
ProgramVersion	Version number of the recording program	[**String**,**Scalar**]
MeaName	Name of the recorded MEA	[**String**,**Scalar**]
MeaLayout	Layout descriptor	[**String**,**Scalar**]
MeaSN	Serial number of the MEA	[**String**,**Scalar**]
Date	Date of the recording	[**String**,**Scalar**]
DateInTicks	Date of the recording in .NET ticks (100 ns)	[**Long**(64-bit Integer),**Scalar**]
FileGUID	GUID of the converted raw data file	[**String**,**Scalar**]
Comment	Comment	[**String**,**Scalar**]

Datasets:

- none

Folder "Recording_x"

Navigation: /Data/Recording_x

Contains all recorded streams for recording x.

Attributes:

Name	Description	Data Type
RecordingID	Recording ID	[**Integer**(32-bit Integer),**Scalar**]

RecordingType	Recording type	[**String**,**Scalar**]
TimeStamp	Start time of the recording in microseconds	[**Long**(64-bit Integer),**Scalar**]
Duration	Total recording duration in microseconds (This duration can differ from the actual duration of the recorded data!!!)	[**Long**(64-bit Integer),**Scalar**]
Label	Label	[**String**,**Scalar**]
Comment	Comment	[**String**,**Scalar**]

Datasets:

- none

Folder "AnalogStream"

Navigation: /Data/Recording_x/AnalogStream

(Organisational) folder for all channel-based streams of this recording

Attributes:

- none

Datasets:

- none

Sub-folder "Stream_x" of "AnalogStream"

Navigation: /Data/Recording_x/AnalogStream/Stream_x

Container for an analog stream

Attributes:

Name	Description	Data Type	StreamInfoVersion
StreamInfoVersion	Version number of the meta information structure	[**Int**(32-bit Integer),**Scalar**]	1 ≤
Label	Label	[**String**,**Scalar**]	1 ≤
SourceStreamGUID	GUID of the source streams	[**String**,**Scalar**]	1 ≤
StreamGUID	GUID	[**String**,**Scalar**]	1 ≤
StreamType	Type of the stream, e.g. **Electrode**	[**String**,**Scalar**]	1 ≤
DataSubType	Sub-type of the analog stream (e.g. **Analog**)	[**String**,**Scalar**]	1 ≤

Datasets:

- Matrix InfoChannel → n × 16 matrix of describing information vectors for the n channels:
  - **Attributes:** InfoVersion → Version number of the Info-Objects [**Int**(32-bit Integer),**Scalar**]

Name	Description	Data Type	InfoVersion
ChannelID	ID of the channel as given by the recording software	[**Int**(32-bit Integer),**Array**(Size 1)]	1 ≤

RowIndex	Row number of this channel inside the **ChannelData** matrix where the data of this channel is stored	[**Int**(32-bit Integer),**Array**(Size 1)]	1 ≤
GroupID	ID of the group that this channel belongs to	[**Int**(32-bit Integer),**Array**(Size 1)]	1 ≤
Label	Label of the channel	[**String**,**Array**]	1 ≤
RawDataType	Type of the raw data	[**String**,**Array**]	1 ≤
Unit	Physical unit of the measured sensor value	[**String**,**Array**]	1 ≤
Exponent	Exponent n ⇒ 1En resp. 10^n in which the channel values magnitude is measured (e.g. k,m,μ,...)	[**Int**(32-bit Integer),**Array**(Size 1)]	1 ≤
ADZero	ADC-Step that represents the 0-point of the measuring range of the ADC	[**Int**(32-bit Integer),**Array**(Size 1)]	1 ≤
Tick	Sample tick Δ between two sample points of a channel in µs ⇒ sampling frequency = 1000000 / Δ	[**Long**(64-bit Integer),**Array**(Size 1)]	1 ≤
ConversionFactor	Conversion factor for the mapping ADC-Step ⇒ measured value	[**Long**(64-bit Integer),**Array**(Size 1)]	1 ≤
ADCBits	Number of bits used by the AD-Converter	[**Int**(32-bit Integer),**Array**(Size 1)]	1 ≤
HighPassFilterType	Type of the high-pass filter (empty string if not available)	[**String**,**Scalar**]	1 ≤
HighPassFilterCutOffFrequency	Cut-off frequency of the high-pass filter ('-1'-String if not available)	[**String**,**Scalar**]	1 ≤
HighPassFilterOrder	Order of the high-pass filter (-1 if not available)	[**Int**(32-bit Integer),**Array**(Size 1)]	1 ≤
LowPassFilterType	Type of the low-pass filter (empty string if not available)	[**String**,**Scalar**]	1 ≤
LowPassFilterCutOffFrequency	Cut-off frequency of the low-pass filter ('-1'-String if not available)	[**String**,**Scalar**]	1 ≤
LowPassFilterOrder	Order of the low-pass filter (-1 if not available)	[**Int**(32-bit Integer),**Array**(Size 1)]	1 ≤

