Migrating from Anybus® CompactCom™ 30 to Anybus® CompactCom™ 40

DESIGN GUIDE

SCM-1202-043 1.1 ENGLISH

HMS Connecting Devices™

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1 Preface

1.1 About this Document

This document is intended to provide a good understanding of differences between the Anybus CompactCom 30-series and the Anybus CompactCom 40-series to be able to migrate a host application, i.e. a product, as smooth as possible

For additional related documentation and file downloads, please visit the support website at www.anybus.com/support.

1.2 Related Documents

Document	Author	Document ID
Anybus CompactCom 40 Software Design Guide	HMS	HMSI-216-125
Anybus CompactCom M40 Hardware Design Guide	HMS	HMSI-216-126
Anybus CompactCom Host Application Implementation Guide	HMS	HMSI-27-334
Anybus CompactCom 40 Network Guides	HMS	
Anybus CompactCom 30 Network Guides	HMS	
PROFINET Installation Guideline for Cabling and Assembly	PI	

The network guides for the industrial networks mentioned in this document, as well as the design guides, are available at www.anybus.com/support.

1.3 Document History

Version	Date	Description
1.0	2017-04-28	First version
1.1	2017-06-27	BACnet updates

1.4 Document Conventions

Ordered lists are used for instructions that must be carried out in sequence:

1. First do this
2. Then do this

Unordered (bulleted) lists are used for:

- Itemized information
- Instructions that can be carried out in any order

...and for action-result type instructions:

► This action...

➡ leads to this result

Bold typeface indicates interactive parts such as connectors and switches on the hardware, or menus and buttons in a graphical user interface.

```
Monospaced text is used to indicate program code and other
kinds of data input/output such as configuration scripts.
```

This is a cross-reference within this document: *Document Conventions, p. 6*

This is an external link (URL): www.hms-networks.com

This is additional information which may facilitate installation and/or operation.

This instruction must be followed to avoid a risk of reduced functionality and/or damage to the equipment, or to avoid a network security risk.

Caution
This instruction must be followed to avoid a risk of personal injury.

WARNING
This instruction must be followed to avoid a risk of death or serious injury.

1.5 Terminology

- The terms “Anybus” or “module” refers to the Anybus CompactCom module.
- The terms “host” or “host application” refer to the device that hosts the Anybus.
- Hexadecimal values are written in the format NNNNh or 0xNNNN, where NNNN is the hexadecimal value.
- A byte always consists of 8 bits.
- The terms “basic” and “extended” are used to classify objects, instances and attributes.

1.6 Trademark Information

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EtherCAT® is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

EtherNet/IP™ is a trademark of ODVA, Inc.

DeviceNet™ is a trademark of ODVA, Inc.

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2 Background

2.1 Anybus CompactCom 30-Series

The Anybus CompactCom 30-series concept was introduced in 2005 and is based on the NP30 processor from HMS Industrial Networks AB. The concept supports various fieldbuses and industrial Ethernet networks. The Anybus CompactCom 30-series fieldbus and industrial Ethernet solutions today offer a good level of performance and is used by many customers.

2.2 Upgrade to the 40-Series

During 2013, HMS Industrial Networks AB introduced the new Anybus CompactCom 40-series which presented a high performance solution with very low latency, extended APIs, and the ability to meet the future demands of industrial networking. In addition to the new APIs, the Anybus CompactCom 40-series supports the same APIs as the 30series, offering a possibility to enable present Anybus CompactCom 30 applications an easy upgrade to the latest technology.

2.3 Access to Real-time Ethernet, IIoT and Advanced Security Features

The Anybus CompactCom 40-series is based on the NP40 processor which is the foundation for the high performance and extended functions offered by the 40-series. Future technologies and demands of advanced network functions, IIoT solutions, and advanced security features will be incorporated in the Anybus CompactCom 40-series.

2.4 Recommendations from HMS Industrial Networks AB

For new designs the Anybus CompactCom 40-series is the recommended platform for communication, but the compatibility between the two series enables usage of both series in one product. This document describes the differences between the CompactCom 30-series and the CompactCom 40-series in order to add guidance on how to modify an existing product to support the latest 40-series modules in addition to existing 30-series support.

3 Initial Considerations

There are two options to consider when starting the work to modify a host application developed for Anybus CompactCom 30-series modules to also be compatible with the 40-series modules:

- Add support with as little work as possible i.e. reuse as much as possible of the current design.
  - This is the fastest and easiest solution but with the drawback that many of the new features available in the 40-series will not be enabled (e.g. enhanced and faster communication interfaces, larger memory areas, and faster communication protocols).
  - You have to check the hardware and software differences below to make sure the host application is compatible with the 40-series modules. Small modifications to your current design may be needed.
- Make a redesign and take advantage of all new features presented in the 40-series.
  - A new driver and host application example code are available at www.anybus.com/starterkit40 to support the new communication protocol.This driver supports both 30-series and 40-series modules.
  - You have to check the hardware differences below and make sure the host application is compatible with the 40-series modules.

This documentation only deals with differences between the 30-series and the 40-series. For a description of new and enhanced functionality in the Anybus CompactCom 40-series, please consult our support pages, where you can find all documentation.

Link to support page: www.anybus.com/support.

4 Hardware Compatibility

Anybus CompactCom is available in three hardware formats; Module, Chip, and Brick.

4.1 Module

The modules in the 30-series and the 40-series share physical characteristics, like dimensions, outline, connectors, LED indicators, mounting parts etc. They are also available as modules without housing.

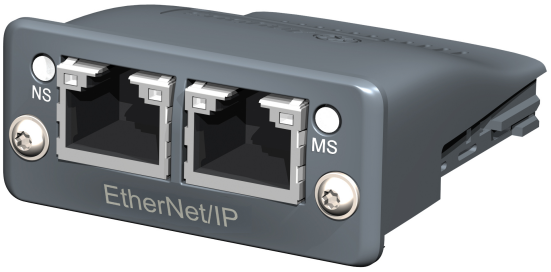

Fig. 1 Anybus CompactCom M30/M40

4.2 Chip

The chip (C30/C40) versions of the Anybus CompactCom differ completely when it comes to physical dimensions.

> **!** There is no way to migrate a chip solution from the 30-series to the 40-series without a major hardware update.

4.3 Brick

The Anybus CompactCom B40-1 does not share dimensions with the Anybus CompactCom B30. The B40-1 is thus not suitable for migration. However HMS Industrial Networks AB has developed a separate brick version in the 40-series, that can be used for migration. This product, B40-2, shares dimensions etc. with the B30. Please contact HMS Industrial Networks AB for more information on the Anybus CompactCom B40-2.

