



Documentation

ABC-CPU Systems

Global Data Xchange – GDX v2

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1. New in the version v2

1.2 Compatibility

Version v2 of the GDX method is backward compatible with older versions.

With the firmware version v18 build 0214 the GDX method is an integral part and thus also always active. Activation by assigning a GDXCID in 'cmdline.txt' can be omitted. The current firmware of each CPU is in the download area on the ABC IT website at www.abcit.eu.

1.3 Assignment of GDXCID

An X-CPU-4 w57 can manage up to 100 GDXCIDs with version v2. This means, that up to 100 S7 data blocks can be parameterized as send data blocks (see 3.2 in this document).

2. Basics

2.1 The global data room

In the X-CPU technology, we interpret the global data space, that data from the other controllers is automatically available to one controller via the Ethernet medium, without parametrization of communication relationships / programming.

We call the global data room of the X-CPU –technology '*Global Data Room*', or simply '*GDR*'.

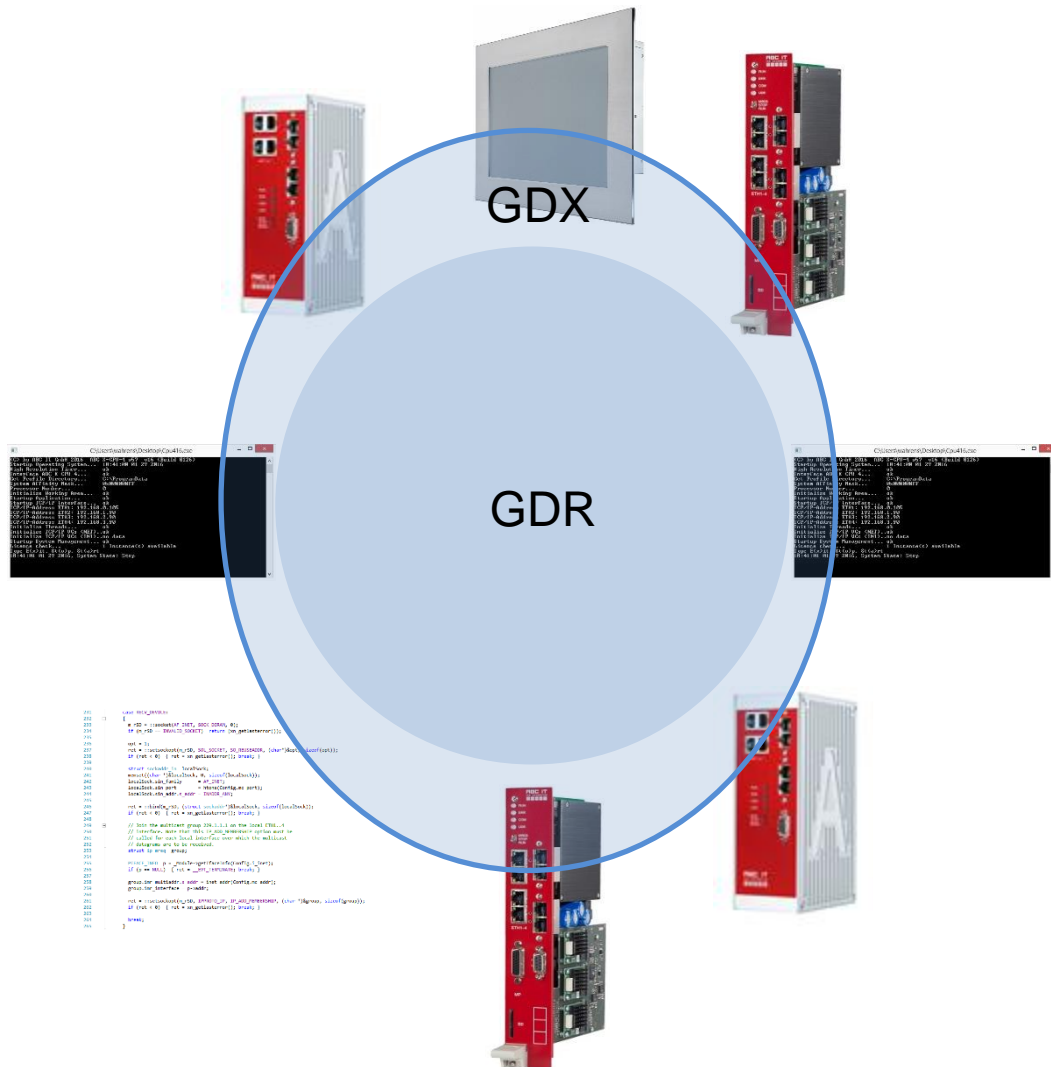


Global Data Room - GDR

2.3 Heterogeneous network topology

The network is Ethernet, the topology is star-shaped (Y) interconnected by switch architecture.

The *GDX* method is integrated in all X-CPU systems. Furthermore, we provide C++ / C # source code for free use.

