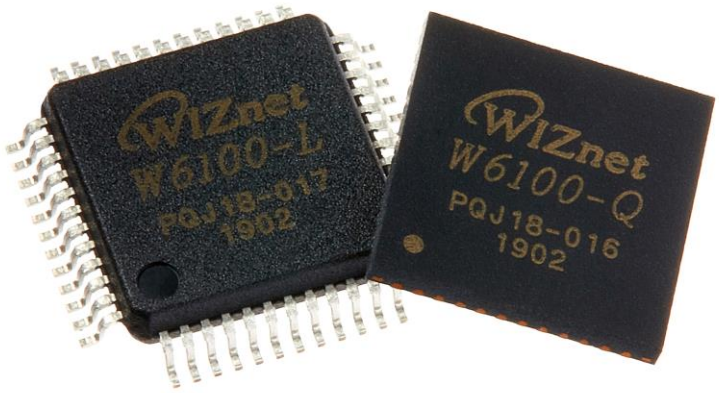
Preferred Source Address Application Note

Version 1.0.0



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1 Introduction

All interfaces can have more than one address in IPv6 communication. In case of Link Local Address, it is used for control message exchange for the network to which it belongs. The range is limited to a single link, and the packet to the outside is automatically discarded by the router. Global Unicast Address is used for external communication. The W6100 is set to the Source Local Address or Global Unicast Address according to the user's settings.

2 SOCKET Prefer Source IPv6 Address

In W6100, user can select source IPv6 address of packet transmitted in TCP6, TCPD, UDP6, UDPD, IPRAW6 mode through Sn_PSR register. When set to Auto, it is determined according to Destination IPv6 Address and it is determined as IPv6 Address stored in LLAR or GUAR. In addition, source IPv6 address can be set differently for each socket. The default value of Source IPv6 Address is Auto mode.

Sn_PSR[1]	Sn_PSR[0]	Address
0	0	Link Local Address
0	1	Global Unicast Address
1	X	Auto

Table 1 SOCKET Prefer Source

Below is an example of loopback test by opening Socket with TCP Client and setting Source IPv6 Address as Link Local Address, and Destination Address as Link Local Address.
Note that the packets are captured when the Source IPv6 Address and the Destination IPv6 Address were set differently.

```
{
    /* set Prefer Source LLA of SOCKET 0 */
    setSn_PSR(0, Sn_PSR_LLA);
    while(1){
        /* TCP Client Loopback test with Link Local Address */
        loopback_tcpc(0, data_buf, DestIP6_LLA, 5000, AF_INET6);
    }
}
```

2.1 Packet Capture

No.	Time	Source	Destination	Protocol	Lengtl	Info
1	0.0000…	fe80::208:dcff:fe57:5761	ff02::1:ff24:4bb1	ICMPv6	86	Neighbor Solicitation f
2	0.0000…	fe80::3171:9805:7024:4bb1	fe80::208:dcff:fe57:5761	ICMPv6	86	Neighbor Advertisement
3	0.0007…	fe80::208:dcff:fe57:5761	fe80::3171:9805:7024:4bb1	TCP	78	50000 → 5000 [SYN] Seq=
4	0.0008…	fe80::3171:9805:7024:4bb1	fe80::208:dcff:fe57:5761	TCP	78	5000 → 50000 [SYN, ACK]
5	0.0015…	fe80::208:dcff:fe57:5761	fe80::3171:9805:7024:4bb1	TCP	74	50000 → 5000 [ACK] Seq=
6	0.0103…	fe80::3171:9805:7024:4bb1	fe80::208:dcff:fe57:5761	TCP	1494	5000 → 50000 [ACK] Seq=
7	0.0138…	fe80::208:dcff:fe57:5761	fe80::3171:9805:7024:4bb1	TCP	74	50000 → 5000 [ACK] Seq=
8	0.0139…	fe80::3171:9805:7024:4bb1	fe80::208:dcff:fe57:5761	TCP	1494	5000 → 50000 [ACK] Seq=
9	0.0175…	fe80::208:dcff:fe57:5761	fe80::3171:9805:7024:4bb1	TCP	1494	50000 → 5000 [PSH, ACK]
10	0.0183…	fe80::208:dcff:fe57:5761	fe80::3171:9805:7024:4bb1	TCP	74	50000 → 5000 [ACK] Seq=

