# New Features in ibaHD-Server v3.4.0

Date: 2024-11-12

# Table of contents

# 1　　Support for non-equidistant data in ibaHD-Server

Since ibaPDA v8.9.0 and ibaHD-Server v3.4.0, there is support for non-equidistant time-based data implemented.

In ibaHD-Server, non-equidistant signals can be added to ibaHD time stores together with equidistant signals. In the aggregation layers, these non-equidistant signals are converted to equidistant layers with the configured timebase.

## 1.1　　Support in ibaPDA

In ibaPDA non-equidistant data can be created in two different ways:

1. Modules that support data with external time stamps like e.g. IEC 61850 modules.

2. A data store profile that samples other signals using a trigger signal.

In an HD store data is stored in raw and multiple aggregation levels. The aggregation levels have fix default factors to reduce the data in higher levels. The raw level contains the original data with the time base of the signal. The next level has a time base equal to 40 times the raw time base. On this level the average, minimum and maximum values of the 40 samples of the raw level are stored. The next level has again a time base equal to 40 times the time base of the previous level. Here also average, minimum and maximum are stored. There are as many levels as required to reach a time base of at least 24 hours.

Non-equidistant data is stored as time-value pairs on the raw level in the HD data store. For the higher levels equidistant data is stored also as aggregated but the aggregation factors are selected based on the requirements to fit into reporting cycles of the IEC 61850 modules. On the higher levels average, minimum and maximum are stored for analog signals. For digital signals minimum, maximum and edge count are stored. Since non-equidistant data doesn't really have a time base the aggregation levels are not a factor 40 apart. Instead, they can be configured by the user. There is a new type of profile called "*Time, ibaHD*" that can be used to configure this.

The "*Time, ibaHD*" profile has 3 modes:

1. **As is**: Signals are stored as they are. There is no resampling done. If the signal is equidistant then it will be stored equidistant. If the signal is non-equidistant then it will be stored non-equidistant.
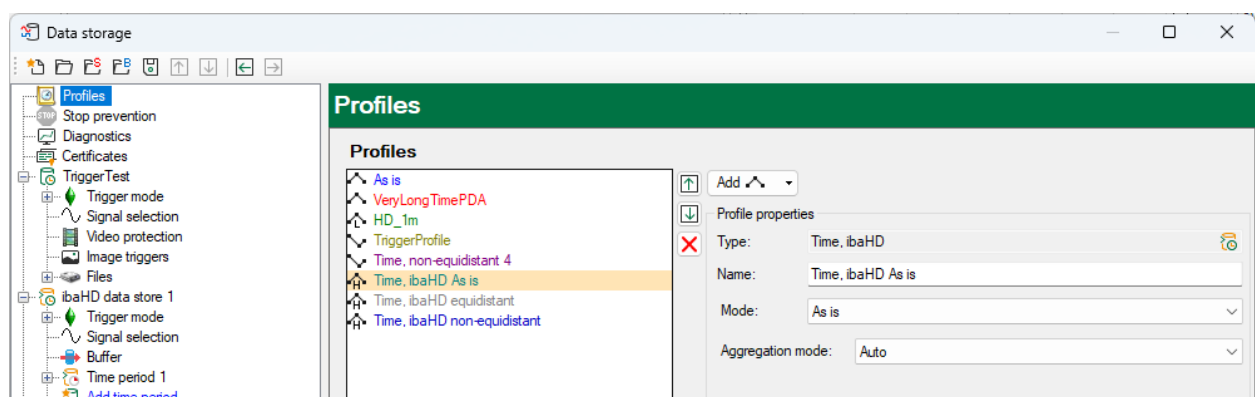


2. **Equidistant**: Signals are resampled. The new time base can be configured as an absolute time base or as a number of times the original time base. Filtering can be used

