Sherpa R-IN32M3 PROFINET device communication stack for Renesas Electronics Corporation's R-IN32M3 series industrial Ethernet controller

Technical reference

Sherpa LLC
http://sherpa-tech.jp

Version R01_06
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Simple Device Application Interface SDAI is trademark of Softing Industrial Automation GmbH
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Table of Contents

1. Overview
2. Delivery overview
3. Overview of Sherpa LLC's PROFINET device communication stack licensing
4. Evaluation and development environment
5. Support Scope
6. R-IN32M3 and Sherpa PROFINET device
7. Delivery description
8. PROFINET Stack documentation
9. Simple Device Application Interface
10. Sample Application
11. S7-1200 PROFINET controller program and Sherpa PROFINET application
12. Sherpa PROFINET application's external interface in IAR System board
13. Sample Application Initialization
14. Licensing, product development and additional services
15. PROFINET device stack functionality

1. Overview

This document is the technical reference for Sherpa LLC's PROFINET device communication stack and its corresponding Sherpa LLC's PROFINET device evaluation kit. This PROFINET device communication stack has been optimized for the Renesas Electronics Corporation R-IN32M3 industrial network LSI and is the result of the Softing Industrial Automation GmbH's PROFINET device stack ported into the R-IN32M environment. This document covers the description of the communication stack and its access library, setup of sample application on evaluation board, description of sample application, description of PLC program, scope of support, licensing, additional services and PROFINET device stack specification.

2. Delivery overview

The Sherpa LLC's PROFINET device evaluation kit consists of a downloadable image which contains this technical document as well as the following data:

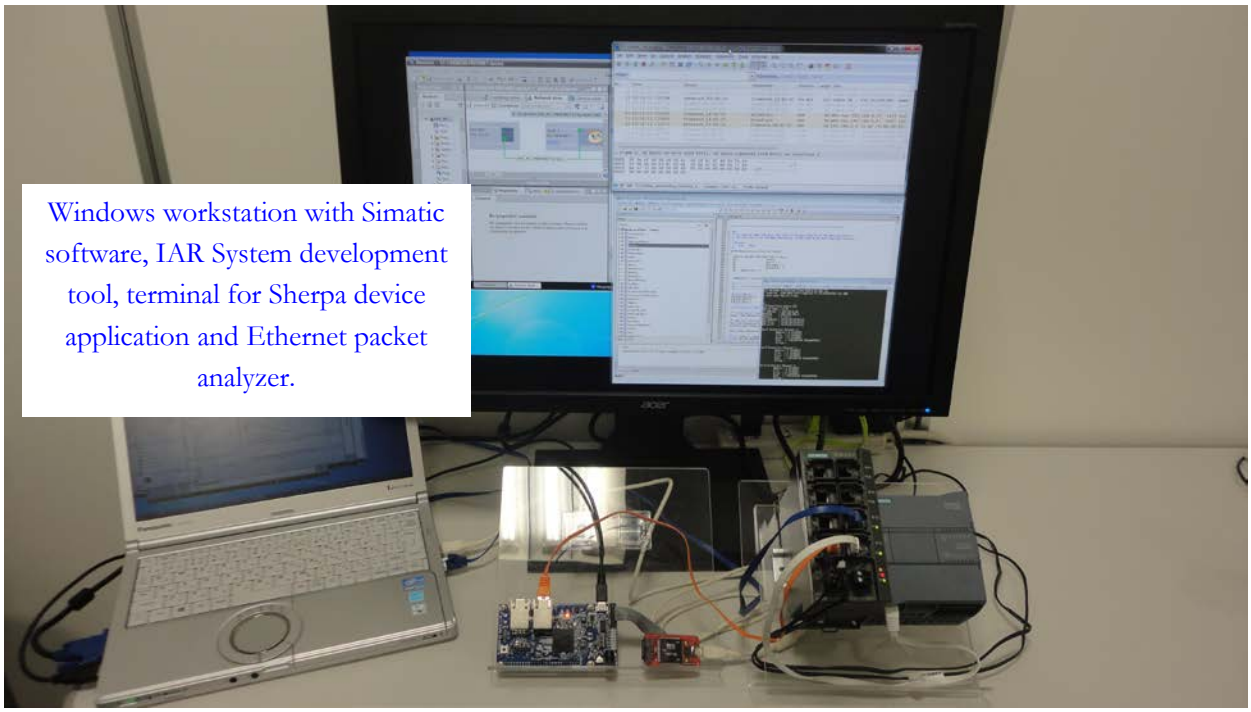
- Sample PROFINET device application in sources optimized for evaluation board described later in this document.
- Evaluation PROFINET device stack in binary format, with the full PROFINET device functionality but limited to 90 minutes of continued operation. By restarting the sample application, the PROFINET device stack can work normally for 90 minutes.
- GSDML file for the Sherpa LLC's PROFINET device evaluation kit sample application.
- Sample programmable logic controller (PLC) program for Simatic S7-1200 industrial controller.
- Additional documentation for detailed access library description, application description and PROFINET stack description from Softing Industrial Automation GmbH.

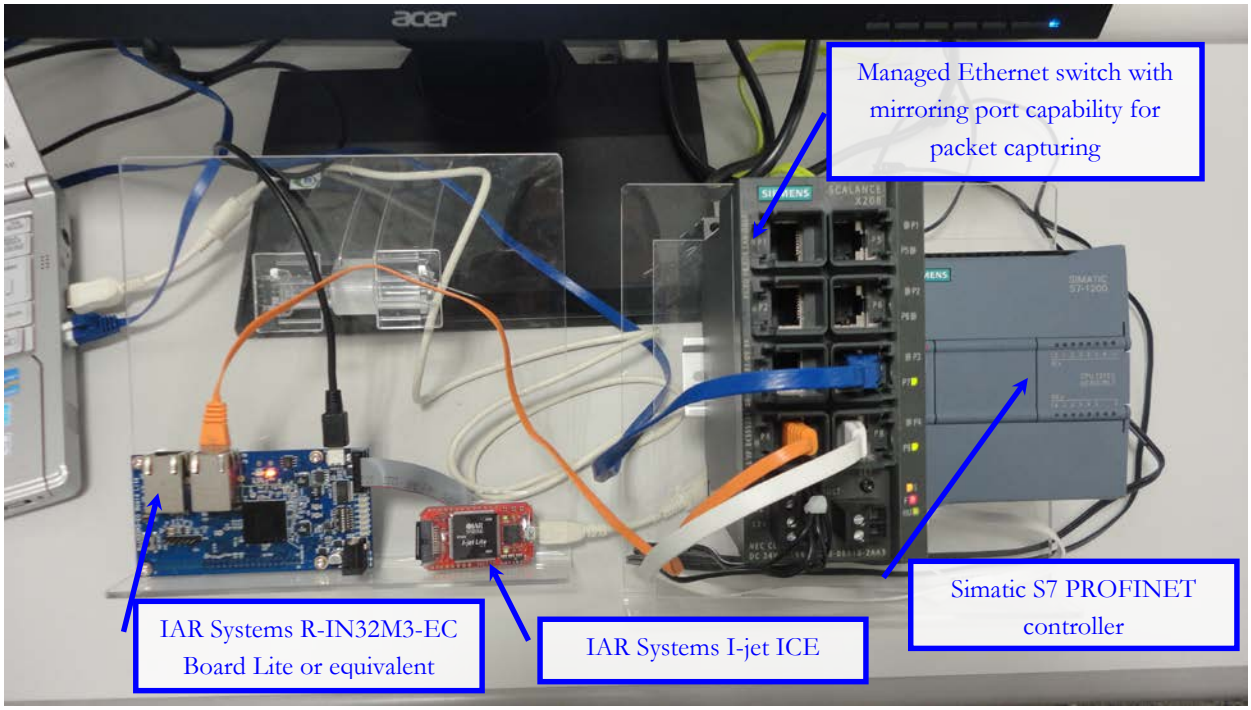
3. Overview of Sherpa LLC's PROFINET device communication stack licensing