- 2-dimensional Data-Matrix ChannelData → Data for sampled channels organized as n × m matrix ⇒ one row per channel and one column per sample time point
  - reconstruct the value of the measured signal: $y(\mathrm{channel}, t_{ind}) = (\mathrm{ChannelData}[\mathrm{InfoChannel}[\mathrm{channel}].\mathrm{RowIndex}, t_{ind}] - \mathrm{ADZero}) * \mathrm{InfoChannel}[\mathrm{channel}].\mathrm{ConversionFactor} * 10^{\mathrm{InfoChannel[channel].Exponent}}$ in $\mathrm{InfoChannel}[\mathrm{channel}].\mathrm{Unit}$
  - reconstruct the sample time point: $t = t_{ind} * \mathrm{InfoChannel}[\mathrm{channel}].\mathrm{Tick}$ in μs
- Matrix ChannelDataTimeStamps → k × 3 matrix of segments where the rows are one segment and the columns are:
  - first column → time stamp of the first sample point of the segment
  - second column → first index (column) of the segment in **ChannelData**
  - third column → last index (column) of the segment in **ChannelData**

Folder "FrameStream"

Navigation: /Data/Recording_x/FrameStream

(Organisational) folder for all frame-based streams of this recording

Attributes:

- none

Datasets:

- none

Subfolder "Stream_x" of "FrameStream"

Navigation: /Data/Recording_x/FrameStream/Stream_x

Folder that contains all Frame-Entities of one Frame-Stream:

Attributes:

Name	Description	Data Type	StreamInfoVersion
StreamInfoVersion	Version number of the meta information structure	[**Int**(32-bit Integer),**Scalar**]	1 ≤
Label	Label	[**String**,**Scalar**]	1 ≤
SourceStreamGUID	GUID of the source stream	[**String**,**Scalar**]	1 ≤
StreamGUID	GUID	[**String**,**Scalar**]	1 ≤
StreamType	Type of the stream **Frame**	[**String**,**Scalar**]	1 ≤
DataSubType	Sub-type of the event stream (e.g. **SpikeTimeStamp**)	[**String**,**Scalar**]	1 ≤

Datasets:

- Matrix InfoFrame → n × 24 matrix of describing information vectors for the n Frame-Entities:
    - **Attributes:** InfoVersion → Version number of the Info-Objects [**Int**(32-bit Integer),**Scalar**]

