Linuxcnc vs. ASDA-A2-E Ethercat driver

fupe

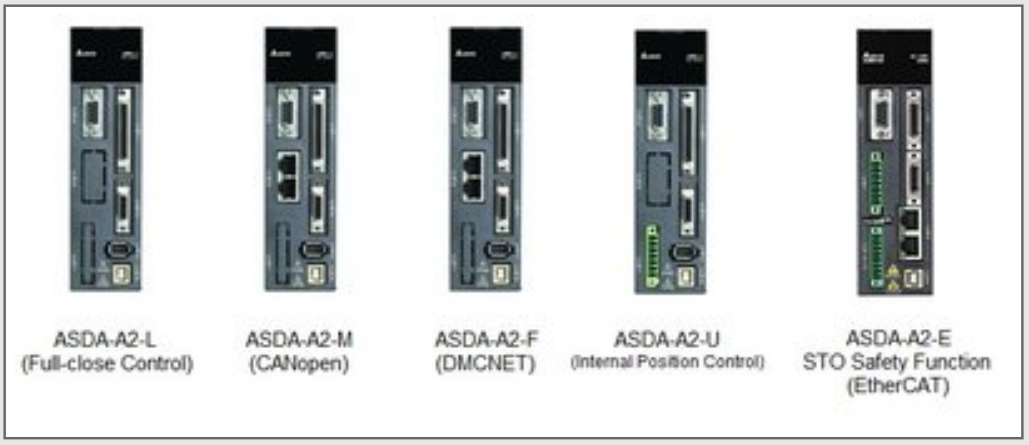
3. 10. 2017, 1:30

Hello to all enthusiasts of new technology.

some time ago I was writing here how to break the Rexroth driver and now we have a more affordable and perhaps even more widely distributed driver than Delta.
the entire procedure mentioned here is http://www.cnc.com/viewtopic.php?f=34&t=23755 and I will refer to it occasionally because some steps are the same.

But to take it from the start, Robokop balked somewhere and talked to the Czech company PROFCOM, a DELTA distributor on our market, and they kindly borrowed some ACS driver and an IO module also running on ethrcat to test it . Well, then was bitching here, and it all ended up with me on the table, trying to run it up a

when it's done, I'll talk to you a few mouder about it.
Well, because you're reading it, then it's going to make it happen.
If I knew at the beginning what it would be like, I would not have laughed, but it was a challenge. In any case, it will be a walk for you, because the dead lane traversed and mainly wrote a new "firmware" for a driver without which it just would not run, but I'll get it later.



this is the right driver that supports Ethercat as the only one

. Driver setup
2 Installing Ethercat under linux debian
3 Installing a module hub for linuxcnc
4. Generating an xml file
5 Generating a new firmware and uploading it to the driver.
6 Test in linuxcnc

As always a couple of crap around.

ASDA-A2-E, as opposed to Rexroth supports Delta CoE (CANopen over ethercat), means that a set of parameters (almost all) can be set directly from linuxcnc and there is no need for Ethercat configurator services to get the driver settings. I'm talking about setting the communication, not setting the servo parameter.
In addition to this driver, support is added directly in ethercat-HAL, so making the xml file is really a toy and it has everything about 5 rows. But what really made me sick and took about 14 days, is the incompleteness of the EEPROM driver information needed to synchronize the transmission.

1. Driver settings.

The driver is freely downloadable ASDA-Soft V5.03.03
software, including other programs, documentation and xml files.
http://www.deltaww.com/services/Downloa ... 1 & hl = en-US "onclick ="
window.open (this.href); return false;

or here

http://iacommunication.deltaww.com/enew ... N_0915.pdf "onclick =" window.open
(this.href); return false;

It can be used to set different servo parameters such as accelerations, moments of inertia, and the like. I will not write about it all, and it's pretty well documented.
The only thing to recall is that I had to set or reset at the beginning some settings for the limit switches because the driver still thought immediately after switching on that he was out of the work area and did not go to the chance.
Again, it is quite easy to find and the driver's display buzzes buzz or error cody what's going on. In the documentation, each code is written about what causes it and how to correct it.
The driver can be dragged directly from the panel using a button or help the software, which is probably easier because it is clearer and wiser.

