



Documentation

ABC-CPU Systems

Global Data Xchange - GDx

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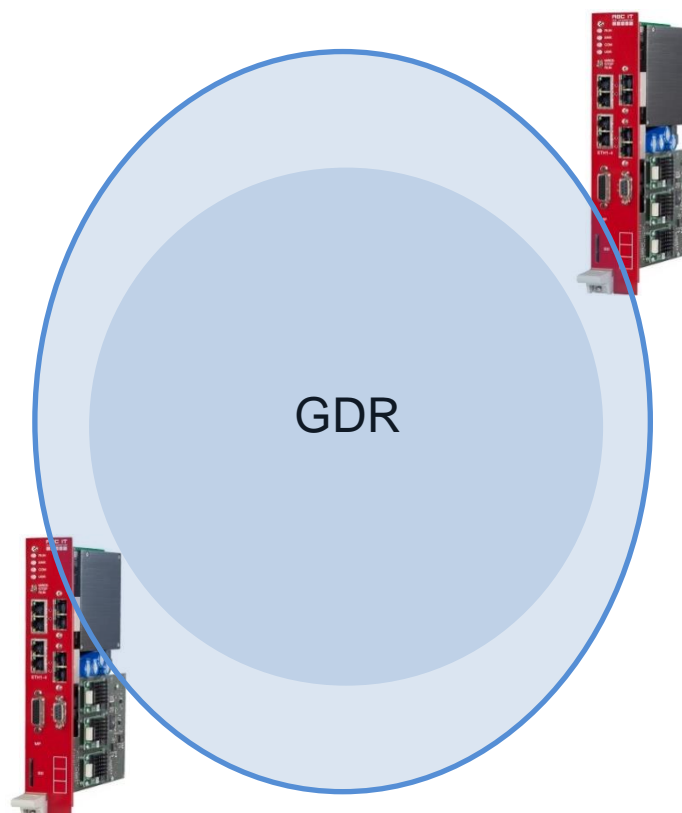
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1. Basics

1.1 The global data room

In the X-CPU technology we interpret the global data room that one controller is provided with data of another controller automatically, without parameterization of communication/programming, via the medium Ethernet.

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

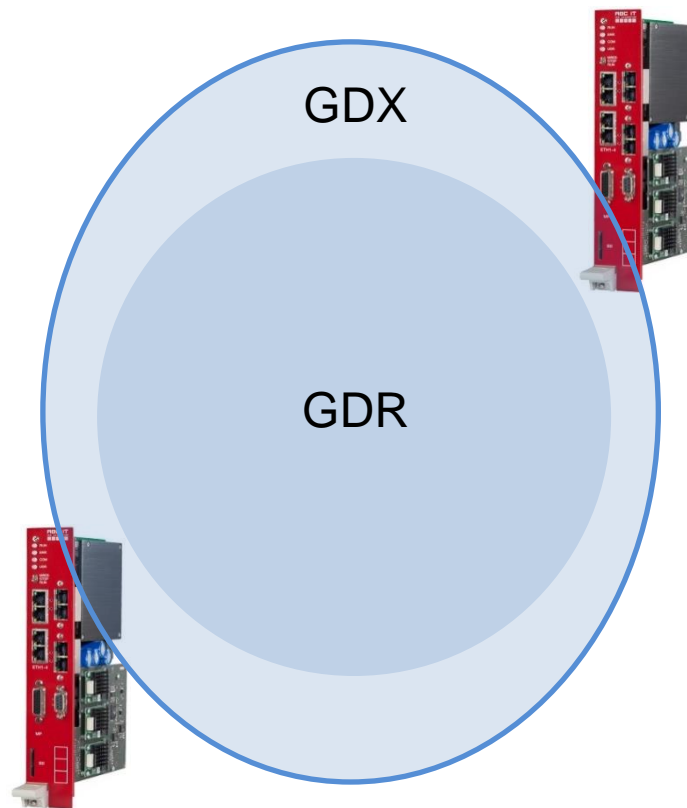


Global Data Room - GDR

1.2 The global data exchange

In the X-CPU – technology is the global data exchange the leading development for providing one controller with data of another controller automatically, without parameterization of communication/programming, via the medium Ethernet.

We've called the global data exchange of the X-CPU – technology '*Global Data Xchange*', or simply '*GDX*'.

