V850 Family

TCP/IP for Embedded system M3S-T4-Tiny (Green Hills MULTI): Introduction Guide

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Introduction

This document explains M3S-T4-Tiny for the V850 Family (Green Hills MULTI) V.1.05 Release 00E (hereafter referred to as “T4") .

T4 is the TCP/IP protocol stack for embedded system. T4 is provided as library format and user can develop own system with this library to use TCP/IP function. The peripherals of the MCU used for communication are two types. Type 1 Ethernet. The peripherals are internal Ethernet controller or external bus. The external bus connects to external Ethernet controller chip. Type 2 PPP. The peripheral is serial I/O (UART). We recommend V850E2/ML4 (has internal Ethernet controller) for Ethernet system, in case user selects V850 family. (T4 for V850 does not support PPP functions)

And we prepared “easy T4 application” (Web server, FTP server, DHCP client, DNS client, etc..). Please refer to the URL below.

http://www.renesas.com/mw/t4

We prepared T4 two version, [Free Version] and [Version for a Fee]. If user needs technical support for T4, please buy [Version for a Fee]. (Now T4 [Version for a Fee] for V850 is developing.)

Target Device

V850 Family

Contents

1. Structure of product

1. M3S-T4-Tiny for the V850 Family (Green Hills MULTI) V.1.05 Release 00E
2. M3S-T4-Tiny for the V850 Family (Green Hills MULTI) V.1.05 Release 00E Introduction Guide (r20an0155ej0100_ v850e2_t4.pdf)

This product includes files below.

table.1 T4 product files

name		description
installer (setup.exe)		Windows installer. Installer will show the T4 product agreement. If user admits this agreement, installer will copy the T4 file to the path below. [Free version] C:\Renesas\an_r20an0155ej_v850e2_t4_v105r00
T4 Library(lib)		
	T4_Library_V850_ether_ghs.a	V850E2 core T4 Library file ver 1.05(For the Ethernet)
	r_t4_itcpip.h	T4 header file
sample driver (drv)		
	driver	Sample driver for V850E2/ML4. This program is shown in Renesas web site as application note. Document Number R01AN1018EJ0100
sample program(sample)		
	Ether.gpj	MULTI Project file (This sample works on V850E2/ML4 CPU board)
document(doc)		
	r20uw0031ej0104_t4tiny.pdf r20uw0032ej0103_t4tiny.pdf r20an0155ej0100_v850e2_t4.pdf	user's manual Ethernet driver interface specification Introduction Guide (this document)

2. Library specification

Library specification can be seen in user's manual included in T4 installer. T4 installer can be downloaded in Renesas Electronics Web site.
User's manual explains how to use this library, and APIs. And Ethernet driver interface specification and PPP driver interface specification explain how to make the user defined functions called from library.

3. Corresponding MCU

This product corresponds to V850 family.
Library file is built with default compile option.

4. Development environment

-Host OS
Windows XP Windows NT 4.0 Windows 2000 Windows Me Windows 98 Windows 95

-Requirement items
When user develops, please choose newer version than below.

[Software]
-Integrated Development Environment
MULTI V.5.1.7D

[Debug tools]
Emulator debugger E1/E20
V850 E1/E20 Emulator Debugger V.1.02.00

[board]

Ethernet:

V850E2/ML4 CPU board (type：R0K0F4022C000BR)

5. T4 Ethernet sample application ROM / RAM / stack size

Sample application is made with settings below. (these values are example of “tcp_nonblocking_sample”)

* 3 Reception buffer for application
  -> Required RAM 1460 byte.by 1 reception buffer.
* 3 Communication endpoints with 1460bytes reception window.
  -> Required RAM 1460byte by 1 communication endpoint.
*3 Reception buffer Entry and 4 Transmission buffer Entry for Ethernet driver.
  -> Required RAM 1520byte by 1 reception/transmission buffer.

[Required memory1 : ROM/RAM size for Application :: main.c, echo_srv.c]

ROM	:	about	1036	byte
RAM	:	about	10040	byte

[Required memory2 : ROM/RAM size for T4 :: libT4_Library_V850_ether.lib]

ROM	:	about	30267	byte
RAM	:	about	3	byte

[Required memory3 : ROM/RAM size for Ethernet driver :: t4_driver.c, ether_driver.c, ether_phy.c]

ROM	:	about	5850	byte
RAM	:	about	10716	byte

[stack size]

API	stack size (includes sample driver)	Function called from T4 Library
tcp_acp_cep	Required 350 byte stack for T4 library _process_tcpip() function.	api_slp
tcp_con_cep		api_slp
tcp_rcv_dat		api_slp
tcp_snd_dat		api_slp
tcp_sht_cep		api_slp
tcp_cls_cep		api_slp
tcp_can_cep		api_slp
udp_rcv_dat		api_slp
udp_snd_dat		api_slp
udp_can_cep		dis_int ena_int
tcpudp_get_ramsize		
tcpudp_open		tcpudp_act_cyc
tcpudp_close		tcpudp_act_cyc
_process_tcpip		api_wup api_slp rcv_buff_release lan_write lan_read lan_reset

This stack size table is for sample program of T4.

6. Version information

User can access T4 Library information with valuable below.
extern const char _T4_Version[];

"M3S-T4-Tiny(Ethernet) version 1.05 for V850 GreenHills.(Mar 15 2012, 19:26:00) "

7. How to update Ethernet sample driver

In case update sample Ethernet driver shown in Renesas web site, user overwrite directories “driver” from sample Ethernet driver to T4 program.

And apply 2 changes like after this.

