Network Driver for Microchip LAN7500 and LAN9500 User Guide

Version 1.50

For use with Network Driver for Microchip LAN7500 and LAN9500 module versions 1.02 and above

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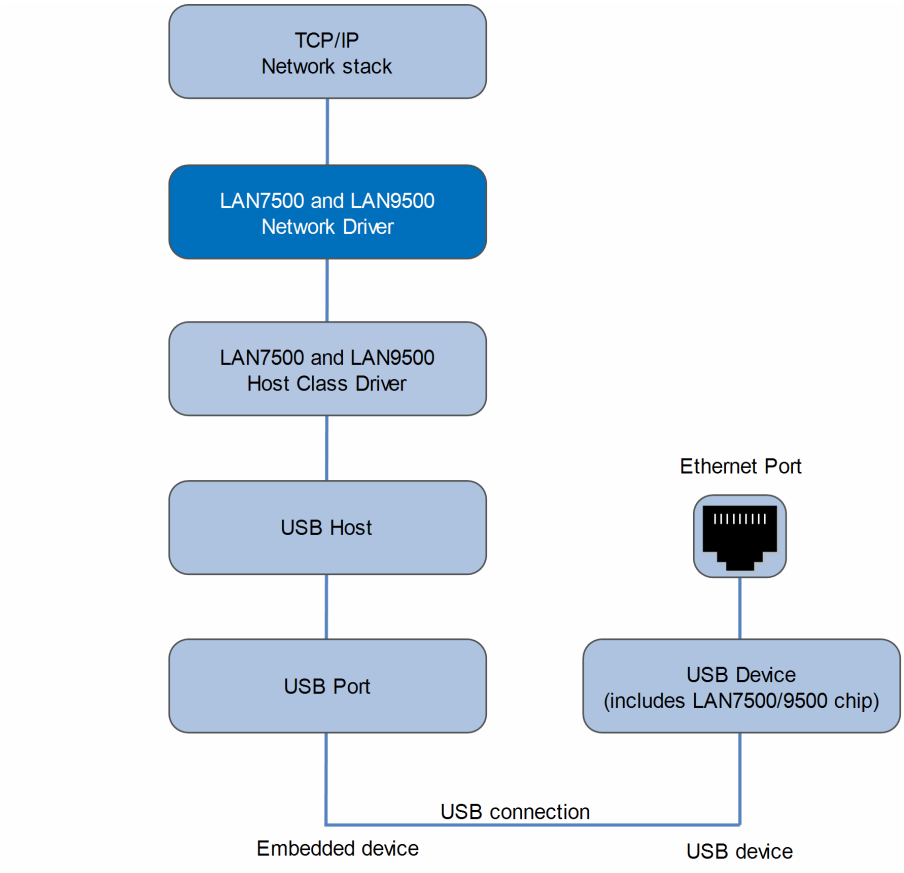
Table of Contents