2. Install Ethercat under linux debian
This has been written once and the procedure is the same.
just add that it is better to make the symphony instead of copying the configurator.
this avoids double editing when changing.
sudo cp / etc / default / ethercat / etc / sysconfig / ethercat
to replace
sudo ln -s / etc / default / ethercat / etc / sysconfig / ethercat and / etc / sysconfig.
Other important information missing from the previous article is that not all versions of the kernel are supported, I tested it on 3.4.9. standard linuxcnc from linuxcnc version 2.7.11

What's more important and a major change that has bothered me too is using a specific network card driver instead of using a generic generic driver.
I have an integer two-port e1000 in the machine, so
instead of DEVICE_MODULES = "generic" DEVICE_MODULES = "e1000" is set in the ethercat / etc / default / ethercat configuration .
The problem is that the generic driver does not use the native driver card directly, but it goes a bit around and uses another layer of the driver and can get into trouble with RTAI. It definitely wakes up memory, which the system does not quite like. It came to that after the traffic started, and the whole machine hardened every 10 seconds every time.
https://www.etherlab.org/download/ether ... -1.5.2.pdf "onclick =" window.open (this.href); return false; they write about this here on page 23. The use of the generic driver is inconsistent. This is an interesting document if you want to understand how it works.
One more thing occurred to me. The created / dev / Ethercat [0-9] device has default rights and does not allow you to upload a new file. it is necessary to set the system so that an ordinary user can access the device. To do this,
echo KERNEL == \ "EtherCAT [0-9] * \", MODE = \ "0666 \"> /etc/udev/rules.d/99-EtherCAT.rules

3 Install the module hub for linuxcnc

This is a complete as in the previous instructions.

4. The XML file for Linuxcnc,

as has already been said, Mr. Sittner gave the job and when he wrote the ethercat-hal driver for linuxcnc, he already implemented a few devices that the system knows by PID and VID and there is almost no need to finish.
If you look at the sources of linuxcnc-ethercat
https://github.com/sittner/linuxcnc-ethercat."onclick =" window.open (this.href); return false; so it's all described here. So it was not just about how much it had to

write, so the documentation was zero, but it could be read.
for example, in the lcec_deasda.h file, all the HAL pins that arise after the linuxcnc is started with the drive.
so the xml file for one ASDA-A2-E device will look as follows.

<Masters>
<master idx = "0" appTimePeriod = "1000000" refClockSyncCycles = "1000">
<slave idx = "0" type = "DeASDA" name = "3A1">
<dcConf assignActivate = "300" sync0Cycle = "* 1 "sync0Shift =" - 25000 "/>
</ slave>
</ master>
</ masters>

the only things that need to be defined are the ethercat master information and then the synchronization data for the slave device. slave_idx is the device number in the order (if there is only one it will be 0) the type is DeASDA and the name is any name as the driver will see in the system (here 3A1) and then the
pines for example lcec.0.3A1.srv-enable-volt
as the pattern has been configured in the examples directory.

Of course, you can write your own xml file and define everything you need in the prefetch file, but it does not seem to me what it might be like.
Anyway, you need to set the appropriate SDo like 0x0c10-0x0c13, set the transmitted PDO 0x6041 - status word, etc. and also set the driver to synchronization mode speed mode using SDo 0x6060, set the interpolation time in 0x60c2: 01 and 0x60c2: 02. etc etc but who would do it when someone wrote it for us.