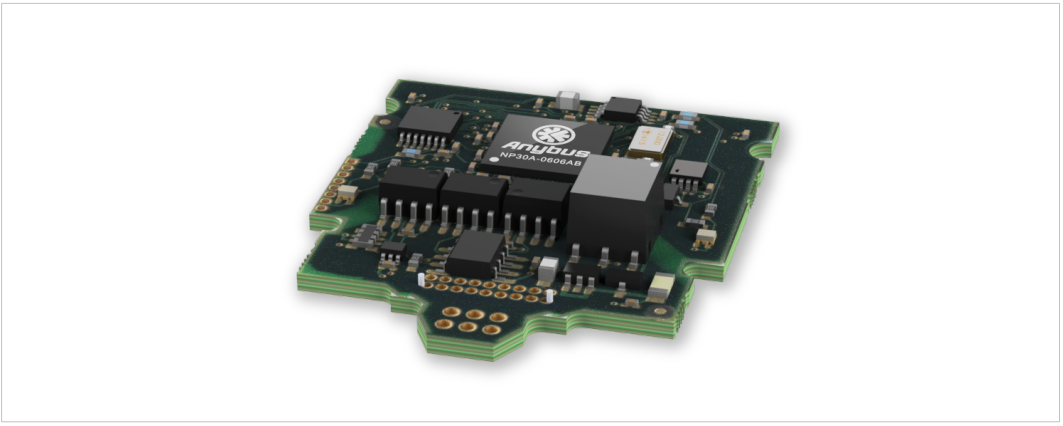

Fig. 2 Anybus CompactCom B30

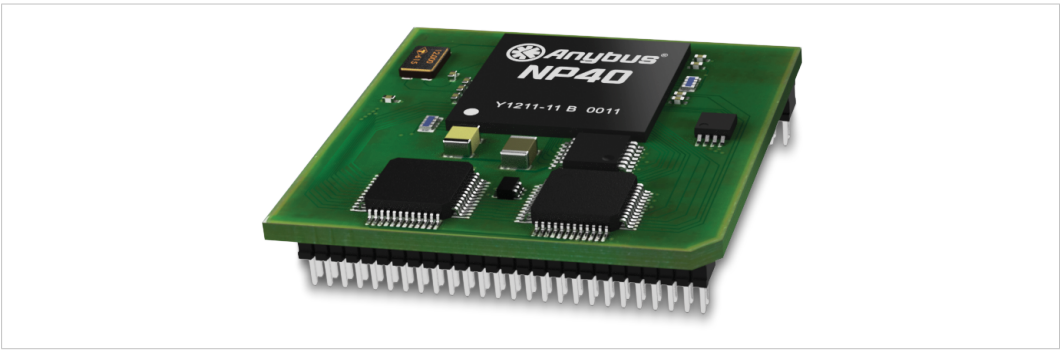

Fig. 3 Anybus CompactCom B40–1 (not for migration)

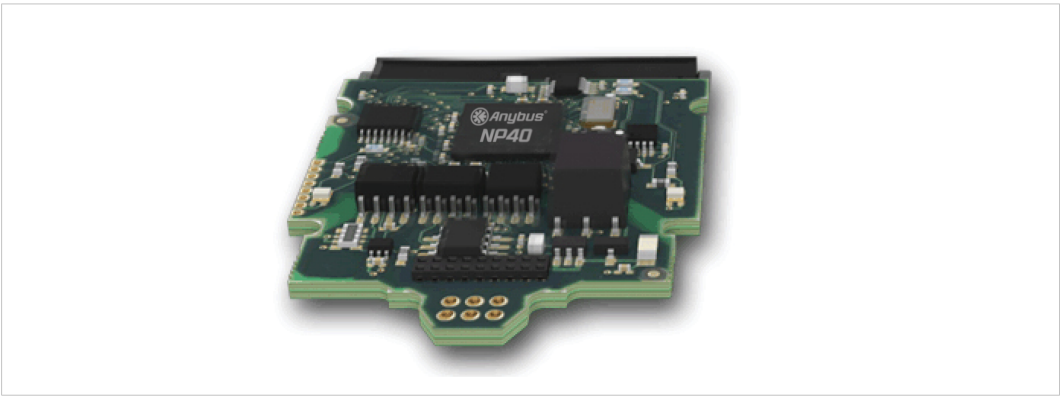

Fig. 4 Anybus CompactCom B40–2

4.4 Host Application Interface

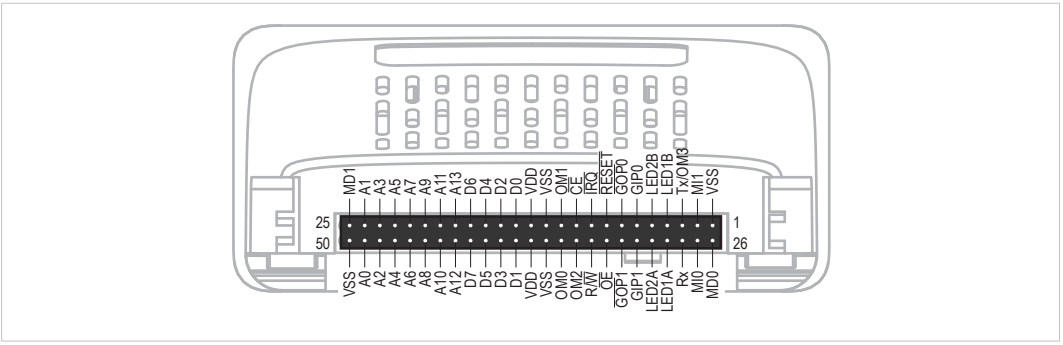

Fig. 5

Some signals in the host application interface have modified functionality and/or functions which must be checked for compatibility. See the following sections.

4.4.1 Tx/OM3

This pin is Tx only in the 30-series. It is tri-stated during power up, and driven by the Anybus CompactCom UART after initialization. In the 40-series this pin is used as a fourth operating mode setting pin (OM3). During startup after releasing the reset, this pin is read to determine the operating mode to use. The pin is then changed to a Tx output.

In the 40-series, this pin has a built-in weak pull-up. If this pin, on a 30-series module or brick is unconnected, pulled high, or connected to a high-Z digital input on the host processor, it will be compatible with the 40-series. An external pull-up is recommended, but not required.

> **!** If this pin is pulled low by the host during startup, the 40-series module or brick will not enter the expected operating mode.

Related Information: Anybus CompactCom M40 Hardware Design Guide (HMSI-216-126), Section “Application Connector Pin Overview”

4.4.2 Module Identification (MI[0..1])

These pins are used by the host application (i.e your product) to identify what type of Anybus CompactCom that is mounted. The identification differs between the 30-series and the 40-series.

> *If your software use this identification you need to handle the new identification value.*

MI1	MI0	Module Type
LOW	LOW	Active Anybus CompactCom 30
HIGH	LOW	Active Anybus CompactCom 40

MI[0..1] shall only be sampled by the application during the time period from power up to the end of SETUP state. The pins are low at power up and before reset release.

Related Information: Anybus CompactCom M40 Hardware Design Guide (HMSI-216-126), Section “Settings/Sync”.

4.4.3 GIP[0..1]/LED3[A..B]

These pins are tri-stated inputs by default in the 30-series. In the 40-series, these pins are tri-stated until the state NW_INIT. After that they become open-drain, active low LED outputs (LED3A/LED3B).

No modification of the hardware is needed, if your current design has

- tied these pins to GND
- pulled up the pins
- pulled down the pins
- left the pins unconnected

However, if the application drive the pins high, a short circuit will occur.

If you connect the pins to LEDs, a pull-up is required.

