

RX Family

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DNS client using the embedded TCP/IP M3S-T4-Tiny Module

Firmware Integration Technology

Introduction

This application note explains DNS client using the embedded TCP/IP M3S-T4-Tiny Module (hereafter DNS client).

DNS client is provided as Firmware Integration Technology (FIT) Module. Please refer to the URL to know FIT outline.

<https://www.renesas.com/en-us/solutions/rx-applications/fit.html>

DNS client is used by combining the following middleware products.

Table 1 Middleware products

Function	product	website
TCP/IP	M3S-T4-Tiny (hereafter T4)	http://www.renesas.com/mw/t4

We prepared sample programs for each CPU board included in [the Renesas Starter Kit](#). For more information, see Renesas Starter Kit for sample application notes.

Table 2 Sample application notes

sample application notes	document number	website
Application example using T4 (DHCP/DNS/FTP/HTTP)	R20AN0314	http://www.renesas.com/mw/t4
Firmware Integration Technology		

Target Device

RX Family

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1. Outline

DNS client is the program getting IP address which corresponds to domain name (www.renesas.com etc.) from DNS server.

1.1 System Structure

Show System Structure Example.

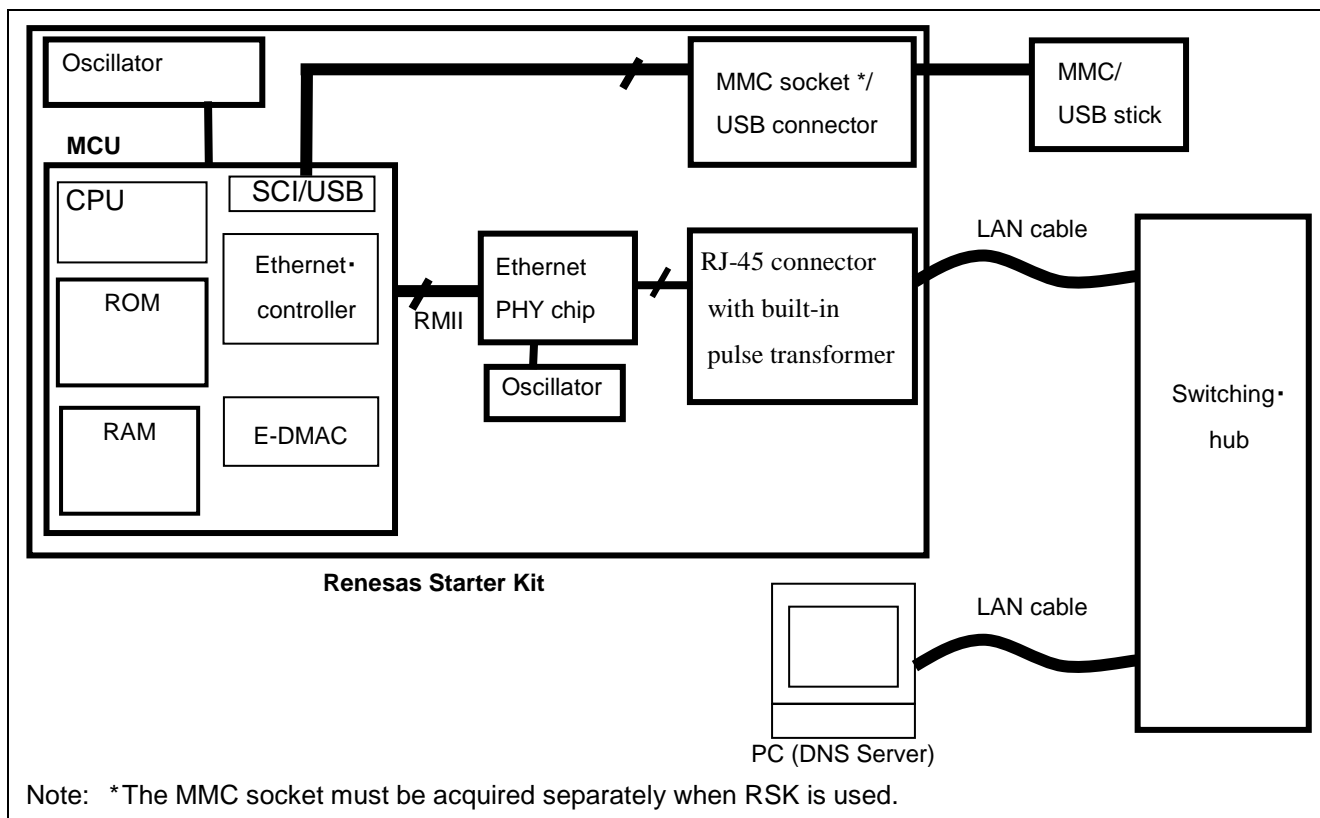


Figure 1 System Structure Example

1.2 Software Structure

Show Software Structure Example.