5 generate a new firmware and upload to the driver.
And here comes the strangest mystery for me. Each driver has an EEPROM memory and knows the most important information. PID VID, name, sync manag information, FMMU drive etc etc but this driver is simply not. neither the name nor

the sync manager, just nothing.
Whom do not forget the details skip to the end of the paragraph and there is a download file needed.

there are a few tools that allow us to look into the SII file structure. (that's just the EEPRROM). or generate a new file from the xml definition.
for example, siitool https://github.com/synapticon/siitool "onclick =" window.open (this.href); return false; which is Linux's case and both, how to look into the binary file in xml in readable form, so generate new binary y xml.
continue the web application https://oblac-edt.synapticon.com/projects/new "onclick =" window.open (this.href); return false; who can generate binaries from the xml file, but he wants to know a bit about what to do.
and the third one is the Window Program http://download.rt-labs.com/ethercat/slaveeditor/"onclick =" window.open (this.href); return false; which is a clickable tool for generating binaries.
However, neither instrument can create what I need directly. There is some information missing or residing there, or they are set to values quite different from what I need.
So in the final I ended up with an ordinary hexaeductor and I set up the necessary value by hand. It is a tedious job and involves a heap of studies.
the file can be read and uploaded either by the ethercat configurator or simply by using the ethercat command itself in linux.
ethercat -p0 sii_read (sii_write)
original sii file from the driver as I wrote it does not contain much. Probably what is not explicitly forbidden is allowed. But all the generators are picking up a bunch of stuff, and the EEPROM of this driver is limited to 256B. However, the generated files are over 1KB and can not be used. In the end, I managed to generate a new 256B SII file in the slaveeditor program with completely different values, which it manually modified here.
I will give you an example of one tidy parameter.
I generated a SII file and everything was fine, just dmesg said that PDO records can not be edited.
original sii file writes
siitool -p ASDA-original.bin

CoE ..... True

EoE .... False
FoE ..... False
SoE ..... False
VoE ..... False

nothing more. but newly generated by

CoE ..... True
EoE ..... False
FoE ..... False
SoE ..... False
VoE ..... False

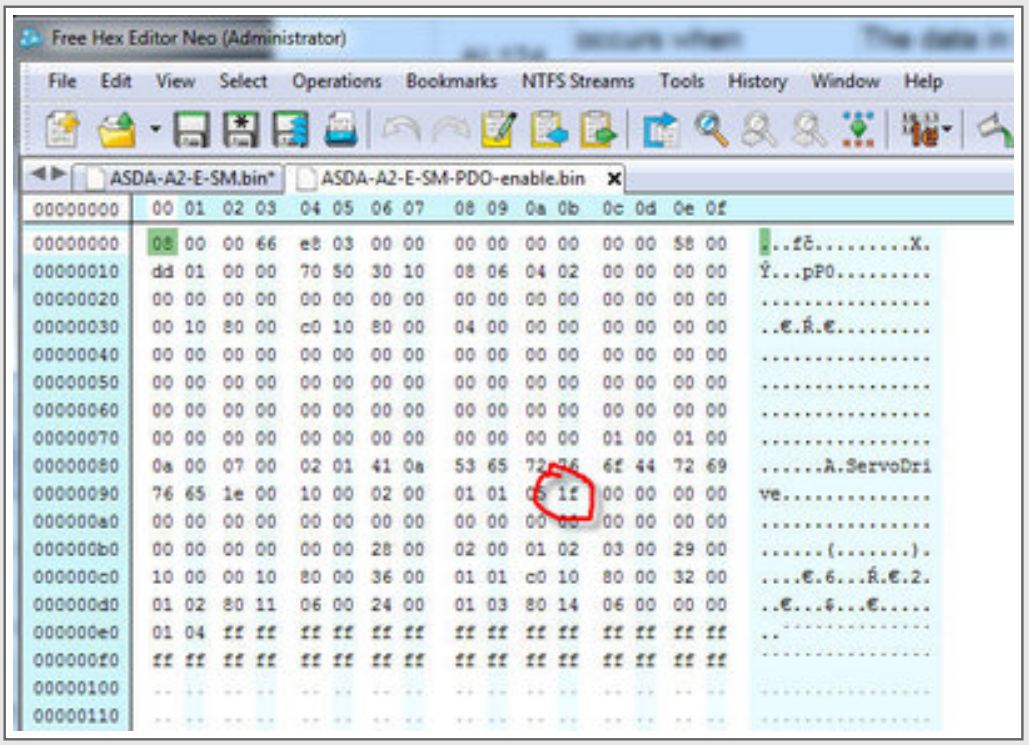
CoE Details:
Enable SDO: .... yes
Enable SDO Info: ..... yes
Enable PDO Assign: ..... no
Enable PDO Configuration: .... no
Enable Upload at Startup : .... yes
Enable SDO complete access: .. no
FoE Details: ..... not enabled
EoE Details: .... not enabled