In the 40-series, there is a possibility to set the GIP[0..1] and GOP[0..1] in high impedance state (tri-state) by using attribute #16 (GPIO configuration) in the Anybus object (01h). I.e. if it is not possible to change the host application hardware, this attribute can be configured for high impedance state of GIP and GOP before leaving NW_INIT state.

Related Information: Anybus CompactCom M40 Hardware Design Guide (HMSI-216-126), Section “LED Interface/D8-D15 (Data Bus)”

4.4.4 GOP[0..1]/LED4[A..B]

These pins are outputs (high state) by default in the 30-series. In the 40-series, these pins are tri-stated until the state NW_INIT, and after that they become push-pull, active low LED outputs (LED4A/LED4B).

This change should not affect your product.

Related Information: Anybus CompactCom M40 Hardware Design Guide (HMSI-216-126), Section 3.2.3, LED Interface/D8-D15 (Data Bus)

4.4.5 Address Pins A[11..13]

The address pins 11, 12, and 13 are ignored by the 30-series. These pins must be high when accessing the 40-series module in backwards compatible 8-bit parallel mode. If you have left these pins unconnected or connected to GND, you need to make a hardware modification to tie them high.

4.4.6 Max Input Signal Level (V_{IH})

The max input signal level for the 30-series is specified as $V_{IH}=V_{DD}+0,2$ V, and for the 40-series as $V_{IH}=3.45$ V. Make sure that you do not exceed 3.45V for a logic high level.

5 General Software

5.1 Extended Memory Areas

The memory areas have been extended in the 40-series, and it is now possible to access larger sizes of process data (up to 4096 bytes instead of former maximum 256 bytes) and message data (up to 1524 bytes instead of former maximum 255 bytes). The 30-series has reserved memory ranges that the application should not use. The 40-series implements new functionality in some of these memory areas.

To use the extended memory areas you need to implement a new communication protocol which is not part of this document.

Memory areas not supported by the specific network cannot be used. Make sure you do not access these areas, e.g. for doing read/write memory tests.

Related Information: Anybus CompactCom 40 Software Design Guide (HMSI-216-125), Section “Memory Map”

5.2 Faster Ping-Pong Protocol

The ping-pong protocol (the protocol used in the 30-series) is faster in the 40-series. A 30-series module typically responds to a “ping” within 10-100µs. The 40-series typically responds to a “ping” within 2µs.

Interrupt-driven applications (parallel operating mode) may see increased CPU load due to the increased speed.

5.3 Requests from CompactCom to Host Application During Startup

All requests to software objects in the host application must be handled and responded to (even if the object does not exist). This applies for both the 30-series and the 40-series. The 40-series introduces additional objects for new functionality.

There may also be additional commands in existing objects added to the 40-series that must be responded to (even if it is not supported).

If your implementation already responds to all commands it cannot process, which is the expected behavior, you do not need to change anything.

5.4 Anybus Object (01h)

Attribute	30-series	40-series	Change/Action/Comment
#1, Module Type	0401h	0403h	Make sure the host application accepts the new module type value for the 40-series.
#15, Auxiliary Bit	Available	Removed	It is not possible to turn off the “Changed Data Indication” in the 40-series. Also see “Control Register CTRL_AUX-bit” and “Status Register STAT_AUX-bit” below.
#16, GPIO Configuration	Default: General input and output pins	Default: LED3 and LED4 outputs	See also .. • *GIP[0..1]/LED3[A..B], p. 13* • *GOP[0..1]/LED4[A..B], p. 13*

5.5 Control Register CTRL_AUX-bit

30-series The CTRL_AUX bit in the control register indicates to the Anybus CompactCom if the process data in the current telegram has changed compared to the previous one.

40-series The value of the CTRL_AUX bit is always ignored. Process data is always accepted.

All released Anybus CompactCom 30 example drivers from HMS comply with this difference.

Related Information: Anybus CompactCom 40 Software Design Guide (HMSI-216-125), section “Control Register”.

5.6 Status Register STAT_AUX-bit

30-series The STAT_AUX bit in the status register indicates if the output process data in the current telegram has changed compared to the previous one. This functionality must be enabled in the Anybus object (01h), Attribute #15. By default, the STAT_AUX bit functionality is disabled.

40-series The STAT_AUX bit indicates updated output process data (not necessarily changed data) from the network compared to the previous telegram. The functionality is always enabled.

All released Anybus CompactCom 30 example drivers from HMS comply with this difference.

Related Information: Anybus CompactCom 40 Software Design Guide (HMSI-216-125), section “Status Register”.

5.7 Control Register CTRL_R-bit

30-series The application may change this bit at any time.

40-series For the 8-bit parallel operating mode, the bit is only allowed to transition from 1 to 0 when the STAT_M-bit is set in the status register. When using the serial operating modes, it is also allowed to transition from 1 to 0 in the telegram immediately after the finalizing empty fragment.

All released CompactCom 30 example drivers from HMS comply with this difference.

Related Information: Anybus CompactCom 40 Software Design Guide (HMSI-216-125), section “Control Register”.

5.8 Modifications of Status Register, Process Data Read Area, and Message Data Read Area

In the 40-series, the Status Register, the Process Data Read Area, and the Message Data Read Area are write protected in hardware (parallel interface). If the software for some reason writes to any of those areas, a change is needed.

All released Anybus CompactCom 30 example drivers from HMS comply with this difference.

6 Network Specific — BACnet/IP

6.1 Network Configuration Object (04h)

The instances in the Network Configuration Object have been rearranged for the Ethernet based modules for consistency. Network specific instances are moved to instance number 20 and onwards. This is done to increase the number of instances in the section that is not network specific.

If the host application is using any of the parameters below, the software must be updated to use the new instance numbers.

Parameter Name	30-series Instance #	40-series Instance #
Device Instance	3	20
UDP Port	4	21
Process Active Timeout	5	22
IP Address	6	3
Subnet Mask	7	4
Gateway Address	8	5
DHCP Enable	9	6
Comm 1 Settings	10	7
Comm 2 Settings	11	8
DNS1	12	9
DNS2	13	10
Host Name	14	11
Domain Name	15	12
SMTP Server	16	13
SMTP User	17	14
SMTP Password	18	15
Foreign Device Registration IP	19	23
Foreign Device Registration UDP Port	20	24
Foreign Device Registration Time to Live Value	21	25

6.2 Reduced Network Resources Due to Memory Constraints

The Anybus CompactCom 40 BACnet/IP will have reduced network resources compared to the AnybusCompactCom 30 due to memory constraints.

Network Resource	30-series	40-series
Maximum size of BACnet NPDU	1476	1024
Maximum number of active server requests	10	5
Number of supported COV server subscriptions	60	60
Maximum number of Network Configuration object recipients supported	60	18
Number of client requests	120	78
Number of supported Network Configuration events	256	64
Maximum size of APDU service payload with segmentation included	32 kB	5 kB
Number of BACnet objects (advanced mode)	6120	768
Number of BAPL DeviceAddressBindings supported 18	60	18

7 Network Specific — CC-Link

7.1 Network CC-Link Object (08h)

The specific CC-Link mapping commands: Map_ADI_Specified_Write_Area, Map_ADI_Specified_Read_Area have been removed. With these two previously used commands it was possible to freely specify the location of the mapped data in the CC-Link address map; this is not possible anymore.