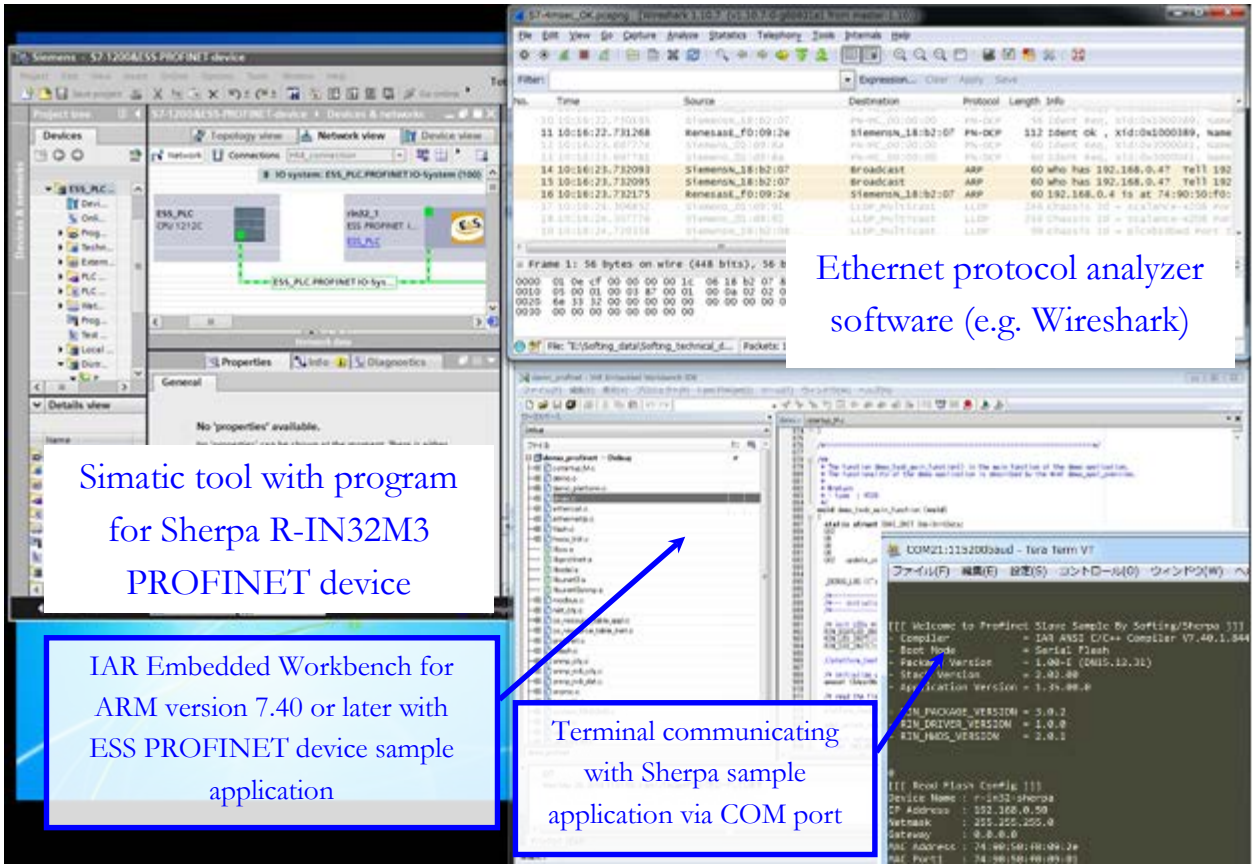
The PROFINET device communication stack provided as part of the Sherpa LLC's PROFINET device evaluation kit is an evaluation product. Its use is strictly restricted for evaluation in laboratory or display environment. This product is not licensed for use in actual industrial devices and the sale of this evaluation PROFINET device communication stack is strictly prohibited. In order to use this communication stack in commercial products the device manufacturer must sign a contract with the owner of the intellectual property of this communication stack, Sherpa LLC. For licensing conditions please see clause "Licensing, product development and additional services" at the end of this document.

4. Evaluation and development environment

In order to successfully use the Sherpa LLC's PROFINET device evaluation kit in any meaningful way the below minimum setup is required.







