CAN and General

BLF Logging Format

Specification

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VECTOR

Document Management

Revision list

Version	Date	Editor	Section	Changes, comments
0.1	2008-06-09	Gey	All	Initial version created.
0.2	2008-06-17	Gey	All	Rework after review
1.0	2008-06-19	Gey	All	Added BL_OBJ_* values to the object types. Added VBLObjectHeader2
1.2	2008-09-24	Ae	3.1	Extended CAN message flags
1.3	2009-05-18	Gia	1	Added Disclaimer
1.4	2010-01-15	Sc	3.1	New member mObjectVersion in VBLObjectHeader and VBLObjectHeader2
1.5	2010-08-12	Jr	3.13	Added example for VBLEthernetFrame
1.6	2010-10-26	Sha	3.2; 3.3	Added VBLCANMessage2
1.7	2010-11-29	Hb	3.5	VBLCANErrorFrameExt extensions
1.8	2010-12-21	Hb	3.5	VBLCANErrorFrameExt extensions
1.9	2011-01-19	Sha	3.2; 3.3	Hints added to VBLCANMessage and VBLCANMessage2 description
1.10	2011-04-07	Mp	3.17	Added Comment event (for comments in Trace Window)
1.11	2011-05-20	Jr	3.15, 3.16	Added WLAN events
1.12	2011-08-29	Jr	3.15	Modified signal strength of WLAN event
1.13	2011-09-08	Sha	3.3	Clarification to CAN message length
1.14	2011-10-24	Mp	3.20	Added global marker event (for global markers)
1.15	2012-03-01	Wwi	3.21, 3.22	Added AFDX events
1.16	2012-05-07	Wwi	3.21	AFDX flag bit enumeration updated
1.17	2012-08-23	Chk	3.1.2,3.4	Added CAN FD message flag description, Added VBLCANFDMessage description
1.18	2012-09-06	Chk	3.4	VBLCANFDMessage format modified
1.19	2012-09-06	Chk	3.4	VBLCANFDMessage format modified
1.20	2012-10-22	Gia	3.19	Some modifications for VBLAppText
1.21	2013-04-15	Fsi	3.4, 3.7	CAN FD BLF Logging
1.22	2013-04-23	Jr	3.17. 3.18	Added Ethernet status and Rx error
1.23	2013-04-23	Hb	3.4	CAN FD BLF Logging
1.24	2013-07-12	Hb	3.4	CAN message-flags added
1.25	2013-10-15	Chk	3.4,3.7	Data length for CAN remote frames
1.26	2014-02-13	Hb	3.4, 3.7	Clarifications
1.27	2014-03-04	Wwi	3.25–3.29	Added AFDX status event and new bus statistic
1.28	2014-12-10	Jmi	3.18	Added Ethernet bus statistic event
1.29	2014-12-10	Hb	3.4, 3.7	Extended CAN FD events

Version	Date	Editor	Section	Changes, comments
1.30	2014-12-11	Wwi	3.31-3.35	Added AFDX error event and all A429 events
1.31	2015-01-21	Uru	3.32, 3.35	A429 message and A429 Statistic format modified
1.32	2015-01-26	Rue	3.14	mRepresentation flag for system variable
1.33	2015-01-28	Lt	3.1.4	mClientIndex for internal use
1.34	2015-02-13	Chk	3.6	Add Ack Error failure code
1.35	2015-02-17	Chk	3.4	Changed description of mFlag Bit 19, because differ to source code description
1.36	2015-04-01	Lke	3.36	Added test structure events
1.37	2015-04-07	Chk	3.4, 3.7	Replace EDL by FDF
1.38	2015-04-23	Lke	3.36	Test structure events modified
1.39	2015-09-01	Lke	3.36	Corrected description for VBLTestStructure::mUniqueNo
1.40	2016-02-15	Wwi	3.25–3.29	Improve description for AFDX/A429
1.41	2016-06-22	Jr	3.17	Moved Ethernet events to own document
1.42	2016-10-12	Srj	3.34-3.36	Added queue events
1.43	2017-02-24	Mom	All	CI and layout
1.44	2017-03-07	Vrd	3.1.6, 3.18	Added Trigger Condition event
1.45	2018-07-20	Chk	3.13	Add Reset/Bit Timing Changed event
1.46	2018-10-26	Chk	3.4	Correct description of CAN-FD event flags

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Contents

1 Disclaimer

Severability clause - Restrictions for the usage of Vector logging data formats outside of Vector products

The format specification / access functions for the Vector BLF and ASC logging data formats are made available under the restrictions and conditions cited hereafter.

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2 Overview

The document specifies the format of CAN events and general objects in the CANoe/CANalyzer BLF logging. The described structures can be used to read and write BLF logging files using the binlog.dll, which can be found in the CANoe/CANalyzer User Data folder:

<UserDataFolder>\Programming\BLF_Logging

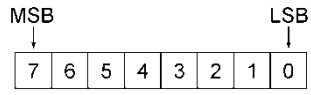
3 Format Description

3.1 Common Data Types

3.1.1 CAN Message Flags

The following flags are valid for the **mFlags** members of CAN objects.

1. Direction of CAN frame (DIR)
2. Remote Transmission Request (RTR).
3. Single wire operation (NERR)
4. Wake Up Message (high voltage) (WU)



RTR (Bit 7)		WU (Bit 6)		NERR (Bit 5)		DIR (Bit 3-0)	
0:	No RTR	0:	No WU	0:	No NERR	0:	RX
1:	RTR	1:	WU	1:	NERR	1:	TX

Use the following macros to determine the values of RTR, WU, NERR and DIR:

```
#define CAN_MSG_DIR( f)          ( BYTE)(   f & 0x0F)
#define CAN_MSG_RTR( f)          ( BYTE)( ( f & 0x80) >> 7)
#define CAN_MSG_WU( f)           ( BYTE)( ( f & 0x80) >> 6)
#define CAN_MSG_NERR( f)         ( BYTE)( ( f & 0x80) >> 5)
```

Use the following macro to set the values of RTR and DIR:

```
#define CAN_MSG_FLAGS( dir, rtr) ( BYTE)( ( ( BYTE)( rtr & 0x01) << 7) | \
                                          ( BYTE)( dir & 0x0F))
```

Use the following macro to set the values of RTR, WU, NERR and DIR:

```
#define CAN_MSG_FLAGS_EXT( dir, rtr, wu, nerr) \
                                 ( BYTE)( ( ( BYTE)( rtr  & 0x01) << 7) | \
                                          ( ( BYTE)( wu   & 0x01) << 6) | \
                                          ( ( BYTE)( nerr & 0x01) << 5) | \
                                            ( BYTE)( dir  & 0x0F))
```

To set the RTR flag to **true** and the frame direction to a send frame, execute:

```
BYTE flags = CAN_MSG_FLAGS( 1, 1)
```

To set the RTR flag to **true**, the WU flag to **true**, the NERR flag to **true** and the frame direction to a send frame, execute:

```
BYTE flags = CAN_MSG_FLAGS_EXT( 1, 1, 1, 1)
```

3.1.2 Driver Error Codes

The following values are error codes valid for CAN driver error information

Value	Description
0	timeout during board initialization
1	no events in the rx queue / no event available for dvGetEvent

Value	Description
2	tx queue full, tx request refused
3	unknown Controller-Nr.
4	timeout during command
5	DPRAM-Overflow
6	not allowed event in dvPutCommand
8	driver detected another hardware (see CANIB)
9	parameter error in dvMeasureInit
10	parameter error in dvMeasureInit and dvPutCommand
11	not (yet) implemented function in this version of driver
12	82526: no access to imp
14	last msg wasn't transferred
100	unknown send id (FullCAN only)
101	rx queue overrun
102	chip state busoff
103	chip state error passive
104	chip state error active
105	rx register overrrun (BasicCan only)
106	at bootup the firmware couldn't access the controller
107	no valid dpram address in dvBoardInit
108	no interrupt from CANIB received
109	wrong modulnumber
110	wrong pointer to source buffer
111	address > CANIB_SRAM_SIZE
112	address + size > CANIB_SRAM_SIZE
113	CAN-Nr. <> 0 && CAN-Nr. <> 1
114	FIFO-Entry > 16 Byte

Value	Description
115	see drvspec
codes 200..455 are reserved for CANIB-Driver	
217	Enable CPU not successful
218	Set of TR-Status Bit not successful
219	Halt command not successful
220	Halt command not successful
221	Reset command not successful
222	Reset command not successful
232	Timeout waiting for Data from FIFO
248	Unknown command
249	Unknown function
250	Wrong parameter format
251	Wrong parameter
252	OK-message while waiting for data
455	Unknown answer from CANIB

3.1.3 VBLObjectHeaderBase

Description: Object header base structure.

