M451 驅動 DM9051

NuMicro® 32 位系列微控制器範例代碼介紹

文件資訊

代碼簡述	本範例代碼使用 M451 來驅動 DM9051 來實現 uIP/httpd 功能。
BSP 版本	M451BSP_v3.01.003
開發平台	NuTiny-SDK-M451V

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1 功能介紹

1.1 簡介

本範例代碼使用M451系列通過SPI接口驅動DM9051，來實現uIP/httpd功能。

1.2 原理

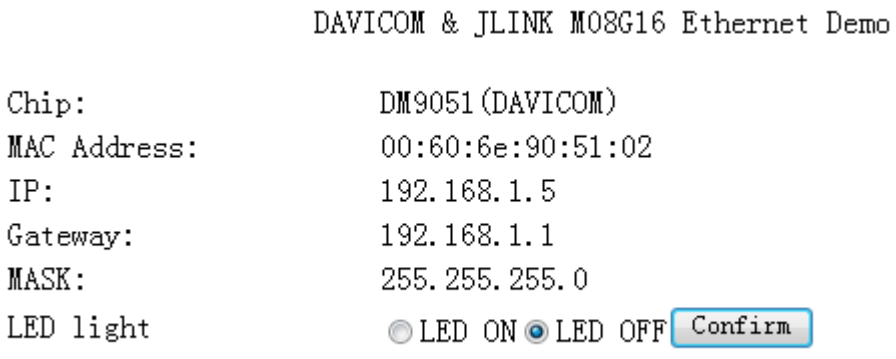
DM9051 是一個高集成和低成本的少管腳數的單芯片快速以太網控制器，具有串行外圍接口(SPI)， 10/100M PHY 和 MAC，以及 16k 字節的 SRAM。低功耗、高性能的工藝接口，支持 3.3V、5V IO 融差。

DM9051 的物理層可以通過 HP Auto-MDIX 與 10Base-T 中的 UTP3、4、5 和 100Base-TX 中的 UTP5 連接。它完全符合 IEEE 802.3u 規範，其自動協商功能將自動配置 DM9051，最大限度地利用其 10M 或 100M 的能力。

DM9051 在 PHY 和 MAC 中支持 IEEE 802.3az，以節省以太網空閒時的功耗。支持 ieee802.3X 全雙工流量控制和半雙工背壓功能，避免與鏈路夥伴丟失以太網數據包。

作爲SPI從機接口支持與CPU的SPI主機接口兼容的SPI時鐘模式0和3。時鐘速度可以高達50Mhz，以配合高速的主SPI。SPI突發命令格式是有效的代碼，可以最小化訪問DM9051內部寄存器和內存中的包數據時的命令開銷。

1.3 執行結果



2 代碼介紹

初始化 DM9051：

```
int32_t dm9051_init()
{
    int i, oft, lnk;
    uint32_t value=0;
    dm9051_Configuration();
  /* identfy DM9051   */
  value |= DM9051_Read_Reg(DM9000_VIDH) << 8;
  value |= DM9051_Read_Reg(DM9000_PIDL) << 16;
  value |= DM9051_Read_Reg(DM9000_PIDH) << 24;
  value |= DM9051_Read_Reg(DM9000_VIDL);
  . . . . . .
}
```

uIP 初始化及 IP 地址設置：

```
int main(void)
{
    . . . . . .
    uip_init();
    uip_arp_init();    // Clear arp table.
#ifdef __DHCPC_H__
  // setup the dhcp renew timer the make the first request
    timer_set(&dhcp_timer, CLOCK_SECOND * 600);
     dhcpc_init(&uip_ethaddr, 6);
#endif
    uip_ipaddr(ipaddr, 192,168,1,5);         //Host IP address
    uip_sethostaddr(ipaddr);
    uip_ipaddr(ipaddr, 192,168,1,1);         //Default Gateway
    uip_setdraddr(ipaddr);
    uip_ipaddr(ipaddr, 255,255,255,0);  //Network Mask
    uip_setnetmask(ipaddr);
    httpd_init();
    iperf_init();
    . . . . . .

}
```

DM9051 發送數據：

```
uint32_t DM9051_tx(void)
{
    uint16_t calc_MWR;
    uint16_t SendLength;
    //printf("DM9051_tx()....\n");
    SendLength = uip_len;

    /* disable DM9051a interrupt            */
    //DM9051_Write_Reg(DM9051_IMR, IMR_PAR);
    while (DM9051_Read_Reg(DM9051_TCR) & DM9051_TCR_SET)
    {
        _DM9051_Delay(5);
    }
  . . . . . .
}
```