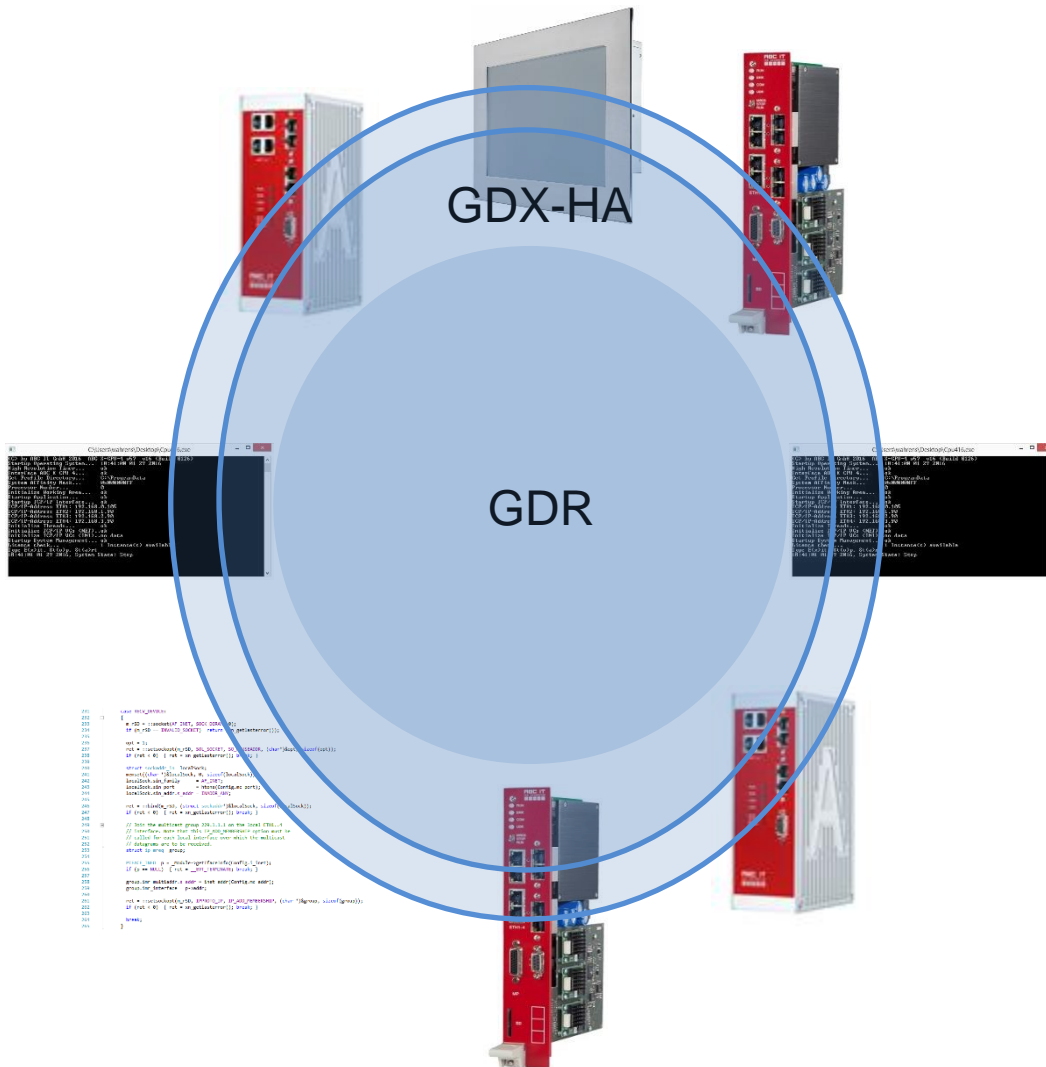


Heterogeneous network topology

2.4 Highly available network topology

The network is Ethernet, the topology is circular (O) connected from controller to controller.

