What's new

in ASAM COMMON MDF V4.0.0

Stuttgart, 2009-05-25

ASAM

What's new

Agenda

- Introduction

- Goal

- Work group members

- Requirements

What's new

Introduction

Aim of **M**easurement **D**ata **F**ormat (MDF) is to store measure data from sensors, ECU and bus monitoring for post measurement processing. The measure data is stored time, angle, distance or index related.

In comparison to other measure data formats MDF supports non-periodic and multiple sample rates per file used in the automotive area.

Key concept:

➢ Binary, block and channel oriented format to ensure best performance of reading and writing data
➢ General split into data and corresponding descriptive data section
➢ Loose coupling of blocks ensures reorganization of blocks
➢ Grouping of channels along sample rates via block structure
➢ Synchronization mechanism of channels via master channel concept
➢ Calculation of the physical values out of the recorded values in raw format by corresponding conversion formulas in the descriptive section for a channel

association for standardisation of automation and measuring systems

What's new
Goal

- ➢ Standardize the industry proven MDF format known for more than 10 years (All market leading tools are already supporting this format in its versions up to 3.x.)
- ➢ Streamline next version development with other ASAM standards, e.g. ASAM ODS or ASAM MCD-2 MC
- ➢ General clean up of MDF structures and alignment of company extensions
- ➢ Re-use of introduced key concepts and strategies from existing MDF versions
- ➢ Fulfill new requirements on the format like:
  - ↬ Extension of maximum file size (currently limited to 2/4 GByte)
  - ↬ Extension of other limitations (e.g. comment text length, record length, array size, signals per group, …)
  - ↬ Allow addition of custom information (e.g. about measurement environment) by using meta-data and/or attachment of complete files
  - ↬ Introduce angel, distance or index for synchronization in addition to time
  - ↬ …

What's new
Work group members

Goal: Involvement by main stakeholders of MDF (primary[1,] secondary[2], other ASAM work groups and end users) to increase the acceptance - and therefore the use of - the well established format in the market

Work group members:

➢ AWS[3]   (end user)
➢ Vector Informatik   (primary user)
➢ ETAS   (primary user)
➢ dSPACE   (secondary user)
➢ AVL   (secondary user)
➢ AUDI   (representative of ASAM work group)
➢ M&K   (representative of ASAM work group)

[1] Primary user: MDF is used in the company tools as internal data model as well

[2] Secondary user: Another internal data format will be converted into MDF

[3] AWS was represented by Mr. Kemle from BMW

What's new
Requirements: Clean up and Alignment

- ➢ Agreement to a common file extension
- ➢ Introduction of common block structure (CR_40_013)
- ➢ Introduction of common event block (CR_40_014)
- ➢ Remove unused blocks, structures and conversion formulas (CR_40_006/7)
- ➢ Common concept of storing CURVE, MAP and STRUCTURE (CR_40_033)
- ➢ Introduction of path hierarchy (CR_40_034)
- ➢ Remove company specifics (CR_40_009)
- ➢ Consolidation towards existing ASAM standards and concepts
  - ↳ ASAM AIS "Abstract data type definition", Version 2.0.0
  - ↳ ASAM MCD-2 MC "Data Model for ECU Measurement and Calibration", Version 1.6.0
  - ↳ ASAM ODS "Open Data Services", Version 5.2.0
    - ↳ MIME types introduced by ODS
  - ↳ ASAM AE "Harmonized Data Objects", Version 1.1.0
  - ↳ ASAM AE "General Expression Syntax", Version 1.0.0

What's new

Requirements: Reproducibility of measurement (CR_40_022/26)

Use case:

Introduced national laws and regulations requests for a reproducibility of measurement as mandatory for series production in the automotive.

Requirement:

- ➢ Reconstruction of the measurement only with data of the file
- ➢ Saving of customer dependent data without changing the format
- ➢ Attachment of other data file

Solution:

- ➢ Introduction of formula tag
- ➢ Recommendation to use ASAM AE "General Expression Syntax",
- ➢ Introduction of mechanism to attach files (CR_40_011)
- ➢ Introduction of history block (CR_40_021)
- ➢ Introduction of meta data blocks for customized XML content (CR_40_008)

What's new
Requirement: Attachment of files

(CR_40_031/32)

Use case:

The automotive market moved on in the last years and developed new features like Adaptive Cruise Control with the necessity of video/audio analysis capability, and navigation systems with GPS data visualization.

Requirement:

➢ Possibility to attach external files

Solution:

➢ Introduce mechanism to attach files (in-) directly

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What's new

Requirement: Lift of file size limit of 2GB/4GB

<u>Use case:</u>

Processing measure data has become huge for some areas, e.g. for fuel cell development

<u>Requirement:</u>

- ➢ Lift of file size limit

<u>Solution:</u>

- ➢ Introduction of new data type for block links (loose coupling)

Note:

Thus COMMON MDF BS V4.0.0 is closely related to the previous version but **not**

backwards compatible anymore.

What's new
Requirement: Quality statement on time

Use case:

Typically the time is acquired from the used PC itself. But for some use cases an additional time master is present (like GPS). Additional it's necessary to store the information about the quality and the device itself

Requirement:

➢ Add time quality class to quantify the master clock

Solution:

➢ Introduction of time quality classes

➢ Using of UTC as reference

➢ Allow absolute time additional

What's new

Requirement: Streaming signal with variable length (CR_40_001)

Use case:
Logging of signals with variable length (e.g. string signals) to MDF file if the logging device has only limited capabilities to buffer data

Requirement:
- ➢ Add mechanism to record signal with variable length

Solution:
- ➢ Introduction new block type to cover those type

What's new

Requirement: DT Blocks as linked list (CR_40_003)

<u>Use case:</u>

Recover the MDF file in case of an unexpected abortion of the recording procedure

<u>Requirement:</u>

➢ Provide recovering mechanism

<u>Solution:</u>

➢ Introduce for linked list for sequences of records

What's new
Requirement: Preview signals

Use case:

Because of performance reasons a preview of signals might be helpful

Requirement:

➢ Provide mechanism for a preview of channel data with reduced resolution

Solution:

➢ Introduce a new block type and algorithm for reduction

What's new
Requirement: Master channel

Use case:

Today systems exist on the market which are not time related anymore but angle, index or distance based

Requirement:

➢ Additional support of index-based, distance-based and angle-based data-channels

Solution:

➢ Add new types (angle, distance and index) for synchronization as master channel

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