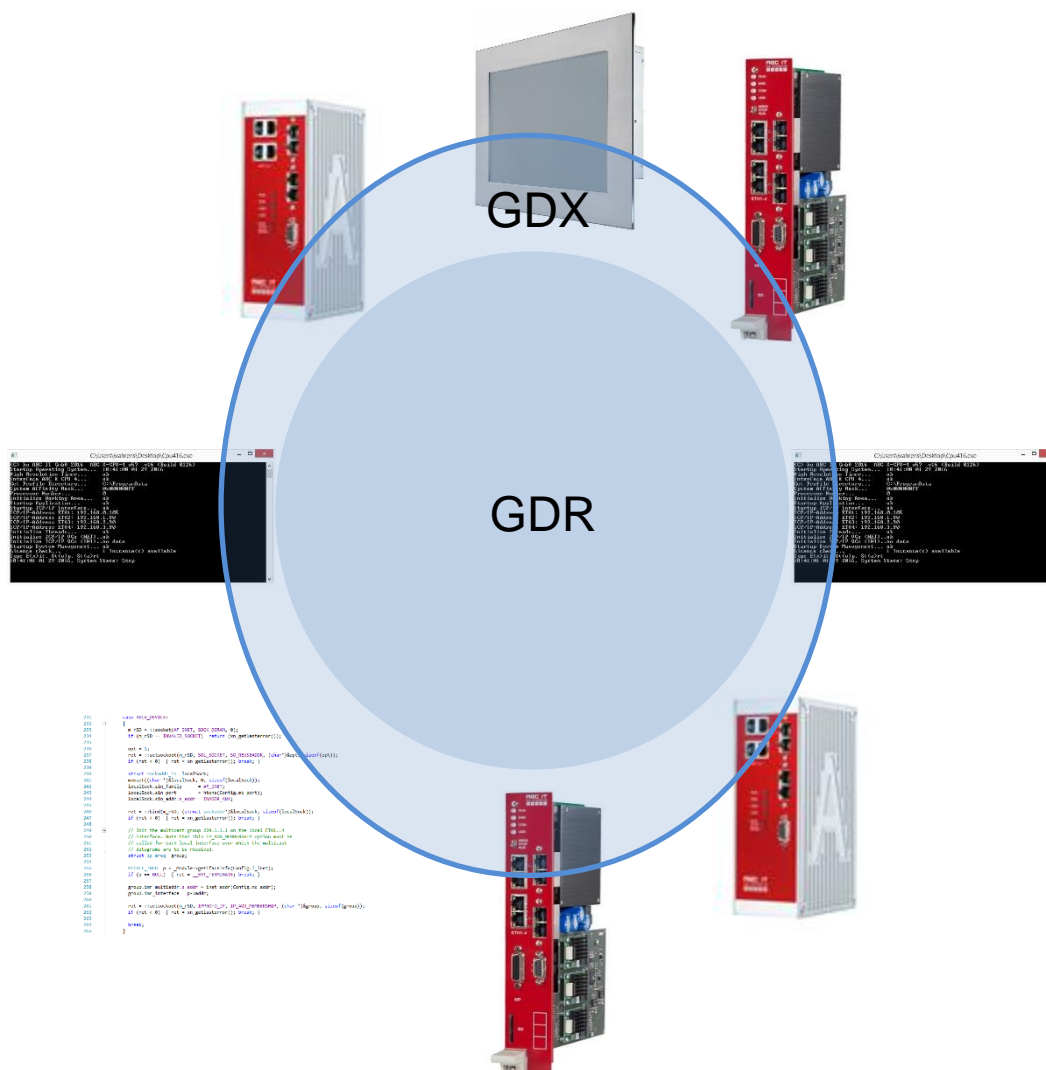


Global Data Xchange - GDX

1.3 Heterogeneous network topology

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

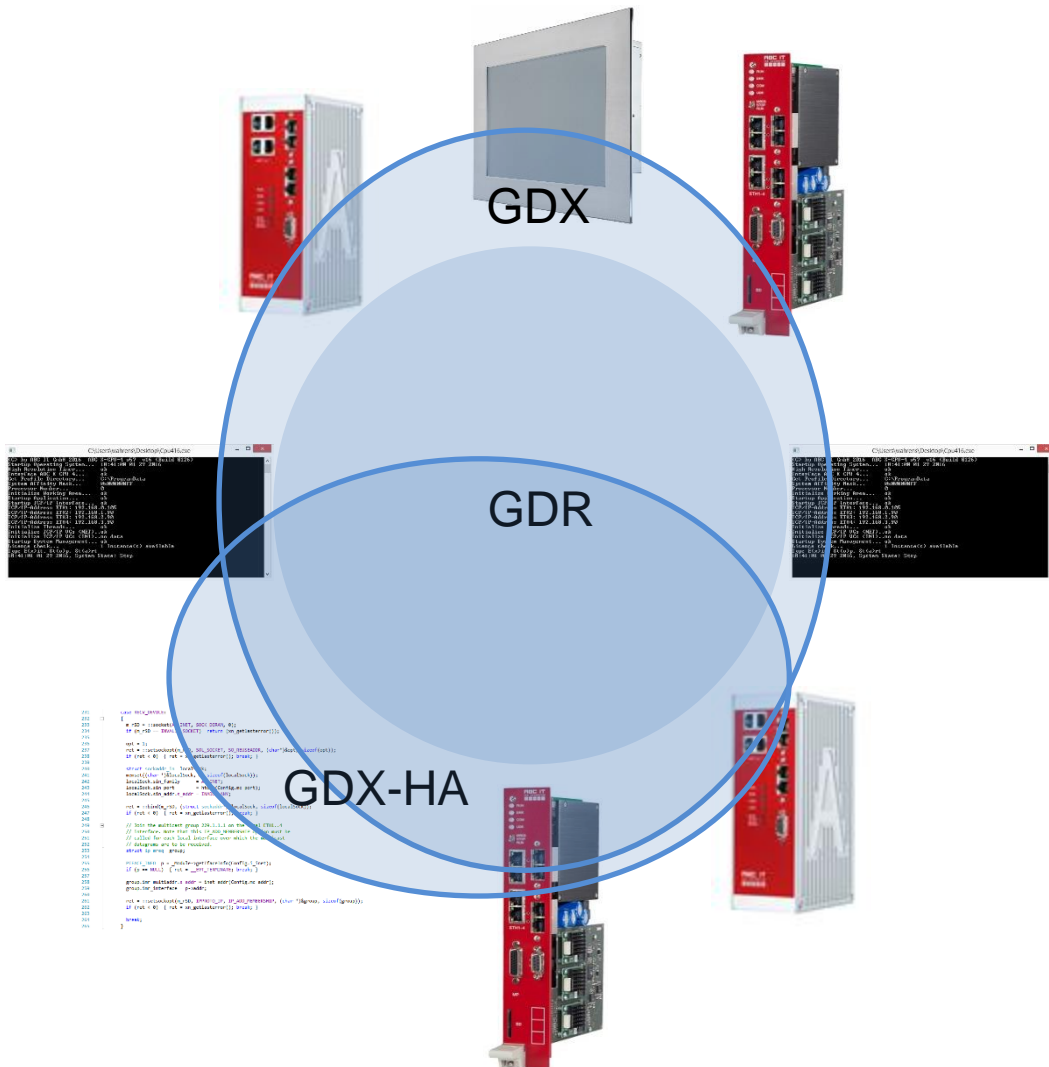
The GDX method is integrated in all X-CPU systems.
Furthermore, we provide C++/C# source code for free use.