Figure 1 Source - Auto, Destination - LLA

No.	Time	Source	Destination	Protocol	Lengtl	Info
1	0.0000…	2001:2b8:10:1:208:dcff:fe57:5761	ff02::1:ff08:4c81	ICMPv6	86	Neighbor Solicitation f
2	0.0004…	2001:2b8:10:fffe::2	2001:2b8:10:1:208:dcff:fe57:5761	ICMPv6	86	Neighbor Advertisement
3	0.0004…	2001:2b8:10:1:208:dcff:fe57:5761	2001:2b8:10:fffe:3171:9805:7024:4bb1	TCP	78	50000 → 5000 [SYN] Seq=
4	0.0012…	fe80::200:87ff:fe08:4c81	2001:2b8:10:1:208:dcff:fe57:5761	ICMPv6	150	Redirect
5	0.0016…	2001:2b8:10:fffe:3171:9805:7024:4bb1	2001:2b8:10:1:208:dcff:fe57:5761	TCP	78	5000 → 50000 [SYN, ACK]
6	0.0019…	2001:2b8:10:1:208:dcff:fe57:5761	2001:2b8:10:fffe:3171:9805:7024:4bb1	TCP	74	50000 → 5000 [ACK] Seq=
7	0.0023…	fe80::200:87ff:fe08:4c81	2001:2b8:10:1:208:dcff:fe57:5761	ICMPv6	150	Redirect
8	0.0171…	2001:2b8:10:fffe:3171:9805:7024:4bb1	2001:2b8:10:1:208:dcff:fe57:5761	TCP	1494	5000 → 50000 [ACK] Seq=
9	0.0174…	2001:2b8:10:1:208:dcff:fe57:5761	2001:2b8:10:fffe:3171:9805:7024:4bb1	TCP	74	50000 → 5000 [ACK] Seq=
10	0.0174…	fe80::200:87ff:fe08:4c81	2001:2b8:10:1:208:dcff:fe57:5761	ICMPv6	150	Redirect

Figure 2 Source - Auto, Destination - GUA

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	fe80::208:dcff:fe57:5761	ff02::1:ff24:4bb1	ICMPv6	86	Neighbor Solicitation f
2	0.000980	fe80::3171:9805:7024:4bb1	fe80::208:dcff:fe57:5761	ICMPv6	86	Neighbor Advertisement
3	0.001718	fe80::208:dcff:fe57:5761	fe80::3171:9805:7024:4bb1	TCP	78	50000 → 5000 [SYN] Seq=
4	0.001836	fe80::3171:9805:7024:4bb1	fe80::208:dcff:fe57:5761	TCP	78	5000 → 50000 [SYN, ACK]
5	0.002563	fe80::208:dcff:fe57:5761	fe80::3171:9805:7024:4bb1	TCP	74	50000 → 5000 [ACK] Seq=
6	0.036892	fe80::3171:9805:7024:4bb1	fe80::208:dcff:fe57:5761	TCP	1494	5000 → 50000 [ACK] Seq=
7	0.041027	fe80::208:dcff:fe57:5761	fe80::3171:9805:7024:4bb1	TCP	74	50000 → 5000 [ACK] Seq=
8	0.041054	fe80::3171:9805:7024:4bb1	fe80::208:dcff:fe57:5761	TCP	1494	5000 → 50000 [ACK] Seq=
9	0.044291	fe80::208:dcff:fe57:5761	fe80::3171:9805:7024:4bb1	TCP	1494	50000 → 5000 [PSH, ACK]
10	0.045024	fe80::208:dcff:fe57:5761	fe80::3171:9805:7024:4bb1	TCP	74	50000 → 5000 [ACK] Seq=

