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# Object dictionary (OD)

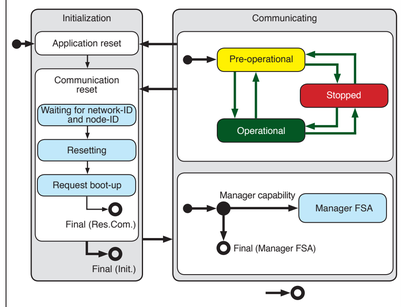
Overview

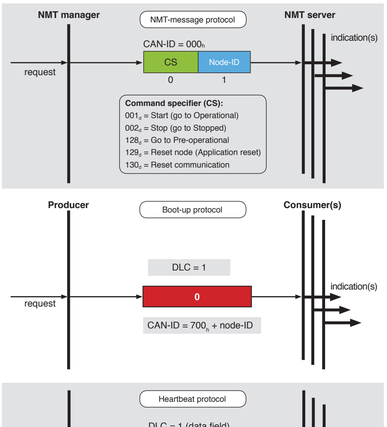
| Index range | Description |
|---|---|
| $0000_h$ | Reserved |
| $0001_h$ to $025F_h$ | Data types |
| $0260_h$ to $0FFF_h$ | Reserved |
| $1000_h$ to $1FFF_h$ | Communication profile area |
| $2000_h$ to $5FFF_h$ | Manufacturer-specific profile area |
| $6000_h$ to $9FFF_h$ | Standardized profile area |
| $A000_h$ to $AFFF_h$ | Network variables |
| $B000_h$ to $BFFF_h$ | System variables |
| $C000_h$ to $FFFF_h$ | Reserved |

General communication objects

| Index | Name |
|---|---|
| $1000_h$ | Device type |
| $1001_h$ | Error register |
| $1002_h$ | Manufacturer status register |
| $1003_h$ to $1004_h$ | Reserved |
| $1005_h$ | COB-ID SYNC |
| $1006_h$ | Communication cycle period |
| $1007_h$ | Synchronous window length |
| $1008_h$ | Manufacturer device name |
| $1009_h$ | Manufacturer hardware version |
| $100A_h$ | Manufacturer software version |
| $100B_h$ to $100F_h$ | Reserved |
| $1010_h$ | Store parameters |
| $1011_h$ | Restore default parameters |
| $1012_h$ | COB-ID TIME |
| $1013_h$ | High resolution time stamp |
| $1014_h$ | COB-ID EMCY |
| $1015_h$ | Inhibit time EMCY |
| $1016_h$ | Consumer heartbeat time |
| $1017_h$ | Producer heartbeat time |
| $1018_h$ | Identity object |
| $1019_h$ | Synchronous counter overflow value |
| $101A_h$ to $101F_h$ | Reserved |
| $1020_h$ | Verify configuration |
| $1021_h$ | Reserved |
| $1022_h$ | Reserved |
| $1023_h$ | OS command |
| $1024_h$ | OS command mode |
| $1025_h$ | OS debugger interface |
| $1026_h$ | OS prompt |
| $1027_h$ | Module list |
| $1028_h$ | Emergency consumer |
| $1029_h$ | Error behavior |
| $102A_h$ to $102F_h$ | Reserved |
| $1030_h$ | Version information |
| $1031_h$ | Active error history |
| $1032_h$ | Active error list |
| $1033_h$ to $103F_h$ | Reserved |
| $1040_h$ | Port network-ID allocation |
| $1041_h$ | Routing table |
| $1042_h$ | Max. available payload size |
| $1043_h$ to $13FF_h$ | Reserved |
| $1400_h$ to $15FF_h$ | RPDO communication parameter |
| $1600_h$ to $17FF_h$ | RPDO mapping parameter |
| $1800_h$ to $19FF_h$ | TPDO communication parameter |
| $1A00_h$ to $1BFF_h$ | TPDO mapping parameter |
| $1C00_h$ to $1F7F_h$ | Reserved |
| $1F80_h$ | NMT startup |
| $1F81_h$ to $1FFF_h$ | Reserved |

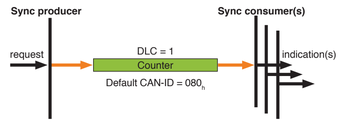
# Network management (NMT)