The mapping is now handled with the commands: Map_ADI_Write_Area, Map_ADI_Read_Area or Map_ADI_Write_Ext_Area and Map_ADI_Read_Ext_Area. The location of the mapped data in the CC-Link address map can now only be managed by using these commands in conjunction with the chronological order the commands are sent.

See “Anybus CompactCom 40 CC-Link Network Guide” for the new Process Data mapping scheme details.

7.2 Network Object (03h)

7.2.1 Process Data

A new default Process Data mapping scheme has been implemented in the 40-series. Data type BOOL is now mapped to the Word-area. In the 40-series, use the new BITx data types instead to map the data to the Bit-area.

All bit data must be mapped before all other data types for the data to be mapped to the Bit-area. If mapping bit data after having mapped other “non-bit-data” the data will be mapped to the Word-area.

The change was made to get a more logical and faster mapping.

You need to make sure the process data is mapped according to the above in the host application.

7.3 Diagnostic Object (02h)

To use the Diagnostic Events in conjunction with the automatic System Area Handler (CC-Link Host Object (F7h), Attribute #5, System Area Handler) in the Anybus CompactCom 40 CC-Link, there is one modification required. The application is now required to use the Diagnostic Events with the severity representing Latching Events or handle the system area completely in the application. For details on Diagnostic Event with latching severity, see the “Anybus CompactCom 40 Software Design Guide”, Diagnostic Object.

If the Diagnostic Event created is not of the latching severity, the system area will not work according the CC-Link specification.

If the automatic System Area Handler functionality is used previously, add the use of Diagnostic Events with a latching event severity or let the host application handle the system area completely.

8 Network Specific — DeviceNet

8.1 DeviceNet Host Object (FCh)

Attribute	30-series	40-series	Change/Action/Comment
#2, Device Type	Default: 0000h	Default: 002Bh	If the attribute is implemented in the host application, it overrides the default value and there is no difference between the 30-series and the 40-series. If the attribute is not implemented, the default value is used.
#3, Product Code	Default: 0062h	Default: 003Fh	If the attribute is implemented in the host application, it overrides the default value and there is no difference between the 30-series and the 40-series. If the attribute is not implemented, the default value is used.
#6, Product Name	Default: “Anybus-CC DeviceNet”	Default: “CompactCom 40 DeviceNet(TM)”	If the attribute is implemented in the host application, it overrides the default value and there is no difference between the 30-series and the 40-series. If the attribute is not implemented, the default value is used.

8.2 EDS file (Electronic Datasheet file used by configuration tool)

8.2.1 Keywords

The following keywords must be updated when migrating.

Keyword	Comments
ProdType	Must match attribute #2 (Device Type) in the DeviceNet Host Object (FCh).
ProdCode	Must match attribute #3 (Product Code) in the DeviceNet Host Object (FCh).
ProdName	Must match attribute #6 (Product Name) in the DeviceNet Host Object (FCh).
MajRev	Must match the major revision of the product.

9 Network Specific — EtherCAT

9.1 Network Configuration Object (04h)

The instance number for the Device ID instance has changed from number 3 (30-series) to number 1 (40-series).

9.2 EtherCAT Object (F5h)

Attribute	30-series	40-series	Change/Action/Comment
#2, Product Code	Default: 0000 0034h	Default: 0000 0036h	If the attribute is implemented in the host application, it overrides the default value and there is no difference between the 30-series and the 40-series. If the attribute is not implemented, the default value is used.
#6, Manufacturer Device Name	Default: “Anybus-CC EtherCAT”	Default: “CompactCom 40 EtherCAT”	If the attribute is implemented in the host application, it overrides the default value and there is no difference between the 30-series and the 40-series. If the attribute is not implemented, the default value is used.

9.3 ESI-file (Configuration file used by engineering tool)

When migrating from the 30-series to the 40-series, a new, updated ESI-file is needed. To help you, there is an ESI-file Generator available from HMS Industrial Networks AB, see below.

9.3.1 ESI-file Generator

An ESI-file generator is available on the HMS Industrial Networks AB website. The generator will create an up to date ESI file fitted for the specific design. The ESI generator works for both the 30-series and the 40-series.

The generator can be downloaded from www.anybus.com/starterkit40.

9.3.2 Keywords

The ESI-file generator is up to date with the following differences between the 30-series and the 40-series.

The Product Code, Revision Number and Product Name must be updated to reflect the current module. Note: These values can be changed via the EtherCAT object (F5h) and the ESI-file values must match the EtherCAT object values.

```
<Type ProductCode="#x00000036" RevisionNo="#x00020001">
   CompactCom 40 EtherCAT</Type>
```

The EtherCAT state transition timeouts must be present in the ESI-file per the latest specification. Note: These timeout values can be change via the EtherCAT object (F5h) and the ESI-file values must match the EtherCAT object values.

```
<StateMachine>
      <Timeout>
            <PreopTimeout>1000</PreopTimeout>
            <SafeopOpTimeout>5000</SafeopOpTimeout>
            <BackToInitTimeout>1000</BackToInitTimeout>
            <BackToSafeopTimeout>200</BackToSafeopTimeout>
      <Timeout>
</StateMachine>
```

The sync manager start addresses have been changed in the 40-series, and the sync manager sizes are now configurable in the EtherCAT configuration tool.

```
<Sm MinSize="34" MaxSize="1486" DefaultSize="276" StartAddress="#x4000"
ControlByte="#x26" Enable="1">MBoxOut</Sm>
<Sm MinSize="34" MaxSize="1486" DefaultSize="276" StartAddress="#x4800"
ControlByte="#x22" Enable="1">MBoxIn</Sm>
<Sm StartAddress="#x2800" ControlByte="#x20" Enable="1">Inputs</Sm>
```

The 40-series supports File over EtherCAT (FoE) and this must be reflected in the ESI-file. If FoE is disabled in the EtherCAT host object, this keyword must be removed from the ESI-file.

```
<FoE/>
```

Since the 40-series is using the HMS slave controller, the EEPROM byte size and the SII configuration data must be changed according to the following settings.

```
<ByteSize>384</ByteSize>
<ConfigData>80360046F401000000000000000000</ConfigData>
```

The 40-series supports the boot strap state, and requires the following keyword.

```
<BootStrap>0040000400480004</BootStrap>
```

10 Network Specific — EtherNet/IP

10.1 Network Object (03h)

Attribute #1, Network Type

The 30-series module is available in two network type versions, either with “Beacon based DLR” (Highest performance) or with “Announce based DLR” which both are Ethernet redundancy protocols. The 40-series is only available with “Beacon based DLR”. The network type value differs between the versions.