to determine which value will be stored. This profile has the same options as the standard "*Time*" profile.
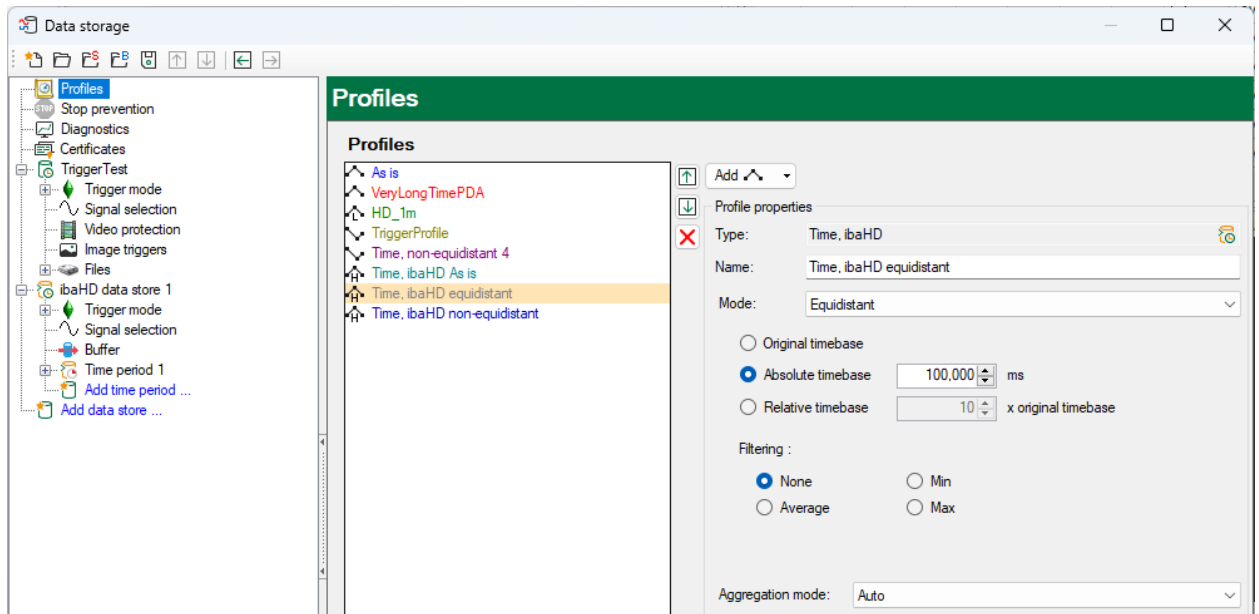


3. **Non-equidistant**: A sample is taken each time the trigger signal's value changes. So in the case of a digital trigger signal a sample will be taken on both rising and falling edges. The timestamp of the sample can be taken from the source signal or from the trigger signal. This is only relevant if the time bases of source and trigger signal are different. This profile has the same options as the standard "*Time, non-equidistant*" profile.
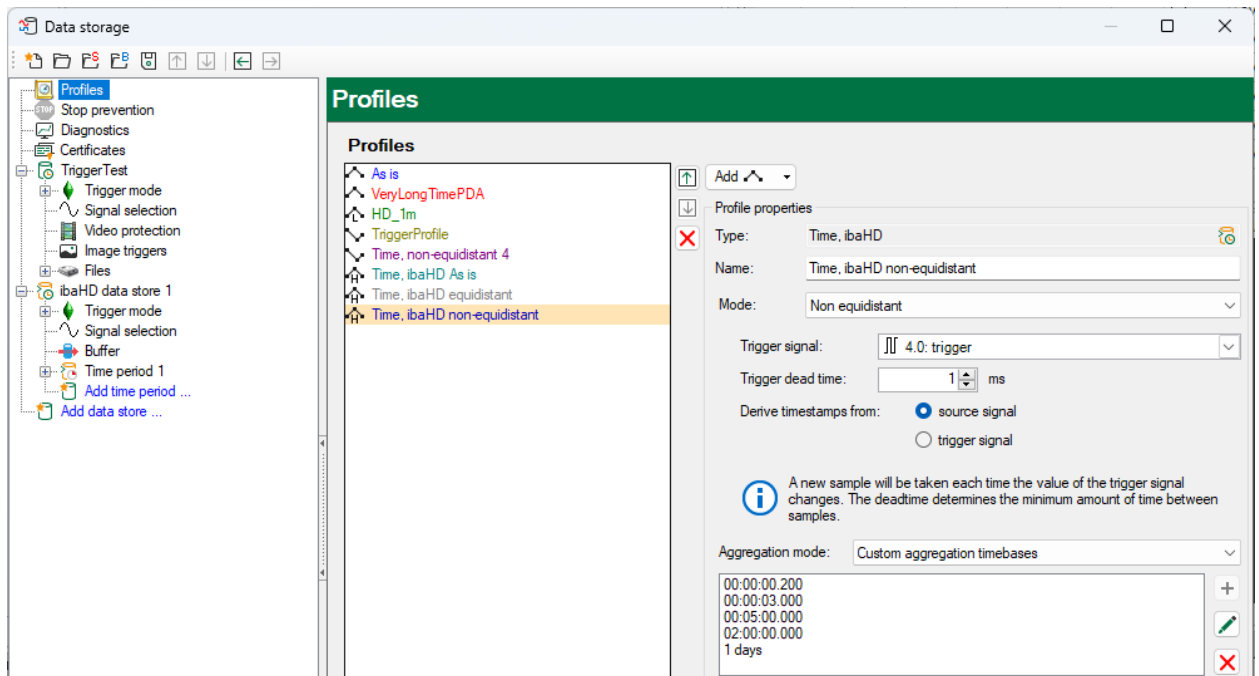


