How to implement IPRAW for W6100

Version 1.0.0

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1 Introduction

IPRAW mode allows upper-layer protocols above the IP layer to be handled as raw data. Since the W6100 supports IPv6, it also provides an IPRAW6 mode.

2 IPRAW SOCKET

All sockets support IPRAW/IPRAW6. When using any protocol in IPRAW/IPRAW6 mode, the protocol number field in the IP header must be set. This must be configured in the SOCKET n IP Protocol Number Register (Sn_PNR) before opening the socket.

Note

When using IPRAW without a port, only one socket should be used. If multiple sockets are used, ping responses will be received by sockets in order of priority, starting from the lowest socket number. When using multiple sockets, a port number must be used.

The SOCKET operation of IPRAW consists of OPEN, SEND, RECEIVE, and CLOSE.

3 IPRAW Example

- ICMP Echo(Ping request/reply)
- ICMPv6 MLD

3.1 ICMP Echo(Ping request/reply)

For IPv4, IP layer information is not required when calculating the checksum. For IPv6, IP layer information is needed when calculating the ICMPv6 checksum. This information is called the Pseudo Header, and it is defined as follows.

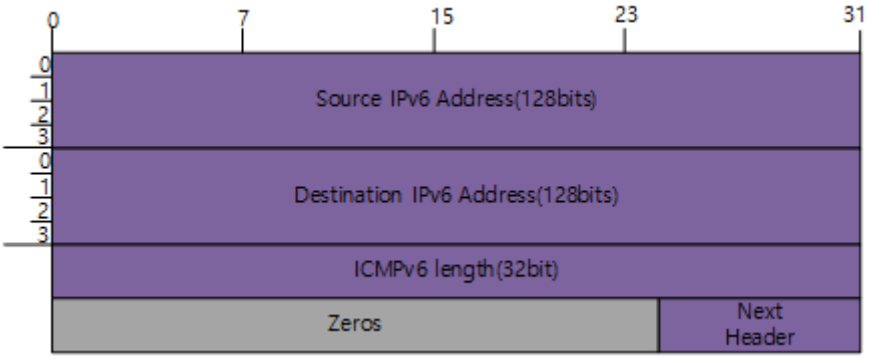

Figure 1 Pseudo Header

The checksum generated using the Pseudo Header is included when calculating the ICMPv6 checksum.

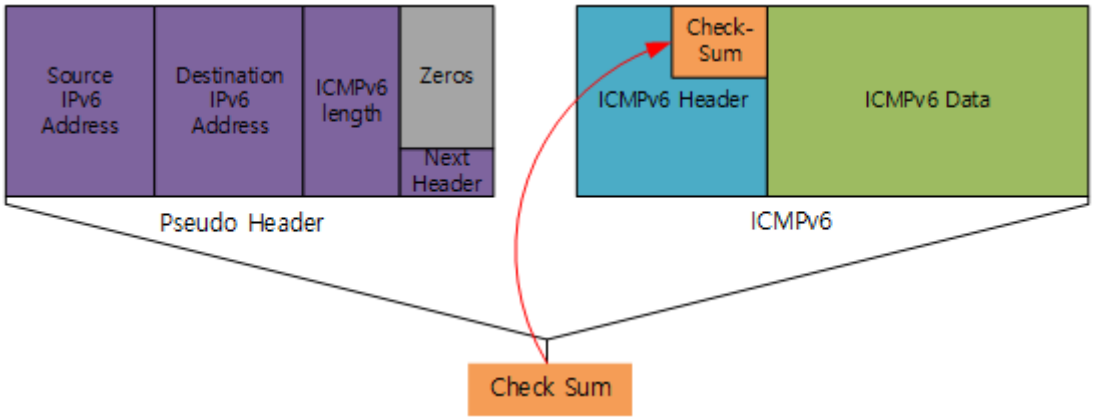

Figure 2 ICMPv6 CheckSum

3.1.1 Socket Open

Set ICMP or ICMP6(0x01 or 0x3A) in Sn_PNR and create the socket in IPRAW4 or IPRAW6 mode. Once the socket is configured as IPRAW4 or IPRAW6, the socket open operation is completed.

