**Application Note**

**DHCP\_DNS Example**

**Version xxx**



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1. Introduction

This Application Note covers the implementation of DHCP and DNS on WIZnet's TOE Chip.

1. Github Link

<https://github.com/WIZnet-ioNIC/WIZnet-PICO-C/tree/main/examples/dhcp_dns>

1. Applicable products

[Raspberry Pi Pico & WIZnet Ethernet HAT](https://docs.wiznet.io/Product/Open-Source-Hardware/wiznet_ethernet_hat)

[W5100S-EVB-Pico](https://docs.wiznet.io/Product/iEthernet/W5100S/w5100s-evb-pico)

[W5500-EVB-Pico](https://docs.wiznet.io/Product/iEthernet/W5500/w5500-evb-pico)

[W55RP20-EVB-Pico](https://docs.wiznet.io/Product/ioNIC/W55RP20/w55rp20-evb-pico)

[W5100S-EVB-Pico2](https://docs.wiznet.io/Product/iEthernet/W5100S/w5100s-evb-pico2)

[W5500-EVB-Pico2](https://docs.wiznet.io/Product/iEthernet/W5500/w5500-evb-pico2)[W6100-EVB-Pico2](https://docs.wiznet.io/Product/iEthernet/W6100/w6100-evb-pico2)[W6300-EVB-Pico2](https://docs.wiznet.io/Product/iEthernet/W6300/w6300-evb-pico2)

1. How to Test DHCP & DNS Example
   1. Step 1: Prepare software

The following serial terminal program is required for DHCP & DNS example test, download and install from below link.

* [**Tera Term**](https://osdn.net/projects/ttssh2/releases/)  
  1. Step 2: Prepare hardware

If you are using W5100S-EVB-Pico, W5500-EVB-Pico, W55RP20-EVB-Pico, W5100S-EVB-Pico2 or W5500-EVB-Pico2, you can skip '1. Combine...'

1. Combine WIZnet Ethernet HAT with Raspberry Pi Pico.
2. Connect ethernet cable to WIZnet Ethernet HAT, W5100S-EVB-Pico, W5500-EVB-Pico, W55RP20-EVB-Pico, W5100S-EVB-Pico2, W5500-EVB-Pico2, W6100-EVB-Pico2 or W6300-EVB-Pico2 ethernet port.
3. Connect Raspberry Pi Pico, W5100S-EVB-Pico or W5500-EVB-Pico to desktop or laptop using 5 pin micro USB cable. W55RP20-EVB-Pico, W5100S-EVB-Pico2, W5500-EVB-Pico2 or W6100-EVB-Pico2 or W6300-EVB-Pico2 require a USB Type-C cable.  
   1. Step 3: Setup DHCP & DNS Example

To test the DHCP & DNS example, minor settings shall be done in code.

1. Setup SPI port and pin in 'wizchip\_spi.h' in 'WIZnet-PICO-C/port/ioLibrary\_Driver/' directory.

Setup the SPI interface you use.

* If you use the W5100S-EVB-Pico, W5500-EVB-Pico, W5100S-EVB-Pico2 or W5500-EVB-Pico2,

|  |
| --- |
| /\* SPI \*/  #define SPI\_PORT spi0  #define PIN\_SCK 18  #define PIN\_MOSI 19  #define PIN\_MISO 16  #define PIN\_CS 17  #define PIN\_RST 20 |

* If you want to test with the DHCP & DNS example using SPI DMA, uncomment USE\_SPI\_DMA.

|  |
| --- |
| /\* Use SPI DMA \*/  //#define USE\_SPI\_DMA // if you want to use SPI DMA, uncomment. |

* If you use the W55RP20-EVB-Pico,

|  |
| --- |
| /\* SPI \*/  #define USE\_SPI\_PIO  #define PIN\_SCK 21  #define PIN\_MOSI 23  #define PIN\_MISO 22  #define PIN\_CS 20  #define PIN\_RST 25 |

* For W6300-EVB-PICO or W6300-EVB-PICO2:
* If you are using the W6300-EVB-PICO or W6300-EVB-PICO2, use the following pinout  
  and SPI clock divider configuration:

|  |
| --- |
| /\* SPI \*/  #elif (DEVICE\_BOARD\_NAME == W6300\_EVB\_PICO2)  // SPI SCLK SPEED = 66.5MHz / (PIO\_CLOCK\_DIV\_MAJOR + (PIO\_CLOCK\_DIV\_MINOR / 256))  #define PIO\_CLOCK\_DIV\_MAJOR 1  #define PIO\_CLOCK\_DIV\_MINOR 130  #define USE\_PIO  #define PIO\_IRQ\_PIN 15  #define PIO\_SPI\_SCK\_PIN 17  #define PIO\_SPI\_DATA\_IO0\_PIN 18  #define PIO\_SPI\_DATA\_IO1\_PIN 19  #define PIO\_SPI\_DATA\_IO2\_PIN 20  #define PIO\_SPI\_DATA\_IO3\_PIN 21  #define PIN\_CS 16  #define PIN\_RST 22 |

1. Setup network configuration such as IP in 'wizhip\_dhcp\_dns.c', which is the DHCP & DNS example in 'WIZnet-PICO-C/examples/dhcp\_dns/' directory.