Heterogene Netztopologie

1.5 O/Y – network topology

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



O/Y – Netztopologie

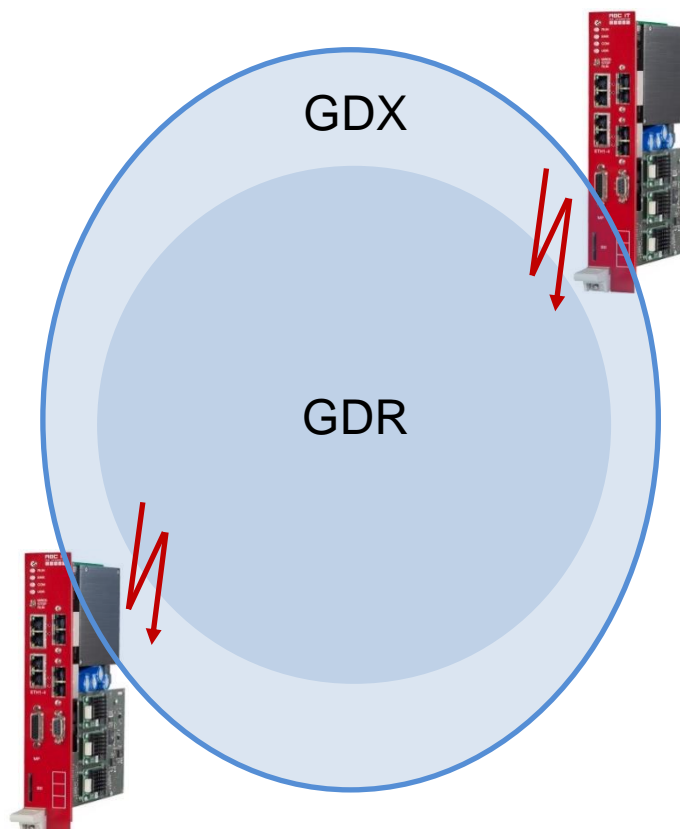
1.6 Telegram and data reduced communication

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

The telegram and data traffic can thus be greatly reduced.