Parameter	Type	Description
mSignature	DWORD	Object signature, must be `BL_OBJ_SIGNATURE`.
mHeaderSize	WORD	Size of header in bytes, set this member to `sizeof(VBLObjectHeader)` or `sizeof(VBLObjectHeader2)` depending on the object header type used for the object.

Parameter	Type	Description
mHeaderVersion	WORD	Version number of object header. Set this member to 1 if the object has a member of type VBLObjectHeader. Set this member to 2 if the object has a member of type VBLObjectHeader2.
mObjectSize	DWORD	Object size in bytes.
mObjectType	DWORD	Object type (BL_OBJ_TYPE_*).

3.1.4 VBLObjectHeader

Description: Object header. Version 1.

Parameter	Type	Description
mBase	VBLObjectHeaderBase	Common object header base. See 3.1.3.
mObjectFlags	DWORD	Unit of object timestamp. Following values are possible: 1: Object time stamp is saved as multiple of ten microseconds (BL_OBJ_FLAG_TIME_TEN_MICS) 2: Object time stamp is saved in nanoseconds. (BL_OBJ_FLAG_TIME_ONE_NANS)
mClientIndex	WORD	For internal use.
mObjectVersion	WORD	Object specific version, has to be set to 0 unless stated otherwise in the description of a specific event.
mObjectTimeStamp	ULONGLONG	Time stamp of this object in the unit specified in mObjectFlags.

3.1.5 VBLObjectHeader2

Description: Object header. Version 2.

Parameter	Type	Description
mBase	VBLObjectHeaderBase	Common object header base. See 3.1.3.
mObjectFlags	DWORD	Unit of object timestamp. Following values are possible: 1: Object time stamp is saved as multiple of ten microseconds (BL_OBJ_FLAG_TIME_TEN_MICS) 2: Object time stamp is saved in nanoseconds. (BL_OBJ_FLAG_TIME_ONE_NANS)

Parameter	Type	Description
mTimeStampStatus	BYTE	Bit field. The bits have the following meanings: Bit 0: Determines whether original timestamp member is valid (1) or not (0). Bit 1: Timestamp is generated by software (1) or by hardware (0). Bit 5: This bit has protocol specific meaning.
mReserved1	BYTE	Reserved, must be 0.
mObjectVersion	WORD	Object specific version, has to be set to 0 unless stated otherwise in the description of a specific event.
mObjectTimeStamp	ULONGLONG	Time stamp of this object in the unit specified in mObjectFlags.
mOriginalTimeStamp	ULONGLONG	Original timestamp in the unit specified in mObjectFlags..

3.1.6 VBLVarObjectHeader

Description: Extendible variable length object header.

Parameter	Type	Description
mBase	VBLObjectHeaderBase	Common object header base. See 3.1.3.
mObjectFlags	DWORD	See 3.1.4
mObjectStaticSize	WORD	Size of the mStatic part of the object
mObjectVersion	WORD	See 3.1.4
mObjectTimeStamp	ULONGLONG	See 3.1.4

3.2 Obsolete Types

3.2.1 VBLCANMessage

Description: CAN data or CAN remote frame received or transmitted on a CAN channel.

Corresponding object type: BL_OBJ_TYPE_CAN_MESSAGE

Obsolete object. Used up to CANoe/CANalyzer version 7.2

Hint: This object is also used in later CANoe/CANalyzer versions when the following flag is set in the CAN.INI file.

[CAN]

BLFFormat_Compatible_with_7_2_and_ealier = 1

Parameter	Type	Description
mHeader	VBLObjectHeader	Common header type. See 3.1.4.
mChannel	WORD	Channel the frame was sent or received.

Parameter	Type	Description
mFlags	BYTE	See 3.1.1
mDLC	BYTE	Data length code of frame (number of valid data bytes, max. 8)
mID	DWORD	Frame identifier.
mData[8]	BYTE	CAN data bytes

3.3 VBLCANMessage2

Description: CAN data or CAN remote frame received or transmitted on a CAN channel.

Corresponding object type: BL_OBJ_TYPE_CAN_MESSAGE2

Object available starting from CANoe/CANalyzer version 7.5

Hint: This object is used only when the following flag is NOT set in the CAN.INI file, otherwise the object VBLCANMessage is used.

[CAN]

BLFFormat_Compatible_with_7_2_and_ealier = 0

Parameter	Type	Description
mHeader	VBLObjectHeader	Common header type. See 3.1.4.
mChannel	WORD	Channel the frame was sent or received.
mFlags	BYTE	See 3.1.1
mDLC	BYTE	Data length code of frame (number of valid data bytes, max. 8)
mID	DWORD	Frame identifier.
mData[8]	BYTE	CAN data bytes
mFrameLength	DWORD	Message duration [in ns]. Not including 3 Interframe Space bit times and by Rx-messages also not including 1 End-Of-Frame bit time
mBitCount	BYTE	Total number of bits of the message including EOF and Interframe Space [in bits]
mReserved1	BYTE	Reserved, must be 0
mReserved2	WORD	Reserved, must be 0

3.4 VBLCANFDMessage64

Description: CAN FD data frame, or CAN data- or remote frame on a CAN FD channel.

Corresponding object type: BL_OBJ_TYPE_CAN_FD_MESSAGE_64

Object available starting from CANoe/CANalyzer version 8.1

<table>
<tr><th>Parameter</th><th>Type</th><th>Description</th></tr>
<tr><td>mHeader</td><td>VBLObjectHeader</td><td>Common header type. See 3.1.4.</td></tr>
<tr><td>mChannel</td><td>BYTE</td><td>Channel the frame was sent or received.</td></tr>
<tr><td>mDLC</td><td>BYTE</td><td>Data length code of the frame.
<table>
<tr><td>DLC</td><td colspan="2">Data length in bytes</td></tr>
<tr><td></td><td>CAN</td><td>CAN FD</td></tr>
<tr><td>0-8</td><td>0-8</td><td>0-8</td></tr>
<tr><td>9</td><td>8</td><td>12</td></tr>
<tr><td>10</td><td>8</td><td>16</td></tr>
<tr><td>11</td><td>8</td><td>20</td></tr>
<tr><td>12</td><td>8</td><td>24</td></tr>
<tr><td>13</td><td>8</td><td>32</td></tr>
<tr><td>14</td><td>8</td><td>48</td></tr>
<tr><td>15</td><td>8</td><td>64</td></tr>
</table></td></tr>
<tr><td>mValidDataBytes</td><td>BYTE</td><td>Valid payload length of mData. The value is 0, if the message was an CAN remote frame.</td></tr>
<tr><td>mTxCount</td><td>BYTE</td><td>Bits 0 – 3: Number of required transmission attempts
Bits 4 – 7: Max number of transmission attempts.</td></tr>
<tr><td>mID</td><td>DWORD</td><td>Frame identifier.</td></tr>
<tr><td>mFrameLength</td><td>DWORD</td><td>Message duration [in ns]. Not including 3 interframe-space bit times and by Rx-messages also not including one end-of-frame bit time</td></tr>
</table>

<table>
<tr><th>Parameter</th><th>Type</th><th>Description</th></tr>
<tr><td>mFlags</td><td>DWORD</td><td>
<table>
<tr><td>Bit#</td><td>Meaning</td></tr>
<tr><td>0 (0x0001)</td><td>Must be 0</td></tr>
<tr><td>1 (0x0002)</td><td>Reserved, for internal use</td></tr>
<tr><td>2 (0x0004)</td><td>1=NERR (1=single wire on low speed CAN)</td></tr>
<tr><td>3 (0x0008)</td><td>1=High voltage wake up</td></tr>
<tr><td>4 (0x0010)</td><td>1=Remote frame (only CAN)</td></tr>
<tr><td>5 (0x0020)</td><td>Reserved, must be 0</td></tr>
<tr><td>6 (0x0040)</td><td>1= Tx Acknowledge</td></tr>
<tr><td>7 (0x0080)</td><td>1= Tx Request</td></tr>
<tr><td>8 (0x0100)</td><td>Reserved, must be 0</td></tr>
<tr><td>9 (0x0200)</td><td>SRR (CAN FD)</td></tr>
<tr><td>10 (0x0400)</td><td>R0</td></tr>
<tr><td>11 (0x0800)</td><td>R1</td></tr>
<tr><td>12 (0x1000)</td><td>FDF
0: CAN frame
1: CAN FD frame</td></tr>
<tr><td>13 (0x2000)</td><td>BRS (CAN FD)</td></tr>
<tr><td>14 (0x4000)</td><td>ESI</td></tr>
<tr><td>15 (0x8000)</td><td>Internal use only</td></tr>
<tr><td>16 (0x10000)</td><td>Reserved, must be 0</td></tr>
<tr><td>17 (0x20000)</td><td>1= Frame is part of a burst</td></tr>
<tr><td>18 (0x40000)</td><td>Single shot mode: Frame could not be transmitted</td></tr>
<tr><td>19 (0x80000)</td><td>Single shot mode: If bit 18 is set to 1, then this bit reports the reason.
0 = arbitration lost,
1 = frame disturbed</td></tr>
<tr><td>20 (0x100000)</td><td>Reserved, for internal use</td></tr>
<tr><td>21 (0x200000)</td><td>Reserved for internal use</td></tr>
<tr><td>22-31</td><td>Reserved, must be 0</td></tr>
</table>
</td></tr>
<tr><td>mBtrCfgArb</td><td>DWORD</td><td>CAN- or CAN-FD bit timing configuration for arbitration phase, may be 0, if not supported by hardware/driver