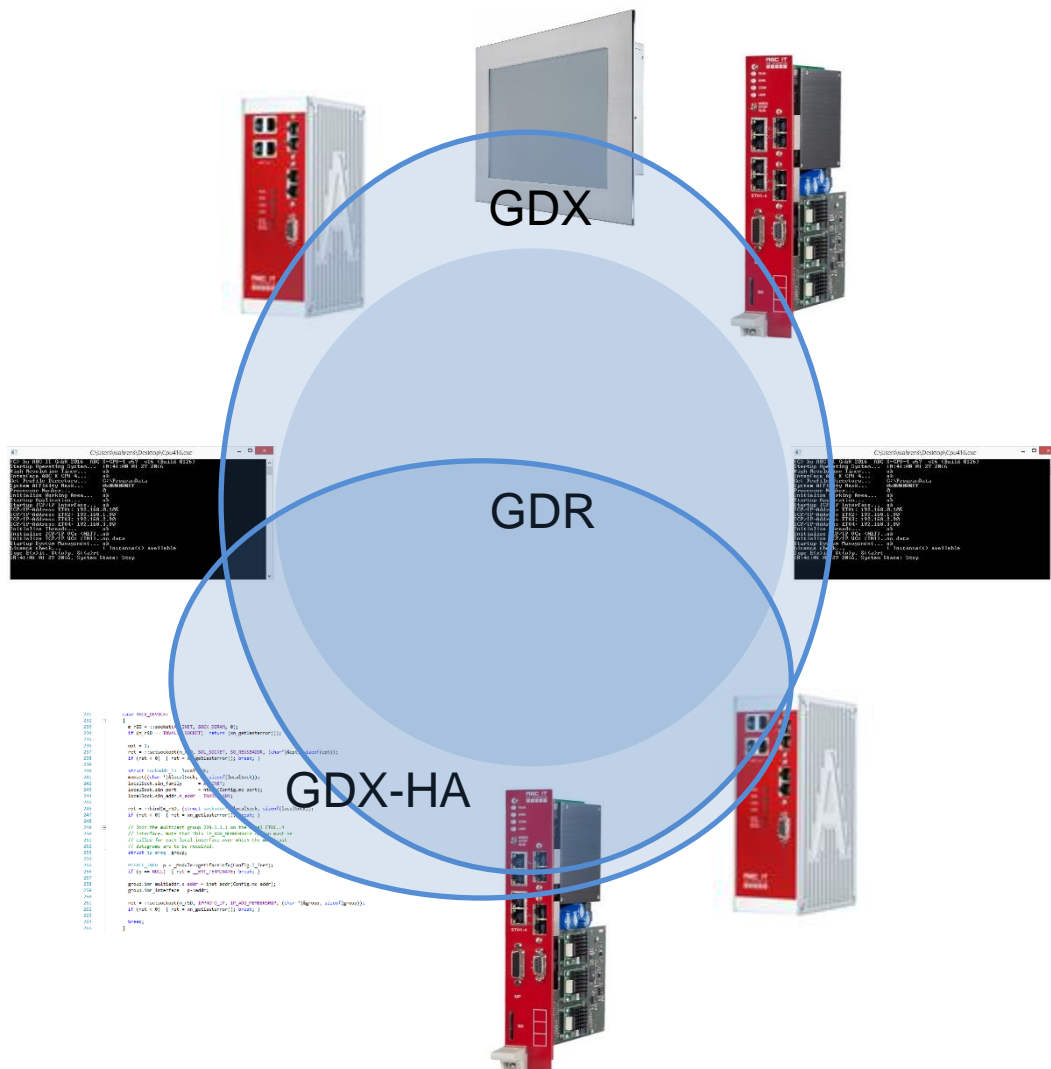
The *GDX-HA* method is integrated in all X-CPU systems. Furthermore, we provide C++ / C# source code for free use.



Global Data Xchange – High Available

2.5 O/Y – network topology

GDX-HA can be 'tapped' on any controller and continued as *GDX*. This allows an almost unlimited possibility of O / Y topologies. The *GDR* remains across all topologies.



O/Y – network topology

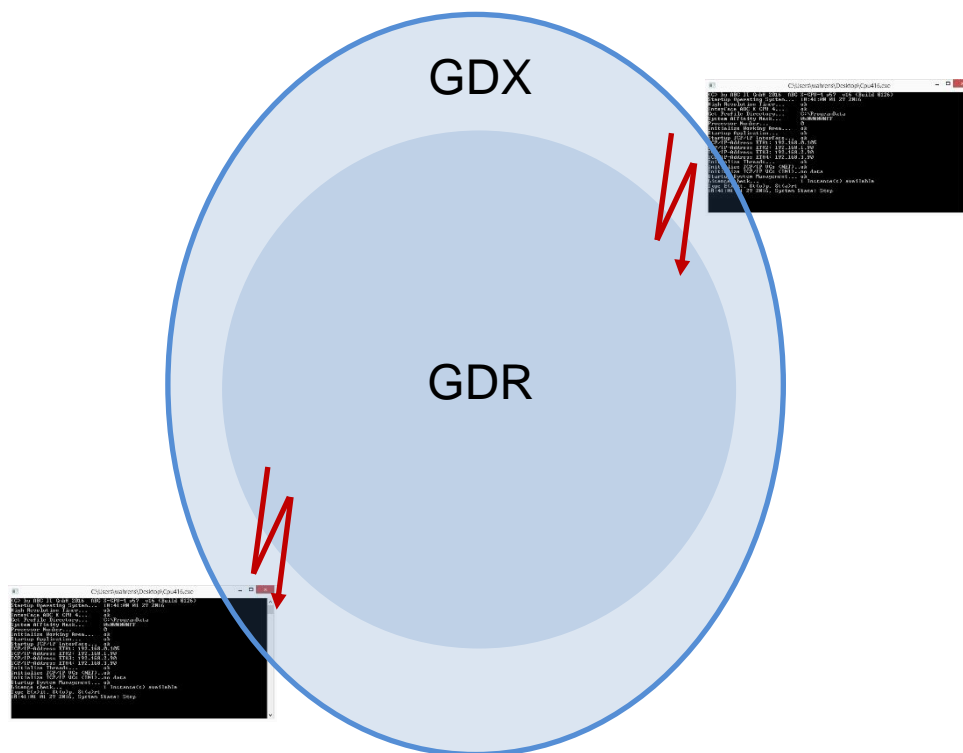
2.6 Telegram and data reduced communication

GDX works on data-level, which is event-controlled. This means, that the data area of the *GDR* is monitored for data change.