1 System Overview

1.1 Introduction

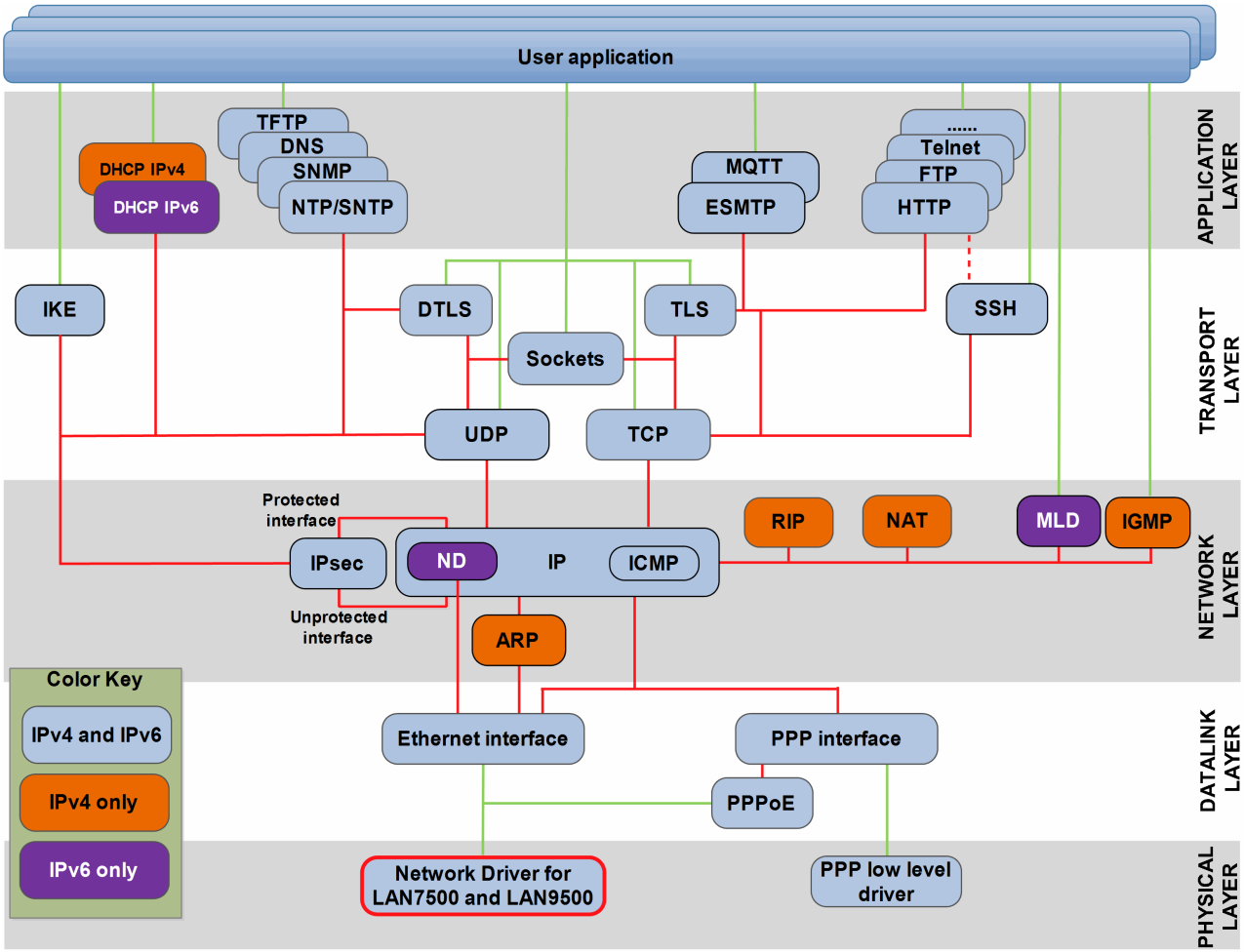
This guide is for those who want to implement a network driver for LAN7500 High Speed USB 2.0 to 10/100 /1000 Ethernet Controllers and LAN9500 USB 2.0 to 10/100 Ethernet Controllers. These devices are produced by Microchip Technology Inc. (formerly SMSC).

The purpose of this driver is to provide an Ethernet physical port interface at the device end of a USB connection, so that the host system sees that remote physical port as a local Ethernet port. It combines with HCC's USB Host Microchip LAN7500 and LAN9500 class driver to provide the interface. The system structure is shown below:



Note: Although every attempt has been made to simplify the system's use, you need a good understanding of the requirements of the systems you are designing in order to obtain the maximum practical benefits. HCC Embedded offers hardware and firmware development consultancy to help you implement your system.

The driver's location within HCC's TCP/IP stack is shown below. (In this diagram green lines show interfaces available to users of the TCP/IP stack, red lines show internal TCP/IP interfaces.)