Bit 0-7: Quartz frequency im MHz
Bit 8-15: Prescaler
Bit 16-23: # of time quanta per bit
Bit 24-31: Sampling point in percent</td></tr>
<tr><td>mBtrCfgData</td><td>DWORD</td><td>CAN-FD bit timing configuration for data phase, may be 0, if not supported by hardware/driver. See mBtrCfgArb.</td></tr>
</table>

Parameter	Type	Description
mTimeOffsetBrsNs	DWORD	Time offset of the sampling point of BRS in nanoseconds
mTimeOffsetCRCDelNs	DWORD	Time offset of the sampling point of CRC delimiter in nanoseconds
mBitCount	WORD	Bit count of the message, exclusive stuff bits.
mDir	BYTE	Direction of the message
mExtDataOffset	BYTE	Offset of the extended event data. Use the macros 'BLHasExtFrameData' and 'BLExtFrameDataPtr' to get a pointer to mExtFrameData. See example below.
mCRC	DWORD	CRC of the message. For CAN FD ISO-frames the stuff count and additional flags are stored in the field: Bits: Meaning 0-20: CRC 21-26: Reserved, must be 0 27-29: Stuff count field 30: Stuff count field parity 31: ISO format. If set to 1, then the message is in CAN FD ISO format, and the stuff count is valid.
mData[]	BYTE	Data bytes of the message. The array size is set to the frame's data length stored in mValidDataBytes. The maximum value is 64.
mExtFrameData	struct VBLCANFDExtFrameData	See description below.

struct VBLCANFDExtFrameData

CANoe/CANalyzer version 8.5 and newer are supporting CAN FD ISO with extended bit timing configurations. The bit timing for the arbitration phase is stored in mBTRExtArb, the bit timing for the data phase is mBTRExtData.

The extended format is:

Bit 0 – 7: TSEG1-1
Bit 8 – 15: TSEG2-1
Bit 16 – 27: Prescaler
Bit 28 – 31: Quartz Frequency (enumeration). Supported values: 0: 16 MHz, 1: 32 MHz, 2: 80 MHz

Example:

```
VBLCANFDMessage64 blfEvt;
if (BLHasExtFrameData(&blfEvt)){
  unsigned int btrArb = BLExtFrameDataPtr(&blfEvt)->mBTRExtArb);
  unsigned int btrData = BLExtFrameDataPtr(&blfEvt)->mBTRExtData);
}
```

```
VBLCANFDErrorFrame64 blfEf;
if (BLHasExtFrameData(&blfEf)){
  unsigned int btrArb = BLExtFrameDataPtr(&blfEf)->mBTRExtArb);
  unsigned int btrData = BLExtFrameDataPtr(&blfEf)->mBTRExtData);
}
```

3.5 VBLCANErrorFrame

Description: CAN error frame received or transmitted on a CAN channel.

Corresponding object type: BL_OBJ_TYPE_CAN_ERROR

Parameter	Type	Description
mHeader	VBLObjectHeader	Common header type. See 3.1.4.
mChannel	WORD	Channel the frame was sent or received.
mLength	WORD	Length of error frame - can be left 0.

3.6 VBLCANErrorFrameExt

Description: Extended CAN error frame received or transmitted on a CAN channel.

Corresponding object type: BL_OBJ_TYPE_CAN_ERROR_EXT

Parameter	Type	Description
mHeader	VBLObjectHeader	Common header type. See 3.1.4.
mChannel	WORD	Channel the frame was sent or received.
mLength	WORD	Length of error frame, unused, may be 0.
mFlags	DWORD	Defines what additional information is valid. Following values are possible: 1: SJA 1000 ECC is valid (member mECC) 2: Vector CAN Core Error Code is valid. 4: Vector CAN Core Error Position 8: Vector CAN Core Frame Length in ns

Parameter	Type	Description
mECC	BYTE	Content of Philips SJA1000 Error Code Capture (ECC) register, or the Vector CAN-Core error register (see also mFlags). SJA1000-ECC See documentation of Philips SJA1000 CAN Controller. Vector CAN-Core Bit Meaning 0-5 0: Bit Error 1: Form Error 2: Stuff Error 3: Other Error 4: CRC Error 5: Ack-Del-Error 7: Ack-Error 6-7 0: RX-NAK-Error 1: TX-NAK-Error 2: RX-Error 3: TX-Error
mPosition [1,2]	BYTE	Bit position of the error frame in the corrupted message.
mDLC [1, 2, 3]	BYTE	Data length code of the corrupted message.
mReserved1	BYTE	Reserved, must be 0.
mFrameLengthInNS [1,2]	DWORD	Difference between the time stamp of the error frame and the start of frame in nanoseconds. Not all hardware interfaces are supporting this parameter.
mID [1, 2, 3]	DWORD	Message ID of the corrupted message.

<table>
<tr><th>Parameter</th><th>Type</th><th>Description</th></tr>
<tr><td>mFlagsExt [1]</td><td>WORD</td><td>Extended error flags.
<table>
<tr><td>Bit</td><td>Meaning</td></tr>
<tr><td>0-4</td><td>Segment (only SJA1000)</td></tr>
<tr><td>5</td><td>Direction, 1=RX</td></tr>
<tr><td>6-11</td><td>Error Code
0 Bit Error
1 Form Error
2 Stuff Error
3 Other Error
4 CRC Error [2]
5 ACK-DEL Error [2]
7 ACK Error [2]</td></tr>
<tr><td>12-13</td><td>Extended Direction [2]
0 RX NAK
1 TX NAK
2 RX
3 TX</td></tr>
<tr><td>14</td><td>1 = The error frame was send from the application</td></tr>
</table></td></tr>
<tr><td>mReserved2</td><td>WORD</td><td>Reserved, must be 0.</td></tr>
<tr><td>mData[8][1, 2, 3]</td><td>BYTE</td><td>Message data.</td></tr>
</table>

Validity of the Parameters

1 Since CANoe/CANalyzer 7.5
2 Only valid for interfaces with Vector CAN-Core (CANcardXLe, VN7600, and others)
3 The validity of ID, DLC, and the data field depends on the type and position of the disturbance. Example: If the message is disturbed in the ID-field, then only the first bits of the ID may be valid, but not the DLC and the data field. The error position is not the position of the disturbance. Example: If the error position is located in the CRC-field, then the message may have been disturbed in any other field, and the erroneous CRC is the result of that disturbance.

3.7 VBLCANFDErrorFrame64

Description: CAN-FD error frame received or transmitted on a CAN-FD channel.

Corresponding object type: BL_OBJ_TYPE_CAN_FD_ERROR_64

Parameter	Type	Description
mHeader	VBLObjectHeader	Common header type. See 3.1.4.
mChannel	BYTE	Channel the frame was sent or received.
mDLC	BYTE	Data length code of the corrupted message.
mValidDataBytes	BYTE	Number of data bytes of the corrupted message. The value is 0, if the corrupted message was a CAN remote frame.
mECC	BYTE	Content of Philips SJA1000 Error Code Capture register, or the Vector CAN-Core error register. See field mECC of VBLCANErrorFrameExt.