The monitoring takes place at binary level and records every change. A typified data monitoring isn't effected.

If a change in the data area is detected, the complete data area is made available to the *GDR*.



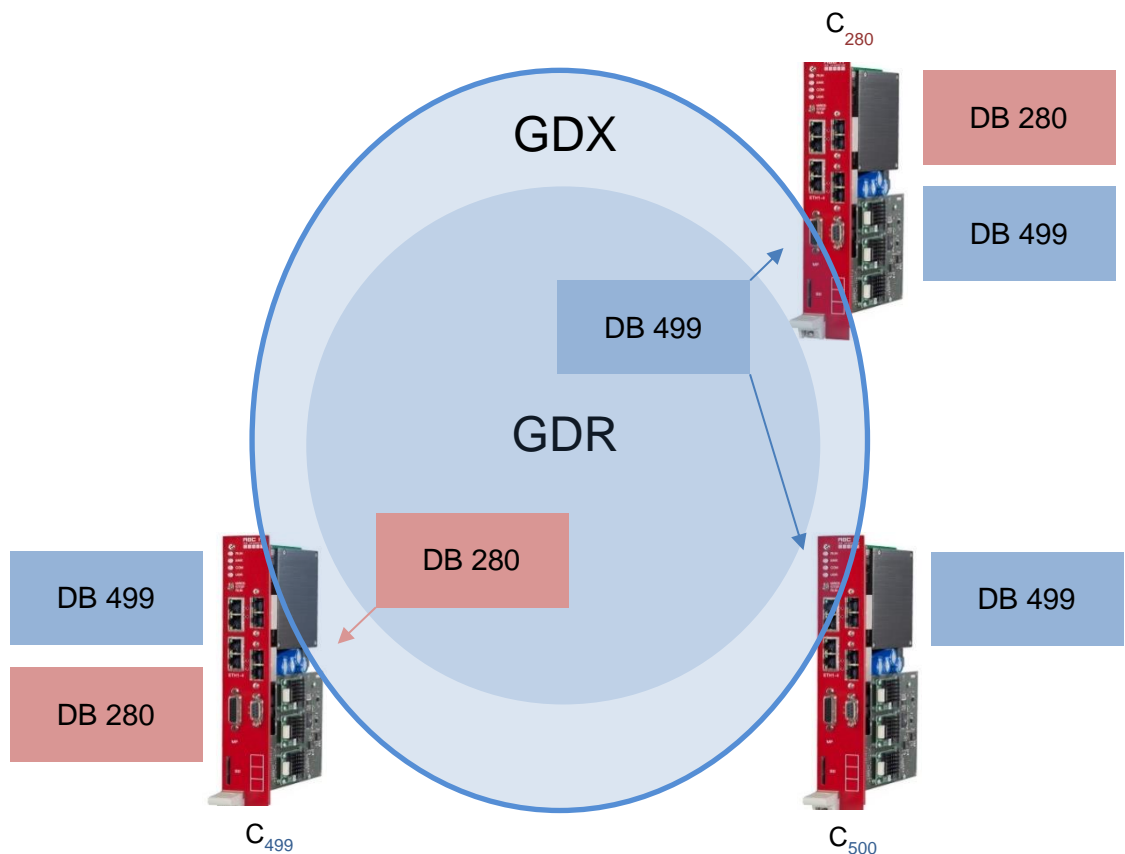
Change Management

2. Global Data Room – GDR

2.1 Areas under STEP7

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

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



Data area under STEP7

In this case an X-CPU-2 m57 with the controller number 280, the second and third one with the controller numbers 499 and 500 were parameterized.

The respective own data block corresponds to the controller number. The data of this block, if there are any, is made available in the GDR.

Controller 280 is provided with data from controller 499 because a local DB499 is present. Conversely, controller 499 may access the data from controller 280.

