

# EtherCAT Full Feature Demo 编译指南

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首先，要下载三个东西

1. EtherCAT 的协议栈，版本为 5.11。需要从 ETG 的官网进行下载，PS:一般需要以公司邮箱进行注册，是免费申请，但需要 ETG 审核授权。<https://www.ethercat.org/>

	Description	Language	Type	Date	Size	Ver.	Status
	EtherCAT Slave Stack Code (SSC)		ZIP	Mar 17, 2016		5.11	Release

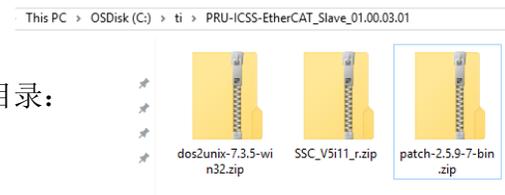
下载后解压开，里面的 src 文件夹中的即为源码，是后面需要使用的。关注下完整的路径，稍后 patch 的时候会用到：C:\ti\PRU-ICSS-EtherCAT\_Slave\_01.00.03.01\SSC\_V5i11\_r\SlaveFiles\src

2. dos2unix-7.3.5-win32

地址：<https://sourceforge.net/projects/dos2unix/>

下载后解压开(打 patch 时会用到)，我这里放在了如下目录：

C:\ti\PRU-ICSS-EtherCAT\_Slave\_01.00.03.01\



3. patch-2.5.9-7-bin

地址：<http://gnuwin32.sourceforge.net/downloads/patch-bin-zip.php>

下载后解压开，同上。

完整这三个下载之后，就可以开始编译工作了：

第一步：windows 下使用 start->run -> cmd 进入命令行，然后使用 cd 命令进入到 TI\_ECATCHAT.patch 的文件目录下 C:\ti\PRU-ICSS-EtherCAT\_Slave\_01.00.03.01\third\_party\protocols\ethercat\_slave\patch\

```
C:\windows\system32\cmd.exe
Microsoft Windows [Version 10.0.10586]
(c) 2015 Microsoft Corporation. All rights reserved.

C:\Users\A0220224>cd C:\ti\PRU-ICSS-EtherCAT_Slave_01.00.03.01\third_party\protocols\ethercat_slave\patch

C:\ti\PRU-ICSS-EtherCAT_Slave_01.00.03.01\third_party\protocols\ethercat_slave\patch>dir
Volume in drive C is OSDisk
Volume Serial Number is 7A39-FD2C

Directory of C:\ti\PRU-ICSS-EtherCAT_Slave_01.00.03.01\third_party\protocols\ethercat_slave\patch

08/22/2017  08:40 PM  <DIR>          .
08/22/2017  08:40 PM  <DIR>          ..
08/22/2017  08:40 PM  <DIR>          bkup
06/09/2017  04:02 PM             1,820 README.txt
06/09/2017  04:02 PM             15,979 TI_ECATCHAT.patch
                2 File(s)          17,799 bytes
                3 Dir(s)  76,255,412,224 bytes free
```

第二步：在 TI\_ECATCHAT.patch 文件夹下，使用 unix2dos.exe 文件对 PATCH 进行转码。

下载步骤 2 中的 dos2unix-7.3.5-win32 组件中，解压开后在如下路径可以找到该工具。

C:\ti\PRU-ICSS-EtherCAT\_Slave\_01.00.03.01\dos2unix-7.3.5-win32\bin\unix2dos.exe

在第一步的路径下面，直接使用如下命令，即可进行转码：

C:\ti\PRU-ICSS-EtherCAT\_Slave\_01.00.03.01\dos2unix-7.3.5-win32\bin\unix2dos.exe TI\_ECAT.patch

```
C:\ti\PRU-ICSS-EtherCAT_Slave_01.00.03.01\third_party\protocols\ethercat_slave\patch>C:\ti\PRU-ICSS-EtherCAT_Slave_01.00.03.01\dos2unix-7.3.5-win32\bin\unix2dos.exe TI_ECAT.patch
unix2dos: converting file TI_ECAT.patch to DOS format...
```

第三步：进入到 patch.exe 文件夹下，将转码后的 TI\_ECAT.patch 打在 EtherCAT slave 的 stack 中。这里，patch.exe 就是在下载步骤 3 中的 patch-2.5.9-7-bin 组件中：

C:\ti\PRU-ICSS-EtherCAT\_Slave\_01.00.03.01\patch-2.5.9-7-bin.zip\bin\patch.exe

```
C:\ti\PRU-ICSS-EtherCAT_Slave_01.00.03.01\third_party\protocols\ethercat_slave\patch>cd C:\ti\PRU-ICSS-EtherCAT_Slave_01.00.03.01\patch-2.5.9-7-bin\bin
C:\ti\PRU-ICSS-EtherCAT_Slave_01.00.03.01\patch-2.5.9-7-bin\bin>dir
Volume in drive C is OSDisk
Volume Serial Number is 7A39-FD2C

Directory of C:\ti\PRU-ICSS-EtherCAT_Slave_01.00.03.01\patch-2.5.9-7-bin\bin

05/15/2007  07:21 AM    <DIR>          .
05/15/2007  07:21 AM    <DIR>          ..
05/15/2007  07:19 AM             112,128 patch.exe
               1 File(s)             112,128 bytes
               2 Dir(s)      76,255,293,440 bytes free
```