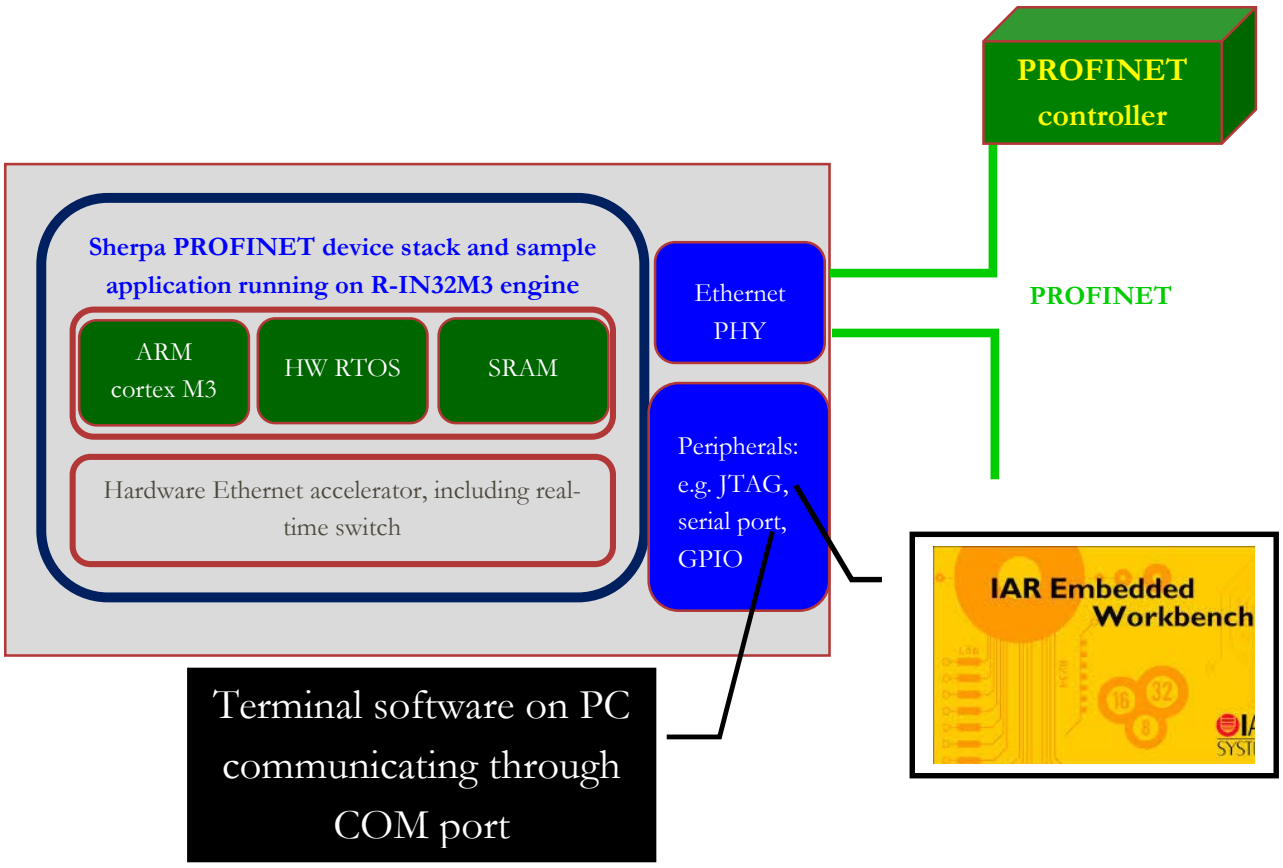
5. Support Scope

The Sherpa LLC's PROFINET device evaluation kit has been thoroughly tested and confirmed to work in environment described in the above sections. Should this application be used in "any" kind of different environment Sherpa LLC will regard any inquiry on the use of this PROFINET device kit as technical assistance beyond the scope of support for this evaluation application. In this context, "different environment" definition and not covered technical assistance includes, but is not limited to, the below circumstances:

- Any modification of the sources of this sample application
- Use of a compiler other than IAR Systems Embedded Workbench 7.40 or later.
  Note: Sherpa LLC product is optimized for the IAR Systems compiler. Use of any other compiler is not warranted and may require development efforts to be requested to Sherpa LLC
- Use of a PROFINET controller other than the Simatic S7-1200 as described in this document, including other Siemens controllers and non-Siemens controllers.
- Any workshop that the end-user may require with regards to PROFINET technology, use of IAR Systems Embedded Workbench tool, use of Simatic tools or use of PROFINET controller configuration tools from other vendors, use of Wireshark software, etc..

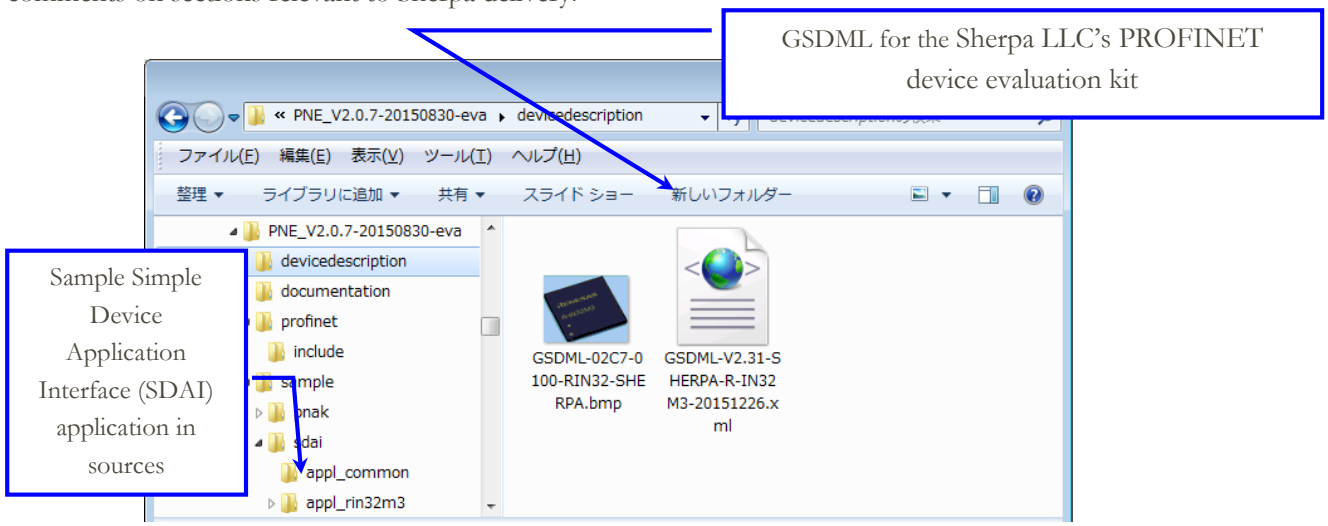
6. R-IN32M3 and Sherpa PROFINET device

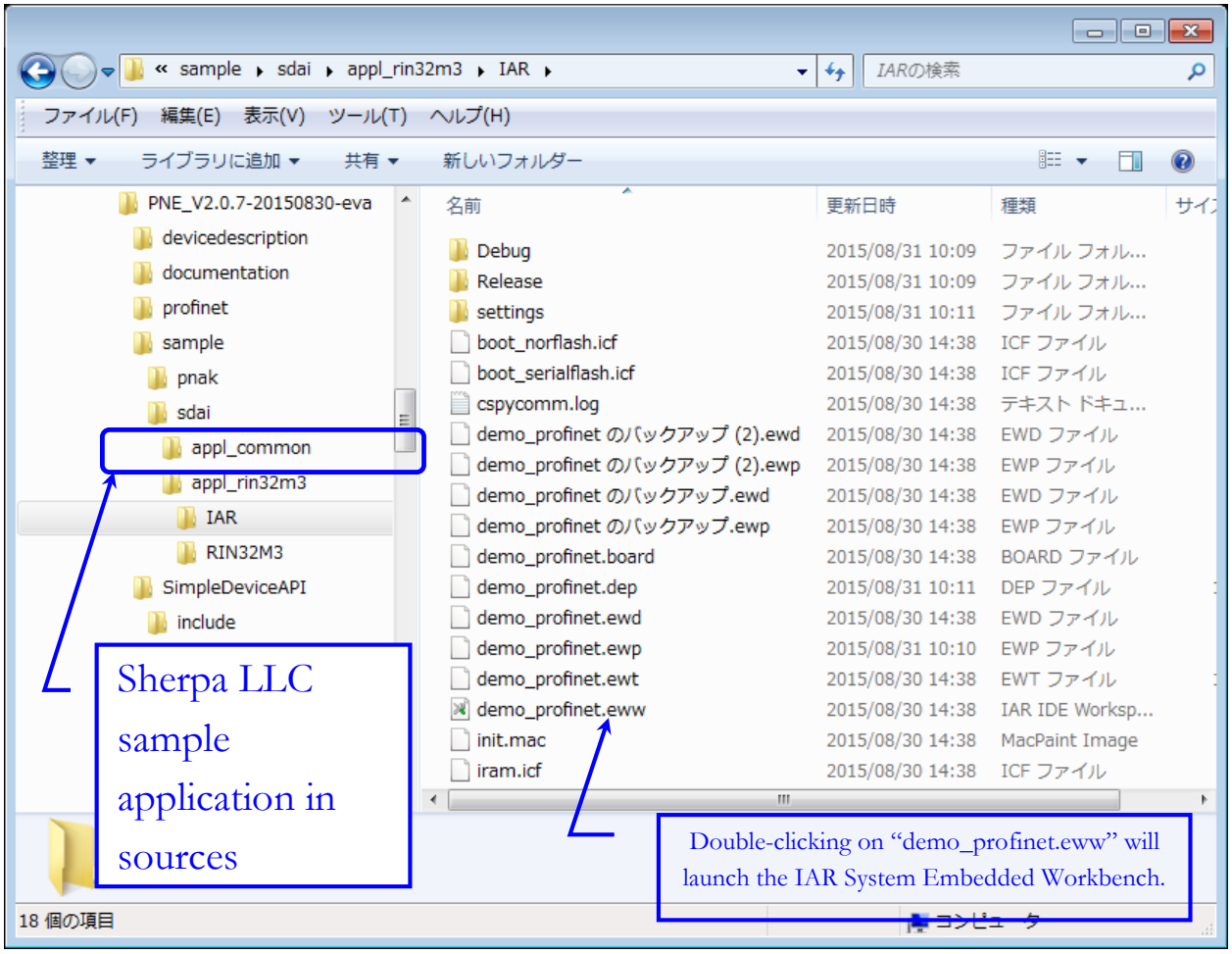
The Sherpa LLC's PROFINET device evaluation kit is optimized for the R-IN32M3 and is described as a "simplified" high level block diagram as per below illustration:

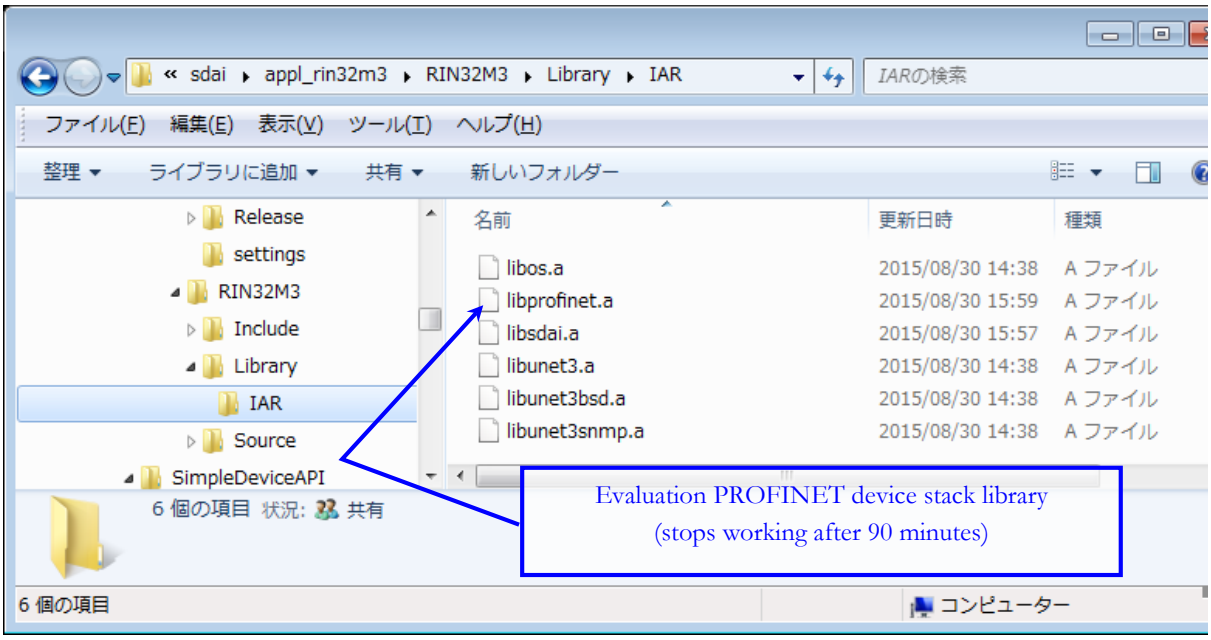


7. Delivery description

This section lists the main files that conform the Sherpa LLC's PROFINET device evaluation kit with comments on sections relevant to Sherpa delivery:




« sample ▸ sdai ▸ appl_rin32m3 ▸ IAR ▸
IARの検索
ファイル(F) 編集(E) 表示(V) ツール(T) ヘルプ(H)
整理 ライブラリに追加 共有 新しいフォルダー
PNE_V2.0.7-20150830-eva
devicedescription
documentation
profinet
sample
pnak
sdai
appl_common
appl_rin32m3
IAR
RIN32M3
SimpleDeviceAPI
include
名前 更新日時 種類
Debug 2015/08/31 10:09 ファイル フォル...
Release 2015/08/31 10:09 ファイル フォル...
settings 2015/08/31 10:11 ファイル フォル...
boot_norflash.icf 2015/08/30 14:38 ICF ファイル
boot_serialflash.icf 2015/08/30 14:38 ICF ファイル
cspycomm.log 2015/08/30 14:38 テキスト ドキュ...
demo_profinet のバックアップ (2).ewd 2015/08/30 14:38 EWD ファイル
demo_profinet のバックアップ (2).ewp 2015/08/30 14:38 EWP ファイル
demo_profinet のバックアップ.ewd 2015/08/30 14:38 EWD ファイル
demo_profinet のバックアップ.ewp 2015/08/30 14:38 EWP ファイル
demo_profinet.board 2015/08/30 14:38 BOARD ファイル
demo_profinet.dep 2015/08/31 10:11 DEP ファイル
demo_profinet.ewd 2015/08/30 14:38 EWD ファイル
demo_profinet.ewp 2015/08/31 10:10 EWP ファイル
demo_profinet.ewt 2015/08/30 14:38 EWT ファイル
demo_profinet.eww 2015/08/30 14:38 IAR IDE Worksp...
init.mac 2015/08/30 14:38 MacPaint Image
iram.icf 2015/08/30 14:38 ICF ファイル
18 個の項目
Sherpa LLC sample application in sources
Double-clicking on “demo_profinet.eww” will launch the IAR System Embedded Workbench.


« sdai ▸ appl_rin32m3 ▸ RIN32M3 ▸ Library ▸ IAR
IARの検索
ファイル(F) 編集(E) 表示(V) ツール(T) ヘルプ(H)
整理 ライブラリに追加 共有 新しいフォルダー
Release
settings
RIN32M3
Include
Library
IAR
Source
SimpleDeviceAPI
名前 更新日時 種類
libos.a 2015/08/30 14:38 A ファイル
libprofinet.a 2015/08/30 15:59 A ファイル
libsdai.a 2015/08/30 15:57 A ファイル
libunet3.a 2015/08/30 14:38 A ファイル
libunet3bsd.a 2015/08/30 14:38 A ファイル
libunet3snmp.a 2015/08/30 14:38 A ファイル
6 個の項目 状況: 共有
6 個の項目
Evaluation PROFINET device stack library (stops working after 90 minutes)

8. PROFINET Stack documentation

The PROFINET device for R-IN32M3 has been developed by Sherpa LLC by porting the Softing PROFINET device communication stack into R-IN32M3 architecture. The PROFINET functionality of this delivery conforms to the Softing product. Detailed explanations are provided in the Softing documentation which is part of the delivery.

NOTE: The Sherpa PROFINET device communication stack for R-IN32M3 is licensed and supported by Sherpa LLC. The Softing documentation provided in this delivery is published here with the consent of Softing Industrial Automation GmbH. All support inquiries for the Sherpa LLC's PROFINET device evaluation kit should be addressed to Sherpa LLC.

Softing and Sherpa LLC continue working together in the constant evolution and improvement of the PROFINET device communication stack. Improvements on the Softing stack will be made available on the Sherpa LLC's PROFINET device evaluation kit within a reasonable time frame.

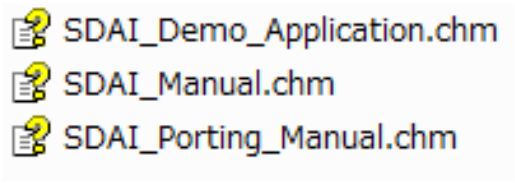
9. Simple Device Application Interface

The application programming interface of the Sherpa communication stack is based on Softing's Simple Device Application Interface (SDAI). Detailed explanations are provided in the Softing documentation which is part of the delivery.