The telegram and data transportation can be greatly reduced.

The monitoring takes place at the binary level and records every change. A typified data monitoring will not take place.

If a change in the data area is detected, the entire data area will be available to the *GDR*.



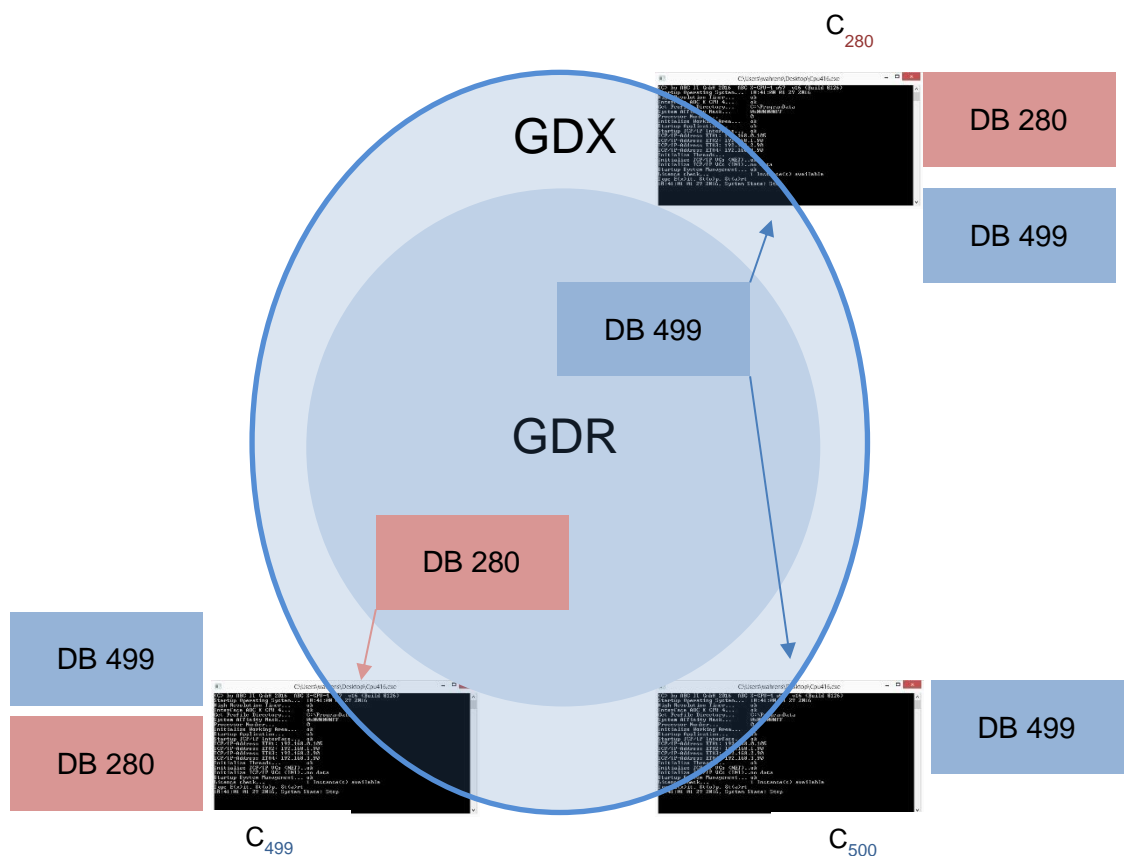
Change Management

3. Global Data Room – GDR

3.1 Areas under STEP7

Global data areas are transparent areas for each controller. These should be easy to address and manage. Data blocks are the first choice here.

Each controller provides the areas that are interesting and important to him. The DB number range 1 .. 65535 composes the *GDR*. Controllers can be addressed in the range 1..65535.



Data area under STEP7

In this case, an X-CPU-4 w57 with the controller number 280, the second and third one with the controller numbers 499 and 500 have been parameterized

Each individual data block corresponds to the controller number. The data of this data block, if there is any, will be provided in the *GDR*.

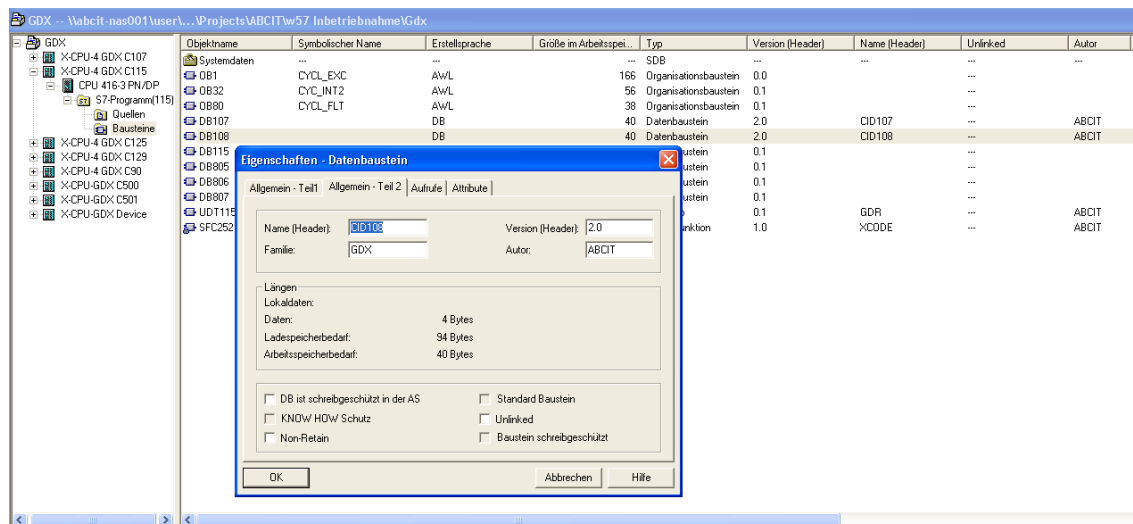
Controller 280 will receive the data from controller 499, because there is a local DB499 under it. Conversely, controller 499 may also access to the data of controller 280.