it follows that it is necessary to allow PDO Assign and PDO Config. but how to find it in a binar with a scattered tea.
in source siitools everything is needed, and whoever is a little clean in cecku could find it.
siig-> coe_enable_sdo = (* b & 0x01) == 0? 0: 1;
siig-> coe_enable_sdo_info = (* b & 0x02) == 0? 0: 1;
siig-> coe_enable_pdo_assign = (* b & 0x04) == 0? 0: 1;
siig-> coe_enable_pdo_conf = (* b & 0x08) == 0? 0: 1;
siig-> coe_enable_upload_start = (* b & 0x10) == 0? 0: 1;
siig-> coe_enable_sdo_complete = (* b & 0x20) == 0? 0: 1;

so we can see that the second and third bit in siig is what we are looking for.
now it's only enough to transfer the binary record 010011 to hex, which is 13, to find

this number in binary, somewhere after the name of the driver and change to 011111 hex 0x1f and we have won.
Let me remind you that Endianity is used (a new word for me) and it means that the order of values is overwritten. MSB and LSB. So the value of 6008 is written in hexadecimal as 08 60.

Here is already seen the modified parameter for CoE PDO



this is how you can edit all the necessary things (three days in fuck) until the new firmware containing the sync manager information provided from xml

<Sm MinSize = "34" MaxSize = "192" DefaultSize = "128" StartAddress = "# x1000" ControlByte = "# x36" Enable = "1"> MBoxOut </ Sm>
<Sm MinSize = "34" MaxSize = "192" DefaultSize = "128" StartAddress = "# x10C0" ControlByte = "# x32" Enable = "1"> MBoxIn </ Sm>
<Sm MinSize = "1" MaxSize = "256" DefaultSize = "6" StartAddress = "# x1180" ControlByte = "# x24" Enable = '1'> Outputs </ Sm>
<Sm MinSize = " 1 "MaxSize =" 256 "DefaultSize =" 6 "StartAddress ="# x1480 "ControlByte =" # x00 "Enable = '1'> Inputs </ Sm>

and FMMU
<Fmmu> Outputs </ Fmmu>
<Fmmu> Inputs </ Fmmu>

<Fmmu> MBoxState </ Fmmu>

contain everything we need and we have won. Now just upload it to EEPROMka and drive.

restrain the driver to get it done and done.

the original driver is

mk @ linuxcnc: ~ / siitool / delta $ ethercat slave
0 0 0 PREOP + 0x000001dd: 0x10305070

after uploading a new file

mk @ linuxcnc: ~ / siitool / delta $ ethercat -p0 sii_write Delta-asda.bin
mk @linuxcnc: ~ / siitool / delta $ ethercat rescan
mk @ linuxcnc: ~ / siitool / delta $ ethercat slave

0 0: 0 PREOP + ASDA-A2-E

This is not as important as the voice, but finally the file contains the necessary information that is ethercat move when initiating communication between the master and the slave when switching from INIT mode to SAFEOp and then to OPERATION. Creates the required domain, sets SM2 and SM3 sizes and contents, assigns FMMU mapping units and can not be defined in the xml file for ethercat-hal.

