Cornell Notes

Topic: CALID CVN

Date: 18/09/2025

Cue Column (Questions, Keywords, or Prompts)

Notes Section (Main Notes)

1. Definition of Term:

- CALID = Calibration ID = Kalibrierungs-Identifikation = Calibration identification
- CVN = Calibration Verification Number = Prüfsumme = Checksum

1.1. CALID

- Identification code for a specific software/calibration contained in a server/electronic control unit (ECU)
- Note 1 to entry: If regulations require calibration identifications for emission-related software, those shall be reported in a standardized format as specified in SAE J1979-DA.

1.2. CVN

- Server/ECU calculated verification number of a calibration identification number to verify the integrity of the software/calibration contained in a server/ECU
- Note 1 to entry: If regulations require calibration identifications for emission-related software, those shall be reported in a standardised format as specified in ISO 15031-2.

1.3. Secondary ECU

- In the following, a specification of the OBD handling in AUTOSAR is introduced. Herein,
- “OBD” is used for automotive OBD with respect to different target markets. For SW- sharing and distributed development reasons as well as aspects of packaging and responsibility of releases, the OBD-relevant information / data structures need to be reported via Standardized AUTOSAR interfaces.
- In a vehicle there can be 3 different kinds of OBD ECUs:
  - Master ECU (one per vehicle), in WWH-OBD referenced as VOBD
  - Primary ECU (several per vehicle)
  - **Dependent / Secondary ECUs** (several per vehicle)
- From the Basic Software point of view **Dependent / Secondary ECUs** doesn’t need any specific OBD functionality. In **Dependent / Secondary ECUs** are always related to a Master or a Primary ECU. In **Dependent / Secondary ECUs** OBD- relevant information will not be stored in the Basic Software (e.g. OBD events will be forwarded to the respective Master or Primary ECU via the Bussystem). In Depen- dent / Secondary ECUs this "reported errors" and other OBD functionality might be handeled by a SW component.

1.4. AUTOSAR Standard

- Following AUTOSAR - Remote Event Communication Protocol Specification standard
- Information for Secondary ECU

1.5. Protocol Specification:

Message formats

- This chapter specifies all of the message formats of the RecM Bus Protocol.

- Unless otherwise specified, all messages are of the "fire and forget" type; meaning that, after a request is sent, there is no response message.
- For both the **Status** and **Management messages**, the same basic RecM Bus Protocol message format is used. It consists of the Header segment, the Payload segment and the Tail segment.

