



TINE Release 4.0 News

(May 7, 2010: That was the month that was !)

“What a long, strange trip it’s been”

From last time ...

New Features: Security

- **Network Address** Access Restriction
 - via File (*in [FEC_HOME]/<EQM>*)
 - `ipnets.csv`
 - `<property>-ipnets.csv`
 - `property-default-ipnets.csv`
 - `<device>-ipnets.csv`
 - `device-default-ipnets.csv`
 - via API
 - `AppendRegisteredNetsList(eqm, iplist, listsize)`
 - `AssignPropertyNetsList(eqm, prp, ipnets, nipnets)`
 - `AssignDeviceNetsList(eqm, prp, ipnets, nipnets)`

Equivalent methods in java (`TEquipmentModule`) ...

Address Lists ...

Traditional :

SUBNET

131.169.9.255

0.0.0.0

131.169.120.47

→ All addresses on subnet .9.

→ The local host via SHM

→ The specific host @ 131.169.120.47

And now :

SUBNET

131.169.150.255

131.169.9.64/26

0.0.0.0

131.169.119.0/26

131.169.120.0/24

CIDR (*Class Inter Domain Routing*) notation

→ 131.169.9.64 -> 131.169.9.127

→ 131.169.119.0 -> 131.169.119.63

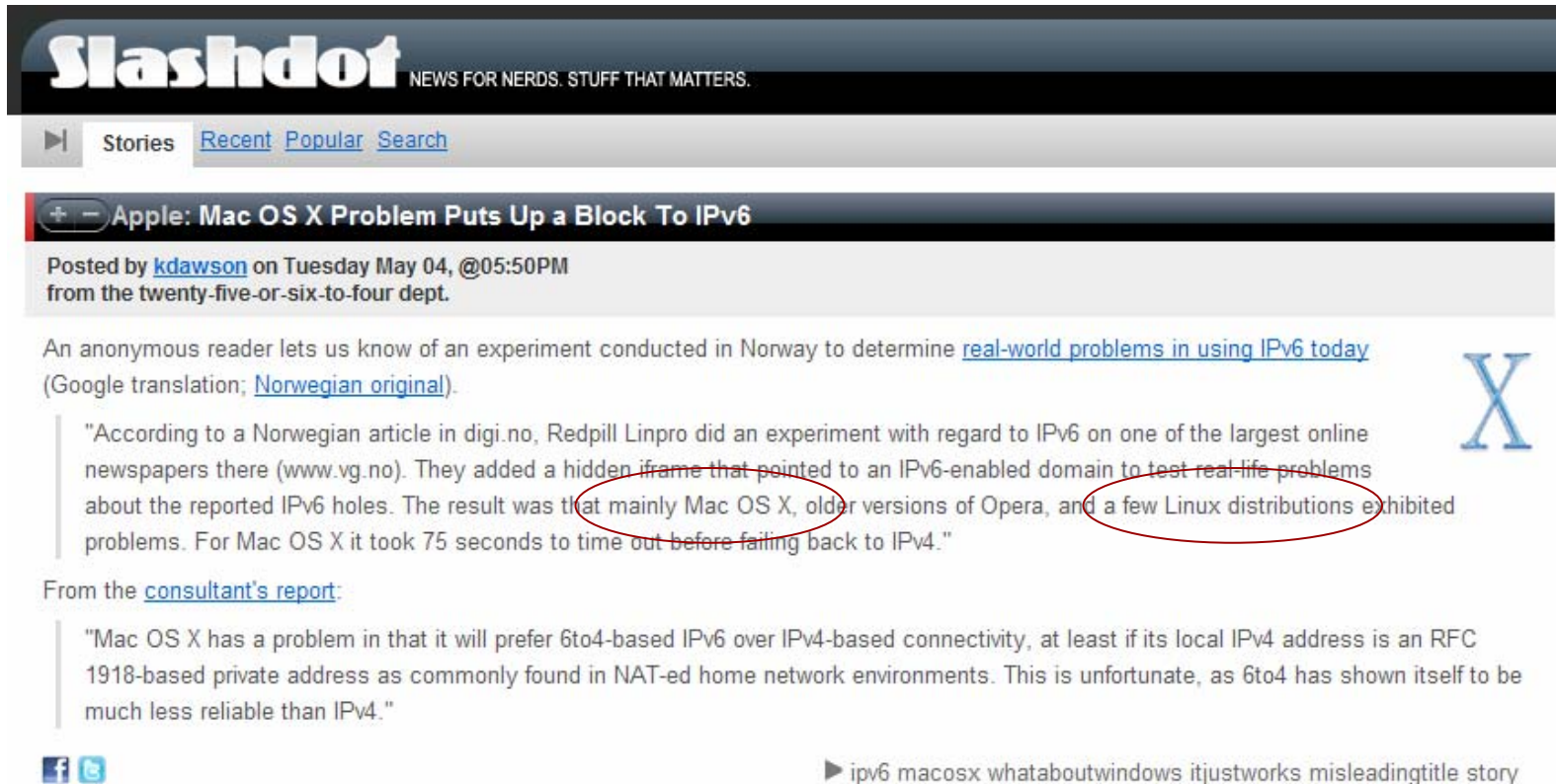
→ 131.169.120.0 -> 131.169.120.255

(equivalent to 131.169.120.255)

[IPv4 versus IPv6]

It just won't go away ...

<http://apple.slashdot.org/story/10/05/04/2029255/Mac-OS-X-Problem-Puts-Up-a-Block-To-IPv6>



Slashdot NEWS FOR NERDS. STUFF THAT MATTERS.

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Apple: Mac OS X Problem Puts Up a Block To IPv6



Posted by [kdawson](#) on Tuesday May 04, @05:50PM
from the twenty-five-or-six-to-four dept.

An anonymous reader lets us know of an experiment conducted in Norway to determine [real-world problems in using IPv6 today](#) (Google translation; [Norwegian original](#)).

"According to a Norwegian article in [digi.no](#), Redpill Linpro did an experiment with regard to IPv6 on one of the largest online newspapers there ([www.vg.no](#)). They added a hidden iframe that pointed to an IPv6-enabled domain to test real-life problems about the reported IPv6 holes. The result was that at mainly Mac OS X, older versions of Opera, and a few Linux distributions exhibited problems. For Mac OS X it took 75 seconds to time out before failing back to IPv4."