10. Sample Application

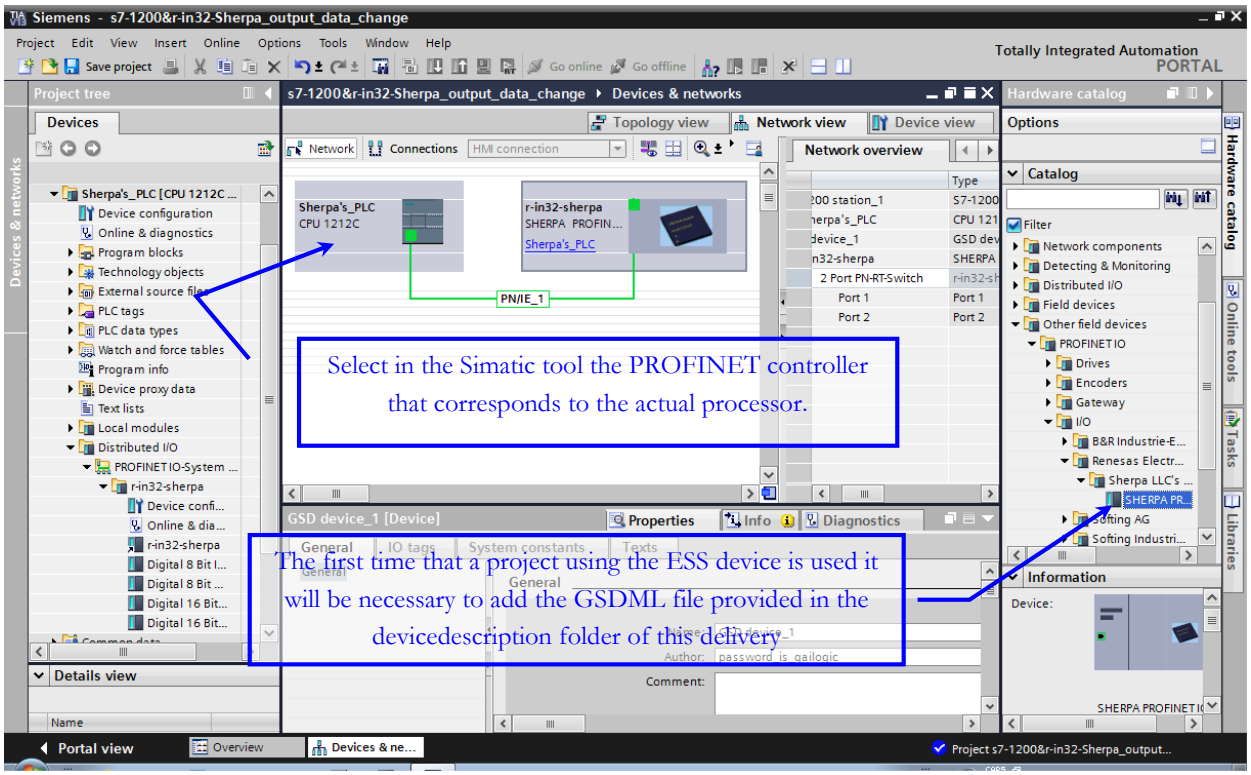
The sample application of Sherpa LLC's PROFINET device evaluation kit is based on Softing's sample application. Detailed explanations are provided in the Softing documentation which is part of the delivery.

The Softing documentation provided in this delivery is shown below:

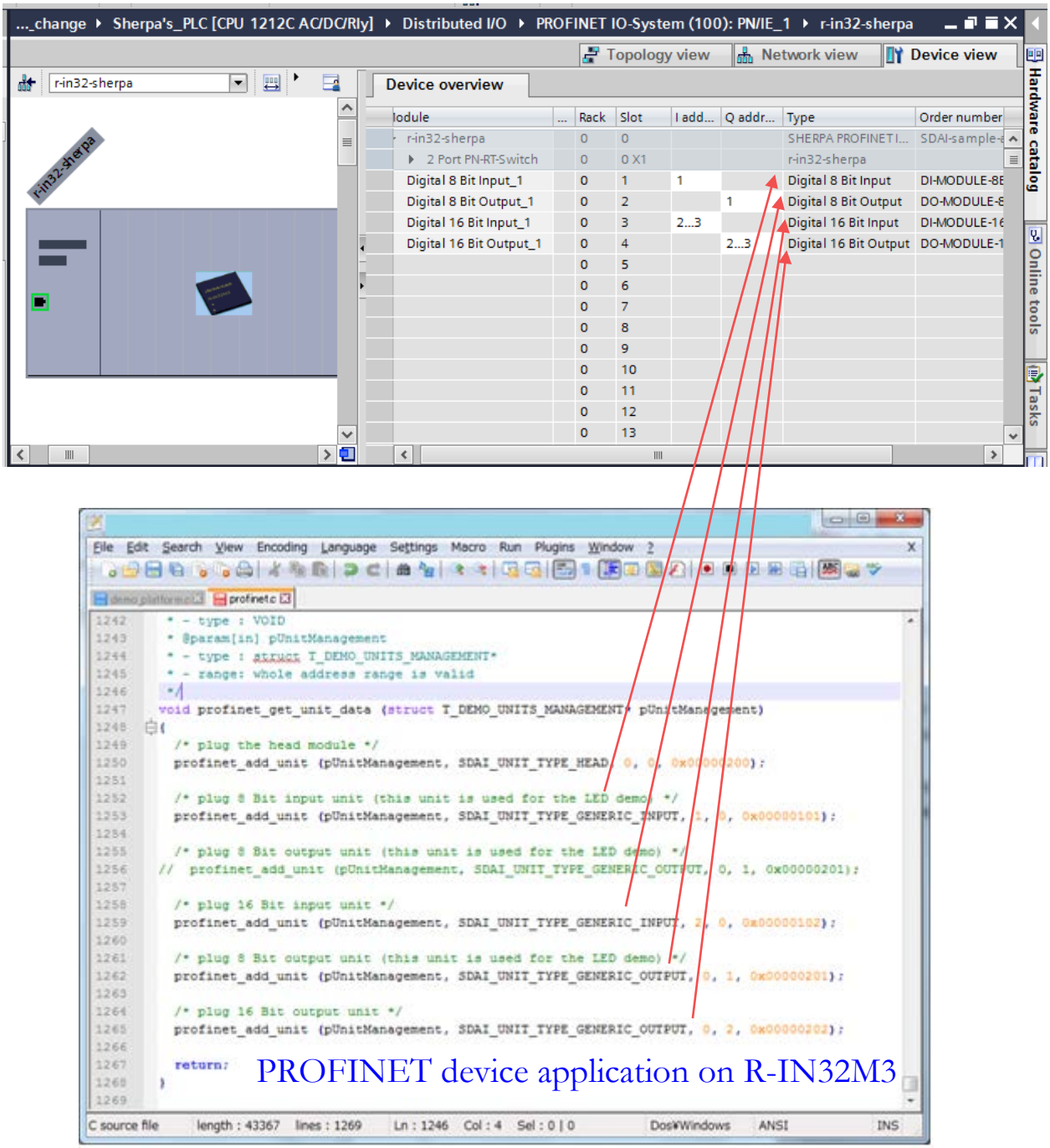


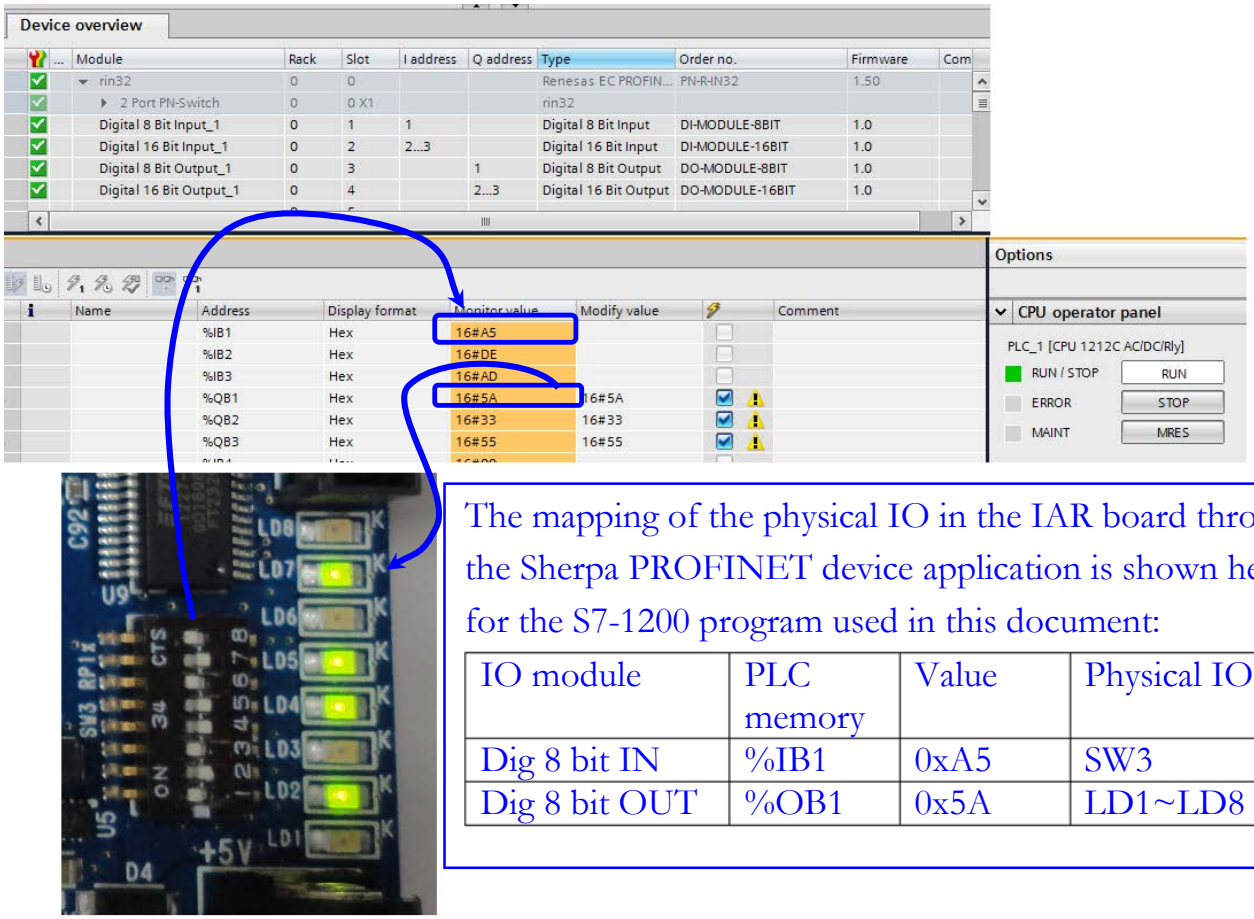
11. S7-1200 PROFINET controller program and Sherpa PROFINET application

This section provides an overview of the PROFINET controller program and the Sherpa sample application.



The IO configuration in the PROFINET controller must correspond to the IO configuration defined in the Sherpa application running on R-IN32M3.





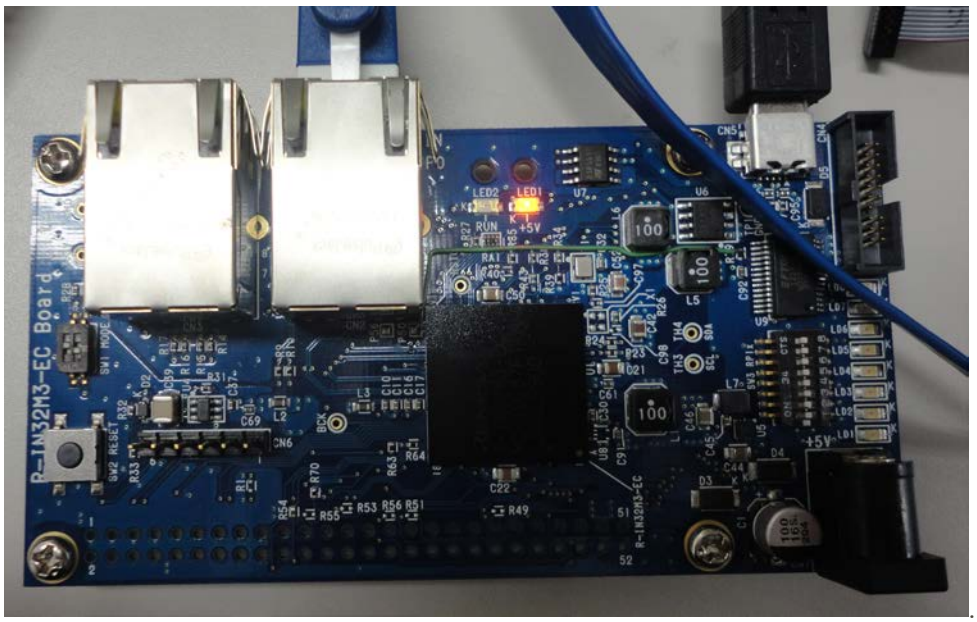
The mapping of the physical IO in the IAR board through the Sherpa PROFINET device application is shown here, for the S7-1200 program used in this document:

IO module	PLC memory	Value	Physical IO
Dig 8 bit IN	%IB1	0xA5	SW3
Dig 8 bit OUT	%OB1	0x5A	LD1~LD8

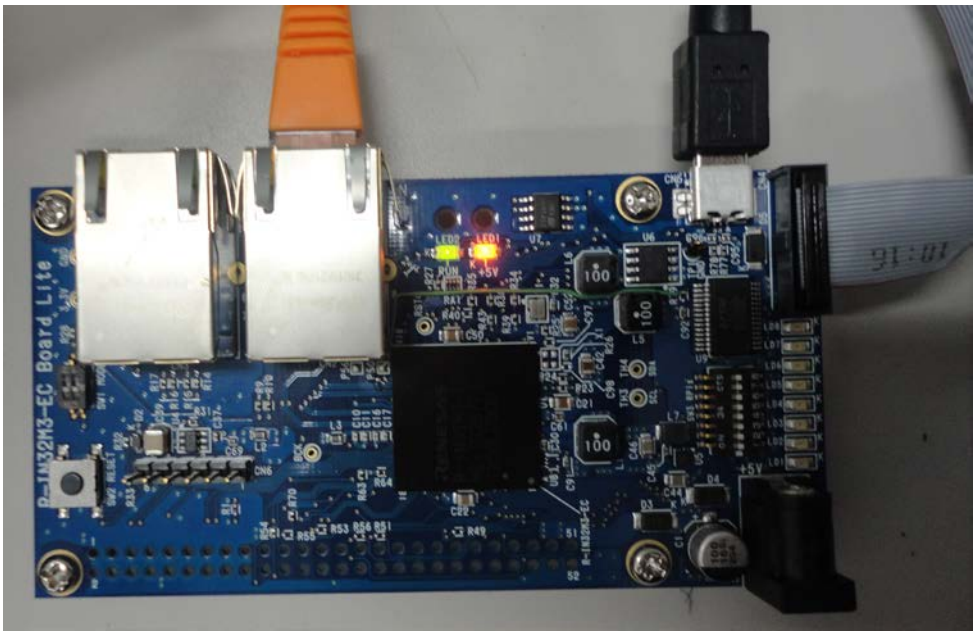
12. Sherpa PROFINET application's external interface in IAR System board

This section provides a description for the Sherpa sample PROFINET device applications external interface on the IAR System evaluation board. The external interface consist of light emitting diode for output and status representation and DIP switch for input to the PROFINET master of Sherpa application operation.