Setup IP, other network settings to suit your network environment and whether to use DHCP.

|  |
| --- |
| /\* Network \*/  static wiz\_NetInfo g\_net\_info =  {  .mac = {0x00, 0x08, 0xDC, 0x12, 0x34, 0x56}, // MAC address  .ip = {192, 168, 11, 2}, // IP address  .sn = {255, 255, 255, 0}, // Subnet Mask  .gw = {192, 168, 11, 1}, // Gateway  .dns = {8, 8, 8, 8}, // DNS server  #if \_WIZCHIP\_ > W5500  .lla = {0xfe, 0x80, 0x00, 0x00,  0x00, 0x00, 0x00, 0x00,  0x02, 0x08, 0xdc, 0xff,  0xfe, 0x57, 0x57, 0x25}, // Link Local Address  .gua = {0x00, 0x00, 0x00, 0x00,  0x00, 0x00, 0x00, 0x00,  0x00, 0x00, 0x00, 0x00,  0x00, 0x00, 0x00, 0x00}, // Global Unicast Address  .sn6 = {0xff, 0xff, 0xff, 0xff,  0xff, 0xff, 0xff, 0xff,  0x00, 0x00, 0x00, 0x00,  0x00, 0x00, 0x00, 0x00}, // IPv6 Prefix  .gw6 = {0x00, 0x00, 0x00, 0x00,  0x00, 0x00, 0x00, 0x00,  0x00, 0x00, 0x00, 0x00,  0x00, 0x00, 0x00, 0x00}, // Gateway IPv6 Address  .dns6 = {0x20, 0x01, 0x48, 0x60,  0x48, 0x60, 0x00, 0x00,  0x00, 0x00, 0x00, 0x00,  0x00, 0x00, 0x88, 0x88}, // DNS6 server  .ipmode = NETINFO\_STATIC\_ALL  #else  .dhcp = NETINFO\_STATIC  #endif  }; |

1. Setup DNS configuration

Setup the domain name that you want to get IP in 'wizhip\_dhcp\_dns.c' in 'WIZnet-PICO-C/examples/dhcp\_dns/' directory.

|  |
| --- |
| /\* DNS \*/  static uint8\_t g\_dns\_target\_domain[] = "www.wiznet.io"; |

* 1. Step 4: Build

1. After completing the DHCP & DNS example configuration, click 'build' in the status bar at the bottom of Visual Studio Code or press the 'F7' button on the keyboard to build.
2. When the build is completed, ‘wizhip\_dhcp\_dns.uf2' is generated in 'WIZnet-PICO-C/build/examples/dhcp\_dns/' directory.
   1. Step 5: Upload and Run
3. While pressing the BOOTSEL button of Raspberry Pi Pico, W5100S-EVB-Pico, W5500-EVB-Pico, W55RP20-EVB-Pico, W5100S-EVB-Pico2, W5500-EVB-Pico2, W6100-EVB-Pico2 or W6300-EVB-Pico2 power on the board, the USB mass storage 'RPI-RP2' is automatically mounted.

[텍스트, 소프트웨어, 컴퓨터 아이콘, 웹 페이지이(가) 표시된 사진

자동 생성된 설명](https://github.com/WIZnet-ioNIC/WIZnet-PICO-C/blob/main/static/images/dhcp_dns/raspberry_pi_pico_usb_mass_storage.png)

Figure 1. USB mass storage

1. Drag and drop 'wizhip\_dhcp\_dns.uf2' onto the USB mass storage device 'RPI-RP2'.
2. Connect to the serial COM port of Raspberry Pi Pico, W5100S-EVB-Pico, W5500-EVB-Pico, W55RP20-EVB-Pico, W5100S-EVB-Pico2, W5500-EVB-Pico2, W6100-EVB-[텍스트, 스크린샷, 소프트웨어, 컴퓨터 아이콘이(가) 표시된 사진

   자동 생성된 설명](https://github.com/WIZnet-ioNIC/WIZnet-PICO-C/blob/main/static/images/dhcp_dns/connect_to_serial_com_port.png)Pico2 or W6300-EVB-Pico2 with Tera Term.

Figure 2. Tera Term

1. Reset your board.
2. If the DHCP & DNS example works normally on Raspberry Pi Pico, W5100S-EVB-Pico, W5500-EVB-Pico, W55RP20-EVB-Pico, W5100S-EVB-Pico2, W5500-EVB-Pico2, W6100-EVB-Pico2 or W6300-EVB-Pico2, you can see the network information, IP automatically assigned by DHCP of Raspberry Pi Pico, W5100S-EVB-Pico, W5500-EVB-Pico, W55RP20-EVB-Pico, W5100S-EVB-Pico2, W5500-EVB-Pico2, W6100-EVB-Pico2 or W6300-EVB-Pico2 and the IP get from the domain name.[텍스트, 스크린샷, 소프트웨어, 컴퓨터이(가) 표시된 사진

   자동 생성된 설명](https://github.com/WIZnet-ioNIC/WIZnet-PICO-C/blob/main/static/images/dhcp_dns/see_network_information_ip_assigned_by_dhcp_of_raspberry_pi_pico_and_get_ip_through_dns.png)

Figure 3. Test Result

Revision history

|  |  |  |
| --- | --- | --- |
| **Version** | **Date** | **Descriptions** |
| Ver. 1.0.0 | Nov, 2024 | Initial release |
| Ver. 1.X.X | April, 2025 | Added 6300(TODO:….) |

Table 1. Revision history

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