Header	Payload	Tail

Table 5.1: RecM Messsage Structure

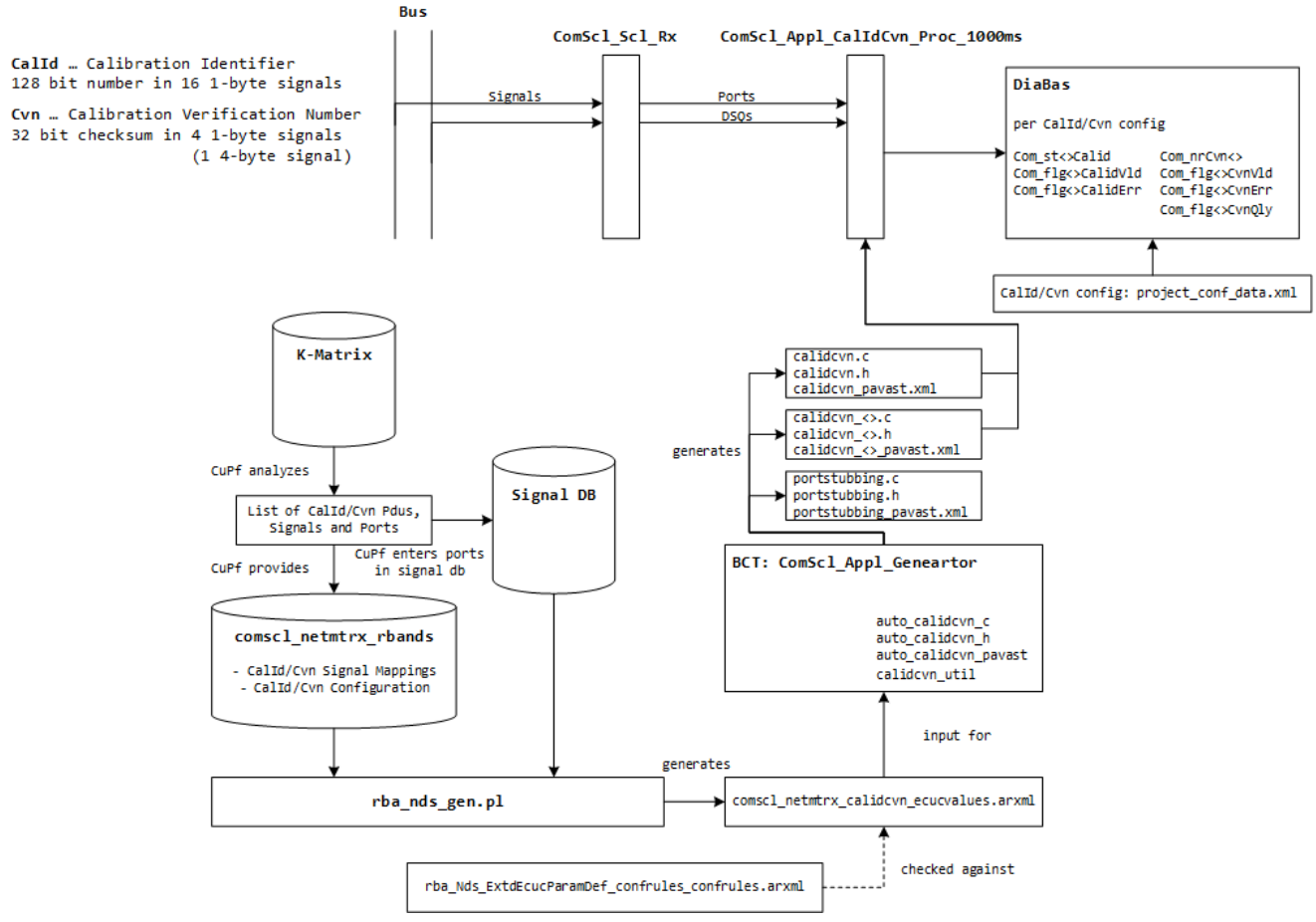
- The Header of all **Status messages** contains three fields: a Message Type, a Client Identifier and a Reserved field.
- The Header of all **Management messages** contains two fields: a Message Type and a Reserved field.
- The Tail of both the **Status** and **Management messages** contains a common Message Counter field.

Client Identifier (CLIENT_ID) field format

- The Client Identifier (CLIENT_ID) is a Secondary ECU identifier which is obtained from the Diagnostic Management module.

2. CALID-CVN-Toolchain and Workflow

2.1. CALID-CVN-Toolchain Overview



2.2. CALID-CVN-Workflow

Step	Task	Description	Role	Output
1	K-Matrix Analysis	During K-Matrix update, PDUs are checked for new CALID-CVN-PDUs (Naming)	Cupf	List new CALID-CVNs and their PDUs and signals

Step	Task	Description	Role	Output
2	Signal port creation	According to the Signals list, Signal ports are added in Signal-Database	Cupf	Signal ports for CALID-CVN in Signal-Database
3	Signal Mapping configuration	Signal mappings for the CALID-CVN-Signals are created in: *SignalMappings-Sheet* `comscl_netmtrx_rbands.xlsx`	Cupf	Signal-Mappings in `comscl_netmtrx_rbands.xlsx`
4	CALID-CVN-Configuration	CALID-CVN-Configuration is created/provided in: Tab *CalldCvnConfiguration* in `comscl_netmtrx_rbands.xlsx`	Cupf	CALID-CVN-Configuration in `comscl_netmtrx_rbands.xlsx`
5	ConfigurationValues generation	EcuC-Configuration for CALID-CVN is generated by: running `rba_nds_gen.pl`	FnD	`comscl_netmtrx_calidcvn_ecucvalues.arxml` `comscl_netmtrx_calidcvn_confdata.xml`
6	check-in	EcuC-Configuration is checked-in in: FC-ARB : `ComScl_NetMtrx`	FnD	FC-ARB : `ComScl_NetMtrx` with check-in: `comscl_netmtrx_calidcvn_ecucvalues.arxml` `comscl_netmtrx_calidcvn_confdata.xml`
7	SWB, Testing, ...	Further steps as per ProcLib	...	Released BC