The controller 500 doesn't have its own data for the *GDR* (the corresponding S7 data block should be DB500). But it accesses to the data of controller 499.

At the controller level, it is decided whether and which data will be provided to the *GDR* and which data will be accessed in the *GDR*.

3.2 GDX v2 under STEP7 parameterizing

With version 2 of the GDX protocol, an S7-DB of the GDX family and version 2.0 correspond to a CID. Up to 100 CIDs can be managed dynamically by an X-CPU. The CIDs must be always uniquely assigned.



CID108 referenced by the S7-DB108

4. Parameterization

4.1 Program parameter

The parameterization of the Global Data Xchange can be done via parameter assignment with the program start.

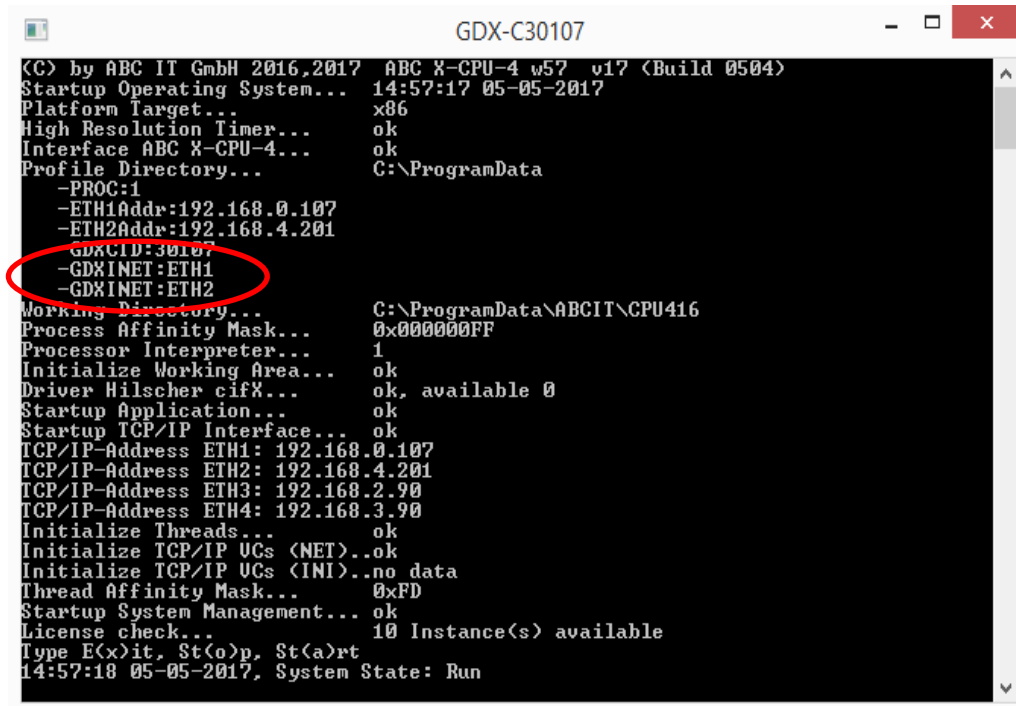
-GDXINET:ETH1	Based on ETH1..ETH4
-GDXADDR:229.1.1.1	MC starts from 224.0.0.0 .. 239.255.255.255
-GDXPORT:7776	GDX - Port
-GDXUPDI:100	Update Interval
-GDXPROC:0	Processor Number for Send/Receive