<table>
<tr><th>Parameter</th><th>Type</th><th>Description</th></tr>
<tr><td>mFlags</td><td>WORD</td><td>Defines what additional information is valid. See field mFlags of VBLCANErrorFrameExt.</td></tr>
<tr><td>mErrorCodeExt</td><td>WORD</td><td>Extended error flags. See field mFlagsExt of VBLCANErrorFrameExt.</td></tr>
<tr><td>mExtFlags</td><td>WORD</td><td>CAN-FD specific flags.<table><tr><td>Bit</td><td>Meaning</td></tr><tr><td>0</td><td>0: FDF is 0 (CAN Error Frame)
1: FDF is 1 (CAN FD Error Frame)</td></tr><tr><td>1</td><td>0: BRS is 0
1: BRS is 1</td></tr><tr><td>2</td><td>0: ESI is 0
1: ESI is 1</td></tr><tr><td>3</td><td>0: Error in Arbitration Phase
1: Error in Data Phase</td></tr><tr><td>4</td><td>0: Error is on a CAN channel
1: Error is on a CAN FD channel</td></tr><tr><td>all others</td><td>reserved, must be set o 0</td></tr></table></td></tr>
<tr><td>mExtDataOffset</td><td>BYTE</td><td>Offset of the extended event data. Use the macros ‘BLHasExtFrameData’ and ‘BLExtFrameDataPtr’ to get a pointer to mExtFrameData. See example in chapter 3.4.</td></tr>
<tr><td>reserved1</td><td>BYTE</td><td>Reserved, must be 0.</td></tr>
<tr><td>mID</td><td>DWORD</td><td>Message ID of the corrupted message.</td></tr>
<tr><td>mFrameLength</td><td>DWORD</td><td>Difference between the time stamp of the error frame and the start of frame in nanoseconds. Not all hardware interfaces are supporting this parameter.</td></tr>
<tr><td>mBtrCfgArb</td><td>DWORD</td><td>CAN-FD bit timing configuration for arbitration phase, may be 0, if not supported by hardware/driver

Bit 0-7: Quartz frequency
Bit 8-15: prescaler
Bit 16-23: # of time quanta of a bit
Bit 24-31: Sampling point in percent</td></tr>
<tr><td>mBtrCfgData</td><td>DWORD</td><td>CAN-FD bit timing configuration for data phase, may be 0, if not supported by hardware/driver. See mBtrCfgArb.</td></tr>
<tr><td>mTimeOffsetBrsNs</td><td>DWORD</td><td>Time offset of bit rate switch within BRS field in nanoseconds</td></tr>
<tr><td>mTimeOffsetCRCDelNs</td><td>DWORD</td><td>Time offset of bit rate switch within CRC delimiter field in nanoseconds</td></tr>
</table>

Parameter	Type	Description
mCRC	DWORD	CRC of the message. For CAN FD ISO-frames the stuff count and additional flags are stored in the field: Bits: Meaning 0-20: CRC 21-26: Reserved, must be 0 27-29: Stuff count field 30: Stuff count field parity 31: ISO format. If set to 1, then the message is in CAN FD ISO format, and the stuff count is valid.
mErrorPosition	WORD	Bit position of the error frame in the corrupted message.
mReserved2	WORD	Reserved, must be 0.
mData[]	BYTE	Data bytes of the message. The array size is set to the frame's data length stored in mValidDataBytes. The maximum value is 64.
mExtFrameData	struct VBLCANFDExtFrameData	See description in chapter 3.4..

Validity of the Parameters

For all fields the same restrictions as for VBLCANErrorFrameExt apply.

3.8 VBLCANOverloadFrame

Description: CAN overload frame received or transmitted on a CAN channel.

Corresponding object type: BL_OBJ_TYPE_CAN_OVERLOAD

Parameter	Type	Description
mHeader	VBLObjectHeader	Common header type. See 3.1.4.
mChannel	WORD	Channel the frame was sent or received.
mDummy	WORD	Reserved, must be 0

3.9 VBLCANDriverStatistic

Description: CAN driver statistic data for a CAN channel.

Corresponding object type: BL_OBJ_TYPE_CAN_STATISTIC

Parameter	Type	Description
mHeader	VBLObjectHeader	Common header type. See 3.1.4.
mChannel	WORD	CAN channel the statistic data belongs to.

Parameter	Type	Description
mBusLoad	WORD	Busload in 1/100 percent (e.g. 100 means 1%)
mStandardDataFrames	DWORD	Number of standard data frames sent on that channel.
mExtendedDataFrames	DWORD	Number of extended data frames sent on that channel.
mStandardRemoteFrames	DWORD	Number of remote data frames sent on that channel.
mExtendedRemoteFrames	DWORD	Number of extended remote data frames sent on that channel.
mErrorFrames	DWORD	Number of error frams sent on that channel
mOverloadFrames	DWORD	Number of overload frams sent on that channel.

3.10 VBLCANDriverError

Description: CAN driver error information for transceiver of a CAN channel.

Corresponding object type: BL_OBJ_TYPE_CAN_DRIVER_ERROR

Parameter	Type	Description
mHeader	VBLObjectHeader	Common header type. See 3.1.4.
mChannel	WORD	CAN channel the driver error information belongs to.
mTXErrors	BYTE	Number of transmit errors that occurred in CAN controller for that channel.
mRXErrors	BYTE	Number of receive errors that occurred in CAN controller for that channel.
mErrorCode	DWORD	See 3.1.2

3.11 VBLCANDriverErrorExt

Description: Extended CAN driver error information for transceiver of a CAN channel. **This object is currently not used in CANoe / CANalyzer.**

Corresponding object type: BL_OBJ_TYPE_CAN_DRIVER_ERROR_EXT

Parameter	Type	Description
mHeader	VBLObjectHeader	Common header type. See 3.1.4.
mChannel	WORD	CAN channel the driver error information belongs to.

Parameter	Type	Description
mTXErrors	BYTE	Number of transmit errors that occurred in CAN controller for that channel.
mRXErrors	BYTE	Number of receive errors that occurred in CAN controller for that channel.
mErrorCode	DWORD	See 3.1.2.
mFlags	DWORD	To be defined.
mState	BYTE	To be defined.
mReserved1	BYTE	Reserved, must be 0
mReserved2	WORD	Reserved, must be 0
mReserved3[4]	DWORD	Reserved, must be 0

3.12 VBLCANDriverHwSync

Description: Event that occurs when hardware sync is executed.

Corresponding object type: `BL_OBJ_TYPE_CAN_DRIVER_SYNC`

Parameter	Type	Description
mHeader	VBLObjectHeader	Common header type. See 3.1.4.
mChannel	WORD	Application channel
mFlags	BYTE	The following values are possible: 1: sync was sent from this channel (`BL_HWSYNC_FLAGS_TX`) 2: external sync received (`BL_HWSYNC_FLAGS_RX`) 4: sync received but generated from this hardware (`BL_HWSYNC_FLAGS_RX_THIS`)
mDummy	BYTE	Reserved, must be 0

3.13 VBLCANSettingsChanged

Description: Event that occurs when a reset or a bit timming change occurs on a CAN channel.

Corresponding object type: `BL_OBJ_TYPE_CAN_DRIVER_SYNC`

Parameter	Type	Description
mHeader	VBLObjectHeader	Common header type. See 3.1.4.
mChannel	WORD	Application channel

Parameter	Type	Description
mChangeType	BYTE	The following values are possible: -1: Invalid Change Type 0: Reset event 1: Bit timing changed
mBitTimings	struct VBLCANFDExtFrameData	See description in chapter 3.4. If CAN channel mBTRExtData is 0.

3.14 VBLEnvironmentVariable

Description: Environment variable that can be used with CANoe.

Corresponding object types:

- BL_OBJ_TYPE_ENV_INTEGER
- BL_OBJ_TYPE_ENV_DOUBLE
- BL_OBJ_TYPE_ENV_STRING
- BL_OBJ_TYPE_ENV_DATA

Note that the object type depends on the type of the environment variable's data. E.g. if you want to save an environment variable with data of type DOUBLE, set the object type to BL_OBJ_TYPE_DOUBLE.

Parameter	Type	Description
mHeader	VBLObjectHeader	Common header type. See 3.1.4.
mNameLength	DWORD	Length of the name of the environment variable (without terminating 0)
mDataLength	DWORD	Length of the data of the environment variable in bytes.
mName	LPSTR	Name of the environment variable.
mData	LPBYTE	Data value of the environment variable.

Note:
The size of a VBLEnvironmentVariable object depends on the length of the name and the length of the data. To set the size correctly you have to add the length of the name and the length of the data to the object size:

```
VBLEnvironmentVariable envVar;
envVar.mHeader.mBase.mObjectSize = sizeof(VBLEnvironmentVariable) +
envVar.mNameLength + envVar.mDataLength;
```

The following piece of code shows how to save different environment variables to a BLF file.

```
BYTE bytes[10] = { 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 };
char* string = "Hello world";
DOUBLE doubleData = 4.2;
```

```
HANDLE hFile;
// open / create the BLF file
// ...
VBLEnvironmentVariable envvar;
envvar.mName = "envvar1";
envvar.mNameLength = strlen("envvar1");

envvar.mHeader.mBase.mObjectType = BL_OBJ_TYPE_ENV_DATA;
envvar.mData = bytes;
envvar.mDataLength = sizeof( bytes);
envvar.mHeader.mBase.mObjectSize = sizeof( VBLEnvironmentVariable) +
  envvar.mDataLength + envvar.mNameLength;
BLWriteObject( hFile, &envvar.mHeader.mBase);

envvar.mHeader.mBase.mObjectType = BL_OBJ_TYPE_ENV_DOUBLE;
envvar.mData = (LPBYTE) &doubleData;
envvar.mDataLength = sizeof( doubleData);
envvar.mHeader.mBase.mObjectSize = sizeof( VBLEnvironmentVariable) +
  envvar.mDataLength + envvar.mNameLength;
BLWriteObject( hFile, &envvar.mHeader.mBase);

envvar.mHeader.mBase.mObjectType = BL_OBJ_TYPE_ENV_STRING;
envvar.mData = (LPBYTE) string;
envvar.mDataLength = strlen( string);
envvar.mHeader.mBase.mObjectSize = sizeof( VBLEnvironmentVariable) +
  envvar.mDataLength + envvar.mNameLength;
BLWriteObject( hFile, &envvar.mHeader.mBase);
```