3. CALID-CVN Configuration

3.1. CALID-CVN-Configuration in `comscl_netmtrx_rbands.xlsx`

- CALID-CVN-Configuration is done in tab "CalldCvnConfiguration" in `comscl_netmtrx_rbands.xlsx`
- Configuration Tags:

Tag	Description
`CalIdCvn`	Name of the CALID-CVN-ECU
`BusName`	Name of the bus where the CALID-CVN-ECU is located – shall equal tag `NetworkName` in tab *Configuration*
`CalId_Type`	Type of the CALID. **Valid types:** - `split`: CALID is sent via 16 8-bit signals, distributed over 1 or more PDUs. Signals are numbered in ascending order 1–16.
`CalId_PduCount`	Count of CALID-PDUs. Usual are 1 or 2.
`CalId_Pdus`	Name of the CALID-PDUs. **Valid syntax:** - **Single-PDU:** `<PduName>` - **Multiple-PDUs:** `<CommonName>_<X>` (... `<X>` placeholder for 1-digit running number) `<CommonName>_<XX>` (... `<XX>` placeholder for 2-digit running number)
`CalId_DataSignals`	Name of the CALID-Signals. **Valid syntax:** `<CommonName>_<XX>` (... `<XX>` placeholder for 2-digit running number)

Tag	Description
`Cvn_Type`	Type of the CVN. **Valid types:** - `split`: CVN is sent via 4 8-bit signals. Signals are numbered in ascending order 1–4. - `atomic`: CVN is sent via 1 32-bit Signal.
`Cvn_PduCount`	Count of CVN-PDUs. Usual 1.
`Cvn_Pdus`	Name of the CVN-PDU. **Valid syntax:** `<PduName>`
`Cvn_DataSignals`	Name of the CVN-Signals. **Valid syntax:** - **One Signal:** `<Signal_Name>` - **More Signals:** `<CommonName>_<X>` (... `<X>` placeholder for 1-digit running number) `<CommonName>_<XX>` (... `<XX>` placeholder for 2-digit running number)
`Cvn_VldSignal`	Name of the CVN-Valid (Vld)-Signal. If there is no CVN-Valid-Signal, value `none` must be entered.

- SignalmappingsforCalId/Cvn ports must be provided in Signal Mappings Sheet
- Please consider: Port for CvnVld Signal must not have name "`Com_flg<CalId>CvnVld`". An interface with the same name is expected by the DiaBas module. So the name of the port mapping of the CvnVld Signal must be changed slightly. E.g. In above example the signalport name for CvnVld Signal is "ComFlgEKATCvnVldPort". Ist recommended to use same or similar nomenclature.

3.2. CALID-CVN-Configuration-Example

- E.g. EKAT Calid on Motor_SUBCAN of E3P:
  - CalId PDUs: EKAT_CALID_01, EKAT_CALID_02
  - CalId Signals:
    - EKAT_CALID_01: EKAT_CALID_Index_01 — EKAT_CALID_Index_07
    - EKAT_CALID_02: EKAT_CALID_Index_08 — EKAT_CALID_Index_16
  - Cvn PDU: EKAT_CVN
  - Cvn Signals:EKAT_CVN_Byte_1 — EKAT_CVN_Byte_4, EKAT_CVN_VLD

CalIdCvn	BusName	CalId_Type	CalId_PduCount	CalId_Pdus	CalId_DataSignals	Cvn_Type	Cvn_PduCount	Cvn_Pdus	Cvn_DataSignals	Cvn_VldSignal
EKAT	Motor_SUBCAN	split	2	EKAT_CALID_<XX>	EKAT_CALID_Index_<XX>	split	1	EKAT_CVN	EKAT_CVN_Byte_<X>	EKAT_CVN_VLD