1.2 Feature Check

The main features of the network driver are the following:

- Conforms to the HCC Advanced Embedded Framework.
- Conforms to the HCC network driver specification.
- Designed for integration with both RTOS and non-RTOS based systems.
- Conforms to the HCC Coding Standard.
- Combines with HCC's USB Host Microchip LAN7500 and LAN9500 class driver to provide the interface.
- Automatic checksum for IP, TCP, and UDP is configurable (for the LAN7500 only).

This driver is compatible with the following Microchip LAN devices:

- LAN7500
- LAN89730
- LAN9500 and LAN9500A
- LAN9512, LAN9513, and LAN9514
- LAN9730

1.3 Device Description

This table summarizes the properties of the supported Microchip devices:

	Ethernet bandwidth	Additional features
LAN7500	10Base-T/100Base-TX/1000Base-T	
LAN89730	10Base-T/ 100Base-TX	HSIC interface
LAN9500	10Base-T/ 100Base-TX	
LAN9500A	10Base-T/ 100Base-TX	Lower power consumption
LAN9512	10Base-T/ 100Base-TX	Two port USB 2.0 hub
LAN9513	10Base-T/ 100Base-TX	Three port USB 2.0 hub
LAN9514	10Base-T/ 100Base-TX	Four port USB 2.0 hub
LAN9730	10Base-T/ 100Base-TX	External MII interface

1.4 Packages and Documents

Packages

The table below lists the packages that you need in order to use this module.

Package	Description
hcc_base_doc	This contains the two guides that will help you get started.
nw_drv_base	The network driver base package. This is the base system on which the Microchip LAN7500 and LAN9500 driver is built.
usbh_cd_microchip_lan7500	The USB Host class driver package for Microchip LAN7500 and LAN9500 devices.
nw_drv_eth_microchip_lan7500	The Network Driver for Microchip LAN7500 and LAN9500 package.

Documents

For an overview of the HCC TCP/IP stack software, see Product Information on the main HCC website.

Readers should note the points in the HCC Documentation Guidelines on the HCC documentation website.

HCC Firmware Quick Start Guide

This document describes how to install packages provided by HCC in the target development environment. Also follow the *Quick Start Guide* when HCC provides package updates.

HCC Source Tree Guide

This document describes the HCC source tree. It gives an overview of the system to make clear the logic behind its organization.

HCC Network Driver User Guide

This document describes the network driver base system.

HCC Network Driver for Microchip LAN7500 and LAN9500 User Guide

This is this document.

Embedded USB Host LAN7500 and LAN9500 Class Driver User Guide

This document describes the USB Host class driver package for Microchip LAN7500 and LAN9500 devices.

1.5 Change History

This section describes past changes to this manual.

- To view or download earlier manuals, see Archive: Network Driver for Microchip LAN7500 and LAN9500 User Guide.
- For the history of changes made to the package code itself, see History: nw_drv_eth_microchip_lan7500.

The current version of this manual is 1.50. The full list of versions is as follows:

Manual version	Date	Software version	Reason for change
1.50	2017-06-15	1.02	New *Change History* format.
1.40	2017-03-29	1.02	Changes to TCP Stack diagram.
1.30	2017-01-17	1.02	Changes to TCP Stack diagram.
1.20	2016-03-03	1.02	Added *Change History*. Added *LAN9500* to title and content.
1.00	2015-12-10	1.01	First online version named Network Driver for Microchip LAN7500 User Guide.

2 Source File List

This section lists and describes all the source code files included in the system. These files follow HCC Embedded's standard source tree system, described in the *HCC Source Tree Guide*. All references to file pathnames refer to locations within this standard source tree, not within the package you initially receive.

> **Note:** Do not modify any files except the configuration file.

2.1 API Header File

The file **src/api/api_ethdriver_microchip_lan7500.h** should be included by any application using the system. This is the only file that should be included by an application using this module. It defines the lan7500_eth_drv_init() function.