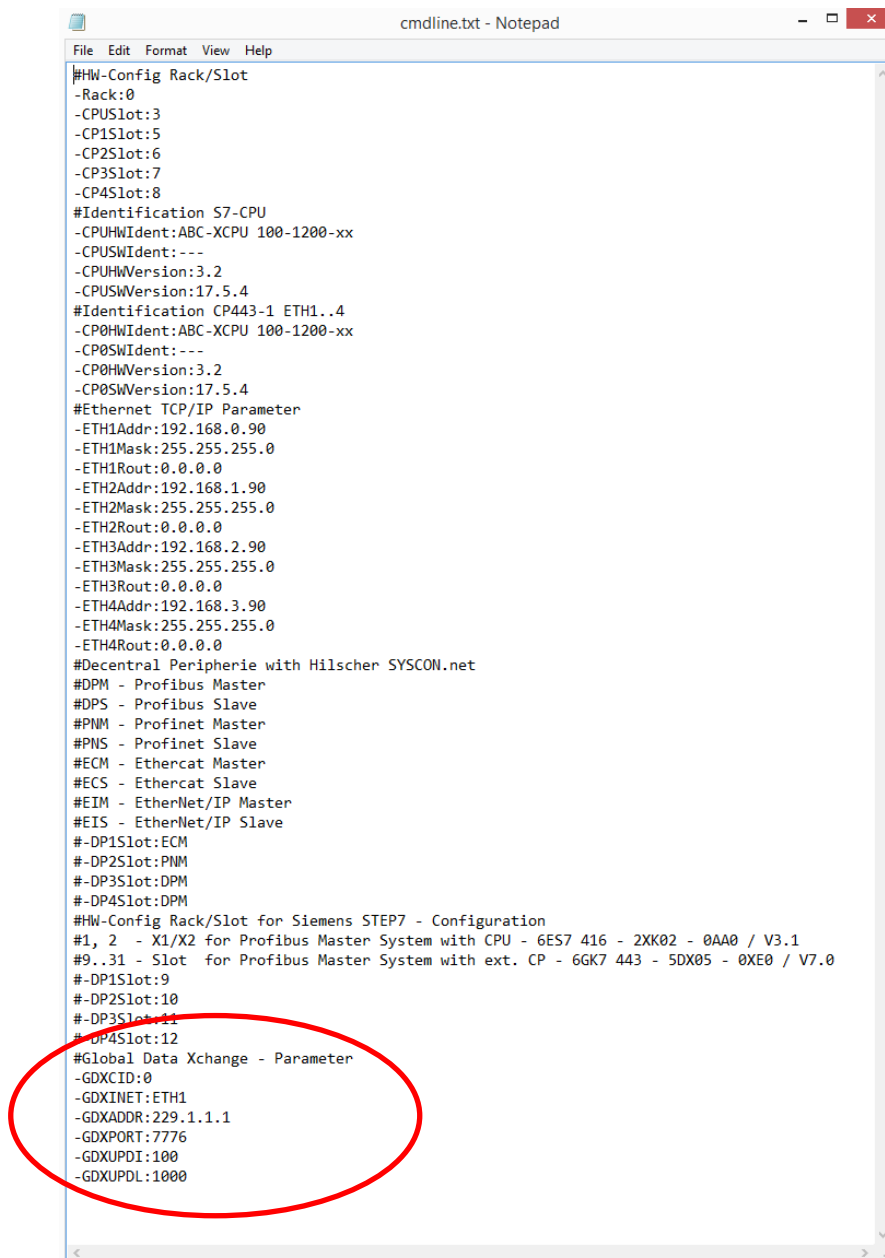
The controller 500 doesn't have its own data for the GDR (the corresponding S7 data block would be DB500), but accesses data from controller 499.

At controller level is decided whether and what data is provided to the GDR and what data is accessed in the GDR.

3. Parameterization

3.1 cmdline.txt

The parameterization of the Global Data Xchange is done by *'cmdline.txt'*.