From the [consultant's report](#):

"Mac OS X has a problem in that it will prefer 6to4-based IPv6 over IPv4-based connectivity, at least if its local IPv4 address is an RFC 1918-based private address as commonly found in NAT-ed home network environments. This is unfortunate, as 6to4 has shown itself to be much less reliable than IPv4."


 

► [ipv6](#) [macosx](#) [whataboutwindows](#) [itjustworks](#) [misleadingtitle](#) [story](#)

IPv4 versus IPv6 (work-around)

```
public TPacket(int port,int rcvBufferSize,int timeToLive)
{
    int clnport = initializer.getClnPort();
    boolean useNextPort = false;
    boolean socketBound = false;
    InetAddress grp;
    for (int i=0; !socketBound && i<1000; i++)
    {
        try
        {
            if (port == 0)
            { // general client side port
                useNextPort = true;
                InetAddress iaddr = InetAddress.getLocalHost();
                if (os != null && os.contains("Linux")) iaddr = null;
                InetSocketAddress addr = new InetSocketAddress(iaddr,clnport+i);
                sck = new MulticastSocket(null);
                sck.setReuseAddress(false);
                sck.bind(addr);
                sck.setSoTimeout(0);
                sck.setReceiveBufferSize(rcvBufferSize);
                sck.setTimeToLive(timeToLive);
                socketBound = true;
                this.port = clnport + i;
            }
            else if (port == initializer.getGCastPort())
            { // globals listening port
                grp = InetAddress.getByName(initializer.getGCastAddress());
            }
        }
    }
}
```

MAC OS needs this
Linux gets confused by it
Windows doesn't care



[And Now ...]