The following piece of code shows you how to read in and use environment variables:

```
HANDLE hFile;
// open the BLF file
// ...
VBLObjectHeaderBase base;
VBLEnvironmentVariable envvar;
BYTE* data = NULL;
DOUBLE doubleData = 0.0;
char* stringdata = NULL;

while( BLPeekObject( hFile, &base))
{
  switch( base.mObjectType)
  {
  case BL_OBJ_TYPE_ENV_DATA:
    envvar.mHeader.mBase =  base;
    BLReadObject( hFile, &envvar.mHeader.mBase);
    data = (BYTE*) malloc( envvar.mDataLength);
    memcpy( data, envvar.mData, envvar.mDataLength);
    BLFreeObject( hFile, &envvar.mHeader.mBase);
    break;
  case BL_OBJ_TYPE_ENV_DOUBLE:
    envvar.mHeader.mBase = base;
    BLReadObject( hFile, &envvar.mHeader.mBase);
    memcpy( &doubleData, envvar.mData, sizeof( doubleData));
    BLFreeObject( hFile, &envvar.mHeader.mBase);
    break;
  case BL_OBJ_TYPE_ENV_STRING:
    envvar.mHeader.mBase = base;
    BLReadObject( hFile, &envvar.mHeader.mBase);
    stringdata = (char*) malloc( envvar.mDataLength+1);
    memcpy( stringdata, envvar.mData, envvar.mDataLength);
    stringdata[envvar.mDataLength] = 0;
    BLFreeObject( hFile, &envvar.mHeader.mBase);
    break;
  default:
```

```
      BLSkipObject( hFile, &base);
      break;
    }
  }
```

3.15 VBLSystemVariable

Description: System variable that can be used with CANoe.

Corresponding object type: BL_OBJ_TYPE_SYS_VARIABLE

Parameter	Type	Description
mHeader	VBLObjectHeader	Common header type. See 3.1.4.
mType	DWORD	Type of system variable. Following values are possible: 1: DOUBLE (BL_SYSVAR_TYPE_DOUBLE) 2: LONG (BL_SYSVAR_TYPE_LONG) 3: STRING (BL_SYSVAR_TYPE_STRING) 4: Array of DOUBLE (BL_SYSVAR_TYPE_DOUBLEARRAY) 5 Array of LONG (BL_SYSVAR_TYPE_LONGARRAY) 6: LONGLONG (BL_SYSVAR_TYPE_LONGLONG) 7: Array of BYTE (BL_SYSVAR_TYPE_BYTEARRAY)
mRepresentation	DWORD	If mType is LONG or LONGLONG: 0 if the data value is signed, 1 if the data value is unsigned. For other types, undefined and must be 0.
mReserved[2]	DWORD	Reserved, must be 0.
mNameLength	DWORD	Length of the name of the system variable (without terminating 0)
mDataLength	DWORD	Length of the data of the environment variable in bytes.
mName	LPSTR	Name of the system variable.
mData	LPBYTE	Data value of the system variable.

Note:
The size of a VBLSystemVariable object depends on the length of the name and the length of the data. To set the size correctly you have to add the length of the name and the length of the data to the object size:

```
VBLSystemVariable sysVar;
sysVar.mHeader.mBase.mObjectSize = sizeof(VBLSystemVariable) +
sysVar.mNameLength + sysVar.mDataLength;
```

The following piece of code shows how to save different system variables to a BLF file.

```
BYTE bytes[10] = { 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 };
char* string = "Hello world";
DOUBLE doubleData = 4.2;
```

```
HANDLE hFile;
// open / create the BLF file
// ...
VBLSystemVariable sysVar;
sysVar.mName = "sysVar1";
sysVar.mNameLength = strlen( "sysVar1");

sysVar.mType = BL_SYSVAR_TYPE_BYTEARRAY;
sysVar.mData = bytes;
sysVar.mDataLength = sizeof( bytes);
sysVar.mHeader.mBase.mObjectSize = sizeof( VBLSystemVariable) +
  sysVar.mDataLength + sysVar.mNameLength;
BLWriteObject( hFile, &sysVar.mHeader.mBase);

sysVar.mType = BL_SYSVAR_TYPE_DOUBLE;
sysVar.mData = (LPBYTE) &doubleData;
sysVar.mDataLength = sizeof( doubleData);
sysVar.mHeader.mBase.mObjectSize = sizeof( VBLSystemVariable) +
  sysVar.mDataLength + sysVar.mNameLength;
BLWriteObject( hFile, &sysVar.mHeader.mBase);

sysVar.mType = BL_SYSVAR_TYPE_STRING;
sysVar.mData = (LPBYTE) string;
sysVar.mDataLength = strlen( string);
sysVar.mHeader.mBase.mObjectSize = sizeof( VBLSystemVariable) +
  sysVar.mDataLength + sysVar.mNameLength;
BLWriteObject( hFile, &sysVar.mHeader.mBase);
```

The following piece of code shows you how to read in and use environment variables:

```
HANDLE hFile;
// open the BLF file
// ...
VBLObjectHeaderBase base;
VBLSystemVariable sysVar;
BYTE* sysvardata = NULL;
DOUBLE sysDouble = 0.0;
char* sysstring = NULL;

while( BLPeekObject( hFile, &base))
{
  switch( base.mObjectType)
  {
  case BL_OBJ_TYPE_SYS_VARIABLE:
    sysVar.mHeader.mBase = base;
    BLReadObject( hFile, &sysVar.mHeader.mBase);
    switch(sysVar.mType)
    {
    case BL_SYSVAR_TYPE_BYTEARRAY:
      sysvardata = (BYTE*) malloc( sysvar.mDataLength);
      memcpy( sysvardata, sysVar.mData, sysvar.mDataLength);
      break;
    case BL_SYSVAR_TYPE_DOUBLE:
      memcpy( &sysDouble, sysVar.mData, sizeof( sysDouble));
      break;
    case BL_SYSVAR_TYPE_STRING:
      sysstring = (char*) malloc(sysVar.mDataLength+1);
      memcpy( sysstring, sysVar.mData, sysVar.mDataLength);
      sysstring[sysVar.mDataLength] = 0;
      break;
    default:
      break;
    }
    BLFreeObject( hFile, & sysVar.mHeader.mBase);
    break;
```

```
    default:
      BLSkipObject( hFile, &base);
      break;
    }
  }
```

3.16 VBLGPSEvent

Description: GPS event.

Corresponding object type: BL_OBJ_TYPE_GPS_EVENT

Parameter	Type	Description
mHeader	VBLObjectHeader	Common header type. See 3.1.4.
mFlags	DWORD	Not used, must be 0.
mChannel	WORD	GPS channel the GPS event was sent.
mReserved	WORD	Reserved, must be 0,
mLatitude	DOUBLE	Latitude, possible values reach from -180 to 180. Negative values are western hemisphere, positive values are eastern hemisphere.
mLongitude	DOUBLE	Longitude, possible values reach from -90 to 90. Negative values are Southern hemisphere, positive values are northern hemisphere.
mAltitude	DOUBLE	Altitude in meters, measured above sea line.
mSpeed	DOUBLE	Current vehicle speed in km/h.
mCourse	DOUBLE	Current driving course, possible values reach from -180 to 180. A value of 0 means driving north, 90 means driving east, -90 means driving west, -180 and 180 mean driving south.

3.17 VBLWlanFrame

Description: WLAN frame.

Corresponding object type: BL_OBJ_TYPE_WLAN_FRAME

Parameter	Type	Description
mHeader	VBLObjectHeader	Common header type. See 3.1.4.
mChannel	WORD	The channel of the frame.
mFlags	WORD	Bit 0 – Genuine MAC Header Bit 1 – Correct Frame Control Format
mDir	BYTE	Direction flag: 0=Rx, 1=Tx 2=TxRq
mRadioChannel	BYTE	Channel number of the radio frequency, i.e 180 or 176

Parameter	Type	Description
mSignalStrength	SHORT	Signal strength in [dBm]
mSignalQuality	WORD	Signal quality
mFrameLength	WORD	Length of WLAN data in bytes. Max. 2342 Bytes.
mFrameData	BYTE*	WLAN frame data. Data starts with WLAN header.

Note:
The size of a VBLWlanFrame object depends on the length of the frame data. To set the size correctly you have to add the payload data length to the object size:

```
VBLWlanFrame wlanFrame;
wlanFrame.mHeader.mBase.mObjectSize = sizeof(VBLWlanFrame) +
wlanFrame.mFrameLength;
```

3.18 VBLWlanStatistic

Description: WLAN statistic event.