Here is the miracle of 256 letters
Delta-asda.rar
(215 bytes) Downloaded: 55 x

6. Testing in linuxcnc

here is just a pause step and immediately know if it works or not.
I made a start.hal file with the contents.

loadusr ethercat debug 1
loadtext threads name1 = master period1 = 1000000
loadusr lcec_conf delta.xml
loadr lcec
addc lcec.read-all master
addf lcec.write-all master
start
loadusr ethercat debug 0
loadusr halshow my.halshow
loadusr sim_pin lcec.0.3A1. srv-enable-volt lcec.0.3A1.srv-enable lcec.0.3A1.srv-switch-on lcec.0.3A1.srv-vel-cmd

just drop the command
halrun -i start.hal

and gradually turn on the pins help the simulation simulator pins
lcec.0.3A1.srv-enable-volt
lcec.0.3A1.srv-enable
lcec.0.3A1.srv-switch-on
and finally set
lcec.0.3A1.srv-vel-cmd to a value of 10 and the motor is spinning and it's done.

it's good to look at what's going on and what's going on.

that's probably all in a nutshell. A pile of information is missing, but it is probably here.
The short description is given on how to run the EC 5500 Delta Module in combination with the EC6002 IO Box, which is a 16x Input Needed for Terminals. This device is the ultimate bracket to break, so it will be short.
And then I can finally start debugging the sserial protocol and creating my own device written on STM32F103. I never pre-programmed it, it would be an ass.I see this for a month of study. The plate and logic analyzer has already arrived from China, so I'm curious about it.

Martin

robokop
Site Admin

October 3, 2017, 2:23

much thanks to
me it will be quite handy

otherwise I repeat
those components is by arrangement with profcomu discount for members of the forum password to gain a "cnc forum"

Mex

3. 10. 2017, 8:55

> fupe writes:
> I will share with you a couple of mouder how to do it

Perfect work, as always. 
Thanks for that.

Monteg

4. 10. 2017, 12:13

So this is a really good
Damage I think about 80% I do not know what I'm talking about but I really like it

Still it would like some video

fupe

4 October 2017, 1:34

> **Monteg writes:**
>
> This is a very good
> shame I think about 80% I do not know what I'm talking about but I really like it
> Still it would like some video

It was either quiet, I did not even know that there was an EEPROM driver a month ago, and I would not binar with it in my dream.
But a couple of sleepless nights, a stack of pdf documents, some forum where people solve it, but nobody knows how to do it and the result has come.
I have a sudoku instead, a bit of a stroke for the brain not to inoculate.

Do you mean a video like spinning a servo shaft in a pile of a brothel on a table, or how do I shake my head against a wall when the bitch did not want to move after 14 days and I did not know where to go?
M

Mex

4 October 2017, 2:14

Jojo. I also had to study how it is with EEPROM under the impression of your article.
Today, more or less every device has a common one, so even with EtherCAT slave I only took it as part of the design. It did not seem to me that its content was part of the standard.
There are few things to say, such as the designer EtharCAT slave. And there will not be much.
Well, you are now part of this narrow family of chosen ones because you are developing their own driver for Delta.
By the way, Delta sells essentially inoperative drivers is quite a shame. I hope they'll give you some revanch.

robokop
Site Admin

4 October 2017, 3:26

it's a question of configuring not the function of the malfunction, I am surprised that it was not turned on in defaults, it comes to me as a good idea to turn it on in defaults and so to empower the customer
but not configuring something in defaulte I would not have indicated as a malfunction
to be there is some reason we do not know
if any other software outside linux will normally start up during initialization

Mex

4 October 2017, 3:54

Maybe you're right, and I misunderstood Fupe's description.
Anyway, I wonder how many people outside Fupe would give this.