- A Tale of Two Servers ...

Magnet Server : PETRA

Device servers

Device servers	Description	
Cms.MagnetPs	PE Central Magnet Server	<input type="button" value="Ping"/> <input type="button" value="Control"/> <input type="button" value="Restart"/>

Activity Contracts Clients Alarms Log File Stats

Server	PEMAGCMS
Local Time	Thu May 06 16:28:11
Start Time	Thu May 06 13:14:32
Sys Poll Rate	100
Nr bkg tasks	0
[SRV] Nr total contracts	38
[SRV] Nr total clients	12
[SRV] PETRA/Cms.MagnetPs contracts	7
[SRV] PETRA/Cms.MagnetPs clients	1
[SRV] Nr UDP packets received	59880
[SRV] Nr TCP packets received	0

Device servers

Device servers	Description	
Cms.MagnetPs	PE Central Magnet Server	<input type="button" value="Ping"/> <input type="button" value="Control"/> <input type="button" value="Restart"/>

Activity Contracts Clients Alarms Log File Stats

Ave Busy Time (%)	0
Cycle Counts	150
Max Cycle Counts	823
Sgl Link Counts	4378
Client Misses	0
Client Reconnects	2
Client Retries	1
Contract Misses	0
Contract Delays	0
Burst Limit Reached Count	0
Data Timestamp Offset (ms)	0

Magnet Server : FLASH

Device servers	Description	
TTFMAG	TTF Magnet Server	<input type="button" value="Ping"/> <input type="button" value="Control"/> <input type="button" value="Restart"/>

Activity	Contracts	Clients	Alarms	Log File	Stats
Server	TTFMAG				
Local Time	Thu May 06 16:31:20				
Start Time	Thu May 06 07:55:07				
Sys Poll Rate	50				
Nr bkg tasks	0				
[SRV] Nr total contracts	1058				
[SRV] Nr total clients	22				
[SRV] TTF2/TTFMAG contracts	19				
[SRV] TTF2/TTFMAG clients	2				
[SRV] Nr UDP packets received	1850664				
[SRV] Nr TCP packets received	0				

Device servers	Description	
TTFMAG	TTF Magnet Server	<input type="button" value="Ping"/> <input type="button" value="Control"/> <input type="button" value="Restart"/>

Activity	Contracts	Clients	Alarms	Log File	Stats
					<input type="button" value="Refresh"/>
Ave Busy Time (%)	17				
Cycle Counts	38				
Max Cycle Counts	773				
Sgl Link Counts	496078				
Client Misses	0				
Client Reconnects	21049				
Client Retries	484				
Contract Misses	155				
Contract Delays	0				
Burst Limit Reached Count	0				
Data Timestamp Offset (ms)	0				

[Servers under Attack ...]

- Recent Features to improve performance.
 - Prevent redundant 'contract list' scans !
 - Get/SetSchedulerInterval()
 - Default = 0 (as often as necessary)
 - Non-zero value -> minimum interval (but introduces latency!)
 - Get/SetSystemCycleDeadband()
 - Default ~ 10 msec (most OSes)
 - Gives time to wait for a server request
 - Blocks the scheduler until a request comes in (no latency problem!)
 - Distinguish between contract 'renewal' or 'cancel' AND 'new request'.
 - 'deadband' wait broken by any of these, but pass thru scheduler blocked if nothing 'new'!

Servers under Attack ...