BusName	PduName	SignalName	SignalDir	SignalPortName	SignalPortSignalQuality	SignalPortSignalStatus	SignalPortVirtualDfc
Motor_SUBCAN	EKAT_CALID_01	EKAT_CALID_Index_01	receive	Com_dataEKATCalIdByt1	Value_Calculated	DSQ_ComDataEKATCalIdByt1	Com_stSigDataEKATCalIdByt1	DFC_ComDataEKATCalIdByt1Virt	63
Motor_SUBCAN	EKAT_CALID_01	EKAT_CALID_Index_02	receive	Com_dataEKATCalIdByt2	Value_Calculated	DSQ_ComDataEKATCalIdByt2	Com_stSigDataEKATCalIdByt2	DFC_ComDataEKATCalIdByt2Virt	63
Motor_SUBCAN	EKAT_CALID_01	EKAT_CALID_Index_03	receive	Com_dataEKATCalIdByt3	Value_Calculated	DSQ_ComDataEKATCalIdByt3	Com_stSigDataEKATCalIdByt3	DFC_ComDataEKATCalIdByt3Virt	63
Motor_SUBCAN	EKAT_CALID_01	EKAT_CALID_Index_04	receive	Com_dataEKATCalIdByt4	Value_Calculated	DSQ_ComDataEKATCalIdByt4	Com_stSigDataEKATCalIdByt4	DFC_ComDataEKATCalIdByt4Virt	63
Motor_SUBCAN	EKAT_CALID_01	EKAT_CALID_Index_05	receive	Com_dataEKATCalIdByt5	Value_Calculated	DSQ_ComDataEKATCalIdByt5	Com_stSigDataEKATCalIdByt5	DFC_ComDataEKATCalIdByt5Virt	63
Motor_SUBCAN	EKAT_CALID_01	EKAT_CALID_Index_06	receive	Com_dataEKATCalIdByt6	Value_Calculated	DSQ_ComDataEKATCalIdByt6	Com_stSigDataEKATCalIdByt6	DFC_ComDataEKATCalIdByt6Virt	63
Motor_SUBCAN	EKAT_CALID_01	EKAT_CALID_Index_07	receive	Com_dataEKATCalIdByt7	Value_Calculated	DSQ_ComDataEKATCalIdByt7	Com_stSigDataEKATCalIdByt7	DFC_ComDataEKATCalIdByt7Virt	63
Motor_SUBCAN	EKAT_CALID_01	EKAT_CALID_Index_08	receive	Com_dataEKATCalIdByt8	Value_Calculated	DSQ_ComDataEKATCalIdByt8	Com_stSigDataEKATCalIdByt8	DFC_ComDataEKATCalIdByt8Virt	63
Motor_SUBCAN	EKAT_CALID_02	EKAT_CALID_Index_09	receive	Com_dataEKATCalIdByt9	Value_Calculated	DSQ_ComDataEKATCalIdByt9	Com_stSigDataEKATCalIdByt9	DFC_ComDataEKATCalIdByt9Virt	63
Motor_SUBCAN	EKAT_CALID_02	EKAT_CALID_Index_10	receive	Com_dataEKATCalIdByt10	Value_Calculated	DSQ_ComDataEKATCalIdByt10	Com_stSigDataEKATCalIdByt10	DFC_ComDataEKATCalIdByt10Virt	63
Motor_SUBCAN	EKAT_CALID_02	EKAT_CALID_Index_11	receive	Com_dataEKATCalIdByt11	Value_Calculated	DSQ_ComDataEKATCalIdByt11	Com_stSigDataEKATCalIdByt11	DFC_ComDataEKATCalIdByt11Virt	63
Motor_SUBCAN	EKAT_CALID_02	EKAT_CALID_Index_12	receive	Com_dataEKATCalIdByt12	Value_Calculated	DSQ_ComDataEKATCalIdByt12	Com_stSigDataEKATCalIdByt12	DFC_ComDataEKATCalIdByt12Virt	63
Motor_SUBCAN	EKAT_CALID_02	EKAT_CALID_Index_13	receive	Com_dataEKATCalIdByt13	Value_Calculated	DSQ_ComDataEKATCalIdByt13	Com_stSigDataEKATCalIdByt13	DFC_ComDataEKATCalIdByt13Virt	63
Motor_SUBCAN	EKAT_CALID_02	EKAT_CALID_Index_14	receive	Com_dataEKATCalIdByt14	Value_Calculated	DSQ_ComDataEKATCalIdByt14	Com_stSigDataEKATCalIdByt14	DFC_ComDataEKATCalIdByt14Virt	63
Motor_SUBCAN	EKAT_CALID_02	EKAT_CALID_Index_15	receive	Com_dataEKATCalIdByt15	Value_Calculated	DSQ_ComDataEKATCalIdByt15	Com_stSigDataEKATCalIdByt15	DFC_ComDataEKATCalIdByt15Virt	63
Motor_SUBCAN	EKAT_CALID_02	EKAT_CALID_Index_16	receive	Com_dataEKATCalIdByt16	Value_Calculated	DSQ_ComDataEKATCalIdByt16	Com_stSigDataEKATCalIdByt16	DFC_ComDataEKATCalIdByt16Virt	63
Motor_SUBCAN	EKAT_CVN	EKAT_CVN_Byte_1	receive	Com_dataEKATCvnByt1	Value_Calculated	DSQ_ComDataEKATCvnByt1	Com_stSigDataEKATCvnByt1	DFC_ComDataEKATCvnByt1Virt	0
Motor_SUBCAN	EKAT_CVN	EKAT_CVN_Byte_2	receive	Com_dataEKATCvnByt2	Value_Calculated	DSQ_ComDataEKATCvnByt2	Com_stSigDataEKATCvnByt2	DFC_ComDataEKATCvnByt2Virt	0
Motor_SUBCAN	EKAT_CVN	EKAT_CVN_Byte_3	receive	Com_dataEKATCvnByt3	Value_Calculated	DSQ_ComDataEKATCvnByt3	Com_stSigDataEKATCvnByt3	DFC_ComDataEKATCvnByt3Virt	0
Motor_SUBCAN	EKAT_CVN	EKAT_CVN_Byte_4	receive	Com_dataEKATCvnByt4	Value_Calculated	DSQ_ComDataEKATCvnByt4	Com_stSigDataEKATCvnByt4	DFC_ComDataEKATCvnByt4Virt	0
Motor_SUBCAN	EKAT_CVN	EKAT_CVN_VLD	receive	Com_flgEKATCvnVldPort	Value_Calculated	DSQ_ComFlgEKATCvnVldPort	Com_stSigFlgEKATCvnVldPort	DFC_ComFlgEKATCvnVldPortVirt	0