在该目录下直接执行如下命令，打上 patch

patch.exe -i C:\ti\PRU-ICSS-EtherCAT\_Slave\_01.00.03.01\third\_party\protocols\ethercat\_slave\patch\TI\_ECAT.patch -d C:\ti\PRU-ICSS-EtherCAT\_Slave\_01.00.03.01\SSC\_V5i11\_r\SlaveFiles\src

这个格式简单来说，就是：

patch.exe -i TI\_ECAT.patch 完整路径 -d EtherCAT 栈完整路径

如果成功之后，情况如下：

```
C:\ti\PRU-ICSS-EtherCAT_Slave_01.00.03.01\patch-2.5.9-7-bin\bin>patch.exe -i C:\ti\PRU-ICSS-EtherCAT_Slave_01.00.03.01\third_party\protocols\ethercat_slave\patch\TI_ECAT.patch -d C:\ti\PRU-ICSS-EtherCAT_Slave_01.00.03.01\SSC_V5i11_r\SlaveFiles\src
patching file bootmode.c
patching file cia402appl.c
patching file coeappl.c
patching file ecat_def.h
Hunk #2 succeeded at 49 with fuzz 1.
patching file ecataappl.c
patching file ecatslv.c
patching file ecatslv.h
patching file EtherCATSampleLibrary.h
patching file SampleApplicationInterface.c
C:\ti\PRU-ICSS-EtherCAT_Slave_01.00.03.01\patch-2.5.9-7-bin\bin>
```

第四步：

将 patch 好的 ECAT 所有源码文件，即 C:\ti\PRU-ICSS-EtherCAT\_Slave\_01.00.03.01\SSC\_V5i11\_r\SlaveFiles\src 中所有文件，拷贝到如下目录：

C:\ti\PRU-ICSS-EtherCAT\_Slave\_01.00.03.01\protocols\ethercat\_slave\ecat\_appl\EcatStack

PS:该目录原始情况下是有些文件的，但是不影响拷贝。

第五步：

生成 CCS 的 full feature demo 文件

进入到 C:\ti\PRU-ICSS-EtherCAT\_Slave\_01.00.03.01\protocols\ethercat\_slave\projects 文件夹下：

```
C:\ti\PRU-ICSS-EtherCAT_Slave_01.00.03.01\patch-2.5.9-7-bin\bin>cd C:\ti\PRU-ICSS-EtherCAT_Slave_01.00.03.01\protocols\ethercat_slave\projects
C:\ti\PRU-ICSS-EtherCAT_Slave_01.00.03.01\protocols\ethercat_slave\projects>dir
Volume in drive C is OSDisk
Volume Serial Number is 7A39-FD2C

Directory of C:\ti\PRU-ICSS-EtherCAT_Slave_01.00.03.01\protocols\ethercat_slave\projects
08/10/2017  03:48 PM  <DIR>      .
08/10/2017  03:48 PM  <DIR>      ..
08/10/2017  03:08 PM  <DIR>      ccsproject_args
08/10/2017  03:55 PM  <DIR>      ethercat_slave_demo_AMIC11x_arm
06/09/2017  04:02 PM                16,511 projectCreate.bat
06/09/2017  04:02 PM                15,165 projectCreate.sh
                2 File(s)                31,676 bytes
                4 Dir(s)      76,251,111,424 bytes free

C:\ti\PRU-ICSS-EtherCAT_Slave_01.00.03.01\protocols\ethercat_slave\projects>
```

参考 user guide 中的命令生成 full feature demo

Usage format: **projectCreate.bat [SOC] [PROCESSOR] [PROJECT\_NAME]**

- **[SOC]**
  - The valid values for first command line argument [SOC] are
    - **AM571x** - To generate a project specific to AM571x
    - **AM572x** - To generate a project specific to AM572x
    - **AM437x** - To generate a project specific to AM437x
    - **AM335x** - To generate a project specific to AM335x
    - **AMIC11x** - To generate a project specific to AMIC11x
    - **K2G** - To generate a project specific to K2G
- **[PROCESSOR]**
  - The valid values for second command line argument [PROCESSOR] are
    - **arm** - To generate a project specific to ARM core
    - **dsp** - To generate a project specific to DSP core