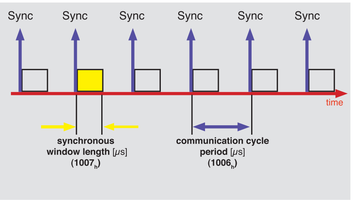


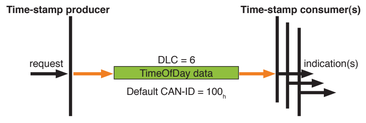

# Special protocols

Sync protocol



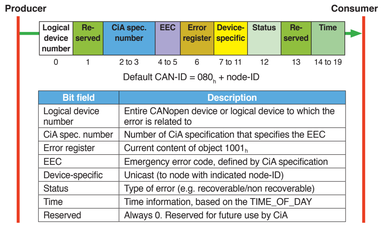

Time-stamp protocol




```
STRUCT OF
    UNSIGNED28    ms,          (after midnight)
    VOID4         reserved_1,
    UNSIGNED16    days,        (since January 1, 1984)
```

TIME COB-ID ($1012_h$)

EMCY write protocol



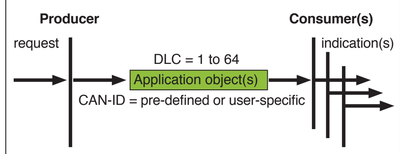

| Bit field | Description |
|---|---|
| Logical device number | Entire CANopen device or logical device to which the error is related to |
| CiA spec. number | Number of CiA specification that specifies the EEC |
| Error register | Current content of object $1001_h$ |
| EEC | Emergency error code, defined by CiA specification |
| Device-specific | Unicast (to node with indicated node-ID) |
| Status | Type of error (e.g. recoverable/non recoverable) |
| Time | Time information, based on the TIME_OF_DAY |
| Reserved | Always 0. Reserved for future use by CiA |

# Pre-defined CAN-IDs

| Object | Specification | CAN-ID |
|---|---|---|
| NMT | CiA 1301 | $000_h$ |
| Sync | CiA 1301 | $080_h$ |
| Emergency | CiA 1301 | $081_h$ to $0FF_h$ ($080_h$ + node-ID) |
| Time stamp | CiA 1301 | $100_h$ |
| TPDO 1 | CiA 1301 | $181_h$ to $1FF_h$ ($180_h$ + node-ID) |
| RPDO 1 | CiA 1301 | $201_h$ to $27F_h$ ($200_h$ + node-ID) |
| TPDO 2 | CiA 1301 | $281_h$ to $2FF_h$($280_h$ + node-ID) |
| RPDO 2 | CiA 1301 | $301_h$ to $37F_h$ ($300_h$ + node-ID) |

| Object | Specification | CAN-ID |
|---|---|---|
| TPDO 3 | CiA 1301 | $381_h$ to $3FF_h$($380_h$ + node-ID) |
| RPDO 3 | CiA 1301 | $401_h$ to $47F_h$ ($400_h$ + node-ID) |
| TPDO 4 | CiA 1301 | $481_h$ to $4FF_h$ ($480_h$ + node-ID) |
| RPDO 4 | CiA 1301 | $501_h$ to $57F_h$ ($500_h$ + node-ID) |
| USDO server-to-client | CiA 1301 | $581_h$ to $5FF_h$ ($580_h$ + node-ID) |
| USDO client-to-server | CiA 1301 | $601_h$ to $67F_h$ ($600_h$ + node-ID) |
| NMT error control | CiA 1301 | $701_h$ to $77F_h$ ($700_h$ + node-ID) |

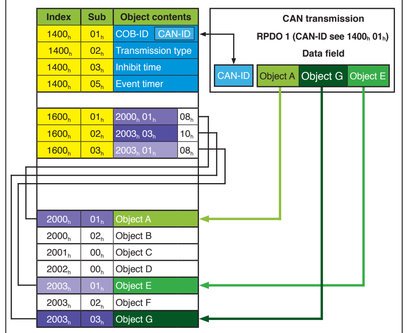
# Process data object (PDO)



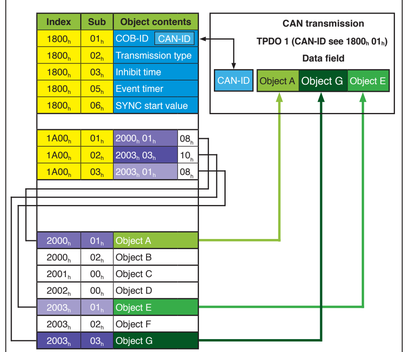

PDO communication parameter

| Index | Sub-index | Description | Data type |
|---|---|---|---|
| **RPDO:** $1400_h$ to $15FF_h$ | $00_h$ | Number of entries | Unsigned8 |
| | $01_h$ | COB-ID | Unsigned32 |
| | $02_h$ | Transmission type | Unsigned8 |
| | $03_h$ | Inhibit time | Unsigned16 |
| **TPDO:** $1800_h$ to $19FF_h$ | $04_h$ | Reserved | Unsigned8 |
| | $05_h$ | Event timer | Unsigned16 |
| | $06_h$ | SYNC start value | Unsigned8 |