4. CALID-CVN-Configuration for DiaBas

Implementation of CVN / CALID

- If a CALID and/or CVN is provided by a sensor within one or more PDUs then:
  - For each PDU only one DSQ shall be configured in PL / FRM --> DSQ_ComdataXXX (XXX = PDU name without "_"; e.g for SCR_DEF2_CAL_ID2 = DSQ_ComdataSCRDEF2CALID2)

    - Only for FR: for each CALID and / or CVN NO signal signal status is needed, because it will not be used!

- The following configuration parameters need to be provided to the ASW as per the DiaBas programmer's guide:

Com-Interface Name	Com-Interface Meaning	ASW Configuration Tag	ASW Configuration Parameter Explanation
`Com_stYYYCalid[X]`	**CALID array** *The ASW expects the complete CALID to be provided within one array (even if more than one PDU is used for receiving or multiplexed within one PDU).*	`<CALID_REF_VALUE>`	16 byte array message containing the Cal ID from external ECU / module. *Hint:* The message array has to be provided in the external tester format. E.g. `Message_array[0] = DATA A of Cal ID to tester`, `Message_array[1] = DATA B …` `Message_array[15] = DATA P of Cal ID`.
`Com_flgYYYCalidVld`	**CALID valid bit** *Provides information on the validity of the CALID, i.e. whether the complete CALID was received on the bus.*	`<CALID_REF_STATUS_VALUE>`	Message containing the validity of Cal ID from external ECU / module.
`Com_flgYYYCalidErr`	**CALID error bit** *Provides information on the error status of the CALID, i.e. whether there has been a bus transmission failure.*	`<CALID_REF_ERROR_VALUE>`	Message containing the error status of the Cal ID from external ECU / module.
`Com_nrCvnYYY[X]`	**CVN array** *The ASW expects the complete CVN to be provided within one array* (Currently all implemented CVNs have 4 byte –> programmers guide from DiaBas).	`<CVN_REF_VALUE>`	4 byte array message containing the CVN from external ECU / module. *Hint:* The message array has to be provided in the external tester format. E.g. `Message_array[0] = DATA A of CVN …` `Message_array[3] = DATA D of CVN`.