Well, they need great support, and they can quickly and accurately tell the phone which should be set in the EEPROM.

fupe

4 October 2017, 4:04

It's like robocop writing. Ethercat master also has this xml file built from the xml file of each slave device and it is all defined in it, so the information about the sync managers takes from its own configuration and does not get it out of memory. However, it is important that this card, which is easy to read in itself, including the addresses of individual pins and xml is not necessary, everything is clear from the file.
And yet the more intense is that the author of the ethercathal has made this particular assault. Maybe this information can be set, but I do not know where, in the example that says nothing about it.

robokop
Site Admin

4 October 2017, 4:08

the next thing is that the driver did not have to and was probably not even in the factory set because one of the lending piece that profcom leases

fupe

4 October 2017, 4:56

> Mex writes:
>
> Well, you are now in this narrow family of chosen because you are developing your own driver for Delta.

Thanks for the compliment but to the slave constructor I miss the precist about 10kg manual and especially I would need a new firmware of the brain. Good for these old models, the development is over.
But it is true that I thought and I was a bit drunk about it, use the ethercat for the mechatrolink driver what we talked about. You would have invented a mecatroline cast and I was ethercat. And we have two things to do in the van.
M

Mex

4 October 2017, 5:18

No já nad něčím podobným trochu přemýšlím.
V první etapě udělám jenom EtherCATové I/O, to by mělo být celkem snadné.
A pak jsem na to chtěl naroubovat nějaké stepgeny, takže by se dala po EtheCATu připojit běžná DIR/STEP serva.
Ta odbočka k Mechatrolinku je ale pěkná myšlenka.

Mex

4. 10. 2017, 5:44

> robokop píše:
>
> dalsi vec je ze ten driver nemusel a dost pravdepodobne ani nebyl v tovarnim nastaveni protoze se jedna o zapujcni kus ktery profcom pujcuje

Já to samozřejmě nevím, ale předpokládal bych, že první Fupeho akce byla "Set factory defaults".
Aspoň já to tak u zařízení v neznámém stavu vždy dělám.

Nepřeju Fupemu nic zlého, ale je fajn, že narazil. Resp. je fajn, že narazil, vyřešil to a podělil se s námi. 
Ještě jednou díky.
Přinutilo mě to se zajímat o některé věci, do kterých jsem se původně vůbec nechtěl pouštět.
Zrovna tady lámu nějaké SoE servo a ty nastudované rozumy (na jejichž studium padla dnešní noc) se docela hodí.

fupe

4. 10. 2017, 8:45

> Mex píše:
>
> > robokop píše:
> >
> > dalsi vec je ze ten driver nemusel a dost pravdepodobne ani nebyl v tovarnim nastaveni protoze se jedna o zapujcni kus ktery profcom pujcuje
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> Zrovna tady lámu nějaké SoE servo a ty nastudované rozumy (na jejichž studium padla dnešní noc) se docela hodí.

Jenom skoda, ze den nema dve az tri noci. Jedna je hrozne malo a rano sem pak mrtvej. Vecer udelat ukoly s detma, v lepsim pripade jenom snist veceri, v horsim ji udelat, zena si taky furt chce povidat kam pojedem na dovolenou a Ethercat je pro ni nadavka. Vsak to znate. Jeste ze clovek chodi do zamestnani, kde si odpocine.


fupe

6. 10. 2017, 2:55

> **Mex píše:**
>
> No já nad něčím podobným trochu přemýšlím.
> V první etapě udělám jenom EtherCATové I/O, to by mělo být celkem snadné.
> A pak jsem na to chtěl naroubovat nějaké stepgeny, takže by se dala po EtheCATu připojit běžná DIR/STEP serva.
> Ta odbočka k Mechatrolinku je ale pěkná myšlenka.

Do you know what you want to do?
i suppose some of your favorite stm32 but what about ethercat?
M

Reply

25 posts 1 2

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