Name	Description	Data Type	InfoVersion
FrameID	ID of the frame entity as given by the recording software	[**Int**(32-bit Integer),**Array**(Size 1)]	1 ≤
FrameDataID	ID of the frame entity inside the stream folder that maps this information vector to the entity folder (**FrameDataID** → subfolder **FrameDataEntity_FrameDataID**)	[**Int**(32-bit Integer),**Array**(Size 1)]	1 ≤
GroupID	ID of the group that this frame entity belongs to	[**Int**(32-bit Integer),**Array**(Size 1)]	1 ≤
Label	Label of the entity	[**String**,**Array**]	1 ≤
RawDataType	Type of the raw data	[**String**,**Array**]	1 ≤
Unit	Physical unit of the measured sensor value	[**String**,**Array**]	1 ≤
Exponent	Exponent n ⇒ 1En resp. 10^n in which the sensor values magnitude is measured (e.g. k,m,µ,...)	[**Int**(32-bit Integer),**Array**(Size 1)]	1 ≤
ADZero	ADC-Step that represents the 0-point of the measuring range of the ADC	[**Int**(32-bit Integer),**Array**(Size 1)]	1 ≤
ADCBits	Number of bits used by the AD-Converter	[**Int**(32-bit Integer),**Array**(Size 1)]	1 ≤
Tick	Sample tick Δ between two frames in µs ⇒ sampling frequency = 1000000 / Δ	[**Long**(64-bit Integer),**Array**(Size 1)]	1 ≤
HighPassFilterType	Type of the high-pass filter (empty string if not available)	[**String**,**Scalar**]	1 ≤
HighPassFilterCutOffFrequency	Cut-off frequency of the high-pass filter ('-1'-String if not available)	[**String**,**Scalar**]	1 ≤
HighPassFilterOrder	Order of the high-pass filter (-1 if not available)	[**Int**(32-bit Integer),**Array**(Size 1)]	1 ≤
LowPassFilterType	Type of the low-pass filter (empty string if not available)	[**String**,**Scalar**]	1 ≤
LowPassFilterCutOffFrequency	Cut-off frequency of the low-pass filter ('-1'-String if not available)	[**String**,**Scalar**]	1 ≤
LowPassFilterOrder	Order of the low-pass filter (-1 if not available)	[**Int**(32-bit Integer),**Array**(Size 1)]	1 ≤
SensorSpacing	Distance between adjacent sensors in µm	[**Int**(32-bit Integer),**Array**(Size 1)]	1 ≤
FrameLeft	Sensor count of the left edge of the entity frame based on the reference frame	[**Int**(32-bit Integer),**Array**(Size 1)]	1 ≤

FrameTop	Sensor count of the top edge of the entity frame based on the reference frame	[**Int**(32-bit Integer),**Array**(Size 1)]	1 ≤
FrameRight	Sensor count of the right edge of the entity frame based on the reference frame	[**Int**(32-bit Integer),**Array**(Size 1)]	1 ≤
FrameBottom	Sensor count of the bottom edge of the entity frame based on the reference frame	[**Int**(32-bit Integer),**Array**(Size 1)]	1 ≤
ReferenceFrameLeft	Sensor count of the left edge of the reference frame (defined by the used sensor array)	[**Int**(32-bit Integer),**Array**(Size 1)]	1 ≤
ReferenceFrameTop	Sensor count of the left edge of the reference frame (defined by the used sensor array)	[**Int**(32-bit Integer),**Array**(Size 1)]	1 ≤
ReferenceFrameRight	Sensor count of the left edge of the reference frame (defined by the used sensor array)	[**Int**(32-bit Integer),**Array**(Size 1)]	1 ≤
ReferenceFrameBottom	Sensor count of the left edge of the reference frame (defined by the used sensor array)	[**Int**(32-bit Integer),**Array**(Size 1)]	1 ≤

Subfolder "FrameDataEntity_x"

Navigation: /Data/Recording_x/FrameStream/Stream_x/FrameDataEntity_x

Contains all datasets of the Frame-Entity x

Datasets:

- Matrix ConversionFactors → n × m matrix of conversion factors for the sensor array
- 3-dimensional Data-Cube FrameData → cube of the frame data organized as one frame to one sample time point (n × m matrix of sampled signal values per sensor) × sample time points
  - reconstruct the value of the measured signal: y = (FrameData[x,y,t] - ADZero) * ConversionFactors[x,y]
  - reconstruct the sample time point:
- Matrix FrameDataTimeStamps → k × 3 matrix of segments where the rows are one segment and the columns are:
  - first column → time stamp of the first sample point of the segment
  - second column → first index (z-axis) of the segment in **FrameData**
  - third column → last index (z-axis) of the segment in **FrameData**