Corresponding object type: `BL_OBJ_TYPE_WLAN_STATISTIC`

Parameter	Type	Description
mHeader	VBLObjectHeader	Common header type. See 3.1.4.
mChannel	WORD	The channel of the frame.
mFlags	WORD	Bit 0 – Valid Rx/Tx counter Bit 1 – Valid error counter (collisions and errors)
mRxPacketCount	ULONG	Number of Rx packets since last statistic event.
mRxByteCount	ULONG	Number of Rx bytes since last statistic event.
mTxPacketCount	ULONG	Number of Tx packets since last statistic event.
mTxByteCount	ULONG	Number of Tx packets since last statistic event.
mCollisionCount	ULONG	Number of collisions since last statistic event.
mErrorCount	ULONG	Number of errors since last statistic event.

3.19 VBLTriggerCondition

Description: Trigger Condition event.

Corresponding object type: `BL_OBJ_TYPE_TRIGGER_CONDITION`

Parameter	Type	Description
mHeader	VBLVarObjectHeader	Common header type. See 3.1.6.
mStatic		

Parameter	Type	Description
mState	DWORD	BL_TC_STATUS_UNKNOWN BL_TC_STATUS_START BL_TC_STATUS_STOP BL_TC_STATUS_STARTSTOP
mTriggerBlockNameLength	DWORD	Length of mTriggerBlockName
mTriggerConditionLength	DWORD	Length of mTriggerCondition
mDynamic		
mTriggerBlockName	LPSTR	Trigger Block Name that generated the trigger condition
mTriggerCondition	LPSTR	Trigger Condition description

3.20 VBLAppTrigger

Description: Application defined trigger to be saved in BLF log file (**currently not used in CANoe / CANalyzer**).

Corresponding object type: BL_OBJ_TYPE_APP_TRIGGER

Parameter	Type	Description
mHeader	VBLObjectHeader	Common header type. See 3.1.4.
mPreTriggerTime	ULONGLONG	Pre trigger time.
mPostTriggerTime	ULONGLONG	Post trigger time.
mChannel	WORD	Trigger that channel belongs to.
mFlags	WORD	0: single trigger type 1: start logging trigger type 2: stop logging trigger type
mAppSecific2	DWORD	Reserved.

3.21 VBLAppText

Description: Application defined text to be saved in BLF log file (**currently not used in CANoe/CANalyzer**).

Corresponding object type: BL_OBJ_TYPE_APP_TEXT

Parameter	Type	Description
mHeader	VBLObjectHeader	Common header type. See 3.1.4.

<table>
<tr><th>Parameter</th><th>Type</th><th>Description</th></tr>
<tr><td>mSource</td><td>DWORD</td><td>Defines the source/semantic of the text. Actually two different values are defined:

0: BL_APPTEXT_MEASUREMENTCOMMENT
mReserved is not used
mText contains a measurement comment

1: BL_APPTEXT_DBCHANNELINFO
mReserved contains channel information. The following table shows how the 4 bytes are used
<table>
<tr><td>Bit 0-7</td><td>Version of the data</td></tr>
<tr><td>Bit 8-15</td><td>Channel number</td></tr>
<tr><td>Bit 15-23</td><td>Bus type of the channel. One of the following values:
BL_BUSTYPE_CAN 1
BL_BUSTYPE_LIN 5
BL_BUSTYPE_MOST 6
BL_BUSTYPE_FLEXRAY 7
BL_BUSTYPE_J1708 9
BL_BUSTYPE_ETHERNET 10
BL_BUSTYPE_WLAN 13
BL_BUSTYPE_AFDX 14</td></tr>
<tr><td>Bit 24</td><td>Flag, that determines, if channel is a CAN-FD channel</td></tr>
<tr><td>Bit 25-31</td><td>Unused at the moment</td></tr>
</table>
mText contains database information for the specified channel. Each database is defined by the database path and the cluster name (if available). The single databases and the cluster name are separated by a semicolon. Example:

<Path1>;<ClusterName1>;<Path2>;<ClusterName2>;…

If for a database there’s no cluster name available, an empty string is written as cluster name.</td></tr>
<tr><td>mReserved</td><td>DWORD</td><td>Depends on mSource.</td></tr>
<tr><td>mTextLength</td><td>DWORD</td><td>Length of mText without ending 0.</td></tr>
<tr><td>mText</td><td>LPSTR</td><td>Text to be saved to log file.</td></tr>
</table>

Note:
The size of a VBLAppText object depends on the length of the text. To set the size correctly you have to add the text length to the object size:

```
VBLAppText appText;
appText.mHeader.mBase.mObjectSize = sizeof(VBLAppText) +
appText.mTextLength;
```

3.22 VBLEventComment

Description: Comment of an event. The comment can be set in Trace Window.

Corresponding object type: BL_OBJ_TYPE_EVENT_COMMENT

Parameter	Type	Description
mHeader	VBLObjectHeader	Common header type. See 3.1.4.
mCommentedEventType	DWORD	Type of the commented event
mTextLength	DWORD	Length of mText without ending 0.
mText	LPSTR	Comment text.

Note:
The size of a VBLEventComment object depends on the length of the text. To set the size correctly you have to add the text length to the object size:

```
VBLEventComment comment;
comment.mHeader.mBase.mObjectSize = sizeof(VBLEventComment) +
comment.mTextLength;
```

3.23 VBLGlobalMarker

Description: Global Marker assigned to another event or to a time stamp.

Corresponding object type: BL_OBJ_TYPE_GLOBAL_MARKER

Parameter	Type	Description
mHeader	VBLObjectHeader	Common header type. See 3.1.4.
mCommentedEventType	DWORD	Type of the commented event
mForegroundColor	COLORREF	Foreground color of the marker group
mBackgroundColor	COLORREF	Background color of the marker group
mIsRelocatable	BYTE	Defines whether a marker can be relocated
mGroupNameLength	DWORD	Length of mGroupName without ending 0.
mMarkerNameLength	DWORD	Length of mMarkerName without ending 0.
mDescriptionLength	DWORD	Length of mDescription without ending 0.
mGroupName	LPSTR	Group name.
mMarkerName	LPSTR	Marker.
mDescription	LPSTR	Description text.

Note:
The size of a VBLGlobalMarker object depends on the length of the text (group name, marker name, description). To set the size correctly you have to add the text length to the object size:

```
VBLEventComment comment;
comment.mHeader.mBase.mObjectSize = sizeof( VBLEventComment) +
mGroupNameLength + mMarkerNameLength + mDescriptionLength
```

3.24 VBLAfdxFrame

Description: AFDX frame.

Corresponding object type: BL_OBJ_TYPE_AFDX_FRAME

Parameter	Type	Description
mHeader	VBLObjectHeader	Common header type. See 3.1.4.
mSourceAddress[6]	BYTE	Ethernet (MAC) address of source computer (network byte order).
mChannel	WORD	The channel of the frame.
mDestinationAddress[6]	BYTE	Ethernet (MAC) address of target computer (network byte order).
mDir	WORD	Direction flag: 0=Rx, 1=Tx, 2=TxRq
mType	WORD	EtherType which indicates protocol for Ethernet payload data See Ethernet standard specification for valid values.
mTPID	WORD	TPID when VLAN tag valid, zero when no VLAN. See Ethernet standard specification.
mTCI	WORD	TCI when VLAN tag valid, zero when no VLAN. See Ethernet standard specification.
mEthChannel	BYTE	Channel number of the underlying Ethernet interface, where the frame originated from.
mAfdxFlags	WORD	Status- and error flags as: Bit 0 – Frame from line-B Bit 1 – Frame is redundant Bit 2 – Frame is a fragment of a message Bit 3 – Packet is a SAP message or part of it Bit 4 – Frame occurred on wrong line (A/B) Bit 5 – Frame is not a valid AFDX frame Bit 6 – AFDX-sequenceNo is invalid Bit 7 – Redundancy error encountered Bit 8 – Fragmentation / reassembly error Bit 9 – Violation of a higher protocol Bit 10 – Packet has been reassembled. Bit 11 – Frame has been checked by redundancy manager Bit 12 – a constant or value violates AFDX recommendation Bit 13 – Frame size does not match expected size from database Bit 14 – Packet is not defined in database Bit 15 – Frame has been checked by integrity manager

Parameter	Type	Description
mBAGusec	ULONG	Time period since last received frame on this virtual link in micro-seconds
mPayLoadLength	WORD	Length of Ethernet payload data in bytes. Max. 1500 Bytes (without Ethernet header) as per AFDX-spec; raw Ethernet may have 1582 Bytes
mPayLoad	BYTE*	Ethernet payload data (without Ethernet header)

Note:
The size of a VBLAfdxFrame object depends on the length of the payload data. To set the size correctly you have to add the payload data length to the object size:

```
VBLAfdxFrame afdxFrame;
afdxFrame.mHeader.mBase.mObjectSize = sizeof(VBLAfdxFrame) +
afdxFrame.mPayLoadLength;
```

It follows the same schema as a VBLEthernetFrame, just with additional elements.