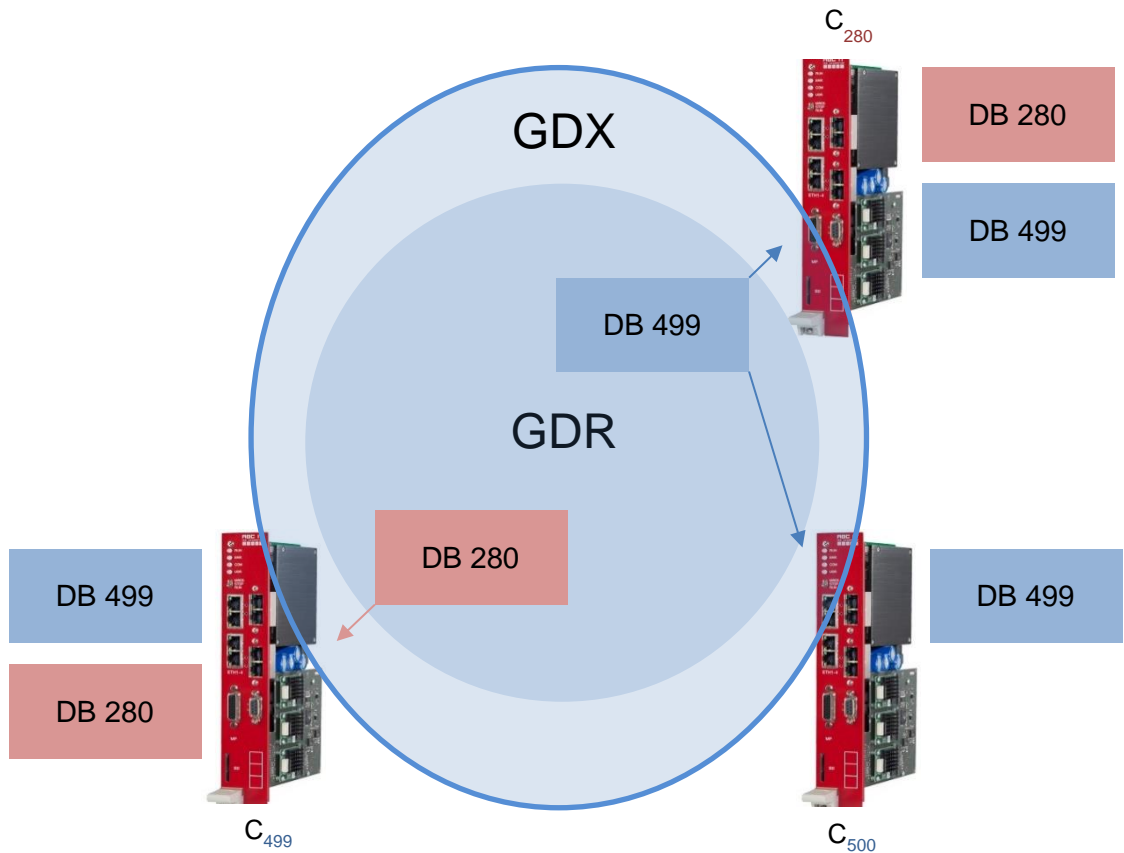


```
cmdline.txt - Notepad
File Edit Format View Help
##HW-Config Rack/Slot
-Rack:0
-CPUSlot:3
-CP1Slot:5
-CP2Slot:6
-CP3Slot:7
-CP4Slot:8
#Identification S7-CPU
-CPUHWIdent:ABC-XCPU 100-1200-xx
-CPUHWIdent:---
-CPUHWVersion:3.2
-CPUHWVersion:17.5.4
#Identification CP443-1 ETH1..4
-CP0HWIdent:ABC-XCPU 100-1200-xx
-CP0HWIdent:---
-CP0HWVersion:3.2
-CP0HWVersion:17.5.4
#Ethernet TCP/IP Parameter
-ETH1Addr:192.168.0.90
-ETH1Mask:255.255.255.0
-ETH1Rout:0.0.0.0
-ETH2Addr:192.168.1.90
-ETH2Mask:255.255.255.0
-ETH2Rout:0.0.0.0
-ETH3Addr:192.168.2.90
-ETH3Mask:255.255.255.0
-ETH3Rout:0.0.0.0
-ETH4Addr:192.168.3.90
-ETH4Mask:255.255.255.0
-ETH4Rout:0.0.0.0
#Decentral Peripherie with Hilscher SYSCON.net
#DPM - Profibus Master
#DPS - Profibus Slave
#PNM - Profinet Master
#PNS - Profinet Slave
#ECM - Ethercat Master
#ECS - Ethercat Slave
#EIM - EtherNet/IP Master
#EIS - EtherNet/IP Slave
#-DP1Slot:ECM
#-DP2Slot:PNM
#-DP3Slot:DPM
#-DP4Slot:DPM
##HW-Config Rack/Slot for Siemens STEP7 - Configuration
#1, 2 - X1/X2 for Profibus Master System with CPU - 6ES7 416 - 2XK02 - 0AA0 / V3.1
#9..31 - Slot for Profibus Master System with ext. CP - 6GK7 443 - 5DX05 - 0XE0 / V7.0
#-DP1Slot:9
#-DP2Slot:10
#-DP3Slot:11
#-DP4Slot:12
#Global Data Xchange - Parameter
-GDXCID:0
-GDXINET:ETH1
-GDXADDR:229.1.1.1
-GDXPORT:7776
-GDXUPDI:100
-GDXUPDL:1000
```