#### NOTE

DSP core build is currently not supported in PRU ICSS EtherCAT 01.00.03 release

- **[PROJECT\_NAME]**
  - The valid values for third command line argument [PROJECT\_NAME] to be used with EtherCAT slave installer package
    - **ethercat\_slave\_full** - to generate EtherCAT slave full application project
    - **ethercat\_slave\_demo** - to generate EtherCAT slave demo application project
    - **ecat\_ti\_esc\_spi\_master** - to generate EtherCAT TI ESC SPI Mode Master application project (supported only for AM572x)
    - **ecat\_ti\_esc\_spi\_slave** - to generate EtherCAT TI ESC SPI Mode Slave application project (supported only for AMIC11x)

比如我使用的是 AMIC110 ICE 开发板，所以使用如下命令。

projectCreate.bat AMIC11x arm ethercat\_slave\_full

成功以后，情况如下：

```
C:\ti\PRU-ICSS-EtherCAT_Slave_01.00.03.01\protocols\ethercat_slave\projects>projectCreate.bat AMIC11x arm ethercat_slave_full
*****
Environment Configuration Summary:
  CCS Install Directory      : C:\ti\ccsv7
  CCS Workspace Directory   : C:\Users\ao220224\ccs_workspace
  SDK Install Directory     : C:\ti\PRU-ICSS-EtherCAT_Slave_01.00.03.01
  PDK Install Directory    : C:\ti\pdk_am335x_1_0_6\packages
  Projects create Directory : C:\ti\PRU-ICSS-EtherCAT_Slave_01.00.03.01\protocols\ethercat_slave\projects
  Project create args directory : C:\ti\PRU-ICSS-EtherCAT_Slave_01.00.03.01\protocols\ethercat_slave\projects\ccsproject_args
s
*****
Creating project 'ethercat_slave_full_AMIC11x_arm' for 'AMIC11x' platform in directory 'C:\ti\PRU-ICSS-EtherCAT_Slave_01.00.03.01\protocols\ethercat_slave\projects\ethercat_slave_full_AMIC11x_arm' by overwriting the project if it exists already...
-----
Creating project 'ethercat_slave_full_AMIC11x_arm'...

Done!

C:\ti\PRU-ICSS-EtherCAT_Slave_01.00.03.01\protocols\ethercat_slave\projects>
```

此时，在 C:\ti\PRU-ICSS-EtherCAT\_Slave\_01.00.03.01\protocols\ethercat\_slave\projects 目录下即会生成 ethercat\_slave\_full\_AMIC11x\_arm 工程。

使用 CCS import 工程后，即可进行该例程的编译工作。成功情况如下：

The image shows a screenshot of an IDE with a project explorer on the left, a code editor in the center, and a console window at the bottom.

**Project Explorer:** Shows a project named "ethercat\_slave\_full\_AMIC11x\_arm" with a sub-project "ethercat\_slave\_full\_AMIC11x\_arm [Active - AMIC11x\_release]". The sub-project contains various source files, including "board\_mcsPIC.c", "board\_misc.c", "board\_oled.c", "board\_phy.c", "board\_platform.c", "board\_rotary\_switch.c", "board\_spi.c", "board\_tik105.c", "board\_tikphy.c", "delay\_us.c", "GPIO\_soc.c", "I2C\_soc.c", "oled\_drv.c", "pruics\_soc.c", "tiesc\_soc.c", "tiescphy\_tik105.c", "UART\_soc.c", "amic11x\_app.cfg", and "SPI\_Flashing\_Tool".

**Code Editor:** Displays C code for SPI initialization. The code includes comments and function calls for enabling the module, configuring the clock, performing pinmux, resetting the instance, enabling CS, and setting CS polarity.

```
278 return status;
279 }
280
281 int32_t SBUMcsPiiInit(sblMcsPcfObj_t *pSblMcsPcfObj)
282 {
283     int32_t status = S_PASS;
284
285     /* Clock Configuration. */
286     status = PRUModuleEnable(CHIPDB_MDO_ID_MCSPI, pSblMcsPcfObj->instNum, 0U);
287
288     if (S_PASS != status)
289     {
290         CONSOLEUtilsPrintf("\n Clock Configuration failed !\n");
291     }
292     else
293     {
294         /* Perform the MCSPI pinmux. */
295         status = PIMUXModuleConfig(CHIPDB_MDO_ID_MCSPI,
296                                 pSblMcsPcfObj->instNum,
297                                 NULL);
298
299         if (S_PASS != status)
300         {
301             CONSOLEUtilsPrintf("\n Pin Muxing failed !\n");
302         }
303         else
304         {
305             /* Reset the MCSPI instance.*/
306             MCSPIReset(pSblMcsPcfObj->instAddr);
307
308             if (TRUE == pSblMcsPcfObj->pSblMcsPcfObj.csFlag)
309             {
310                 /* Enable CS. */
311                 MCSPIEnable(pSblMcsPcfObj->instAddr, TRUE);
312
313                 /* Set the CS polarity. */
314                 MCSPISetCsPol(pSblMcsPcfObj->instAddr,
315                             pSblMcsPcfObj->channelNum,
316                             pSblMcsPcfObj->pSblMcsPcfObj.csPolarity);
317             }
318         }
319     }
320 }
```