2.2 Configuration File

The file **config_ethdriver_microchip_lan7500.h** contains all the configurable parameters of the system. Configure these as required. For details of these options, see Configuration Options.

2.3 System File

The source file is **src/driver/network/ethernet/microchip_lan7500/eth_microchip_lan7500.c**. **This file should only be modified by HCC.**

2.4 Version File

The file **src/version/ver_ethdriver_microchip_lan7500.h** contains the version number of this module. The version number is checked by all modules that use a module to ensure system consistency over upgrades.

3 Configuration Options

Set the system configuration options in the file **src/config/config_ethdriver_microchip_lan7500.h**, as described below. This section lists the available configuration options and their default values.

ETHDRV_MICROCHIP_LAN7500_LINK_STATUS_POLL_INTERVAL

The poll interval of link status in milliseconds. The default is 500.

> **Note:** Checksum offloading does not work on the LAN9500, so the following four options do not apply to that device.

ETHDRV_MICROCHIP_LAN7500_RX_IP_CHKSUM

Keep this at the default value of 1 to check and filter the checksums of incoming IP packets on the USB Ethernet adapter. Set it to 0 to disable this.

ETHDRV_MICROCHIP_LAN7500_RX_TCPUDP_CHKSUM

Keep this at the default value of 1 to check and filter the checksums of incoming TCP/UDP packets on the USB Ethernet adapter. Set it to 0 to disable this.

ETHDRV_MICROCHIP_LAN7500_TX_IP_CHKSUM

Keep this at the default value of 1 to calculate the checksums of outgoing IP headers on the USB Ethernet adapter. Set it to 0 to disable this.

ETHDRV_MICROCHIP_LAN7500_TX_TCPUDP_CHKSUM

Keep this at the default value of 1 to calculate the checksums of outgoing TCP/UDP headers on the USB Ethernet adapter. Set it to 0 to disable this.

ETHDRV_MICROCHIP_LAN7500_TR_BUF_SIZE

The size of the transfer buffer that contains receive and transmit buffers. The default is (32 * 1024).

4 Application Programming Interface

This section describes the single Application Programming Interface (API) function and the error codes it may return.

4.1 lan7500_eth_drv_init

Use this function to initialize the network driver.

Format

```
t_nwdriver_ret lan7500_eth_drv_init (
    uint32_t         param,
    t_nwdriver * *   const p_ethdriver )
```

Arguments

Parameter	Description	Type
param	The driver parameter.	uint32_t
p_ethdriver	Where to write the pointer to the driver.	t_nwdriver * *

Return Values

Return value	Description
NWDRIVER_SUCCESS	Successful execution.
NWDRIVER_ERROR	Operation failed.

4.2 Error Codes

This table lists all the error codes that may be generated by the API calls:

Error code	Value	Meaning
NWDRIVER_SUCCESS	0	Execution successful.
NWDRIVER_ERROR	1	Operation failed.

5 Integration

This section describes all aspects of the network driver that require integration with your target project. This includes porting and configuration of external resources.

5.1 PSP Porting

The Platform Support Package (PSP) is designed to hold all platform-specific functionality, either because it relies on specific features of a target system, or because this provides the most efficient or flexible solution for the developer. For full details of its functions and macros, see the *HCC Base Platform Support Package User Guide*.

The module makes use of the following standard PSP function:

Function	Package	Element	Description
psp_memset()	psp_base	psp_string	Sets the specified area of memory to the defined value.

The module makes use of the following standard PSP macros:

Macro	Package	Element	Description
PSP_RD_LE32	psp_base	psp_endianness	Reads a 32 bit value stored as little-endian from a memory location.
PSP_WR_LE32	psp_base	psp_endianness	Writes a 32 bit value to be stored as little-endian to a memory location.

5.2 Utilities

The code creates and uses a single timer in the **hcc_timer** module.

The **hcc_timer** module is included in your system when you install the base network driver module.