3.25 VBLAfdxStatistic

Description: AFDX statistic event per virtual link.

Corresponding object type: `BL_OBJ_TYPE_AFDX_STATISTIC`

Parameter	Type	Description
mHeader	VBLObjectHeader	Common header type. See 3.1.4.
mChannel	WORD	The channel of the frame.
mFlags	WORD	Bit 0 – Valid Rx/Tx counter Bit 1 – Valid error counter Bit 2 – Valid VirtualLink ID
mRxPacketCount	ULONG	Number of Rx packets since last statistic event.
mRxByteCount	ULONG	Number of Rx bytes since last statistic event.
mTxPacketCount	ULONG	Number of Tx packets since last statistic event.
mTxByteCount	ULONG	Number of Tx packets since last statistic event.
mCollisionCount	ULONG	Number of collisions since last statistic event.
mErrorCount	ULONG	Number of errors since last statistic event.

Parameter	Type	Description
mStatDroppedRedundantPacketCount	ULONG	Number of dropped packet due to redundancy check since last statistic event.
mStatDroppedRedundantErrorCount	ULONG	Number of errors found at redundancy check since last statistic event.
mStatDroppedIntegrityErrorCount	ULONG	Number of errors found at integrity check since last statistic event.
mStatAvrgPeriodMsec	ULONG	Average period of frames on this VL in [msec].
mStatAvrgJitterMysec	ULONG	Average jitter of the time period of frames on this VL in [mysec].
mVLId	ULONG	Unique ID assigned to this VL.
mStatDuration	ULONG	Time period covered by this event in [msec].

3.26 VBLAfdxBusStatistic

Description: AFDX bus statistic event per channel and line (adapter).

Corresponding object type: BL_OBJ_TYPE_AFDX_BUS_STATISTIC

Object available starting from CANoe/CANalyzer version 8.2

Parameter	Type	Description
mHeader	VBLObjectHeader	Common header type. See 3.1.4.
mChannel	WORD	The channel of the frame.
mFlags	WORD	Bit 0 – channel is configured Bit 1 – HW related counters valid (mStatRxPacketCountHW, mStatTxPacketCountHW, mStatRxErrorCountHW, mStatTxErrorCountHW, mStatRxBytesHW, mStatTxBytesHW) Bit 2 – CANwin related counters are valid (mStatRxPacketCount, mStatTxPacketCount) Bit 3 – link-related info is valid (mLinkStatus, mLinkSpeed, mLinkLost) Bit 4 – invalid packet counter is valid Bit 5 – lost packet counter is valid Bit 6 – dropped packet counter is valid Bit 7 – byte counters are based on CANwin packets, not HW

Parameter	Type	Description
mStatDuration	ULONG	Data collection period (epoche) [mysec].
mStatRxPacketCountHW	ULONG	Read frames taken from hardware.
mStatTxPacketCountHW	ULONG	Sent frames taken from hardware.
mStatRxErrorCountHW	ULONG	Number of erronous Rx frames detected by hardware in epoche.
mStatTxErrorCountHW	ULONG	Number of erronous Tx frames detected by hardware in epoche.
mStatRxBytesHW	ULONG	Bytes received by hardware in epoche.
mStatTxBytesHW	ULONG	Bytes sent by hardware in epoche.
mStatRxPacketCount	ULONG	Received frames within CANwin.
mStatTxPacketCount	ULONG	Sent frames from CANwin.
mStatDroppedPacketCount	ULONG	Number of frames dropped actively by CANwin.
mStatInvalidPacketCount	ULONG	Number of frames detected in CANwin with incompatible Eth-header.
mStatLostPacketCount	ULONG	Number of frames lost by CANwin due to queue overflow etc.
mLine	BYTE	LineA (0) or LineB (1)
mLinkStatus	BYTE	Status of adapter as per Eth-Status
mLinkSpeed	WORD	Link speed : 0 : 10Mbps 1 : 100Mbps 2 : 1000Mbps
mLinkLost	WORD	Number of link-losses during epoche

3.27 VBLAfdxLineStatus

Description: AFDX link status event per adapter, used within VBLAfdxStatus, not directly

Corresponding object type: BL_OBJ_TYPE_AFDX_STATUS

Parameter	Type	Description
mFlags	WORD	Valid fields (as ETH): Bit 0 – Link status Bit 1 – Bitrate Bit 2 – Ethernet Phy Bit 3 – Duplex Bit 4 – MDI Type Bit 5 – Connector Bit 6 – Clock Mode Bit 7 – BroadR-Reach Pair
mLinkStatus	BYTE	Link Status: 0: Unknown 1: Down 2: Up 3 Negotiate 4: Link error
mEthernetPhy	BYTE	Ethernet Phy: 0: Unknown 1: IEEE 802.3 2: BroadR-Reach
mDuplex	BYTE	Duplex: 0: Unknown 1: Half Duplex 2: Full Duplex.
mMdi	BYTE	0: Unknown 1: Direct 2: Crossover.
mConnector	BYTE	0: Unknown 1: RJ45 2: D-Sub.
mClockMode	BYTE	0: Unknown 1: Master 2: Slave.
mPairs	BYTE	0: Unknown 1: BR 1-pair 2: BR 2-pair 3: BR 4-pair.
mReserved	BYTE	unused.
mBitrate	ULONG	Bitrate in [kbit/s].

3.28 VBLAfdxStatus

Description: AFDX link status event per channel

Corresponding object type: BL_OBJ_TYPE_AFDX_STATUS

Object available starting from CANoe/CANalyzer version 8.2

Parameter	Type	Description
mHeader	VBLObjectHeader	Common header type. See 3.1.4.
mChannel	WORD	The channel of the frame.
mStatusA	VBLAfdxLineStatus	Status of adapter lineA.
mStatusB	VBLAfdxLineStatus	Status of adapter lineB.

3.29 VBLAfdxErrorEvent

Description: AFDX general error event for asynchronous errors, i.e. not related directly to frame events.

Corresponding object type: BL_OBJ_TYPE_AFDX_ERROR_EVENT

Object available starting from CANoe/CANalyzer version 8.5

Parameter	Type	Description
mHeader	VBLObjectHeader	Common header type. See 3.1.4.
mChannel	WORD	Related channel or 0 if independent from channels
mErrorLevel	WORD	0: error 1: warning 2: informational.
mSourceIdentifier	ULONG	Internal identifier of error source.
mErrorText	CHAR[512]	Textual description of the particular error.
mErrorAttributes	CHAR[512]	Pairs of token and description for further classification. The tokens depend on the error source.

3.30 VBLA429Message

Description: A429 word with additional attributes.

Corresponding object type: BL_OBJ_TYPE_A429_MESSAGE

Object available starting from CANoe/CANalyzer version 8.5

Parameter	Type	Description
mHeader	VBLObjectHeader	Common header type. See 3.1.4.
mA429Data	BYTE[4]	Complete raw A429 traffic bytes
mChannel	WORD	Related channel or 0 if independent from channels
mDir	BYTE	Direction flag: 0=Rx, 1=Tx.

Parameter	Type	Description
mBitrate	ULONG	Bitrate in bits per sec. For Rx this is a measurement value, for Tx it's the requested send bitrate.
mErrReason	ULONG	Bit-coded error number representing the error reason: 0 – No Error 1 – Gap Error 2 – Parity Error 4 – Bitrate too low 8 – Bitrate too High 16 – Frame Format Error 32 - Coding NRZ Error
mErrPosition	USHORT	Bit position of error. Valid range is between bit position 0 and 31.
mFrameGap	ULONGLONG	Distance between two frames in ns
mFrameLength	ULONG	Time between start of frame and end of frame in ns
mMsgCtrl	WORD	Message control for Tx messages. Denotes values for controlling the transmission of a message 0 – On Request 1 – Cyclic 2 – Cyclic Of
mCycleTime	ULONG	Cycle Time in µs for Message Control parameter
mError	ULONG	resered
mBitLenOfLastBit	ULONG	Bit length of the last bit I case of Rx-Error in ns

3.31 VBLA429ErrorEvent

Description: A429 general error event for asynchronous errors, i.e. not related directly to frame events.

Corresponding object type: BL_OBJ_TYPE_A429_ERR0R

Object available starting from CANoe/CANalyzer version 8.5

Parameter	Type	Description
mHeader	VBLObjectHeader	Common header type. See 3.1.4.
mChannel	WORD	Related channel or 0 if independent from channels

Parameter	Type	Description
mErrorType	WORD	0: error 1: warning 2: informational.
mSourceIdentifier	ULONG	Internal identifier of error source.
mErrReason	ULONG	Internal error reason number.
mErrorText	CHAR[512]	Textual description of the particular error.
mErrorAttributes	CHAR[512]	Pairs of token and descriptions for further classification. The tokens depend on the error source.