Value	Network Type	Anybus CompactCom Product
0085h	EtherNet/IP, No DLR	30-series 1-port
009Ch	EtherNet/IP, Announce Based DLR	30-series 2-port
009Bh	EtherNet/IP, Beacon Based DLR	30-series and 40-series

10.2 EtherNet/IP Host Object (F8h)

Attribute	Default	Anybus CompactCom Product	Comment
#2, Device Type	0000h 0000h 002Bh 002Bh	30-series, EtherNet/IP, No DLR 30-series, EtherNet/IP, Announce Based DLR 30-series, EtherNet/IP, Beacon Based DLR 40-series, EtherNet/IP, Beacon Based DLR	If the attribute is implemented in the host application, it overrides the default value and there is no difference between the 30-series and the 40-series. If the attribute is not implemented, the default value is used.
#3, Product Code	0063h 002Eh 0036h 0037h	30-series, EtherNet/IP, No DLR 30-series, EtherNet/IP, Announce Based DLR 30-series, EtherNet/IP, Beacon Based DLR 40-series, EtherNet/IP, Beacon Based DLR	If the attribute is implemented in the host application, it overrides the default value and there is no difference between the 30-series and the 40-series. If the attribute is not implemented, the default value is used.
#6, Product Name	Anybus-CC EtherNet/IP CompactCom EtherNet/IP(TM) 2P Anybus-CC EIP (2-Port) BB DLR Anybus CompactCom 40 EtherNet/IP(TM)	30-series, EtherNet/IP, No DLR 30-series, EtherNet/IP, Announce Based DLR 30-series, EtherNet/IP, Beacon Based DLR 40-series, EtherNet/IP, Beacon Based DLR	If the attribute is implemented in the host application, it overrides the default value and there is no difference between the 30-series and the 40-series. If the attribute is not implemented, the default value is used.
Attribute #27, Producing Instance Map	See comment		Attribute removed in the 40-series (only available in the 30-series EtherNet/IP Beacon Based DLR). The CompactCom will never request this attribute. Replaced by the functionality in the Assembly Mapping Object (EBh). If this attribute is used, the Assembly Mapping object must be implemented instead.
Attribute #28, Consuming Instance Map	See comment		Attribute removed in the 40-series (only available in the 30-series EtherNet/IP Beacon Based DLR). The CompactCom will never request this attribute. Replaced by the functionality in the Assembly Mapping Object (EBh). If this attribute is used, the Assembly Mapping object must be implemented instead.

10.2.1 EtherNet/IP functionality

Max Message Connections	The maximum number of simultaneous Class 3 connections are 16 in the 30-series and 6 in the 40-series. No change is needed in the host application.
EtherNet/IP Encapsulation Sessions	The maximum number of simultaneous encapsulation sessions are 48 in the 30-series and 15 in the 40-series. No change is needed in the host application.

10.3 EDS file (Electronic Datasheet file used by configuration tool)

10.3.1 EDS file Generator Tool

An EDS-generator for automatic EDS-file generation up to date with the differences below. The EDS-generator only works with the 40-series, version 1.30 and later.

The generator can be downloaded from www.anybus.com/starterkit40: .

10.3.2 Keywords

The following keywords differs between the 30-series and the 40-series. The EDS generator reflects this change.

Keyword	Comments
Capacity->MaxCIPConnections	Removed in 40-series – replaced by: MaxMsgConnections and MaxIOConnections (see below)
Capacity->MaxMsgConnections	New keyword in the 40-series, Value: 6
Capacity->MaxIOConnections	New keyword in the 40-series, Value: 4

11 Network Specific — Modbus-TCP

11.1 Modbus Registers

Rearrangements have been made in the Modbus register map, because process data sizes have been increased to 1536 bytes in each direction. An existing PLC configuration need to be changed to use the new addresses. **No difference on the application side.**

Contents	30-series Modbus Address	40-series Modbus Address
Holding Registers (4x)		
Read Process Data	0000h-00FFh	0000h-02FFh
Write Process Data	0100h-01FFh	0800h-0AFFh
Process Active Timeout	0203h	1003h
Enter/Exit Idle Mode	0204h	1004h
ADI Number 1	0210h-021Fh	1010h-101Fh
ADI Number 2	0220h-022Fh	1020h-102Fh
ADI Number 3839		FFF0h-FFFFh
Input Registers (3x)		
Write Process Data	0000h-00FFh	0000h-02FFh
Diagnostic Event Count	0100h	0800h
Diagnostic Event #1	0101h	0801h
Diagnostic Event #2	0102h	0802h
Diagnostic Event #3	0103h	0803h
Diagnostic Event #4	0104h	0804h
Diagnostic Event #5	0105h	0805h
Diagnostic Event #6	0106h	0806h
Coils (0x)		
Read Process Data	0000h-0FFFh	0000h-2FFFh
Discrete Inputs (1x)		
Write Process Data	0000h-0FFFh	0000h-2FFFh

11.2 BOOL arrays

Process data mapped BOOL arrays are not compressed to bit-fields on the network in the 40-series, but handled as a normal 8-bit datatype. To create bit-arrays in the 40-series, use the new datatypes BITx instead.

11.3 Network Configuration Object (04h)

The instances in the Network Configuration Object have been rearranged for the Ethernet based modules for consistency. Network specific instances are moved to instance number 20 and onwards. This is done to increase the number of instances in the section that is not network specific.

If the host application is using any of the parameters below, the software must be updated to use the new instance numbers.

Parameter Name	30-series Instance #	40-series Instance #
Modbus Connection Timeout	9	20
Process Active Timeout	10	21
DNS1	11	9
DNS2	12	10
Host Name	13	11
Domain Name	14	12
SMTP Server	15	13
SMTP User	16	14
SMTP Password	17	15
Word Order	18	22

11.4 Modbus Host Object (FAh)

Attribute	30-series	40-series	Change/Action/Comment
#2, Product Code	Default: “Anybus-CC Modbus-TCP (2-Port)”	Default: “Anybus CompactCom 40 Modbus TCP”	If the attribute is implemented in the host application, it overrides the default value and there is no difference between the 30-series and the 40-series. If the attribute is not implemented, the default value is used.
#11,Modbus read/ write registers command offset	-	-	In the 30-series, this register address offset is only applied when accessing holding registers with the command Read/Write Multiple registers (23). The 40-series applies this register offset to all holding register access, i.e. commands 3, 6, 16 and 23.

11.5 Ethernet Host Object (F9h)

Attribute	30-series	40-series	Change/Action/Comment
#4, Enable Modbus-TCP	Available	Removed	Attribute removed in the 40-series. The CompactCom will never request this attribute. Nothing needs to be changed in the host application.

11.6 Process data

In the 30-series modules, writing to the ADI register area would only result in a Set_Attribute command to the application (Application Data Object (FEh)) if the ADI was not mapped to read process data. For the 40-series, all register writes to the ADI area also results in a corresponding Set_Attribute command to the host application (Application Data Object (FEh)), as well as updating of the process data.

12 Network Specific — PROFIBUS

12.1 Additional Diagnostic Object (05h)

Object removed in the 40-series. To create diagnostics, use Diagnostic Object (02h).

Another option is to use the PROFIBUS DP-V0 Diagnostic Object (10h) where diagnostics can be sent transparently from the host application to the network.

If you use the Additional Diagnostic Object you need to update your software implementation.

12.2 Network PROFIBUS DP-V1 Object (0Bh)

Object removed in the 40-series, i.e. commands Map_ADI_Specified_Write_Area and Map_ADI_Specified_Read_Area are not supported.

