M451 驱动 DM9051

NuMicro® 32 位系列微控制器范例代码介绍

文件信息

代码简述	本范例代码使用 M451 驱动 DM9051 实现 uIP/httpd 功能
BSP 版本	M451BSP_v3.01.003
开发平台	NuTiny-SDK-M451V

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1 功能介绍

1.1 简介

本范例代码使用 M451 系列通过 SPI 接口驱动 DM9051，实现 uIP/httpd 功能。

1.2 原理

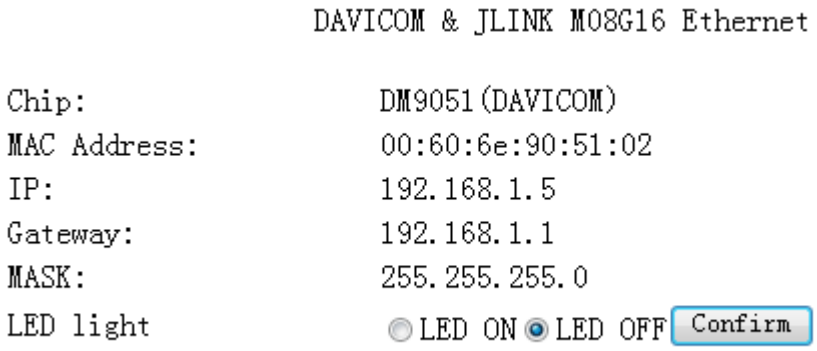
DM9051 是一个高集成和低成本的少管脚数的单芯片快速以太网控制器，具有串行外围接口(SPI)， 10/100M PHY 和 MAC，以及 16k 字节的 SRAM。低功耗、高性能的工艺接口，支持 3.3V、5V IO 融差。

DM9051 的物理层可以通过 HP Auto-MDIX 与 10Base-T 中的 UTP3、4、5 和 100Base-TX 中的 UTP5 连接。它完全符合 IEEE 802.3u 规范，其自动协商功能将自动配置 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，以节省以太网空闲时的功耗。支持 ieee802.3X 全双工流量控制和半双工背压功能，避免与链路伙伴丢失以太网数据包。

作为SPI从机接口支持与CPU的SPI主机接口兼容的SPI时钟模式0和3。时钟速度可以高达50Mhz，以配合高速的主SPI。SPI突发命令格式是有效的代码，可以最小化访问DM9051内部寄存器和内存中的包数据时的命令开销。

1.3 执行结果



2 代码介绍

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 地址设置：

```
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 发送数据：

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

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

DM9051 接收数据：

```
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;
        }  . . . . . .
    }
```

数据处理：

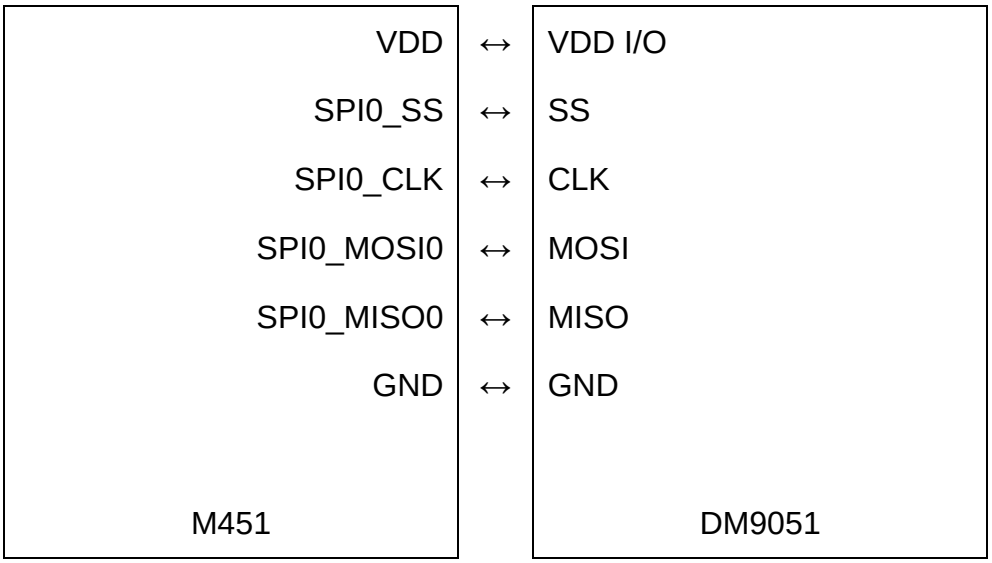
```
    While(1){
     uip_len = tapdev_read();
    if (uip_len > 0)
    {
       //printf("Rx length = %d.\r\n", uip_len);
        if (BUF->type == htons(UIP_ETHTYPE_IP))
        {
               //printf("UIP_ETHTYPE_IP..\r\n");
               uip_input();        // uip_process(UIP_DATA)
         .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

      . . . . . .
    }
```

3 软件与硬件环境

- 软件环境
  - BSP 版本
    - M451BSP_v3.01.003
  - IDE 版本
    - Keil uVersion4.74
- 硬件环境
  - 电路组件
    - NuTiny-SDK-M451V
    - DM9051
  - 示意图

    M451 通过 SPI 接口驱动 DM9051。



4 目录信息

- 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 How to ExecuteExample Code

1. 根据目录信息章节进入 ExampleCode 路径中的 KEIL 文件夹，双击 M451_SPI_DM9051_uIP.uvproj
2. 进入编译模式接口
   a. 编译
   b. 下载代码至内存
   c. 进入 / 离开仿真模式
3. 进入仿真模式接口
   a. 执行代码

6 修订纪录

Date	Revision	Description
Apr. 24, 2019	1.00	1. 初始发布.

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