Cpu416_x86_i10.exe -GDXINET:ETH2

GDX v2 is active by default

4.2 GDXINET:ETH1

GDXINET defines the interface ETH1..ETH4 of the X-CPU –systems, on which GDX should run. Two interfaces will be needed for GDX-HA.



```
(C) by ABC IT GmbH 2016,2017 ABC X-CPU-4 w57 v17 (Build 0504)
Startup Operating System... 14:57:17 05-05-2017
Platform Target... x86
High Resolution Timer... ok
Interface ABC X-CPU-4... ok
Profile Directory... C:\ProgramData
-PROC:1
-ETH1Addr:192.168.0.107
-ETH2Addr:192.168.4.201
-GDXCID:30107
-GDXINET:ETH1
-GDXINET:ETH2
Working Directory... C:\ProgramData\ABCIT\CPU416
Process Affinity Mask... 0x000000FF
Processor Interpreter... 1
Initialize Working Area... ok
Driver Hilscher cifX... ok, available 0
Startup Application... ok
Startup TCP/IP Interface... ok
TCP/IP-Address ETH1: 192.168.0.107
TCP/IP-Address ETH2: 192.168.4.201
TCP/IP-Address ETH3: 192.168.2.90
TCP/IP-Address ETH4: 192.168.3.90
Initialize Threads... ok
Initialize TCP/IP UCs (NET)...ok
Initialize TCP/IP UCs (INI)...no data
Thread Affinity Mask... 0xFD
Startup System Management... ok
License check... 10 Instance(s) available
Type E(x)it, St(o)p, St(a)rt
14:57:18 05-05-2017, System State: Run
```

X-CPU-4 w57 Interface

Special feature of *GDX-HA* in O-topology

Assignment of two Ethernet interfaces:

-GDXINET:ETH3
-GDXINET:ETH4

Das Durchschleifen des Ethernets erfolgt immer zu identischen Interfaces:

3-HA Controller

C₂₈₀ ETH4 to C₅₀₀ ETH4
C₅₀₀ ETH3 to C₄₉₉ ETH3
C₄₉₉ ETH2 to C₂₈₀ ETH2

4-HA Controller

C₂₈₀ ETH4 to C₅₀₀ ETH4
C₅₀₀ ETH3 to C₄₉₉ ETH3
C₄₉₉ ETH4 to C₃₁₃ ETH4
C₃₁₃ ETH3 to C₂₈₀ ETH3

4.3 GDXADDR:229.1.1.1

This parameter should be changed only after having consulted with the support of ABC IT GmbH.

4.4 GDXPORT:7776

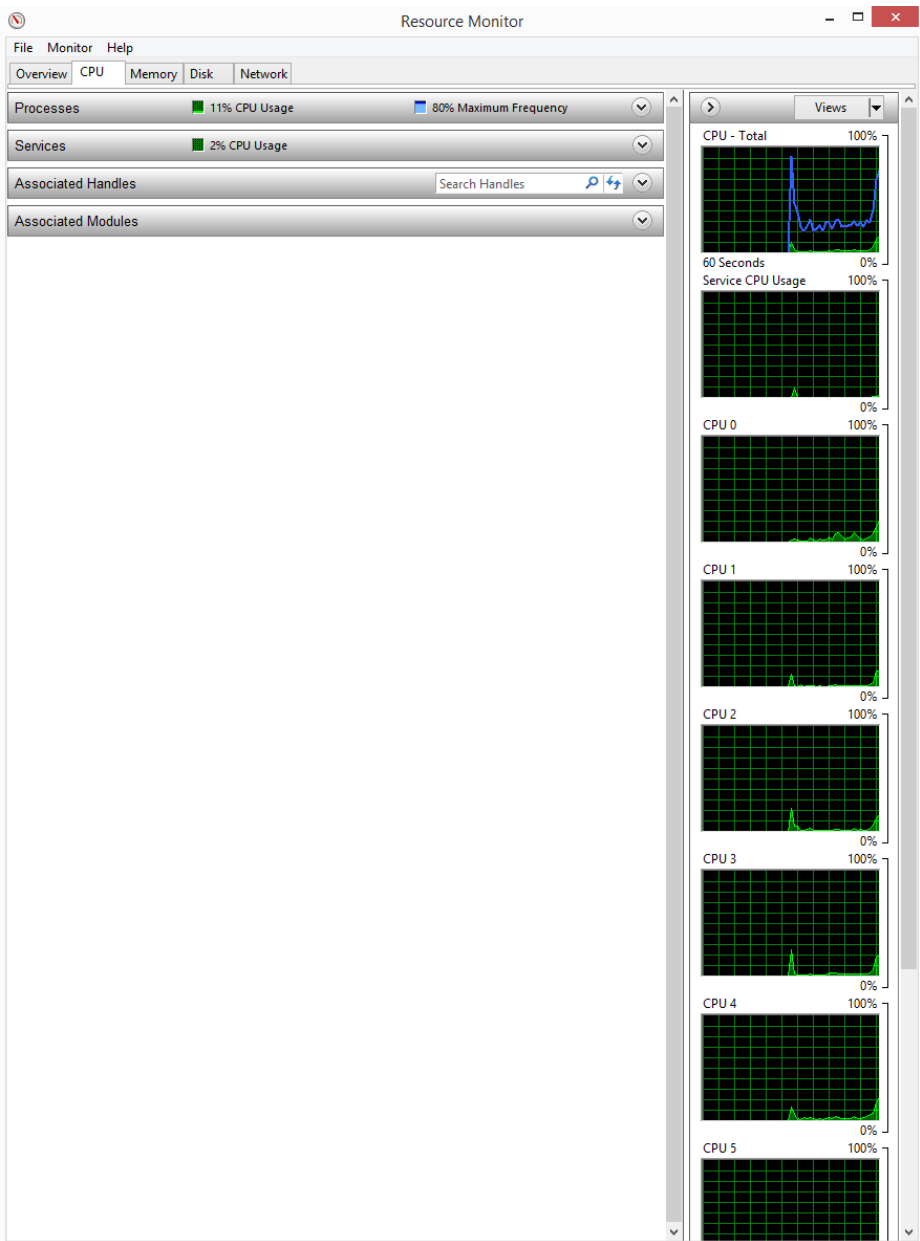
This parameter should be changed only after having consulted with the support of ABC IT GmbH.