- How to coerce 'single-device' panel or MatLab applications into efficient data access ?
 - Avoid synchronous polling !
 - The server could 'enforce' this (but that's rather harsh).
 - Make MatLab, etc. use asynchronous 'listeners' (i.e. synchronous calls from a local buffer).
 - Enforce Multi-Channel Array (MCA) access
 - Need to register properties as such !
 - OO issues (Karol is working on this)
 - DOOCS enquires as to data type/size need to 'see' a 'single value' as the data size
 - DDD panels don't know how to deal with a MCA as is!
 - CF_DEFAULT will report a size of '1' if property is a registered MCA -> single-element link logic is already in place !
 - If 'rpc_test' sees a MCA property then show the user a '1' as the data size!
 - If Necessary: enforce **NETWORK** (i.e. multicast) access

Feature-of-the-Month AWARD

MCS-1

– (Room 520) For dealing with this!

Plus: a bronze star as well :



[doocs2tine News]

- Current deployed version contains the necessary client-logic to 'react' to a 'CF_DEFAULT' request to a MCA property properly.
 - Next TINE server release will now fix CF_DEFAULT requests for MCA properties to use a size of '1' (the DOOCS preference).

Multi-Channel Arrays (a short review)

See <http://adweb.desy.de/mcs/tine/tinearraytype.html>

- If you register a property as Multi-Channel Array then it should behave like one! (this is a ‘covenant’)
 - If property “P” is registered MCA then:
 - “P” will provide an array of length N (same EGU and settings)
 - Each element of “P” corresponds to a device channel
 - The order of the device channels in the array can be obtained by calling “P.NAM”
 - Various ways to achieve this
 - explicit property registration
 - Device assignment via API or file
 - Default to the registered DEVICES list
 - The Device specified in the call to “P” gives the desired ‘offset’ in the MCA.
 - The Array Length specified in the call gives the number of elements desired (usually ‘1’ or ‘N’).
 - The behavior of the call when (requested length) > (N – offset) is left unspecified, but the server should NOT return an error.
 - One possibility: Wrap the array
 - Another possibility: Truncate the call

[Multi-Channel Arrays (a short review)]

- Single-element access of MCA property “P” flows thru internal handshaking
 - returns the entire array to the caller
 - informs him which element is desired!
- Application asking for all (or many) channels individually
 - collapses to a single contract
 - single interrupt at the server
- Major efficiency advantage
- Numerous use case ‘bugs’ fixed over past several months.
 - Most recent:
 - Single-element call with a non-existent device
 - Single-element call with an expired synchronous contract still in link table.
 - Other ‘cute’ use cases:
 - Multiple identical, single-element links using CF_DEFAULT and landing on a redirected property ...

[Multi-Channel Arrays (a short review)]

- You can turn the 'handshaking' OFF (if desired):
 - SetEnforceMultiChannelAccess(TRUE or FALSE) (Default = TRUE)
- Advantages
 - Much more efficient
 - 1 dispatch interrupt instead of many
 - Less network traffic
 - Overhead of single contract instead of many
 - Atomic data access
 - Some 'collections' need to be atomic !
 - Archiving is much, much easier
 - Easier to configure
 - Easier to retrieve
 - 'Snapshots' of MCA at a given time
- This is a 'property' oriented view
 - Similar but NOT equivalent to wildcard '*' calls
 - With an MCA you know a priori what will come back
 - With a wildcard call you don't!

A working example :

The screenshot displays the 'Ante Linac Chopper' control interface. The main window includes a menu bar (Datei, Optionen, Hilfe) and a 'Betriebszustand' section with three buttons: 'Chopper einschalten', 'Chopper in den Sparzustand schalten', and 'Chopper ausschalten'. A 'Puls' control panel shows 'Soll: 984.6323µs' and various adjustment buttons (-10ns, -1ns, -100ps, +100ps, +1ns, +10ns). A 'Timing' graph shows a signal transition from approximately 6V to 4V. Two 'Tine Status Viewer' windows are overlaid, showing a list of links and messages. A yellow callout box highlights the 'Links' tab in the viewer, stating 'Has 14 links instead of ~110!'. The viewer displays a list of messages with columns for time, status, and link names.