IPv4

```
/* Create Socket */    //IPPROTO_ICMP = 0x01
IINCHIP_WRITE(Sn_ PNR(s), IPPROTO_ICMP);      // set ICMP Protocol
if(socket(s,Sn_MR_IPRAW,port,0)!=s)
{ // open the SOCKET with IPRAW mode, if fail then Error
        printf( "\r\n socket %d fail r\n",     (s)) ;
}
/* Check socket  register  */
while(getSn_SR(s)!=SOCK_IPRAW);
```

IPv6

```
/* Create Socket */    //IPPROTO_ICMPv6 = 0x3a
IINCHIP_WRITE(Sn_ PNR(s), IPPROTO_ICMPv6);      // set ICMP Protocol
if(socket(s,Sn_MR_IPRAW6,port,0)!=s)
{ // open the SOCKET with IPRAW mode, if fail then Error
        printf( "\r\n socket %d fail r\n",     (s)) ;
}
/* Check socket  register  */
while(getSn_SR(s)!=SOCK_IPRAW6);
```

3.1.2 Send

Use sendto() to transmit the data stored in Ping4Request or Ping6Request. The stored data contains ICMP or ICMPv6 information.

IPv4

```
sendto(sn,(uint8_t *)&Ping4Request,sizeof(Ping4Request), DestIP4_L,5000,4);
```

IPv6

```
sendto(sn,(uint8_t *)&Ping6Request,sizeof(Ping6Request), DestIP6_L,5001,16);
```

3.1.3 Receive

If the received data size is larger than DATA_BUF_SIZE, it is limited to DATA_BUF_SIZE. When a reply is received, the data is stored in the buffer.

IPv4

```
if(size > DATA_BUF_SIZE) size = DATA_BUF_SIZE;
  ret = recvfrom(sn, buf, size, (uint8_t*)&DestIP4_L, 5000, 4);
```

IPv6

```
if(size > DATA_BUF_SIZE) size = DATA_BUF_SIZE;
ret = recvfrom(sn, buf, size, (uint8_t*)&DestIP6_L, 5001, 16);
```

3.1.4 Close

When IPRAW or IPRAW6 is no longer needed, close the socket using the close(sn) function.

3.2 ICMPv6 MLD

IPv6 multicast refers to the Multicast Listener Discovery Protocol (MLD), which is one of the ICMPv6 types. MLDv1 is similar to IGMPv2, and MLDv2 is similar to IGMPv3.
Here, only MLDv1 is described. The checksum is the same as that of ICMPv6

Echo.

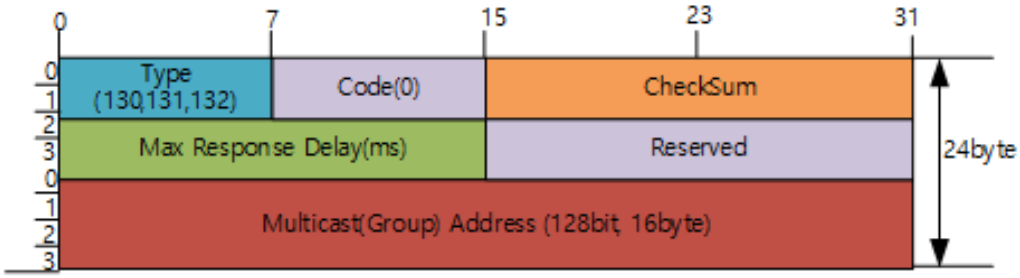

Figure 3 ICMPv6 MLD

MLD messages include Query, Report, and Done. The Query message must be sent by the router.

Here, only Report and Done are transmitted.

Type	Description
130	Multicast Listener Discovery Query
131	Multicast Listener Discovery Report
132	Multicast Listener Discovery Done

Socket open, send, receive, and close operations are the same as ICMP, and only the ICMPv6 MLD information needs to be constructed according to Figure 3 (ICMPv6 MLD).

4 Document History Information

Version	Date	Descriptions
Ver. 1.0.0	Jan, 2019	Release

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