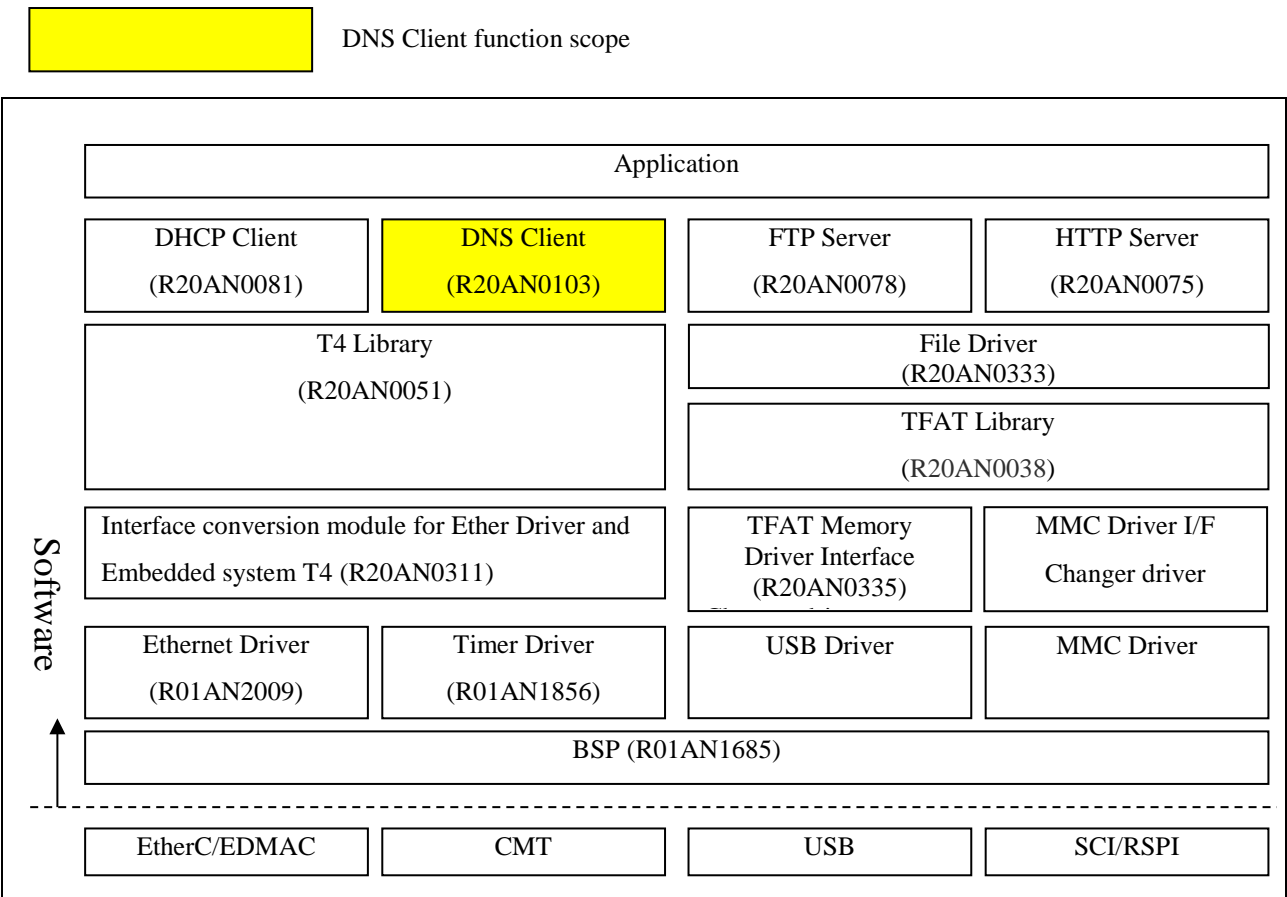


Figure 2 Software Structure Example (in case, store the web contents to MMC/USB memory)

2. API Information

2.1 Hardware Requirements

None

2.2 Software Requirements

This module is dependent upon the following packages:

r_t4_rx

2.3 Supported Toolchains

This library is tested and working with following toolchains:

Renesas RX Toolchain v.2.04.01

2.4 Limitations

None

2.5 Header Files

All API calls are accessed by including a single file " r_t4_dns_client_rx_if.h " which is supplied with this software's project code.

2.6 Configuration Overview

All configurable options that can be set at build time are located in the file "r_t4_dns_client_rx_config.h". A summary of these settings are provided in the following table:

Table 3 Configuration options

Configuration options in <i>r_t4_dns_client_rx_config.h</i>	
#define DNS_IP_ADDR_1 ※Default value is "172,30,11,5" .	Set the primary DNS server IP address.
#define DNS_IP_ADDR_2 ※Default value is "10,29,72,33" .	Set the secondary DNS server IP address.
#define DNS_TIMEOUT ※Default value is "5" .	Set the time out which queries to DNS server. Positive value : the time waiting to complete sending. Unit is 10ms. TMO_FEVR : wait to complete sending forever. TMO_NBLK : non-blocking call
#define NAME_SIZE ※Default value is "256" .	Maximum size of domain name which queries to DNS server.
#define DNS_UDP_CEP_ID ※Default value is "1" .	UDP communication end point ID for DNS in file 'config_tcpudp.c'.