4.5 GDXUPDI:100

The update interval defines the time interval in milliseconds, in which a test for date change is running through. If a date change is detected, the new data will be placed in the *GDR*.

4.6 GDXPROC

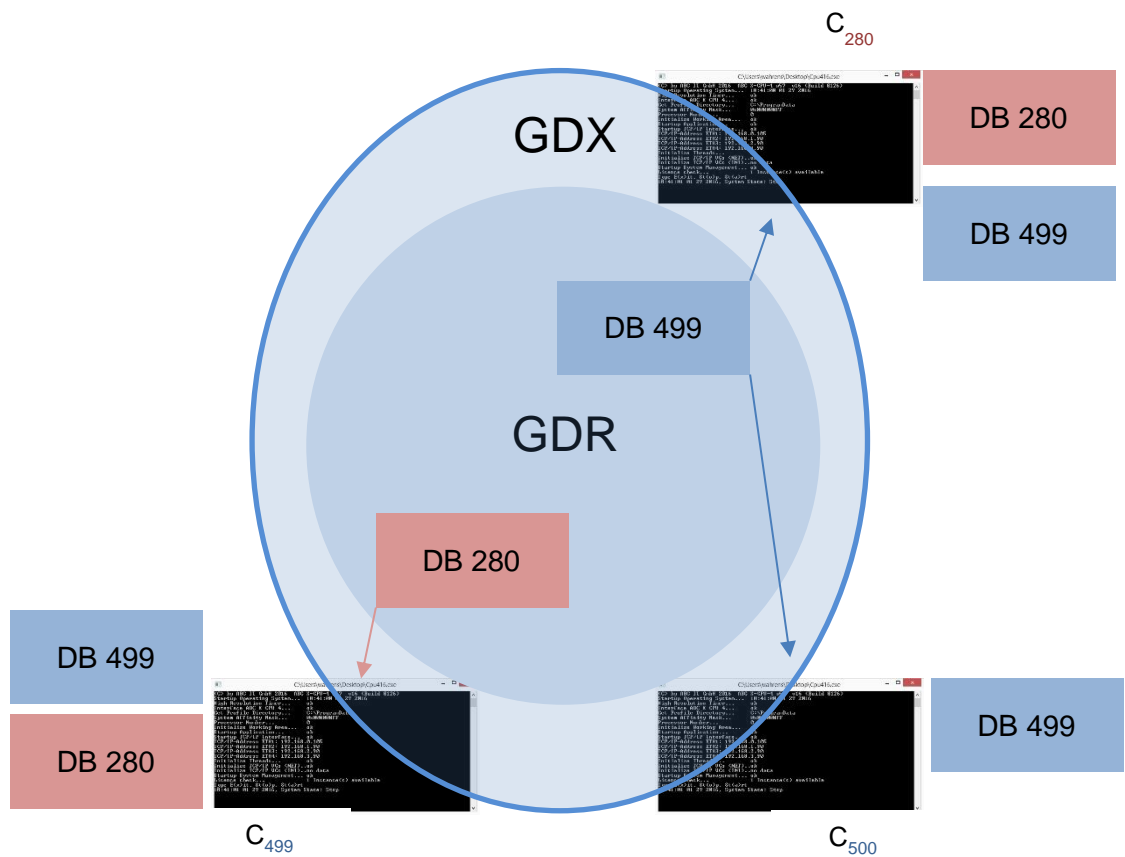
Selection of a CPU_{0..n} of the Windows system.



5. Global Data Xchange GDX

5.1 Controller – controller communication

The ABC X-CPU-4 w57 is a GDX controller and is able to exchange data with all other GDX controllers.



Controller-controller communication

With a typified data source, the communication between the controllers is easy to create and maintain.