Figure 3 Source - LLA, Destination - LLA

No.	Time	Source	Destination	Protocol	Lengtl	Info
1	0.0000…	fe80::208:dcff:fe57:5761	ff02::1:ff08:4c81	ICMPv6	86	Neighbor Solicitation f
2	0.0006…	fe80::200:87ff:fe08:4c81	fe80::208:dcff:fe57:5761	ICMPv6	86	Neighbor Advertisement
3	0.0006…	fe80::208:dcff:fe57:5761	2001:2b8:10:fffe:3171:9805:7024:4bb1	TCP	78	50000 → 5000 [SYN] Seq=
4	0.0014…	fe80::208:dcff:fe57:5761	fe80::3171:9805:7024:4bb1	ICMPv6	86	Neighbor Advertisement
5	0.0014…	2001:2b8:10:fffe:3171:9805:7024:4bb1	fe80::208:dcff:fe57:5761	TCP	78	5000 → 50000 [SYN, ACK]
6	0.0018…	fe80::200:87ff:fe08:4c81	fe80::208:dcff:fe57:5761	ICMPv6	150	Redirect
7	0.0021…	fe80::208:dcff:fe57:5761	2001:2b8:10:fffe:3171:9805:7024:4bb1	TCP	74	50000 → 5000 [ACK] Seq=
8	0.0024…	fe80::200:87ff:fe08:4c81	fe80::208:dcff:fe57:5761	ICMPv6	150	Redirect
9	0.0118…	2001:2b8:10:fffe:3171:9805:7024:4bb1	fe80::208:dcff:fe57:5761	TCP	1494	5000 → 50000 [ACK] Seq=
10	0.0154…	fe80::208:dcff:fe57:5761	2001:2b8:10:fffe:3171:9805:7024:4bb1	TCP	74	50000 → 5000 [ACK] Seq=

Figure 4 Source - LLA, Destination - GUA

No.	Time	Source	Destination	Protocol	Lengtl	Info
1	0.0000…	2001:2b8:10:1:208:dcff:fe57:5761	ff02::1:ff24:4bb1	ICMPv6	86	Neighbor Solicitation fo
2	0.0000…	fe80::3171:9805:7024:4bb1	2001:2b8:10:1:208:dcff:fe57:5761	ICMPv6	86	Neighbor Advertisement t
3	0.0007…	2001:2b8:10:1:208:dcff:fe57:5761	fe80::3171:9805:7024:4bb1	TCP	78	50000 → 5000 [SYN] Seq=0
4	0.2060…	2001:2b8:10:1:208:dcff:fe57:5761	fe80::3171:9805:7024:4bb1	TCP	78	[TCP Retransmission] 500
5	0.6154…	2001:2b8:10:1:208:dcff:fe57:5761	fe80::3171:9805:7024:4bb1	TCP	78	[TCP Retransmission] 500
6	1.4346…	2001:2b8:10:1:208:dcff:fe57:5761	fe80::3171:9805:7024:4bb1	TCP	78	[TCP Retransmission] 500
7	3.0734…	2001:2b8:10:1:208:dcff:fe57:5761	fe80::3171:9805:7024:4bb1	TCP	78	[TCP Retransmission] 500
8	4.6053…	2001:2b8:10:fffe:9bf:cba3:f784:8fe2	2001:2b8:10:1:208:dcff:fe57:5761	ICMPv6	86	Neighbor Solicitation fo
9	4.6060…	2001:2b8:10:1:208:dcff:fe57:5761	2001:2b8:10:fffe:9bf:cba3:f784:8fe2	ICMPv6	86	Neighbor Advertisement 2
10	6.3501…	2001:2b8:10:1:208:dcff:fe57:5761	fe80::3171:9805:7024:4bb1	TCP	78	[TCP Retransmission] 500