2.7 API DATA Structures

This details the data structures of argument which used with the API function. This structure listed in the “r_t4_dns_client_rx_if.h” with API function prototypes.

【DNS data structure】

```
typedef struct _name_table
{
    char name[NAME_SIZE];
    unsigned char ipaddr[4];
}NAME_TABLE;
```

2.8 Adding Library to Your Project

Please refer to the Adding Firmware Integration Technology Modules to Projects (r01an1723eu0111_rx.pdf, for e² studio) or the Adding Firmware Integration Technology Modules to CS+ Projects (r01an1826ej0102_rx.pdf).

3. API Functions

3.1 R_dns_resolve_name

This function sets the domain name which queries to DNS server.

Format

```
int32_t      R_dns_resolve_name(  
                char          *name,  
                DNS_CB_FUNC  func  
            )
```

Parameters

name	input	pointer to domain name string to resolve
func	input	pointer to callback function which is called when query to DNS server is finished.

Return Value

E_OK	normal terminations
E_DNS_PROCESSING	processing
Other	abnormal terminations

Properties

Prototyped in file "r_t4_dns_client_rx_if.h".

Description

The application calls this function after calling tcpudp_open(). This function is set the domain name (www.renesas.com etc.) query to DNS server in first argument. At the end of the query, callback function would be called that is specified in second argument, user can get DNS server response. If this function is called during the query to DNS server, returns E_DNS_PROCESSING.

Reentrant

No

Special Notes

None

3.2 R_dns_init

This function initializes the management information of DNS client.

Format

```
void      R_dns_init (void)
```

Parameters

None

Return Value

None

Properties

Prototyped in file "r_t4_dns_client_rx_if.h".

Description

The application calls this function only once before calling R_dns_resolve_name() in initial sequence. This function initializes the management information of DNS client.

Reentrant

Yes

Special Notes

None

3.3 R_dns_process

This function is periodic process of DNS client.

Format

```
int32_t R_dns_process(void)
```

Parameters

None

Return Value

E_OK	Normal terminations
E_DNS_INTERNAL	Internal error
E_DNS_TIMEOUT	Time out query to DNS server
Other	Abnormal terminations except for the above

Properties

Prototyped in file "r_t4_dns_client_rx_if.h".

Description

Application must call this function periodically after calling tcpudp_open().

After set the domain name query to DNS server in R_dns_resolve_name(), the process of DNS client is executed in this function. When the process of DNS client is normal terminations or abnormal terminations, called callback function set in R_dns_resolve_name(). If no response from DNS server when the time set DNS_TIMEOUT macro in "r_t4_dns_client_rx_if.h" is passed, after retry the prevision times, returns E_DNS_TIMEOUT.

Reentrant

No.

Special Notes

None

3.4 R_T4_DNS_CLIENT_GetVersion

This function returns the version number of DNS client.

Format

```
uint32_t      R_T4_DNS_CLIENT_GetVersion (void)
```

Parameters

None

Return Value

Version number of DNS Client

Properties

Prototyped in file “r_t4_dns_client_rx_if.h”.

Description

Returns the version of this module. The version number is encoded such that the top two bytes are the major version number and the bottom two bytes are the minor version number.

For example, version ‘4.25’, the return value is ‘0x00040019’.

Reentrant

Yes

Special Notes

This function is inlined using the “#pragma inline” directive in “r_dns_client.c”.

4. Technical data

DNS RFC URL

<http://ftp.rfc-editor.org/in-notes/rfc1034.txt>

<http://ftp.rfc-editor.org/in-notes/rfc1035.txt>

Website and Support

Renesas Electronics Website

<http://www.renesas.com/>

Inquiries

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Revision History

Rev.	Date	Description	
		Page	Summary
1.03	Oct.01.16	—	Updated the xml file for FIT.
1.02	Jul.01.14	1	Fixed Fit Module's Web page URL
			Added Support MCUs
		4	Fixed Figure 2
1.01	May.09.14	—	Corresponded to FIT Modules.
1.00	Apr.04.11	—	First edition issued

General Precautions in the Handling of Microprocessing Unit and Microcontroller Unit Products

The following usage notes are applicable to all Microprocessing unit and Microcontroller unit products from Renesas. For detailed usage notes on the products covered by this document, refer to the relevant sections of the document as well as any technical updates that have been issued for the products.

1. Handling of Unused Pins

Handle unused pins in accordance 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 a product with a different part number, confirm that the change will not lead to problems.

- The characteristics of Microprocessing unit or Microcontroller unit products in the same group but having a different part number may differ in terms of the internal memory capacity, layout pattern, and other factors, which can affect the ranges of electrical characteristics, such as characteristic values, operating margins, immunity to noise, and amount of radiated noise. When changing to a product with a different part number, implement a system-evaluation test for the given product.

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