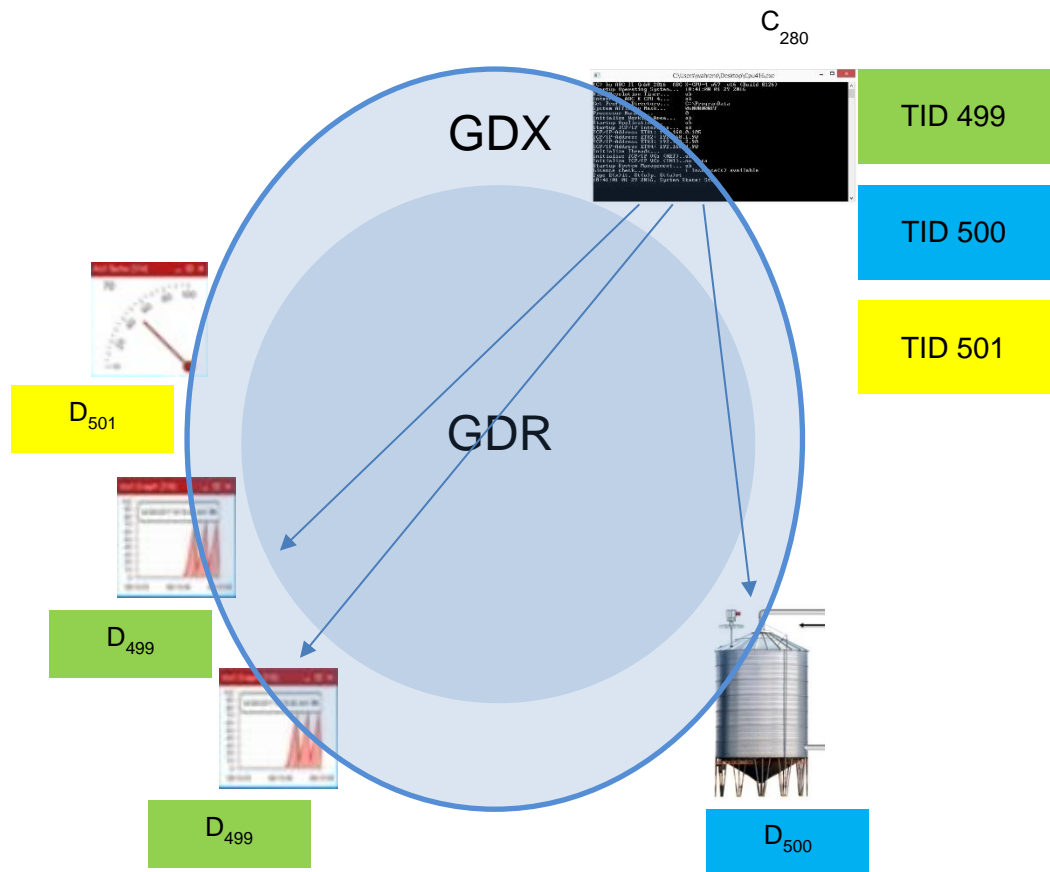
Sender and receiver work with identical objects.

Adresse	Name	Typ	Anfangswert	Kommentar
0.0		STRUCT		
+0.0	LifeCount	DWORD	DW#16#0	
+4.0	Data	ARRAY[0..99]		
+1.0		BYTE		
=104.0		END_STRUCT		

Typified data source under STEP7

5.2 Controller – device communication

The ABC X-CPU-4 w57 is a GDX controller and is able to exchange data with all GDX devices.



Controller-device communication

A GDX device can be a C ++ / C # / Java / ... program, a hardware IO, a complete visualization or a measurement PC in telecontrol.

Devices become unique by assigning a device ID *GDXDID*. If several devices are parameterized with the same *GDXDID*, they will receive identical data objects.

For visualizations, this means a non-license dependent multiple execution is possible in the GDX network.

Schnittstelle

IN

OUT

IN_OUT

STAT

D

Object

SeqNo

Value

Min

Max

Desc

Desc

TEMP

Inhalt von: 'Umgebung\Schnittstelle\STAT\D'

Name	Datentyp	Anfangswert	Ausschlussoperand	Abbruchoperand	Kommentar
Object	DInt	L#514	<input type="checkbox"/>	<input type="checkbox"/>	Object Tacho
SeqNo	DWord	DW#16#0	<input type="checkbox"/>	<input type="checkbox"/>	
Value	Real	0.000000...	<input type="checkbox"/>	<input type="checkbox"/>	
Min	Real	0.000000...	<input type="checkbox"/>	<input type="checkbox"/>	
Max	Real	1.000000...	<input type="checkbox"/>	<input type="checkbox"/>	
Desc	String[32]	'Tacho'	<input type="checkbox"/>	<input type="checkbox"/>	

FB600 : Titel:

Kommentar:

Netzwerk 1: Type Object

L L#514

T #D.Object

#D.Object

-- Object Tacho

Netzwerk 2: Sequence Number

L #D.SeqNo

L 1

+D

T #D.SeqNo

#D.SeqNo

Netzwerk 3: Value

L #Value

T #D.Value

#Value

#D.Value

Netzwerk 4: Automatic

U #Automatic

SPB L800

#Automatic

Netzwerk 5: Minimum

L #Min

T #D.Min

#Min

#D.Min

Netzwerk 6: Maximum

L #Max

T #D.Max

#Max

#D.Max

Netzwerk 7: Description

CALL "BLKMOV"

SRCBLK :=#Desc

RET_VAL:=#t_int

DSTBLK :=#D.Desc

SFC20

#Desc

#t_int

#D.Desc

-- Copy Variables

Netzwerk 8: Peripherie/Port Address

L800: NOP 0

L DINO

SLD 3

T #o

#o

Netzwerk 9: Aktuelle Instanz entspricht dem GDX-Objekt

L 54

L 16

T PAD [#o]

#o

Netzwerk 10: Error

L 0

GDX-Device Tacho definition under STEP7

The data object *Tacho* with the type ID *GDXTID* 514 is transferred to the GDR with the *GDXDID* 600. All devices with the ID 600 will receive this data.