Call T4 LAN interrupt handler in Ethernet driver reception completion interrupt

```
ether_driver.c 174 行目

  if ( int_sts & INTMS_RXI  ) {         /* RX DMA complete         */
    DBG_PRINT((" [int] RXI\r\n"));
    lan_inthdr();
  }
```

Call T4 LAN interrupt handler in Ethernet driver transmission completion interrupt

```
ether_driver.c 203 行目

  if ( int_sts & INTMS_TXI  ) {         /* TX DMA complete         */
    DBG_PRINT((" [int] TXI\r\n"));
    DBG_PRINT("        LSTTXDP[%08X]\r\n",LSTTXDP));
    lan_inthdr();
  }
```

8. Notes

(1)Specify the size of 15bit or less for the third argument "INT len" of tcp_rcv_dat() and tcp_snd_dat().

(2)Specify the size of 15bit or less for the fourth argument "TMO tmout" of tcp_rcv_dat() and tcp_snd_dat().

(3)The MAC address of the sample program is stored in _myethaddr variable of config_tcpudp.c.

Change an initial value of the _myethaddr (MAC address) variable if necessary according to the system.

9. Library version information

ver	change	release date
1.05	[Change for RX T4 library] -add function Add T4 Library for PPP - Improve performance Optimize checksum calculation Enable Ethernet transmit interrupt [Change for COMMON T4 library] -Improve performance Enable Ethernet transmit interrupt -bug fix In case, result of calculating UDP checksum is ZERO, T4 stores temporary value to received UDP checksum area. In case, receiving broadcast packet before sending ARP response, T4 sends illegal packet. In case, user uses RTOS and uses TCP and UDP in same time, user cannot understand which protocol has completed from notify of completion. DELETED: api_wup(), api_slp() ADDED: tcp_api_wup(), tcp_api_slp(), udp_api_wup(), udp_api_slp() Prohibit using _process_tcpip(0) and transmit/reception polling must be used in timer interrupt with _process_tcpip(1).	Apr,01,12
1.04	add function Add Etherent driver function "report_error". Add variable "_udp_enable_zerochecksum" for behavior of UDP sum check. Correct "t4_driver.c" to fix FR flag clear timing. This fixes wrong operation that EDMAC stops incorrectly.	Aug.30.11
1.03	bug fix -case When user use RI600/4(Renesas uITRON) with T4, User definition function “api_wup()” has no way to know which communication endpoint is ended. -measures Change “api_wup()” argument. To know which communication endpoint is ended.	Feb.02.11
1.02	bug fix -case When user use RI600/4(Renesas uITRON) with T4, conflict r_t4_itcpip and itron.h. -measures fixed r_t4_itcpip.h	internal use
1.01	bug fix -case When T4 uses API “tcp_snd_dat” with condition that other endpoint becomes zerowindow, and other endpoint returns ACK with enough window size. T4 (sender) continues zerowindow probe, and other endpoint returns ACK with enough window size. This condition makes T4 not to be able to update remote window size and hung-up. -measures When T4 judges “other endpoint is zerowindow”, and other endpoint returns ACK with enough window size, T4 retransfers previous data. (not zerowindow probe)	Nov.10.10
1.00	first release	Oct.09.10

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Revision Record

		Description	
Rev.	**Date**	**Page**	**Summary**
1.00	Apr.01.12	—	First edition issued

General Precautions in the Handling of MPU/MCU Products

The following usage notes are applicable to all MPU/MCU products from Renesas. For detailed usage notes on the products covered by this manual, refer to the relevant sections of the manual. If the descriptions under General Precautions in the Handling of MPU/MCU Products and in the body of the manual differ from each other, the description in the body of the manual takes precedence.

1. Handling of Unused Pins
   Handle unused pins in accord with the directions given under Handling of Unused Pins in the manual.
   — The input pins of CMOS products are generally in the high-impedance state. In operation with an unused pin in the open-circuit state, extra electromagnetic noise is induced in the vicinity of LSI, an associated shoot-through current flows internally, and malfunctions occur due to the false recognition of the pin state as an input signal become possible. Unused pins should be handled as described under Handling of Unused Pins in the manual.
2. Processing at Power-on
   The state of the product is undefined at the moment when power is supplied.
   — The states of internal circuits in the LSI are indeterminate and the states of register settings and pins are undefined at the moment when power is supplied.
   In a finished product where the reset signal is applied to the external reset pin, the states of pins are not guaranteed from the moment when power is supplied until the reset process is completed.
   In a similar way, the states of pins in a product that is reset by an on-chip power-on reset function are not guaranteed from the moment when power is supplied until the power reaches the level at which resetting has been specified.
3. Prohibition of Access to Reserved Addresses
   Access to reserved addresses is prohibited.
   — The reserved addresses are provided for the possible future expansion of functions. Do not access these addresses; the correct operation of LSI is not guaranteed if they are accessed.
4. Clock Signals
   After applying a reset, only release the reset line after the operating clock signal has become stable. When switching the clock signal during program execution, wait until the target clock signal has stabilized.
   — When the clock signal is generated with an external resonator (or from an external oscillator) during a reset, ensure that the reset line is only released after full stabilization of the clock signal. Moreover, when switching to a clock signal produced with an external resonator (or by an external oscillator) while program execution is in progress, wait until the target clock signal is stable.
5. Differences between Products
   Before changing from one product to another, i.e. to one with a different type number, confirm that the change will not lead to problems.
   — The characteristics of MPU/MCU in the same group but having different type numbers may differ because of the differences in internal memory capacity and layout pattern. When changing to products of different type numbers, implement a system-evaluation test for each of the products.

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