12.3 PROFIBUS DP-V1 Object (FDh)

Attribute	30-series	40-series	Change/Action/Comment
#1, PNO Ident Number	1811h	1815h	If the attribute is implemented in the host application, it overrides the default value and there is no difference between the 30-series and the 40-series. If the attribute is not implemented, the default value is used.
#2, Parameterization Data	See Comment		In the first 10 bytes, only the Parameter Struct bit (bit 3) is copied to this attribute in the 40-series. All other bits are set to 0. In the 30-series all information in the first 10 bytes were copied.
#5, Size of Identifier Related Diagnostics	Available	Removed	Attribute removed in the 40-series. The Anybus CompactCom will never request this attribute. Nothing needs to be changed.
#6, Buffer Mode	Available	Removed	Attribute removed in the 40-series. The Anybus CompactCom will never request this attribute. No buffer modes needed in the 40-series since maximum sizes for all buffers are supported. Nothing needs to be changed.
#7, Alarm Settings	Available	Removed	Attribute removed in the 40-series. The Anybus CompactCom will never request this attribute. Only Diagnostic Alarms supported.
#16, I&M Version	Available	Removed	Attribute removed in the 40-series. The Anybus CompactCom will never request this attribute. The host application cannot influence the I&M version implemented by the Anybus CompactCom.
#17, I&M Supported	Available	Removed	Attribute removed in the 40-series. The Anybus CompactCom will never request this attribute. The host application cannot influence the I&M version supported by the Anybus CompactCom.
#19, Check Config Behavior	Available	Removed	Attribute removed in the 40-series. The Anybus CompactCom will never request this attribute. The 40-series depends on CheckCfgMode (often configurable in the PROFIBUS master) in default mode. Either the expected and actual configuration must match exactly or can differ as long as the expected input and output sizes are equal or larger than the actual sizes.

12.4 Network Configuration Object (04h)

The following attributes are removed in the 40–series. The Anybus CompactCom will never request these attributes. It is only possible to set these values via the network (I&M1-4) – end user configuration.

- Instance #3, Function Tag
- Instance #4, Location Tag
- Instance #5, Installation Date
- Instance #6, Description

12.5 GSD file (PROFIBUS configuration file used by engineering tool)

Implementation Type

If the keyword “Implementation Type” is present in the GSD-file (optional keyword), the value for the 30-series shall be “NP30” and the value for the 40-series shall be “NP40”.

Length Related Keywords

The following keywords are possible to set to maximum values if neeed in the 40-series. In the 30-series the maximum lengths were dependent of the buffer mode setting.

- Max_Input_Len
- Max_Output_Len
- Max_Data_Len
- Max_User_Prm_Data_Len
- Max_Diag_Data_Len

13 Network Specific — PROFINET

Related Information:

Anybus CompactCom 40 PROFINET IRT Network Guide, HMSI-27-226

Network Interface Appendix, Anybus CompactCom 30, PROFINET IO 2-Port, HMSI-168-49

13.1 Network Object (03h)

Attribute	Default	Anybus CompactCom Product	Comment
#1, Network Type	0084h 0096h 0089h	30-series, PROFINET IO 1-Port 30-series, PROFINET IO 2-Port 40-series, PROFINET IRT	The 30-series module is a PROFINET RT module without IRT capabilities. The 40-series module has PROFINET IRT capabilities. The Network Type value differs between the different CompactCom PROFINET versions.
#2, Network Type String	“PROFINET IO” “PROFINET IO 2-Port” “PROFINET IRT”	30-series, PROFINET IO 1-Port 30-series, PROFINET IO 2-Port 40-series, PROFINET IRT	The 30-series module is a PROFINET RT module without IRT capabilities. The 40-series module has PROFINET IRT capabilities. The Network Type value differs between the different CompactCom PROFINET versions.

13.2 PROFINET IO Object (F6h)

Attribute	Default	Anybus CompactCom Product	Comment
#1, Device ID	0007h 0009h 0010h	30-series, PROFINET IO 1-Port 30-series, PROFINET IO 2-Port 40-series, PROFINET IRT	The Device ID controls how your product identifies itself on the PROFINET network. If the attribute is implemented in the host application, it overrides the default value and there is no difference between the 30-series and the 40-series. If the attribute is not implemented, the default value differs between the different CompactCom PROFINET types.
#3, Station Type	“ABCC-PRT” “ABCC-PRT (2-Port)” “ABCC40-PIR”	30-series, PROFINET IO 1-Port 30-series, PROFINET IO 2-Port 40-series, PROFINET IRT	The Station Type defines the name your product uses to identify itself on the PROFINET network. If the attribute is implemented in the host application, it overrides the default value and there is no difference between the 30-series and the 40-series. If the attribute is not implemented, the default value differs between the different CompactCom PROFINET types.
#8, I&M Order ID	“ABCC-PRT” “ABCC-PRT (2-Port)” “ABCC40-PIR”	30-series, PROFINET IO 1-Port 30-series, PROFINET IO 2-Port 40-series, PROFINET IRT	If the attribute is implemented in the host application, it overrides the default value and there is no difference between the 30-series and the 40-series. If the attribute is not implemented, the default value differs between the different Anybus CompactCom PROFINET types.
#19, System Description	“HMS Industrial Networks Anybus CompactCom” “Anybus CompactCom PROFINET IO 2-Port” “HMS Industrial Networks Anybus-CompactCom 40”	30-series, PROFINET IO 1-Port 30-series, PROFINET IO 2-Port 40-series, PROFINET IRT	If the attribute is implemented in the host application, it overrides the default value and there is no difference between the 30-series and the 40-series. If the attribute is not implemented, the default value differs between the different Anybus CompactCom PROFINET types.

Attribute	30-series	40-series	Change/Action/Comment
#7, Record Data Mode	See Comment		I&M Record data transparent mode (bit 1) is replaced with the IM_Options command in the Network PROFINET IO object (0Eh). If this bit is 0 in the current implementation, no action is needed
#13, I&M Profile ID	Used for all APIs	Only used for “non-zero” APIs	In the 40-series, this attribute is only read for submodules belonging to a “non-zero” API (e. g. PROFIdrive profile). Constant values (F600h, Generic Device and 0004h, Communication Module) are used for submodules belonging to API 0. In the 30-series this parameter is used for all API:s.
#14, I&M Profile Specific Type	Used for all APIs	Only used for “non-zero” APIs	In the 40-series, this attribute is only read for submodules belonging to a “non-zero API” (e. g. PROFIdrive profile). Constant values (F600h, Generic Device and 0004h, Communication Module) are used for submodules belonging to API 0. In the 30-series this parameter is used for all API:s.
#15, I&M Version	Available	Removed	Attribute removed in the 40-series. The Anybus CompactCom will never request this attribute. The host application cannot influence the I&M implemented by the Anybus CompactCom.
16, I&M Supported	Available	Removed	Attribute removed in the 40-series. The Anybus CompactCom will never request this attribute. The host application cannot influence the I&M supported by the Anybus CompactCom.
#20, Interface description	Available	Removed	Attribute removed in the 40-series. The Anybus CompactCom will never request this attribute.
#21, Module ID Assignment Mode	Available	Removed	Attribute removed in the 40-series (Incremental Module Identification removed in the 40-series). The Anybus CompactCom will never request this attribute.
#22, System Contact	Available	Removed	Attribute removed in the 40-series. The Anybus CompactCom will never request this attribute. System Contact can now only be reached from the network via SNMP (sysContact). Also see *SNMP MIB-II, p. 33*.
#23, PROFIenergy functionality	Available	Removed	Attribute removed in the 40-series. The Anybus CompactCom will never request this attribute. PROFIenergy is now enabled by the application having implemented the Energy Control Object (F0h).