Time	Status	Link Name
Thu May 06 18:18:24 CEST 2010	success	..LINAC2/Chop.Power/#0/State
Thu May 06 18:18:24 CEST 2010	success	..LINAC2/Chop.Par/#0/CurrentTarget
Thu May 06 18:18:24 CEST 2010	success	..LINAC2/Chop.Par/#0/VoltageTarget
Thu May 06 18:18:12 CEST 2010	success	..LINAC2/Chop.Par/#0/NALARMS
Thu May 06 18:18:24 CEST 2010	success	..LINAC2/ChopperTiming/GEMEINSAM/
Thu May 06 18:18:24 CEST 2010	success	..LINAC2/ChopperTiming/PULSBREITE
Thu May 06 18:18:24 CEST 2010	success	..LINAC2/Chop.Par/#0/CurrentActualDi
Thu May 06 18:18:24 CEST 2010	success	..LINAC2/Chop.Par/#0/VoltageActualDi
Thu May 06 18:18:24 CEST 2010	success	..LINAC2/ChopperTraces/Timing/Error
Thu May 06 18:18:24 CEST 2010	success	..LINAC2/Chop.FanAnCo/#0/ActualDisp
Thu May 06 18:18:24 CEST 2010	success	..LINAC2/ChopperTraces/Timing/Trace
Thu May 06 18:18:25 CEST 2010	success	..LINAC2/ChopperTraces/Timing/Trace
Thu May 06 18:18:25 CEST 2010	success	..LINAC2/Chop.Par/#0/CurrentAdjustm
Thu May 06 18:18:25 CEST 2010	success	..LINAC2/Chop.Par/#0/VoltageAdjustm

New Stock Properties

“SRVSETTINGS”

The screenshot shows the Java Instant Client interface. The 'Device Context' is set to 'PETRA' and the 'Device Server' is 'MDI2_Prosilica1'. The 'Device Subsystem' is 'ALL' and the 'Device Property' is 'SRVSETTINGS'. The 'Data Size' is '1' and the 'Data Type' is 'STRUCT'. The 'Timeout' is '1000'. The 'Show Stock Proprieties' checkbox is checked. The main display area shows the following data:

```
/PETRA/MDI2_Prosilica1/Server SRVSETTINGS @ 18:31:30.421
(0,3) [conTblCapacity] -> 1000
(0,4) [conRenewalLen] -> 60
(0,5) [clnTblCapacity] -> 100
(0,6) [ackOnChange] -> 1
(0,7) [srvBurstLimit] -> 1000
(0,8) [srvBurstCycDly] -> 20
(0,9) [srvPacketMTU] -> 64000
(0,10) [tcpMaxMsgSize] -> 100000000
(0,11) [tcpTblCapacity] -> 32
```

Same information as at command line:

The screenshot shows an SSH Secure Shell terminal window titled 'accfxpefacil01 - default - SSH Secure Shell'. The terminal displays the output of the 'get settings' command:

```
get settings
>Server Settings      :
>Server Work Area    : 1048576 bytes
>System Cycle interval: 10 msec
>Min Polling interval : 20 msec
>Contract tbl capacity: 1000 items
>Contract renewal len : 60 items
>Client tbl capacity  : 100 items
>Req ack. on change   : yes
>Retard cont. removal : no
>Server Burst Limit   : 1000 packets
>Burst Cycle Delay    : 20 msec
>Server Packet MTU    : 1472 bytes
>TCP maximum msg size : 100000000 bytes
>TCP tbl capacity     : 32 items
>Server Send Buffers  : 16384 bytes
>Server Recv Buffers  : 8192 bytes
>Server Scheduling    : eager
>Scheduler interval   : 0 msec
>Server tasks         : not re-entrant
>Server cycle thread  : common
>transport thread     : separate
>Allow remote exit    : no
>Allow remote init    : no
>Allow remote reset   : no
>Client Settings     :
>Client Work Area     : 65536 bytes
>Connect. tbl capacity: 1000 items
>Client Burst Limit   : 1000 packets
>Client Send Buffers  : 16384 bytes
>Client Recv Buffers  : 8192 bytes
>Client Recv Queue    : 10 items
>use loopback addr    : no
>use watchdog links   : yes
>allow common links   : yes
>retry on timeout     : yes
>
```