GDX ist disabled by Default

3.2 GDXCID

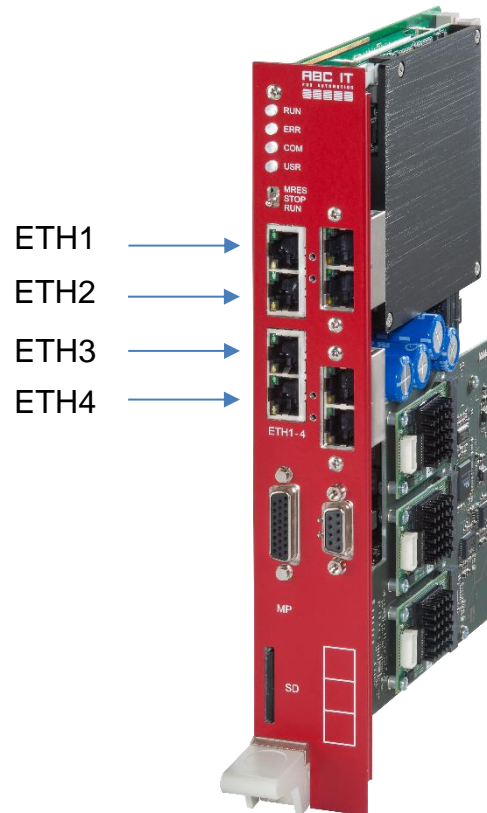
Die Controller-ID *GDXCID* must be unique in the *GDR* (0=disabled, 1-65535). The CID defines the data area in the *GDR*. The CID defines the local S7 sending data block in the Controller.



Controller-ID - CID

3.3 GDXINET

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



X-CPU-3 c57 Interface

Special feature of GDX-HA in O-topology:

Assignment of two Ethernet interfaces:

- GDXINET:ETH3
- GDXINET:ETH4

Looping through the Ethernet always takes place to identical interfaces:

3-HA Controller

C280 ETH4 zu C500 ETH4
C500 ETH3 zu C499 ETH3
C499 ETH2 zu C280 ETH2

4-HA Controller

C280 ETH4 zu C500 ETH4
C500 ETH3 zu C499 ETH3
C499 ETH4 zu C313 ETH4
C313 ETH3 zu C280 ETH3

3.4 GDXADDR

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

3.5 GDXPORT

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

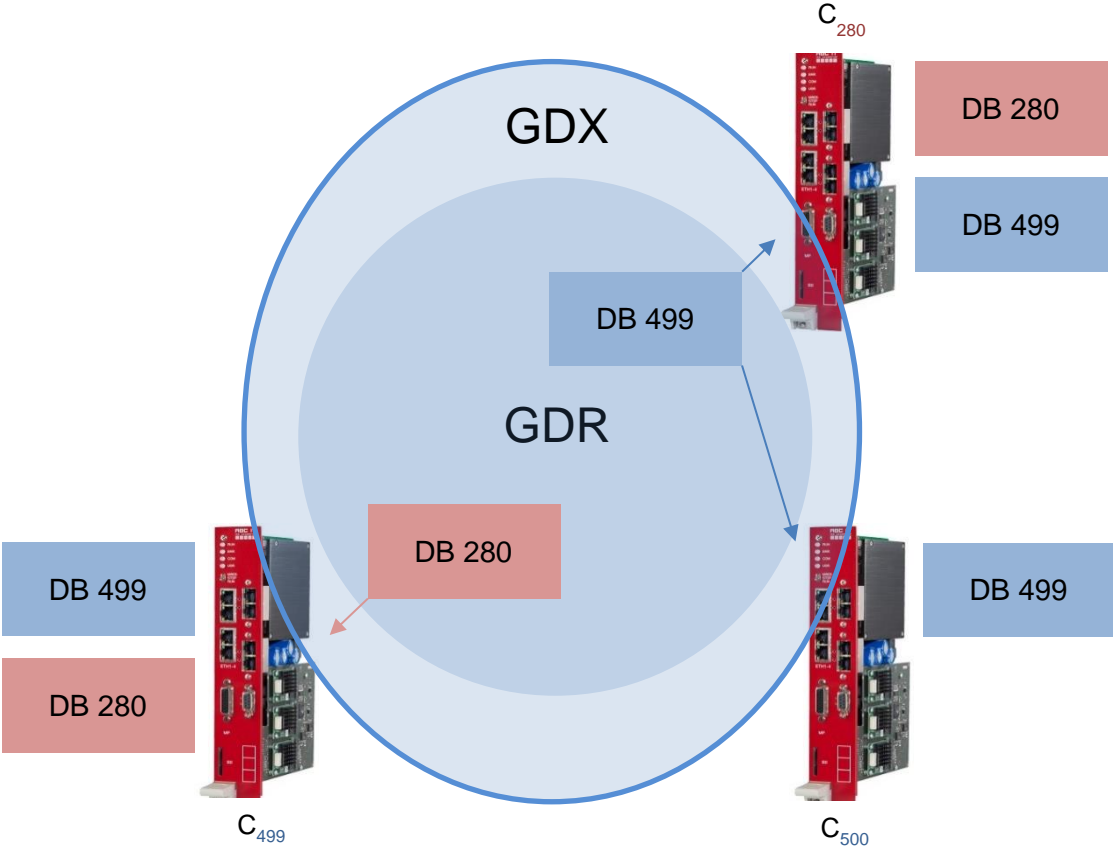
3.6 GDXUPDI

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

4. Global Data Xchange GDX

4.1 Controller – controller communication

The ABC X-CPU-4 w57 is a GDX – controller and capable of exchanging typified data with all other GDX – controllers.