Com-Interface Name	Com-Interface Meaning	ASW Configuration Tag	ASW Configuration Parameter Explanation
Com_flgYYYCvnVld	**CVN valid bit** *Provides information on the validity of the CVN, i.e. whether the complete CVN was received on the bus (for some CVN, a separate valid bus signal is available e.g. BOOST_CVN_VLD).*	<CVN_REF_STATUS_VALUE>	Message containing the validity of CVN from external ECU / module.
Com_flgYYYCvnQly	**CVN quality bit** *Provides information on the quality of the received CVN, i.e. whether the content of the received CVN is proper.*	<CVN_REF_STATUS2_VALUE>	Message containing the quality of CVN from external ECU / module.
Com_flgYYYCvnErr	**CVN error bit** *Provides information on the error status of the CVN, i.e. whether there has been a bus transmission failure.*	<CVN_REF_ERROR_VALUE>	Message containing the error status of the CVN from external ECU / module.

- **YYY** = PDU name without "_" and without the corresponding PDU number (e.g. for SCR DEF2 two PDUs are used SCR_DEF2_CAL_ID1 and SCR_DEF2_CAL_ID2 --> Com_stSCRDEF2CALIDCalid[x])
- A reference implementation can be seen in SnsrECU_Boost 1.2.0;0
- For reference see: DOCMISC : diabas_programmersguide_pdf / 30000.9.0; 0

5. CALID-CVN-Testing

5.1. Definition of Term

CALID:

- The CALID consists of 16 bytes, for easier handling they are called DATA A — P.
- For correct display of the CALID on the tester, the tester expects the CALID as an uint8 array: Com_st<ecu-name>Calid[].
- The CALID needs to be prepared in the array in that format:

DATA A	Com_st<ecu-name>Calid[0]
DATA B	Com_st<ecu-name>Calid[1]
DATA C	Com_st<ecu-name>Calid[2]
DATA D	Com_st<ecu-name>Calid[3]
DATA E	Com_st<ecu-name>Calid[4]
DATA F	Com_st<ecu-name>Calid[5]
DATA G	Com_st<ecu-name>Calid[6]
DATA H	Com_st<ecu-name>Calid[7]
DATA I	Com_st<ecu-name>Calid[8]
DATA J	Com_st<ecu-name>Calid[9]

DATA K	Com_st<ecu-name>Calid[10]
DATA L	Com_st<ecu-name>Calid[11]
DATA M	Com_st<ecu-name>Calid[12]
DATA N	Com_st<ecu-name>Calid[13]
DATA O	Com_st<ecu-name>Calid[14]
DATA P	Com_st<ecu-name>Calid[15]

CVN:

- The CVN consists of 4 bytes, for easier handling the are called: DATA A – D.
- For correct display of the CVN on the tester, the tester expects the CAN provided as uint8 array: Com_nrCvn<ecu-name>[].
- The CVN needs to be prepared in the array in that format:

DATA A	Com_nrCvn<ecu-name>[0]
DATA B	Com_nrCvn<ecu-name>[1]
DATA C	Com_nrCvn<ecu-name>[2]
DATA D	Com_nrCvn<ecu-name>[3]

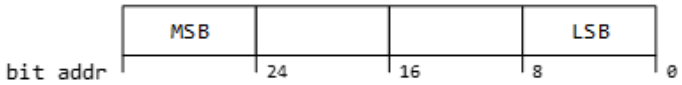
Preconditions:

- The CALID- and CVN-PDUs need to be enabled: Bit 0
- The CALID and CVN to be displayed on the tester needs to be calibrated in I15031_srv9_CALIDCVN_Seq_CA and I15031_CalidCvn_SrvTstr_Seq_CA
- The CVN in the tester output has to be read from left to right, beginning with DATA A - B - C - D (e.g. 0A 0B 0C 0D in hex)
- The CALID has to be read equal in the tester, to the CVN, starting with DATA A --> P
- To provide the tester the CVN in a proper format we also have to know how DATA A-D is provided on the bus. According to our understanding the CVN is written on the bus signals:
  - CVN provided in one PDU with 4x 1byte bus signals (e.g. CCU- and Boost-CVN)
    - CCU_CVN_Byte_1 [Byte 5 Bit [8 <— 0]] --> DATA A
    - CCU_CVN_Byte_2 [Byte 6 Bit [8 <— 0]] --> DATA B
    - CCU_CVN_Byte_3 [Byte 7 Bit [8 <— 0]] --> DATA C
    - CCU_CVN_Byte_4 [Byte 8 Bit [8 <— 0]] --> DATA D
  - CVN provided in one PDU with 1x 32bit (4Byte) bus signal (e.g. GW-CVN)
    - GW_CVN [Byte 5 Bit [8 <— 0]] --> DATA D
    - GW_CVN [Byte 6 Bit [8 <— 0]] --> DATA C
    - GW_CVN [Byte 7 Bit [8 <— 0]] --> DATA B
    - GW_CVN [Byte 8 Bit [8 <— 0]] --> DATA A
- CVN / CALID have always to be tested with Diagra / Tester!! Only with INCA, the testing is not enough
- CVN / CALID have always to be tested for IFX and JDP to verify the proper output and endianness
- Before testing take care that the CVN / CALID is proper configured in your test PVER
  - check CVN / CALID config in I15031_srv9_confdata.xml
  - proper application of I15031_srv9_CALIDCVN_Seq_CA and I15031_CalidCvn_SrvTstr_Seq_CA
  - take care that necessary PDUs are activated / available in ComVeh

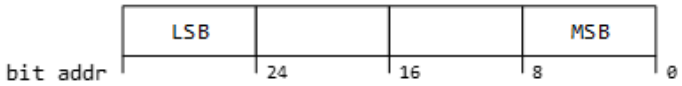
6. Little Endian - Big Endian

- **Little Endian (LE) / Big Endian (BE) explanation. (examples given for a 32 bit system).**

- Endianness describes in which Byte order Words are stored in the memory.
- In a 32 bit system, a Word is 32 bits long and consists of 4 Bytes.
- Little Endian (LE) means, the Least Significant Byte (LSB) of a Word is stored at the lowest memory address of that Word.

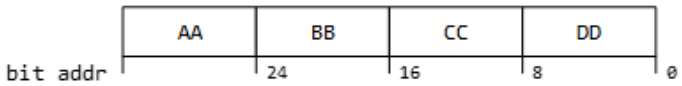


- Big Endian (BE) means, the Most Significant Byte (MSB) of a Word is stored at the lowest memory address of that Word.

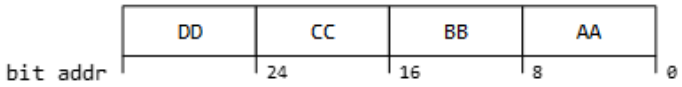


- The bit order inside a Byte, is not effected by endianness and stays the same.
- E.g. 32 bit Word AA BB CC DDh