Command	30-series	40-series	Change/Action/Comment
Ar_Info_Ind	Available	Removed	Command removed in the 40-series. The Anybus CompactCom will never use this command in a request. The command is replaced by the command Expected_Ident_Ind
Ar_Offline_Ind	Available	Removed	Command removed in the 40-series. The Anybus CompactCom will never use this command in a request. The 30-series module issues this command to indicate to the host application that the module enters an offline state. Use Ar_Abort_Ind instead.
Plug_Submodule_ Failed	Available	Removed	Command removed in the 40-series. The Anybus CompactCom will never use this command in a request.
Get_IM_Record	Available	Removed	Command removed in the 40-series. The Anybus CompactCom will never use this command in a request. It will use the general Get_ Record-command instead (filter on index AFF0h-AFFFh).
Set_IM_Record	Available	Removed	Command removed in the 40-series. The Anybus CompactCom will never use this command in a request. It will use the general Set_ Record-command instead (filter on index AFF0h-AFFh).

13.3 PROFINET Additional Diagnostic Object (0Fh)

Object removed in the 40-series. All diagnostics are handled via the standard diagnostic object (02h), Event code FFh. Only Channel diagnostics can be created.

13.4 Diagnostic Object (02h)

The structure of network specific event information has changed in the create command. Instead of including diagnostic source information such as API, Slot, and Subslot in the data field, it is extracted from the extended diagnostic fields in the create command. API, Slot, and Subslot are determined with the help of Slot and ADI given by the extended diagnostic mode.

Process alarms cannot be created in the 40-series.

13.5 Network Configuration Object (04h)

The instances in the Network Configuration Object have been rearranged for the Ethernet based modules for consistency. Network specific instances are moved to instance number 20 and onwards. This is done to increase the number of instances in the section that is not network specific.

If the host application is using any of the parameters below, the software must be updated to use the new instance numbers.

Parameter Name	30-series Instance #	40-series Instance #
DNS1	8	9
DNS2	9	10
Host Name	10	11
Domain Name	11	12
SMTP Server	12	13
SMTP User	13	14
SMTP Password	14	15
Station Name	15	20
F-Address	20	21
Function Tag	16	Parameter removed
Location Tag	17	Parameter removed
Installation Date	18	Parameter removed
Description	19	Parameter removed

The following instances are removed in the 40-series. They are only possible to set via the network.

- Instance #16 in 30-series, Function Tag
- Instance #17 in 30-series, Location Tag
- Instance #18 in 30-series, Installation Date
- Instance #19 in 30-series, Description

13.6 Network PROFINET IO Object (0Eh)

Attribute	30-series	40-series	Change/Action/Comment
#3, Last OffLineInd ReasonCode	-	Removed	Attribute removed in the 40-series. Since the command Ar_Offline_Ind is removed, this attribute makes no sense. If the host application is accessing this attribute, it will receive an error response when using the 40-series.
#9, ProfinetIoStack Init ErrorCode	-	Removed	Attribute removed in the 40-series. If the host application is accessing this attribute, it will receive an error response when using the 40-series.

13.7 I&M4

I&M4 is removed in the 40-series. Writeable I&M records in GSD must be updated (see GSD section below).

13.8 LED Indications

Changes has been made regarding the specification of the LED indications. See tables below for differences.

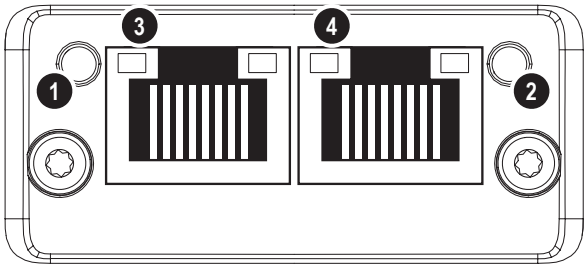

Fig. 6

13.8.1 Network Status LED (LED1[A..B])

LED State	30-series	40-series	Comments
Off	Offline	Offline	- No power- No connection with IO controller
Green	Online (RUN)	Online (RUN)	Connection with IO controller established, IO controller in Run state
Green, 1 flash	-	Online (STOP)	Connection with IO controller established, IO controller in STOP state or IO data bad, IRT synchronization not finished
Green, 3 flashes	-	Identify	Flashing 3 times (1Hz) continuously to identify slave (DCP_Identify).
Green, cont. flash	Online (STOP)	-	Connection with IO controller established, IO controller in STOP state
Red	Fatal event	Fatal event	Major internal error (this indication is combined with a red module status LED)
Red, 1 flash	-	Station Name error	Station name not set
Red, 2 flashes	-	IP address error	IP address not set
Red, 3 flashes	-	Configuration error	Expected Identification differs from Real Identification.

13.8.2 Module Status LED (LED2[A..B])

LED State	30-series	40-series	Comments
Off	Not Initialized	Not Initialized	No power or Module in SETUP or NW_INIT state
Green	Normal Operation	Normal Operation	Module has shifted from the NW_INIT state
Green, 1 flash	Diagnostic Event	Diagnostic Event	Diagnostic event(s) present
Green, cont. flash	Identify	-	Flashing 1Hz continuously to identify slave (DCP_Identify).
Red	Exception error	Exception error	Module in state Exception
	Fatal Event	Fatal Event	Major internal error (this indication is combined with a red Network Status LED)
Red, 1 flash	Configuration error	-	
Red, 2 flashes	IP address error	-	
Red, 3 flashes	Station Name Error	-	
Red, 4 flashes	Internal error	-	
Alternating Red/ Green	-	Firmware Update	Do NOT power off the module. Turning the module off during this phase could cause permanent damage.

13.9 SNMP MIB-II

sysContact, sysLocation and sysName are used to give the product identification in the end installation.

In the 40-module these variables are only set from the network using SNMP protocol by the end user.

Due to this, sysContact (PROFINET IO object (F6h), Attribute 22), sysLocation (Network Configuration Object (04h), Attribute 17) and sysName (Network Configuration Object (04h), Attribute 15) are no longer used.

Nothing needs to be updated in your implementation but attribute values will no longer be used.

13.10 ADI Based Configuration

When using the ADI based configuration, the structure of module identifiers and submodule identifiers are changed in the 40-series to be able to support the re-map functionality.

13.10.1 30-series (2-Port)

DAP V2.0: Module ID: 0x00000011, Submodule ID: 0x00000001

Modules:

Fixed module IDs for different data sizes and data directions

Output 1 byte - Module ID: 0x00000020, Submodule ID: 0x00000000

Output 1 word - Module ID: 0x00000030, Submodule ID: 0x00000000

Output 2 word - Module ID: 0x00000040, Submodule ID: 0x00000000

Output 4 word – Module ID: 0x00000050, Submodule ID: 0x00000000

Input 1 byte – Module ID: 0x00000002, Submodule ID: 0x00000000

Input 1 word – Module ID: 0x00000003, Submodule ID: 0x00000000

Input 2 word - Module ID: 0x00000004, Submodule ID: 0x00000000

Input 4 word – Module ID: 0x00000005, Submodule ID: 0x00000000

One submodule per module

13.10.2 40-series

DAP: Module ID: 0x80010000, Submodule ID: 0x00000001

Modules:

The Module IDs and Submodule IDs are built up according to the figure below.