3.32 VBLA429Status

Description: A429 channel status event, describing the so called channel parameter settings.

Corresponding object type: BL_OBJ_TYPE_A429_STATUS

Object available starting from CANoe/CANalyzer version 8.5

Parameter	Type	Description
mHeader	VBLObjectHeader	Common header type. See 3.1.4.
mChannel	WORD	Channel described
mDir	BYTE	Channel direction type: 0: Rx, l: Tx.
mParity	WORD	Protocol parity to apply: 0: use hardware default, 1: disabled, 2: odd, 3: even, 4: mark, 5: space
mMinGap	ULONG	Minimum gap to preserve between 2 messages in 1/8 bit time.
mBitrate	ULONG	Tx channel (transmit) bitrate in Hz. Not relevant for Rx channels.
mMinBitrate	ULONG	Minimum allowed bitrate for Rx channels in Hz.
mMaxBitrate	ULONG	Maximum allowed bitrate for Rx channels in Hz

3.33 VBLA429BusStatistic

Description: A429 bus statistic events.

Corresponding object type: BL_OBJ_TYPE_A429_BUS_STATISTIC

Object available starting from CANoe/CANalyzer version 8.5

Parameter	Type	Description
mHeader	VBLObjectHeader	Common header type. See 3.1.4.
mChannel	WORD	Channel described
mDir	BYTE	Channel direction type: 0: Rx, l: Tx.
mBusload	ULONG	Bus load in 0.01 %.
mDataTotal	ULONG	Counts of valid A429words during epoche.
mErrorTotal	ULONG	Counts of invalid A429words during epoche, i.e. A429word events with error bits set.
mBitrate	ULONG	Average bitrate during epoche.
mParityErrors	USHORT	Parity error counts during epoche.
mBitrateErrors	USHORT	Bitrate error counts during epoche.
mGapErrors	USHORT	Gap error counts during epoche.
mLineErrors	USHORT	Line error counts during epoche.
mFormatErrors	USHORT	Format error counts during epoche
mDutyFactorErrors	USHORT	Duty factor error counts during epoche
mWordLenErrors	USHORT	Word length error count during epoche
mCodingErrors	USHORT	Coding error count during epoche
mIdleErrors	USHORT	Idle error count during epoche
mLevelErrors	USHORT	Level error count during epoche
mLabelCount	USHORT[256]	Counts of valid A429words per label (index = label).

3.34 VBLTestStructure

Description: Events produced during execution of Test Modules or Test Configurations in CANoe. For each start or end of a structural element in the test, e.g. TestCase or TestGroup, a matching event is produced.

Corresponding object type: BL_OBJ_TYPE_TEST_STRUCTURE

Object available starting from CANoe/CANalyzer version 8.5 SP3

Parameter	Type	Description
mHeader	VBLObjectHeader	Common header type. See 3.1.4.
mExecutingObjectIdentity	DWORD	Unique ID for the executing Test Configuration or Test Module. This ID can be used to correlate all VBLTestStructure events during one measurement; it's not persistent across measurements.
mType	WORD	Type of structure element in the test. The following values are defined: 1 Test Module (BL_TESTSTRUCT_TYPE_TM_TESTMODULE) 2 Test Group (in Test Module) (BL_TESTSTRUCT_TYPE_TM_TESTGROUP) 3 Test Case (in Test Module) (BL_TESTSTRUCT_TYPE_TM_TESTCASE) 8 Test Configuration (BL_TESTSTRUCT_TYPE_TESTCONFIGURATION) 9 Test Unit (BL_TESTSTRUCT_TYPE_TESTUNIT) 10 Test Group (in Test Unit) (BL_TESTSTRUCT_TYPE_TESTGROUP) 11 Test Fixture (BL_TESTSTRUCT_TYPE_TESTFIXTURE) 12 Test Sequence (BL_TESTSTRUCT_TYPE_TESTSEQUENCE) 13 Test Sequence List (BL_TESTSTRUCT_TYPE_TESTSEQUENCELIST) 14 Test Case (in Test Unit) (BL_TESTSTRUCT_TYPE_TESTCASE) 15 Test Case List (BL_TESTSTRUCT_TYPE_TESTCASELIST)
mUniqueNo	DWORD	Unique ID for the structure element (Test Case etc.), can be used to correlate events belonging to the same element and to disambiguate between elements with the same mName. This value is not persistent across measurements. (Currently not supported for Elements not visible in the CANoe GUI, e.g. Test Cases inside a Test Sequence, these always have a value of 0xFFFFFFFF)

Parameter	Type	Description
mAction	WORD	Defines if this event indicates the start, end of, or abort information for the structural element: 1 Start (BL_TESTSTRUCT_ACTION_BEGIN) 2 End (BL_TESTSTRUCT_ACTION_END) 3 Start (BL_TESTSTRUCT_ACTION_ABORT) Abort information is additional if test was aborted e.g. due to verdict impact setting or due to user stop; it is always followed by an end event.
mResult	WORD	For “END” events, the overall result (verdict) of the structural element. The following values are defined: 0 Undefined (BL_TESTSTRUCT_VERDICT_UNDEFINED) 1 None (BL_TESTSTRUCT_VERDICT_NONE) 2 Passed (BL_TESTSTRUCT_VERDICT_PASSED) 3 Inconclusive (BL_TESTSTRUCT_VERDICT_INCONCLUSIVE) 4 Failed (BL_TESTSTRUCT_VERDICT_FAILED) 5 Error in test system (BL_TESTSTRUCT_VERDICT_ERRORINTESTSYSTEM)
mExecutingObjectNameLength	DWORD	Length of mExecutingObjectName in wide characters without terminating null character.
mNameLength	DWORD	Length of mName in wide characters without terminating null character.
mTextLength	DWORD	Length of mText in wide characters without terminating null character.
mExecutingObjectName	LPWSTR	Name of the executing Test Configuration or Test Module.
mName	LPWSTR	Name of the structure element.
mText	LPWSTR	Complete informational text of the event as shown in the CANoe Trace Window or in ASC-Log.

Note:
The size of a VBLTestStructure object depends on the length of the wide character strings (executing object name, element name, element info). To calculate the size correctly you have to add the text lengths (in bytes!) to the object size:

```
VBLTestStructure test;
```

```
 test.mHeader.mBase.mObjectSize = sizeof(VBLTestStructure)
+ sizeof(wchar_t) * test.mExecutingObjectNameLength
+ sizeof(wchar_t) * test.mNameLength
+ sizeof(wchar_t) * test.mTextLength;
```

3.35 VBLDataLostBegin

Description: An error event which indicates the start of a data loss in one of the CANoe queues.

Corresponding object type: BL_OBJ_TYPE_DATA_LOST_BEGIN

Object available starting from CANoe/CANalyzer version 10.0

Parameter	Type	Description
mHeader	VBLObjectHeader	Common header type. See 3.1.4.
mQueueIdentifier	DWORD	Identifier for the queue where the data lost occurred: 0: Data loss in RT main queue (BL_DL_QI_RT_QUEUE) 1: Data loss in Anlyz main queue (BL_DL_QI_ANLYZ_QUEUE) 2: Data loss in Anlyz and RT main queue (BL_DL_QI_RT_AND_ANLYZ_QUEUE)

3.36 VBLDataLostEnd

Description: An error event which indicates the end of a data loss in one of the CANoe/CANalyzer queues.

Corresponding object type: BL_OBJ_TYPE_DATA_LOST_END

Object available starting from CANoe/CANalyzer version 10.0

Parameter	Type	Description
mHeader	VBLObjectHeader	Common header type. See 3.1.4.
mQueueIdentifier	DWORD	Identifier for the queue where the data lost occurred: 0: Data loss in RT main queue (BL_DL_QI_RT_QUEUE) 1: Data loss in Anlyz main queue (BL_DL_QI_ANLYZ_QUEUE) 2: Data loss in Anlyz and RT main queue (BL_DL_QI_RT_AND_ANLYZ_QUEUE)
mFirstObjectLostTimeStamp	ULONGLONG	Time stamp of the first lost event in nanoseconds.
mNumberOfLostEvents	DWORD	Number of the lost events

3.37 VBLWaterMarkEvent

Description: An event which indicates the current water mark level of the CANoe/CANalyzer queue.

Corresponding object type: BL_OBJ_TYPE_WATER_MARK_EVENT

Object available starting from CANoe/CANalyzer version 10.0

Parameter	Type	Description
mHeader	VBLObjectHeader	Common header type. See 3.1.4.
mQueueState	DWORD	Watermark state of the queue: 0: Status normal (BL_WM_QS_STATUS_NORMAL) 1: Status is critical. Data loss may occur soon. (BL_WM_QS_STATUS_EMERGENCY) 2: Status data loss (BL_WM_QS_STATUS_NORMAL)