New Stock Property Behavior

- “SRVINIT”
 - No changes
 - calls an equipment module’s registered init routine
- “SRVEXIT”
 - No changes
 - Takes exit level as input
 - Causes a ‘clean’ exit of the server
- “SRVRESET”
 - *New behavior!*
 - De-registers all equipment modules (calls their exit routines)
 - Returns all allocated (tine) memory to the heap
 - Calls ‘PostSystemInit()’ (IF registered)
 - Can be used to effectively ‘warm’ restart the server!

Not yet available in java!

Note: Remote Management MUST be enabled !

SetAllowRemoteManagement(TRUE)

New Registration Routines

- C-Lib only:
 - SetPreSystemInitFunction(),
SetPostSystemInitFunction()

If “SRVRESET” is supposed to actually work properly !

```
2:mstbs02 - default - SSH Secure Shell
File Edit View Window Help
Quick Connect Profiles

duval@mcslxterm01:~/servers/SineServer$ cat devsrv.c
#include <stdio.h>
#include <stddef.h>
#include <stdlib.h>
#include "tine.h"

void PostSystemInit(void);
void PreSystemInit(void);

int main(int argc, char *argv[])
{
    PreSystemInit();
    SystemInit(TRUE);
    PostSystemInit();
    for(;;)
    {
        SystemCycle(TRUE);
    }
    return 0;
}
```

```
2:mstbs02 - default - SSH Secure Shell
File Edit View Window Help
Quick Connect Profiles

#include <stdio.h>
#include <stddef.h>
#include <stdlib.h>
#include "tine.h"

void PostSystemInit(void);
void PreSystemInit(void);

int main(int argc, char *argv[])
{
    SetPreSystemInitFunction(PreSystemInit);
    SetPostSystemInitFunction(PostSystemInit);

    SystemInit(TRUE);
    for(;;)
    {
        SystemCycle(TRUE);
    }
    return 0;
}
```

[Notable Bug Fix]

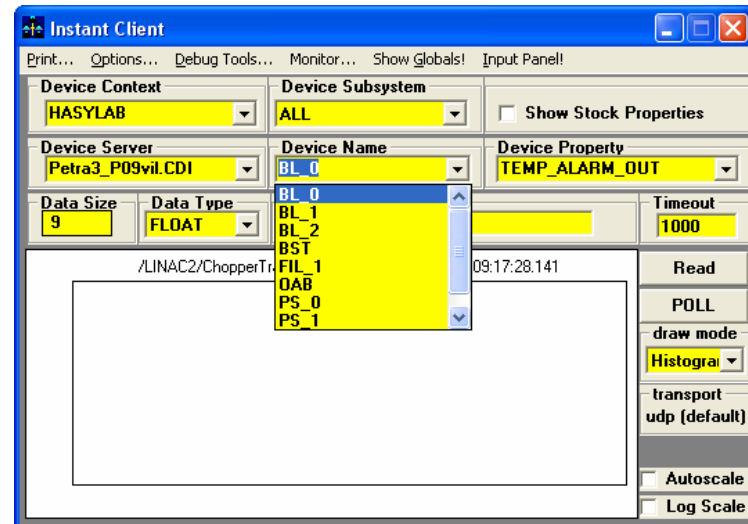
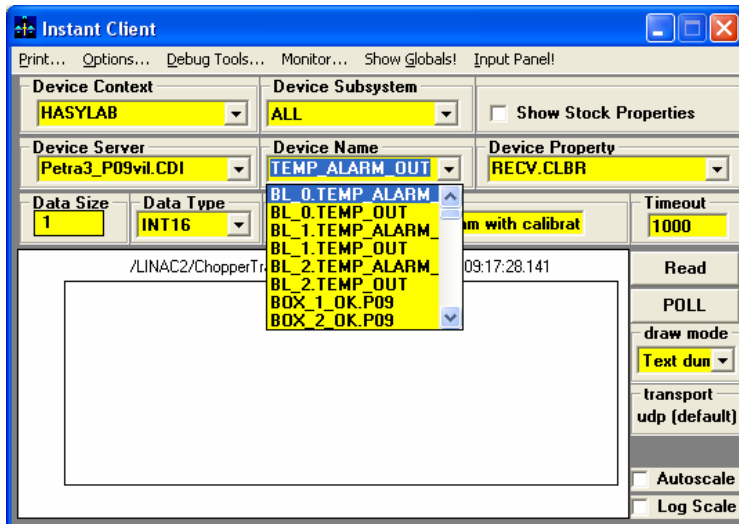
- In the buffered 'listener'
 - Note: this is a utility add-on (tbufsrv.dll/.so)
 - Used in [LabView](#), [MatLab](#)
 - And [tine2tango](#) (soon) !
 - Links with 'adjustable length data types' not working properly !
 - **CF_STRING** (free string)
 - **CF_AIMAGE** (adjustable image)
 - **CF_ASPECTRUM** (adjustable spectrum)