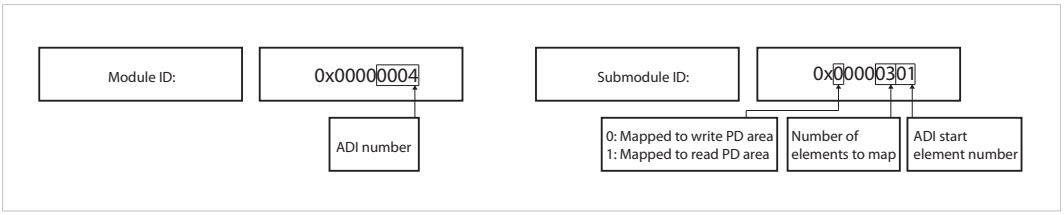

Fig. 7

13.11 Configuration Mismatch

The 40-series are stricter regarding outputs and more tolerant regarding inputs compared to the 30-series. All outputs are locked if at least one output is missing. The network engineering tool may use anywhere between 0 and all actual input submodules without error indication.

ABCC40 provides a window for "seamless" adaptation of Real Identification (RI). In ADI based RI mode through remap, and in advanced mode by blocking in the connect request handling. It is not ok to adapt RI by rebooting.

For detailed information about how a configuration mismatch is handled in the 30-series, see Anybus CompactCom 30 PROFINET IO Network Appendix, HMSI-168-74, Section “Configuration Mismatch”.

For detailed information about how a configuration mismatch is handled in the 40-series, see Anybus CompactCom 40 PROFINET IRT Network Guide, HMSI-27-226, Section “Configuration Mismatch”.

13.12 Media Redundancy Protocol (MRP)

MRP is supported in the 40-series and cannot be disabled by the host application. You need to add new keywords in your GSD file, see GSD section below.

13.13 GSD File (PROFINET configuration file used by engineering tool)

13.13.1 GSD Generator Tool

When using the ADI-based configuration, it is possible to use a GSD Generator from HMS which will generate a basic GSD file (up to date with the above differences) with correct ADI modules.

The GSD generator only works for the 40-series

The generator can be downloaded from www.anybus.com/starterkit40

13.13.2 Modifications for Conformance Class B (if you want to disable support for IRT)

The example GSD file, supplied by HMS Industrial Networks AB, is prepared for testing an Anybus CompactCom 40 PROFINET IRT for conformance class C, which includes PROFINET isochronous communication mode (IRT). If the implementation does not need the isochronous features of the device, the GSD file can be modified to reflect this. The product can then be conformance tested for conformance class B instead. The list below describe the changes needed in the example GSD file to accomplish this.

> **!** If IRT support is removed from the GSD file, it is not possible to use the device in the middle of an IRT line. It has to be connected to the line using an IRT capable switch or placed at the end of the line.

1. 1. The value of the ConformanceClass attribute in the `<CertificationInfo...>` element in each DAP must be changed from “C” to “B”:

   ```
   <CertificationInfo ConformanceClass="B" ApplicationClass=""
   NetloadClass="III"/>
   ```

2. The value of the SupportedRT_Classes attribute in the `<InterfaceSubmoduleItem...>` element in each DAP must be “RT_CLASS_1”. I.e. the “RT_CLASS_2” and “RT_CLASS_3” values must be removed. Also, remove the keyword `DelayMeasurementSupported`.

   ```
   <InterfaceSubmoduleItem ID=“Interface” SubslotNumber=“32768”
   SubmoduleIdentNumber=“0x00000002” SupportedRT_Classes=“RT_CLASS_1”
   TextId=“T_ID_INTERFACE ”SupportedProtocols=“SNMP;LLDP”
   SupportedMibs=“MIB2” DCP_
   HelloSupported=“true” PTP_BoundarySupported=“true” DCP_
   BoundarySupported=“true”
   ```

3. 3. The elements `<RT_Class3Properties ...>`, `<SynchronisationMode ...>`, and `<RT_Class3TimingProperties ...>` must be removed from each DAP.

13.13.3 Keywords

Keyword	Comments
GSDML-DeviceProfile version	2.31 for 30-series, 2.32 for 40-series
DeviceIdentity->DeviceID	Must be changed to reflect the Device ID you have configured in the PROFINET IO object (F6h), Attribute 1.
DeviceAccessPointItem->CheckDeviceID_ Allowed	False for 30-series, true for 40-series
DeviceAccessPointItem- >ImplementationType	NP30 for 30-series, NP40 for 40-series
DeviceAccessPointItem->WebServer	Optional keyword. Can be removed if not used.
DeviceAccessPointItem->LLDP_NoD_ Supported	Manadatory, =true for 40-series
DeviceAccessPointItem- >PowerOnToCommReady	Required if Fast Start-Up is supported
DeviceAccessPointItem- >ResetToFactoryModes	2 in 30-series, 2 and 8 in 40-series (2 mandatory)
DeviceAccessPointItem->PNIO_Version	V2.2 in 30-series, V2.32 in 40-series
ModuleInfo->HardwareRelease Value	Optional. Removed in 40-series
ModuleInfo->SoftwareRelease Value	Optional. Removed in 40-series
CertificationInfo->ConformanceClass	B in 30-series, B or C in 40-series depending on IRT.
CertificationInfo->NetloadClass	Mandatory. III in 40-series
VirtualSubmoduleItem->API	Removed in 40-series. API=0 default.
VirtualSubmoduleItem->IOData IOPS_ Length	Removed in 40-series. Default=1
VirtualSubmoduleItem->IOData IOCS_ Length	Removed in 40-series. Default=1
VirtualSubmoduleItem->Writeable_IM_ Records	1 2 3 4 in 30-series. 1 2 3 in 40-series.
VirtualSubmoduleItem- >MayIssueProcessAlarm	Mandatory for 2.32. False in 40-series.
InterfaceSubmoduleItem->PTP_ BoundarySupported	False in 30-series, true in 40-series
InterfaceSubmoduleItem->DCP_ HelloSupported	True - Required if FSU is supported
InterfaceSubmoduleItem- >DelayMeasurementSupported	Only for IRT (40-series)
InterfaceSubmoduleItem->RT_ Class3Properties	Only for IRT (40-series)
InterfaceSubmoduleItem- >SynchronisationMode	Only for IRT (40-series)
ApplicationRelations->StartupMode	Legacy in 30-series. Legacy and Advance in 40-series (mandatory).
MediaRedundancy SupportedRole="Client"	New MRP keyword in the 40-series. MRP not supported in 30-series.
SupportsRingportConfig="true"	New MRP keyword in the 40-series. MRP not supported in 30-series.
IsDefaultRingport="true"	New MRP keyword in the 40-series. MRP not supported in 30-series.
VirtualSubmoduleItem->Writeable_IM_Records="1 2 3"	I&M4 removed in the 40-series

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