RPDO parameter

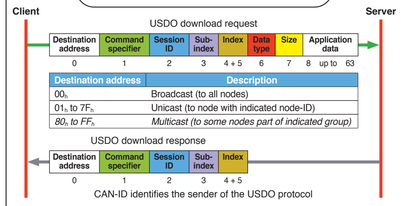



TPDO parameter

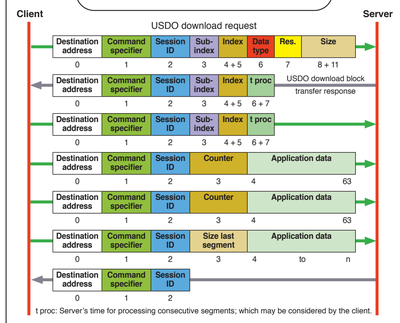



# Universal service data object (USDO)

Expedited USDO protocol




USDO bulk transfer




USDO abort codes

| Error class | Abort code | Description |
|---|---|---|
| Universal errors | 10h | Unknown error |
| | 11h | USDO protocol error detected |
| | 12h | USDO time out error |
| | 13h | Unknown command specifier |
| | 14h | Invalid value in counter byte (segmented protocol) |
| | 15h | Incorrect data size |
| | 16h | Out of memory |
| | 17h | Reserved for future use by CiA |
| | 18h | Reserved for future use by CiA |
| | 19h | USDO general routing error |
| | 1Ah | USDO destination network unknown |
| | 1Bh | USDO destination node unknown |
| | 1Ch | USDO source network unknown |
| | 1Dh | USDO source node unknown |
| | 1Eh | Unexpected CAN DLC |
| | 1Fh | Unexpected multiplexer |
| | 20h | Data transfer not possible; parallel USDO access to the very same sub-index |
| | 21h | Session-ID wrong or unknown |
| | 22h to 2Fh | Reserved for future use by CiA |
| Errors with regard to attributes of accessed parameter | 30h | Reserved for future use by CiA |
| | 31h | Attempt to read a write only data element |
| | 32h | Attempt to write a read only data element |
| | 33h | Data object does not exist in the object dictionary |
| | 34h | Sub-index does not exist |
| | 35h | Access failed due to a hardware error |
| | 36h | Data type does not match, length of service parameter does not match |
| | 37h | Data type does not match, length of service parameter too high |
| | 38h | Data type does not match, length of service parameter too low |
| | 39h to 3Fh | Reserved for future use by CiA |
| Parameterrelated errors | 40h | Invalid value for parameter (download only) |
| | 41h | Value of parameter written too high (download only) |
| | 42h | Value of parameter written too low (download only) |
| | 43h | Maximum value is less than minimum value |
| | 44h | Minimum value is higher than maximum value |
| | 45h | CAN-ID and CAN frame format are of access type read-only |
| | 46h to 4Fh | Reserved for future use by CiA |
| PDO-related errors | 50h | Data element cannot be mapped to the PDO |
| | 51h | The number and length of the data elements to be mapped would exceed PDO length |
| | 52h | Attempt to map a nonmappable data element to a PDO |
| | 53h | Attempt to map a data element of PDO access type RPDO to a TPDO |
| | 54h | Attempt to map a data element of PDO access type TPDO to a RPDO |
| | 55h | Attempt to write to PDO parameters, while PDO is valid |
| | 56h | Attempt to write to PDO mapping parameters, while PDO mapping is valid |
| | 57h to 5Fh | Reserved for future use |
| Data storagerelated errors | 60h | Data cannot be transferred or stored to the application |
| | 61h | Data cannot be transferred or stored to the application because of local control |
| | 62h | Data cannot be transferred or stored to the application because of the present device state |
| | 63h | Object dictionary dynamic generation fails or no object dictionary is present |
| | 64h | No data available |
| | 65h to 6Fh | Reserved for future use by CiA |
| USDO server resources-related error | 70h | USDO server busy |
| The remaining value range $71_h$ to $FF_h$ shall be reserved for future use by CiA. | | |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