The "Time, ibaHD" allows you to configure the aggregation level time bases. By default, it is set to *Auto*. In *Auto* mode the equidistant signals are stored with time bases equal to 40 times the time base of the previous aggregation level. In *Auto* mode the non-equidistant signals have fixed aggregation levels of 200 ms, 10 s, 5 minutes, 2 hours and 1 day. You can also configure

custom aggregation level time bases. There is a maximum of 5 aggregation levels. The configuration of the custom aggregation levels can be done independent of the mode of the profile.



The green signal shows a non-equidistant version of the blue signal. A sample is taken each time the yellow signal changes value. The samples are shown as dots. The sample is considered constant until the next sample. That is why you see the step-wise drawing of the green signal. As long as you are on the raw level you will see the dots. When you zoom out further until the first aggregation level is used, then no more dots will be drawn.

If you enabled "Show sub signals" in the ibaHD signal tree then you will see the sub signals from the aggregation levels. Avg, min and max for analog signals and min, max and edgeCount for digital signals.
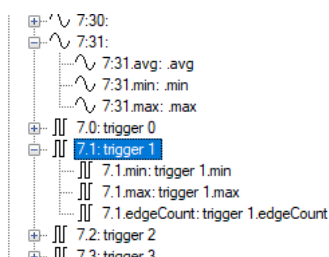
## 1.2   ibaHD-API

In the ibaHD-API, non-equidistant signals can be read on the raw and aggregation levels. To read these signals, the api calls GetRawChannelData and GetAggregatedChannelData can be used like equidistant signals. To identify non-equidistant signals, the following new data types are introduced

- DATA_TYPE_NE_FLOAT_VALUES

- DATA_TYPE_NE_DOUBLE_VALUES

With these data types, each sample has a value and a matching timestamp. This is similar to the existing String and Digital data types.

For aggregated digital signals, a new aggregation type is added where edge counts are calculated. This indicates how often the signal changed value within the aggregated range. The data type 'DATA_TYPE_DIGITAL_EDGE_VALUES' is used to indicate these edge values are present. Next to the edge values additional min and max values can also be included.

The changes to the ibaHD-API introduce new functionalities, all previously existing requests remain compatible with ibaHD-Server v3.4.0.

## 1.3   ibaAnalyzer

ibaAnalyzer v8.3.0 or higher is required to read non-equidistant data from ibaHD-Server.

## 2     Custom aggregation profiles

For both equidistant and non-equidistant signals aggregation levels can be customized. In older versions, the aggregation layers where always 40 times less points than the lower level. This provides a good balance between offering enough data points at each zoom level and the performance cost of the number of points. With custom aggregation levels it is possible to manually define the timebase for each aggregation level. There are some limitations regarding the timebase for each aggregation level

- A maximum of 5 aggregation levels can be defined.

- At least one level with timebase > 1 minute.

- Timebases must be < 7 days

- Each layer must be a multiplication of the level below. E.g. level 1 with timebase 500ms and level 2 with timebase 20.35 seconds is not allowed.

It is recommended that the factor between the time bases of 2 aggregation levels is between 10 and 100.

# 3    Aligned signal grid for aggregation levels

ibaPDA data acquisition related feature. Aggregation levels are now guaranteed to remain equidistant over gaps. In previous versions, the first point after a gap introduced by restarting the new / changed signal configuration) would be the point defining the equidistant grid afterwards. This could lead to data being shifted in e.g. ibaAnalyzer to draw the entire graph equidistant over the gaps. From ibaHD-Server v3.4.0 onwards, aggregation points are always placed on the grid starting at 0 for the current timebase. Combined with custom aggregation profiles the data used in analyses and reports will be more precise.