DM9051 接收數據：

```
uint16_t DM9051_rx(void)
{
    . . . . . .

    rxbyte = DM9051_Read_Reg(DM9051_MRCMDX);
    rxbyte = DM9051_Read_Reg(DM9051_MRCMDX);

    //printf("DM9051_rx process...1st byte = 0x%x\n",rxbyte);
    if ((rxbyte != 1) && (rxbyte != 0))
    {
        printf("rxbyte = %02X.\n", rxbyte);
        DM9051_TRACE2("DM9051 rx: rx error, stop device \n");

        /* Reset RX FIFO pointer */
        DM9051_Write_Reg(DM9051_RCR, RCR_DEFAULT);  //RX disable
        DM9051_Write_Reg(DM9051_MPCR, 0x01);        //Reset RX FIFO pointer
        _DM9051_Delay(2);
        DM9051_Write_Reg(DM9051_RCR, (RCR_DEFAULT | RCR_RXEN));     //RX Enable
        /* restore receive interrupt                */
        //DM9051_device.imr_all |= IMR_PRM;
```

```
            //DM9051_device.imr_all = IMR_DEFAULT;
            //DM9051_Write_Reg(DM9051_IMR, DM9051_device.imr_all);
            return 0;
        }  . . . . . .
    }
```

數據處理:

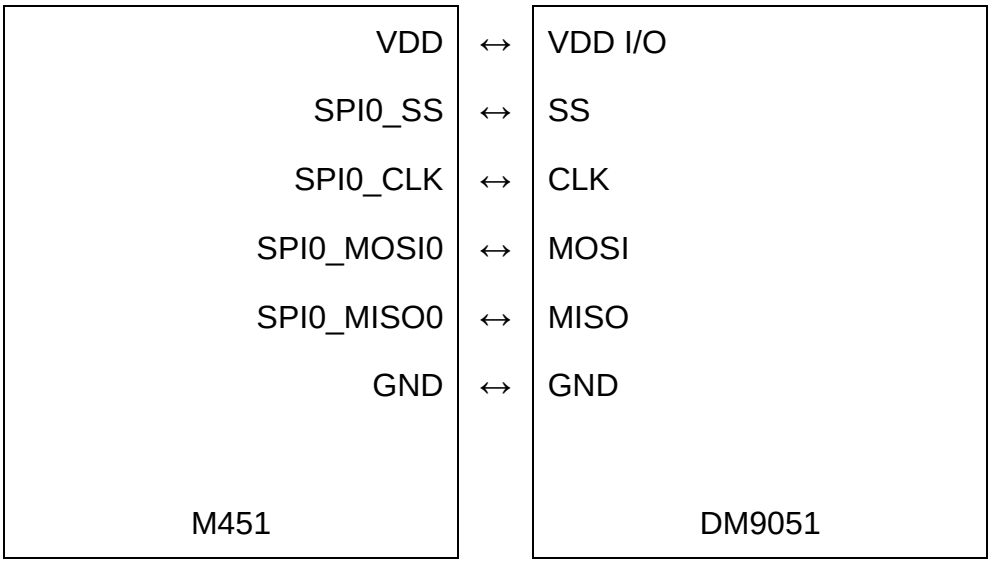
```
    While(1){
     uip_len = tapdev_read();
    if (uip_len > 0)
    {
       //printf("Rx length = %d.\r\n", uip_len);
        if (BUF->type == htons(UIP_ETHTYPE_IP))
        {
               //printf("UIP_ETHTYPE_IP..\r\n");
               uip_input();        // uip_process(UIP_DATA)
         . . . . . .
    }
    else if (timer_expired(&periodic_timer))
    {
         timer_reset(&periodic_timer);

      . . . . . .
    }
```

3 軟體與硬體環境

- 軟件環境
  - BSP 版本
    - M451BSP_v3.01.003
  - IDE 版本
    - Keil uVersion4.74
- 硬件環境
  - 電路元件
    - NuTiny-SDK-M451V
    - DM9051
  - 示意圖

    M451 通過 SPI 接口驅動 DM9051。



4 目錄資訊

EC_M451_SPI_DM9051_uIP_V1.00	
Library	Sample code header and source files
CMSIS	Cortex®Microcontroller Software Interface Standard (CMSIS) V4.5.0 definitions by ARM® Corp.
Device	CMSIS compliant device header file
StdDriver	All peripheral driver header and source files
SampleCode	
ExampleCode	Source file of example code

5 如何執行範例程式

1. 根據目錄資訊章節進入 ExampleCode 路徑中的 KEIL 文件夾，雙擊 M451_SPI_DM9051_uIP.uvproj
2. 進入編譯模式接口
   a. 編譯
   b. 下載代碼到內存
   c. 進入/離開仿真模式
3. 進入仿真模式接口
   a. 執行代碼

6 修訂紀錄

Date	Revision	Description
Apr. 24, 2019	1.00	1. 初始發布.

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