e.g. `alsnExecLink("/PETRA/Undulator/PU03","ConnectionErrorString", ...)`

requires data type **CF_STRING** !

CDI News

- Note: CDI devices with ‘decorated’ names
 - e.g. “BL_0.TEMP_ALARM_OUT”
 - Available as is via the “bus action” properties
 - “RECV”, “SEND”, “RECV.CLBR”, etc.
 - Also ‘parsed’ and offered as ‘extended’ (multi-channel array) properties
 - Property “TEMP_ALARM_OUT” with an associated device list:



[CDI News]

- But, by default, CDI servers call:
 - *SetEnforceMultiChannelAccess(FALSE)*
 - i.e. assume that the device server programmer knows best how to read out his hardware efficiently !
- However, some CDI servers are used directly as device servers !

[CDI News]

Something New !

- Can override the CDI default setting by
 - **API**: `cdiSetEnforceMcaAccess(TRUE)`
- Or (Ruediger's favorite)
 - set **CDI_FORCE_MCA_ACCESS=TRUE**
- If 'TRUE' then the single-element 'handshaking' is active !
 - But direct access from client applications should use the 'extended' properties

CDI News (example)

Device servers

Device servers	Description	
Petra3_P09vil.CDI	CDI Raw Hardware Server	Ping Control Restart

Activity Contracts Clients Alarms Log File Stats

Server	Petra3_P09vil
Local Time	Fri May 07 10:26:42
Start Time	Tue May 04 16:24:04
Sys Poll Rate	10
Nr bkg tasks	0
[SRV] Nr total contracts	110
[SRV] Nr total clients	6
[SRV] HASYLAB/Petra3_P09vil.CDI c...	110
[SRV] HASYLAB/Petra3_P09vil.CDI cli...	2
[SRV] Nr UDP packets received	17267348
[SRV] Nr TCP packets received	0

Device servers

Device servers	Description	
Petra3_P09vil.CDI	CDI Raw Hardware Server	Ping Control Restart

Activity Contracts Clients Alarms Log File Stats

Available Contracts

Available Contracts		
RECV[OAB.STELLUNG]	RECV	
RECV[VMO_0.STELLUNG]	OAB.STELLUNG	
RECV[RVMO_1.STELLUNG]	CDIEQM	
RECV[OAB.TEMP_ALAR]	0	
RECV[P_1.P09]	2048	
RECV[P_0.P09]	1	
RECV[C_VMO_0_A.P09]	255	
RECV[FIL_1.STELLUNG]	1	
tagIn		

This is NOT a moot point: each contract results in an ADS access over EtherCat !

[Video System News]

- Lots of news, but have to wait until next time !