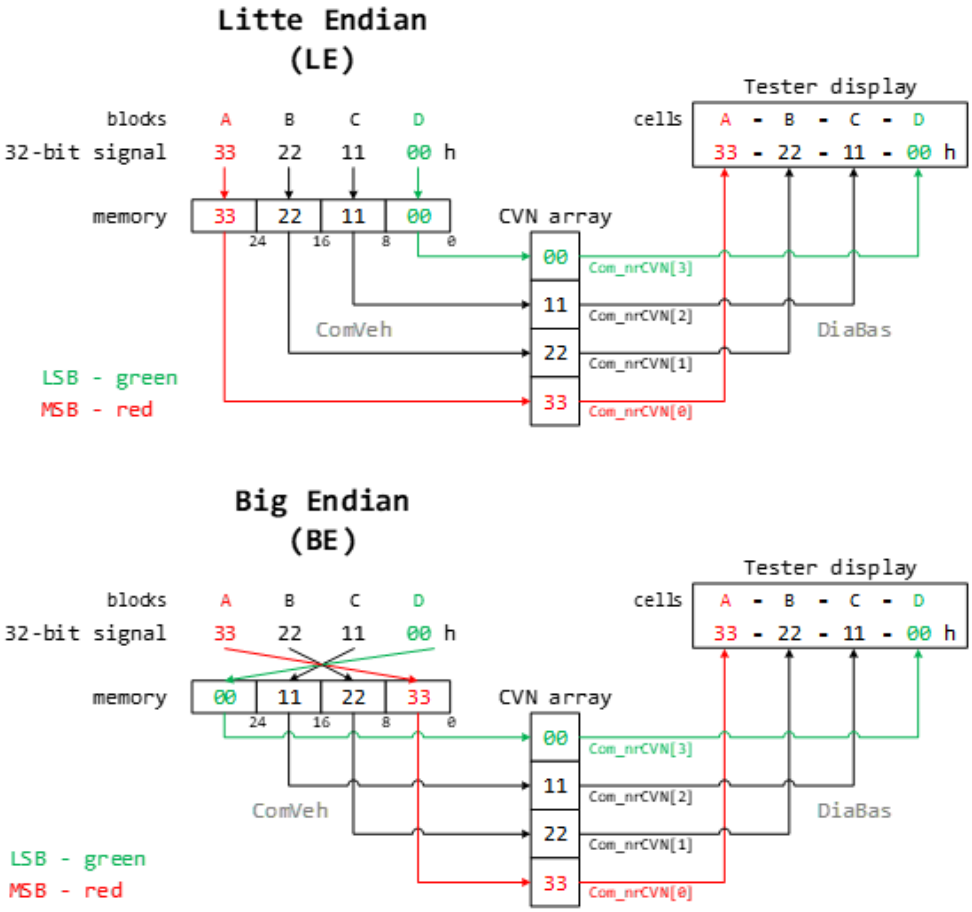
- When red in that representation, the leftmost number is the most significant --> MSB = AAh
- The rightmost number is the lest significant --> LSB = DDh
  - Mem storage for LE:



  - Mem storage for BE:



- A CVN number is a 32 bit number divided in the 4 8-bit blocks A,B,C,D.
- Those blocks are displayed in the Tester Software in the format A - B - C - D.
- In that nomenclature, Block A is the MSB of the CVN and Block D is the LSB.
- The CVN is provided to the DiaBas service via a Byte array with 4 Element: Com_nrCVN[0] - Com_nrCVN[3]
- Array element 0 gest mapped to the display cell A and element 3 gets mapped to the display cell D.
- When the CVN is sent via 4 separate 8-bit signals on the bus, endianness in the ECU is irrelevant and each byte can be mapped separately to the array elements according to their naming.
- When the CVN is sent via 1 32-bit signal, the 32-bit memory representation of the signal needs to be divided into 4 8-bit blocks and mapped to the array elements according to the endianness of the system.
- Based on the Tester Display in the format A - B - C - D, Com_nrCVN[0] must hold the MSB of the 32-bit bus signal and Com_nrCVN[3] must hold the LSB of the 32.bit bus signal.
- E.g. CVN = 33 22 11 00h and is transmitted via a 32-bit bus signal holding value 33 22 11 00h. CVN needs to be displayed in the Tester in the Form 33 -22 - 11 - 00. The mapping can be shown easily in a diagramm:



- MSB path is marked red, LSB path is marked green.
    - IFX CPUs are LE.
    - JDP CPUs are BE.

Summary Section (Summary of Notes)

CALIDCVN CALIDCVN_Autosar