IAR board after power on prior to sample application going into RUN mode: LED1 status is solid amber (orange)

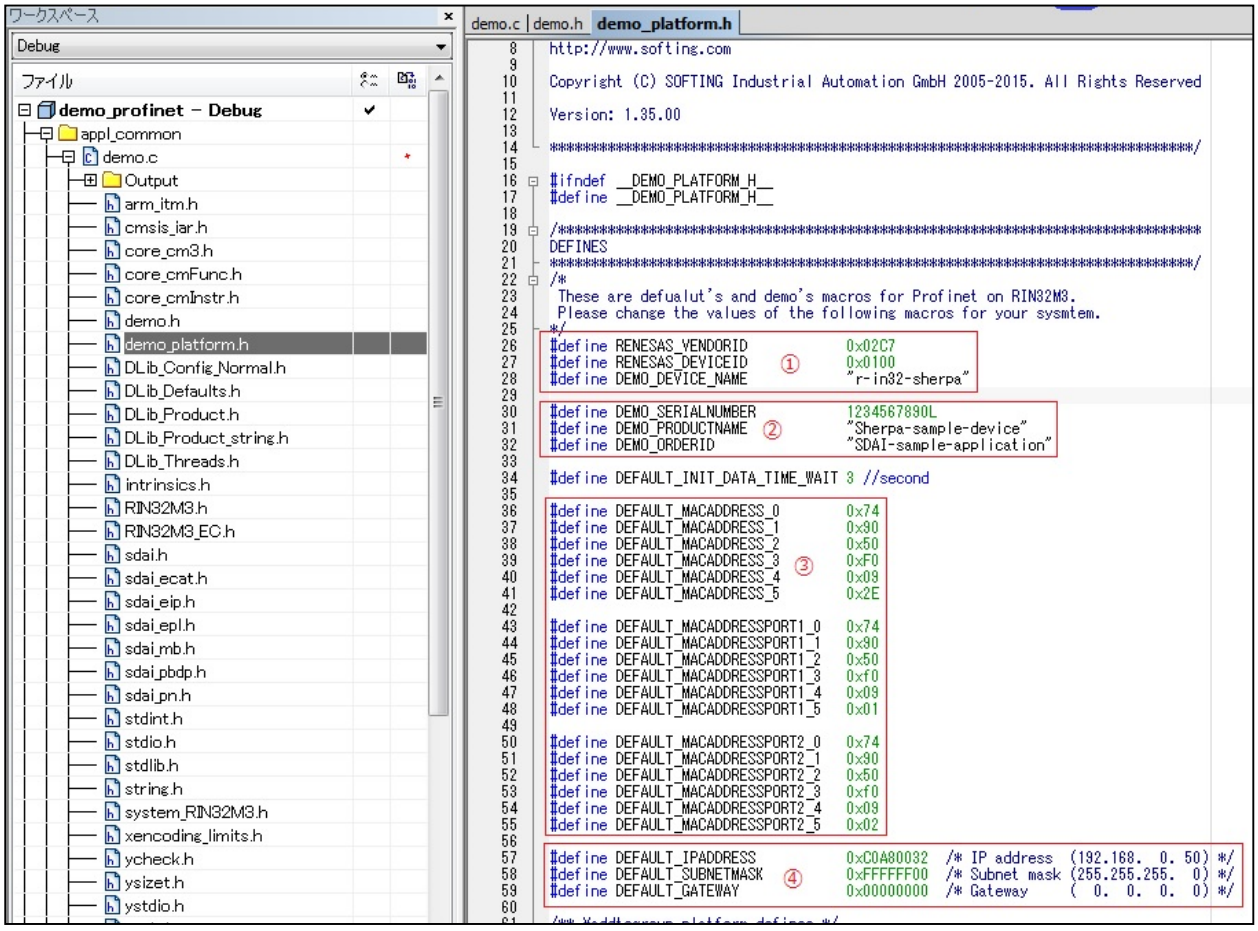


IAR board after sample application goes into run mode: LED2 status is solid green.



13. Sample Application Initialization

The initialization for the sample application is described in “demo_platform.h” header file.



There are four sections of this file that must be modified to customize an application. The explanation below elaborate further on the changes required for “demo_platform.h” header file.

(1) Changes related to the device identity:
The “RENESAS_VENDORID” is a value assigned by PNO. In order to use a different vendor ID in the application this code must be modified. The value programmed on the SDAI application must be identical to the vendor ID used in the GSDML file with which the Profinet controller is programmed. For testing purposes the value provided in the sample application and the GSDML file provided by the package can be used. The value in “DEMO_DEVICE_NAME” must be used in the Profinet controller’s engineering tool.

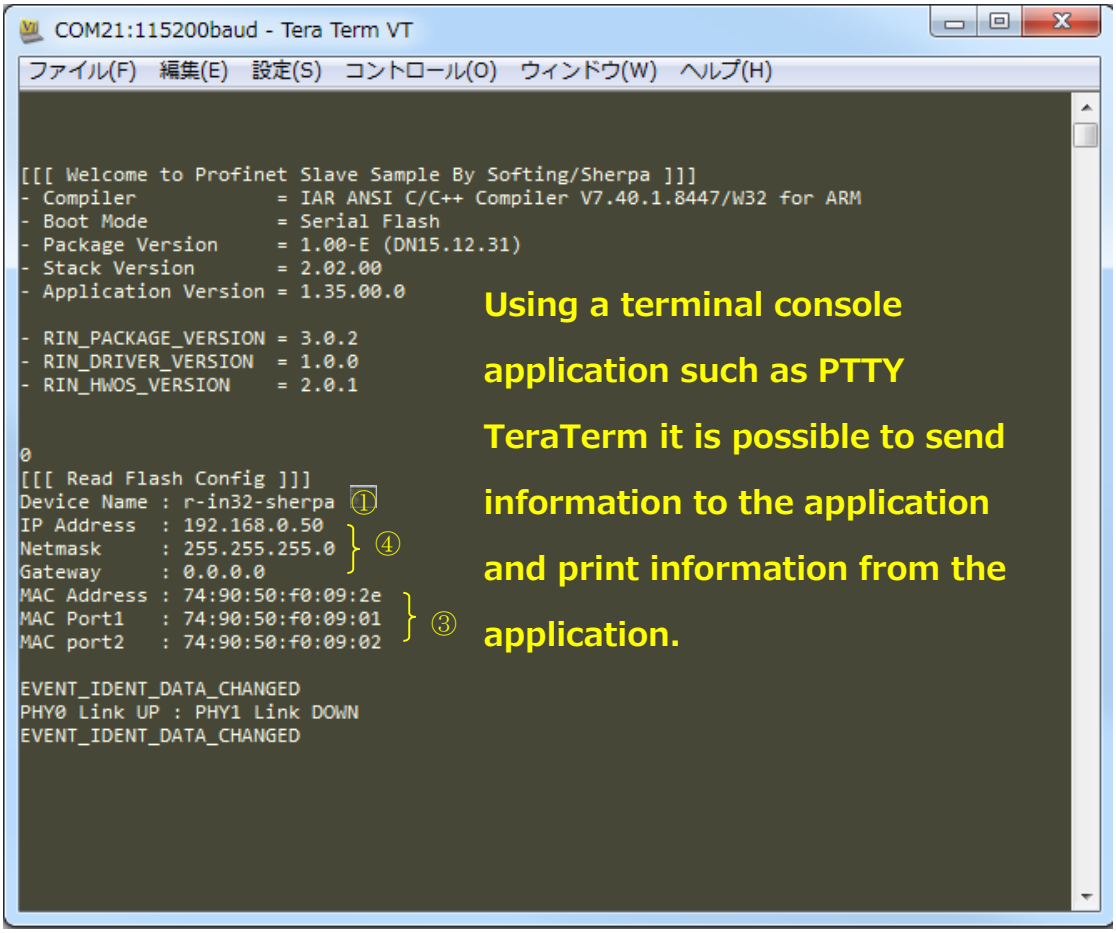
(2) Values related to demo product. These values will need to be modified and matched to the customized GSDML when developing an actual product. For the purpose of testing the values provided in the sample application and the GSDML provided can be used.