Datasets:

- none

Folder "EventStream"

Navigation: /Data/Recording_x/EventStream

(Organisational) folder for all event-based streams of this recording

Attributes:

- none

Datasets:

- none

Subfolder "Stream_x" of "EventStream"

Navigation: /Data/Recording_x/EventStream/Stream_x

Folder that contains all Event-Entities of one Event-Stream:

Attributes:

Name	Description	Data Type	StreamInfoVersion
StreamInfoVersion	Version number of the meta information structure	[**Int**(32-bit Integer),**Scalar**]	1 ≤
Label	Label	[**String**,**Scalar**]	1 ≤
SourceStreamGUID	GUID of the source stream	[**String**,**Scalar**]	1 ≤
StreamGUID	GUID of the current stream	[**String**,**Scalar**]	1 ≤
StreamType	Type of the stream **Event**	[**String**,**Scalar**]	1 ≤
DataSubType	Sub-type of the event stream (e.g. **StgSideband**, **UserInput**, **DigitalPort**)	[**String**,**Scalar**]	1 ≤

Sub-type Description:

- StgSideband → The event is associated to a STG sideband change.
- UserInput → The event is associated with an user input.
- DigitalPort → The event is associated with a digital port change.

Datasets:

- Matrix InfoEvent → n × 7 matrix of describing information vectors for the n Event-Entities:
  - **Attributes:** InfoVersion → Version number of the Info-Objects [**Int**(32-bit Integer),**Scalar**]

Name	Description	Data Type	InfoVersion
EventID	ID of the event entity	[**Int**(32-bit Integer),**Array**(Size 1)]	1 ≤
GroupID	ID of the group that the entity belongs to	[**Int**(32-bit Integer),**Array**(Size 1)]	1 ≤
Label	Label of the entity	[**String**,**Array**]	1 ≤
RawDataType	Type of the raw data	[**String**,**Array**]	1 ≤
RawDataBytes	Number of bytes of the raw data type	[**Int**(32-bit Integer),**Array**(Size 1)]	1 ≤
SourceChannelIDs	Comma separated list of ID's of (source) channel that were involved in the generation of this event	[**String**,**Array**]	1 ≤
SourceChannelLabels	Comma separated list of labels of the source channels	[**String**,**Scalar**]	1 ≤

- 2-dimensional matrix EventEntity_x → 5 × n matrix ⇒ n events with describing vector (time stamp of event, duration of event, event info type, info 1, info 2)
  - **Attributes:** Short description of content
  - $t_{\text{event i}} = \text{EventEntity\_}x[0, i]$ in μs
  - $\Delta_{\text{event i}} = \text{EventEntity\_}x[1, i]$ in μs

Folder "SegmentStream"

Navigation: /Data/Recording_x/SegmentStream

(Organisational) folder for all segment-based streams of this recording. A segment is a cutout of parts of the sampled signal relative to an event, defined by a pre- and post interval.

Attributes:

- none

Datasets:

- none

Subfolder "Stream_x" of "SegmentStream"

Navigation: /Data/Recording_x/SegmentStream/Stream_x

Folder that contains all Segment-Entities of one Segment-Stream:

Attributes:

Name	Description	Data Type	StreamInfoVersion
StreamInfoVersion	Version number of the meta information structure	[**Int**(32-bit Integer),**Scalar**]	1 ≤
Label	Label	[**String**,**Scalar**]	1 ≤
SourceStreamGUID	GUID of the source stream	[**String**,**Scalar**]	1 ≤
StreamGUID	GUID of the current stream	[**String**,**Scalar**]	1 ≤
StreamType	Type of the stream **Segment**	[**String**,**Scalar**]	1 ≤
DataSubType	Sub-type of the segment stream (e.g. **Spike**)	[**String**,**Scalar**]	1 ≤

Datasets:

- Matrix InfoSegment → n × 7 matrix of describing information vectors for the n Segment-Entities:
  - **Attributes:** InfoVersion → Version number of the Info-Objects [**Int**(32-bit Integer),**Scalar**]