# 4    Change log settings from the ibaHD-Manager

A new form is added to the log tab in the ibaHD-Manager. Here it is possible to change the number of log files stored and if all data requests to the ibaHD-Server should be logged. This can offer valuable insights for researching issues but can lead to performance loss in case a large number of data requests are sent.
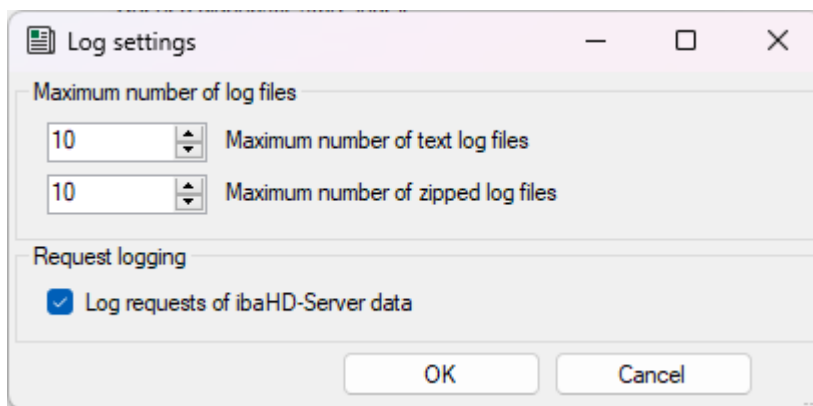


# 5    Improved disk space checking

When applying a store configuration, it was possible to allocate more disk space than available by writing multiple stores on the same disk. From ibaHD-Server v3.4.0 onwards, the total required disk space is checked over all stores combined. This should reduce the cases where disks are completely full. If this would still happen, it is now also checked that disk space is available when starting to write a store to avoid constantly writing mini segments when the disk is full.

# 6     New folder selection dialogs and network drives

Before ibaHD-Server v3.4.0 the dialog for selecting folders (for example for selecting the directory of an HD store) was an older dialog from Windows, that was not very user friendly and did not show mapped network drives.
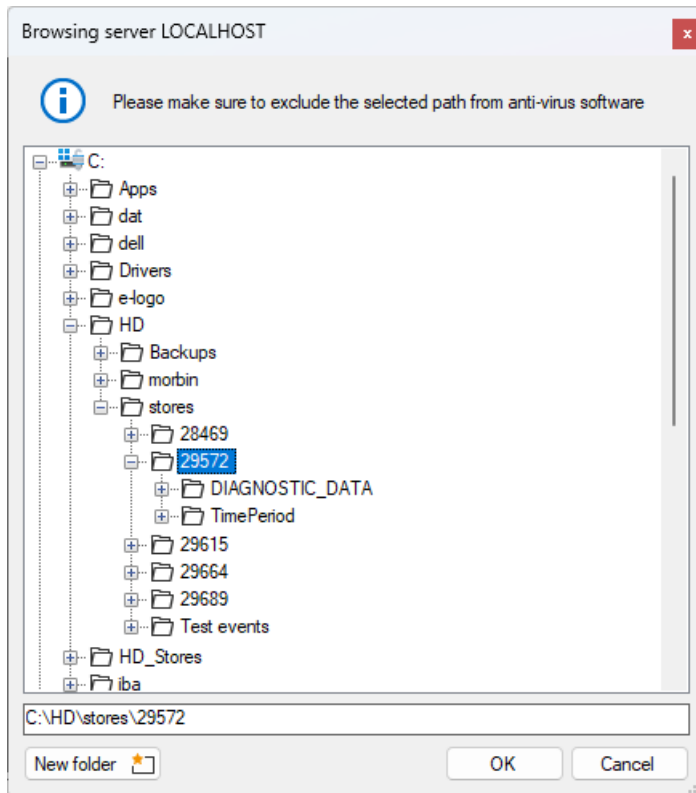


From ibaHD-Server v3.4.0 onwards, this old dialog has been replaced with the current standard selection dialog from Windows, except in the *HD store configuration* dialog, due to limitations from Windows. This new folder selection dialog also lets the user select mapped network drives. However, due to another limitation from Windows, for this to work a value is set in the registry by the installer and a restart of the system is required after the installation is complete. Currently at the end of the installer the user is not informed that a restart is necessary.