(3) MAC address:
The MAC address used in the application has been provided by Renesas Corpotation. When developing an actual product the MAC address must be determined by standard rules.

(4) IP address:
The IP address should be corrected for the actual application.

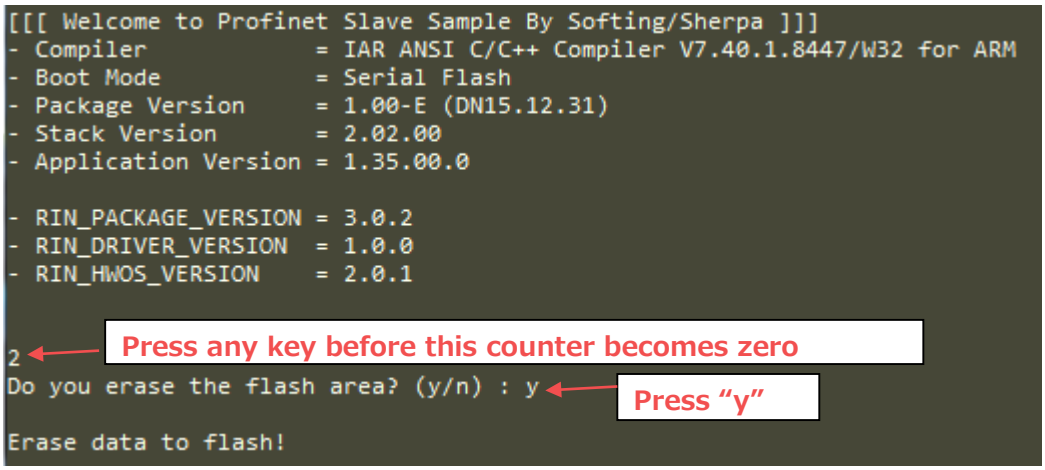
It is also possible to modify the above values at runtime using a terminal console application which should be set to the below communication parameters.

Baud rate:	115200
Data bits:	8bit
Parity:	none
Stop-bit:	1bit
Flow control:	none



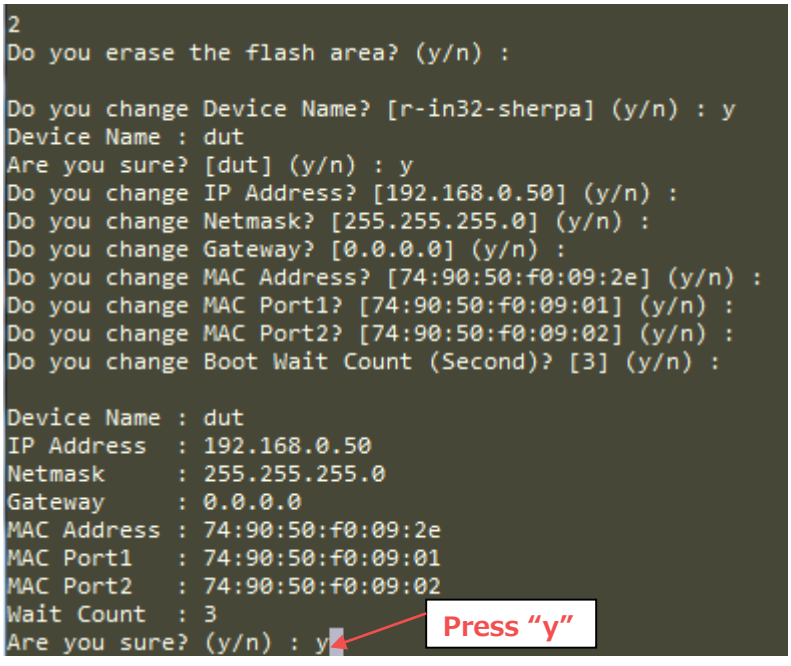
When the PROFINET device stack application runs on the R-IN32M3 evaluation board for the first time the values shown in the above screenshot are written to the flash ROM of R-IN32M3 on the evaluation board, and the application will start with those values.

In order to be able to use values other than those programmed in “demo_platform.h” file, before the counter shown in below screenshot becomes zero, press any key to start a menu option to modify these values.



If “y” is seletec in the above menu the following menu will allow the programming of different values.

- Device Name
- IP Address,Netmask,Gateway
- MAC Address, Mac Port1 Address、Mac Port2 Address
- Wait Count (Number of seconds for count down before boot)



Press “y” at the end to get the values programmed into flash ROM.

14. Licensing, product development and additional services

The Sherpa LLC's PROFINET device evaluation kit allows industrial device manufacturers to develop devices that conform to the PROFINET standard in a very short time and with minimum involvement in the communication protocol management, which is done by the Sherpa library. The use of this library in production requires a licensing contract between the device manufacturer and Sherpa LLC. When this agreement is reached Sherpa will provide release library customized to the vendor's specific board. Customization services can include access library porting to external application processor when R-IN32M3 is used as a communication co-processor. Additionally, consulting services for measurement application development can be considered as part of consulting services package.

For information about licensing and consulting services, please contact Sherpa LLC at:

Sherpa LLC
Office #16, 4th floor, Kase Building
88 3-19-11 Shin-Yokohama, Kohoku-ku
TEL 050-5532-6257
r-in32-stack@sherpa-tech.jp

15. PROFINET device stack functionality

Functionality according to Conformance Class B	
Media Redundancy Client	
Multicast Provider and Subscriber	
Number of PROFINET Controllers with which the Stack can simultaneously communicate (shared Devices).	2
Number of Connections per Controller	2
Max. Number of Configuration Data in the Device	8 kB
Max. Number of Parameter Data in the Device	8 kB
Max. Number of I/O Data per Communication Link	1440 bytes
Support of Profiles	yes