Name	Description	Data Type	InfoVersion
SegmentID	ID of the segment entity	[**Int**(32-bit Integer),**Array**(Size 1)]	1 ≤
GroupID	ID of the group that the segment entity belongs to	[**Int**(32-bit Integer),**Array**(Size 1)]	1 ≤
Label	Label of the entity	[**String**,**Array**]	1 ≤
PreInterval	Time interval in µs before the segment defining event occured - definition of the beginning of the segment	[**Int**(64-bit Integer),**Array**(Size 1)]	1 ≤
PostInterval	Time interval in µs after the segment defining event occured - definition of the end of the segment $\text{length of the segment} = \text{PreInterval} + \text{PostInterval}$ in µs	[**Int**(64-bit Integer),**Array**(Size 1)]	1 ≤
SegmentType	Type of the segment (e.g. **SpikeCutout**)	[**String**,**Array**]	1 ≤
SourceChannelIDs	Comma separated list of ID's of (source) channels that the segements are taken from → Link to the SourceChannelInfo matrix	[**String**,**Array**]	1 ≤

- 2-dimensional matrix SourceChannelInfo → n × 15 matrix ⇒ n of describing vectors for the n source channels, the structure is the same as in ChannelInfo used in section Sub-folder "Stream_x" of "AnalogStream"
  - **Attributes:** InfoVersion → Version number of the Info-Objects [**Int**(32-bit Integer),**Scalar**]
- Vector SegmentData_ts_x → n time stamps in µs of the event triggering the segment, one for each of the n segments contained by segment entity x
- 2-dimensional matrix or 3-dimensional cube SegmentData_x → k × n matrix (k sample points for one segment, n number of sampled segments) or k × m × n cube (k sample points for one segment, m number of segments for one time point/for one multi-segment, n number of sampled multi-segments) of segment data:
  - **Attributes:** SourceChannelID → Comma separated list of ID's of (source) channels that the segements are taken from [**String**,**Scalar**] (the same as in InfoSegment, repeated for clarification)
  - reconstruct the value of the measured segment signal (only one segment id_{segment} → 2-dimensional matrix **M**[row,col]):
    - $t_{ind}[row, col] = \text{SegmentData ts x}[\text{col}] + (\text{row} - 1) * \text{tick}_{\text{source-channel}} - \text{PreInterval}$ in µs
    - $y(id_{\text{segment}}, t_{ind}(row, col)) = (\text{SegmentData x}[row, col] - \text{ADZero}_{\text{source-channel}}) * \text{ConversionFactor}_{\text{source-channel}} * 10^{\text{Exponent}_{\text{source-channel}}}$ in $\text{InfoChannel}[\text{source-channel}].\text{Unit}$

    - reconstruct the value of the measured segment signal (m segments → multi-segments → 3-dimensional cube **M**[row,col,z]):
        - col → id_{segment} → source-channel
        - $t_{ind}[row, col, z] = \text{SegmentData ts x[z]} + (\text{row} - 1) * \text{tick}_{\text{source-channel}[col]}$ in µs
        - $y(id_{\text{segment}}, t_{ind}(row, z)) = (\text{SegmentData x}[row, \text{col}, z] - \text{ADZero}_{\text{source-channel[col]}}) * \text{ConversionFactor}_{\text{source-channel[col]}} * 10^{\text{Exponent}_{\text{source-channel[col]}}}$ in $\text{InfoChannel[source-channel[col]]. Unit}$

DataSubType-Average: Subfolder "Stream_x" of "SegmentStream"

Navigation: /Data/Recording_x/SegmentStream/Stream_x

Folder that contains all Segment-Entities of one Segment-Stream with **DataSybType == Average**:

Attributes: no difference to the standard case above

Datasets:

- Matrix InfoSegment: no difference to the standard case above
- Matrix SourceChannelInfo: no difference to the standard case above
- (3 × n) matrix AverageData_Range_x → (**start**, **end**, **count**) per segment average × count of segment averages contained by segment entity x. **start** and **end** denote the start and end timestamp in µs of the interval that contains all averaged segments. **count** is the number of averaged segments.
    - **Attributes:** description of the content
- (2 × k × n) cube AverageData_x → (mean and standard deviation) × k sample points of the segment × n number of segment averages
    - **Attributes:**: description of the content
    - reconstruct the value of the mean and standard deviation of the average segment (n average segments → 3-dimensional cube **M**[row,col,z]):
        - row: mean → row = 0; StdDev → row = 1
        - col: $t_{ind}(col) = (\text{col} - 1) * \text{tick}_{\text{source-channel}}$ → time range $(0, PreInterval[\text{SegmentID}] + PreInterval[\text{SegmentID}])$ in µs
        - z: z = id_{average} (number of average segment)
        - $Mean(id_{\text{average}}, t_{ind}(col)) = (\text{AverageData x}[0, \text{col}, id_{\text{average}}] - \text{ADZero}_{\text{source-channel}}) * \text{ConversionFactor}_{\text{source-channel}} * 10^{\text{Exponent}_{\text{source-channel}}}$ in $\text{InfoChannel}_{\text{source-channel}}.\text{Unit}$
        - $StdDev(id_{\text{average}}, t_{ind}(col)) = \text{AverageData x}[1, \text{col}, id_{\text{average}}] * \text{ConversionFactor}_{\text{source-channel}} * 10^{\text{Exponent}_{\text{source-channel}}}$ in $\text{InfoChannel}_{\text{source-channel}}.\text{Unit}$

Folder "TimeStampStream"

Navigation: /Data/Recording_x/TimeStampStream

(Organisational) folder for all TimeStamp-based streams of this recording

Attributes:

- none

Datasets:

- none

Subfolder "Stream_x" of "TimeStampStream"

Navigation: /Data/Recording_x/TimeStampStream/Stream_x

Folder that contains all TimeStamp-Entities of one TimeStamp-Stream:

Attributes:

Name	Description	Data Type	StreamInfoVersion
StreamInfoVersion	Version number of the meta information structure	[**Int**(32-bit Integer),**Scalar**]	1 ≤
Label	Label	[**String**,**Scalar**]	1 ≤
SourceStreamGUID	GUID of the source stream	[**String**,**Scalar**]	1 ≤
StreamGUID	GUID of the current stream	[**String**,**Scalar**]	1 ≤
StreamType	Type of the stream **TimeStamp**	[**String**,**Scalar**]	1 ≤
DataSubType	Sub-type of the TimeStamp stream (e.g. **NeuralSpike**)	[**String**,**Scalar**]	1 ≤

Sub-type Description:

- **NeuralSpike** → The entity contains time stamps of neural spikes

Datasets:

- Matrix InfoTimeStamp → n × 7 matrix of describing information vectors for the n Event-Entities:
  - **Attributes:** InfoVersion → Version number of the Info-Objects [**Int**(32-bit Integer),**Scalar**]

Name	Description	Data Type	InfoVersion
TimeStampEntityID	ID of the event entity	[**Int**(32-bit Integer),**Array**(Size 1)]	1 ≤
GroupID	ID of the group that the entity belongs to	[**Int**(32-bit Integer),**Array**(Size 1)]	1 ≤
Label	Label of the entity	[**String**,**Array**]	1 ≤
Unit	Physical unit of the measured sensor value	[**String**,**Array**]	1 ≤
Exponent	Exponent n ⇒ 1En resp. 10^n in which the channel values magnitude is measured (e.g. k,m,µ,...)	[**Int**(32-bit Integer),**Array**(Size 1)]	1 ≤
SourceChannelIDs	Comma separated list of ID's of (source) channel that were involved in the generation of this event	[**String**,**Array**]	1 ≤
SourceChannelLabels	Comma separated list of labels of the source channels	[**String**,**Scalar**]	1 ≤

- Vector TimeStampEntity_x → n time stamps in µs

Comment

All time-related information except dates (100ns ticks) are given in microsecond ticks!!