Controller-Controller communication

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

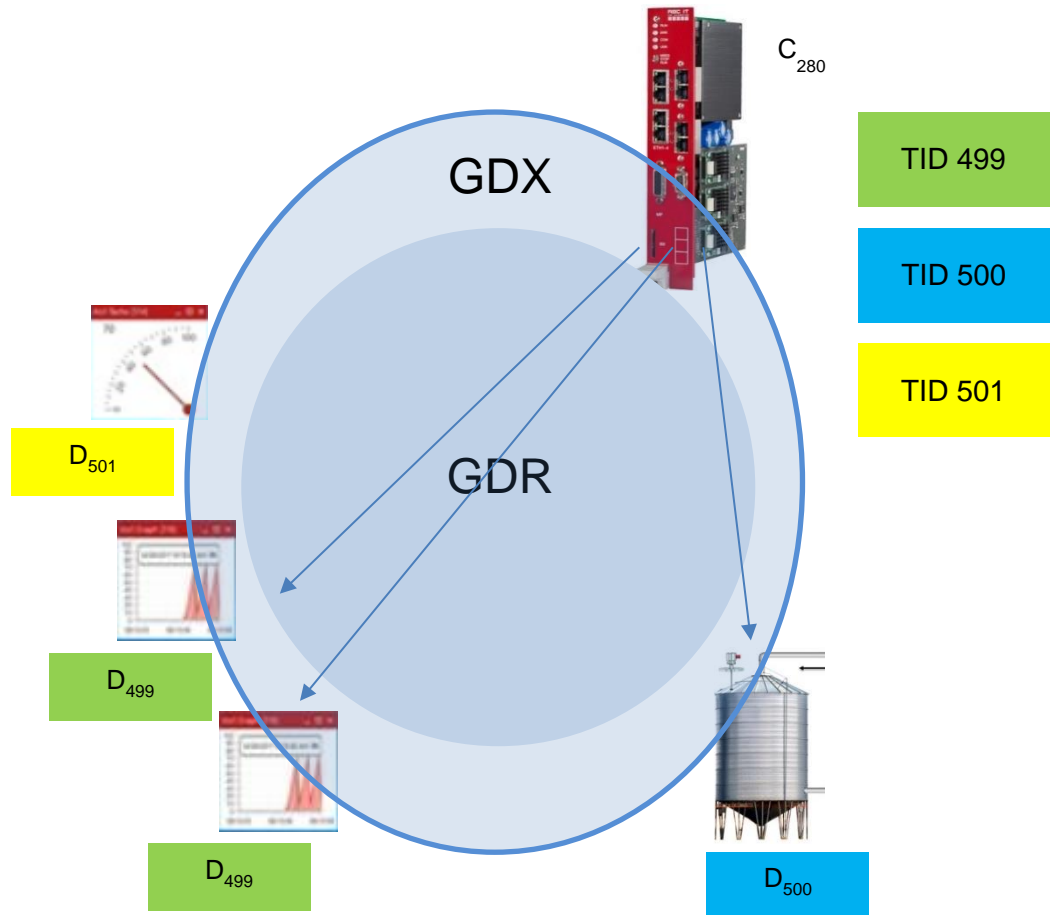
Transmitter and receiver work with identical objects.

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

4.2 Controller – device communication

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



Controller-Device Kommunikation

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 receive identical data objects.

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

Schnittstelle		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          #D.SeqNo
    L   1
    +D
    T   #D.SeqNo          #D.SeqNo

[ ] Netzwerk 3: Value
    L   #Value            #Value
    T   #D.Value          #D.Value

[ ] Netzwerk 4: Automatic
    U   #Automatic        #Automatic
    SPB L800

[ ] Netzwerk 5: Minimum
    L   #Min              #Min
    T   #D.Min            #D.Min

[ ] Netzwerk 6: Maximum
    L   #Max              #Max
    T   #D.Max            #D.Max

[ ] Netzwerk 7: Description
    CALL "BLKMOV"          SFC20      -- Copy Variables
    SRCBLK :=#Desc         #Desc
    RET_VAL:=#t_int        #t_int
    DSTBLK :=#D.Desc       #D.Desc

[ ] 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   P&D [#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 receive this data.