Figure 5 Source - GUA, Destination - LLA

No.	Time	Source	Destination	Protocol	Lengtl	Info
1	0.0000…	2001:2b8:10:1:208:dcff:fe57:5761	ff02::1:ff08:4c81	ICMPv6	86	Neighbor Solicitation fo
2	0.0005…	2001:2b8:10:fffe::2	2001:2b8:10:1:208:dcff:fe57:5761	ICMPv6	86	Neighbor Advertisement t
3	0.0005…	2001:2b8:10:1:208:dcff:fe57:5761	2001:2b8:10:fffe:3171:9805:7024:4bb1	TCP	78	50000 → 5000 [SYN] Seq=0
4	0.0013…	fe80::200:87ff:fe08:4c81	2001:2b8:10:1:208:dcff:fe57:5761	ICMPv6	150	Redirect
5	0.0019…	2001:2b8:10:fffe:3171:9805:7024:4bb1	2001:2b8:10:1:208:dcff:fe57:5761	TCP	78	5000 → 50000 [SYN, ACK]
6	0.0023…	2001:2b8:10:1:208:dcff:fe57:5761	2001:2b8:10:fffe:3171:9805:7024:4bb1	TCP	74	50000 → 5000 [ACK] Seq=1
7	0.0026…	fe80::200:87ff:fe08:4c81	2001:2b8:10:1:208:dcff:fe57:5761	ICMPv6	150	Redirect
8	0.0178…	2001:2b8:10:fffe:3171:9805:7024:4bb1	2001:2b8:10:1:208:dcff:fe57:5761	TCP	1494	5000 → 50000 [ACK] Seq=1
9	0.0178…	2001:2b8:10:1:208:dcff:fe57:5761	2001:2b8:10:fffe:3171:9805:7024:4bb1	TCP	74	50000 → 5000 [ACK] Seq=1
10	0.0178…	fe80::200:87ff:fe08:4c81	2001:2b8:10:1:208:dcff:fe57:5761	ICMPv6	150	Redirect

Figure 6 Source -GUA, Destination - GUA

3 SOCKET-less Prefer Source IPv6 Address

In the W6100, the user can select the source IPv6 address of the packet to be transmitted to the SOCKET-less command through the SLPSR register. When set to Auto, it is determined according to Destination IPv6 Address and it is determined as IPv6 Address stored in LLAR or GUAR. The default value is Auto mode.

SLPSR[1]	SLPSR[0]	Address
0	0	Link Local Address
0	1	Global Unicast Address
1	X	Auto

Table 2 SOCKET-less Prefer Source

The following is an example of sending a PINGv6 Message by setting the Source IPv6 Address to the Global Link Address and the Destination Address to the Link Local Address.
Note that the packets are captured when the Source IPv6 Address and the Destination IPv6 Address were set differently.

```
{
    /* set Prefer Source GUA of SOCKET-less Command */
    setSLPSR(0, SLPSR_GUA);

    /* Transmit PING Request to Link Local Address */
    setPINGSEQR(0x1234);
    setPINGIDR(0x5678);
    setSLRTR(4000);
    setSLRCR(5);
    setSLPIP6R(DestIP6_LLA);
    setSLCR(SLCR_PING6);
    while(!(getSLIR() & (SLIR_PING6|SLIR_TOUT)));
}
```

3.1 Packet Capture

No.	Time	Source	Destination	Protocol	Length	Info
1	0.0000…	fe80::208:dcff:fe57:5761	ff02::1:ff24:4bb1	ICMPv6	86	Neighbor Solicitation fo
2	0.0009…	fe80::208:dcff:fe57:5761	fe80::3171:9805:7024:4bb1	ICMPv6	86	Neighbor Advertisement t
3	0.0010…	fe80::3171:9805:7024:4bb1	fe80::208:dcff:fe57:5761	ICMPv6	86	Neighbor Advertisement t
4	0.0017…	fe80::208:dcff:fe57:5761	fe80::3171:9805:7024:4bb1	ICMPv6	82	Echo (ping) request id=0
5	0.0018…	fe80::3171:9805:7024:4bb1	fe80::208:dcff:fe57:5761	ICMPv6	82	Echo (ping) reply id=0x5

Figure 7 Source - Auto, Destination - LLA

No.	Time	Source	Destination	Protocol	Length	Info
1	0.0000…	fe80::208:dcff:fe57:5761	ff02::1:ff08:4c81	ICMPv6	86	Neighbor Solicitation fo
2	0.0004…	fe80::200:87ff:fe08:4c81	fe80::208:dcff:fe57:5761	ICMPv6	86	Neighbor Advertisement t
3	0.0004…	2001:2b8:10:1:208:dcff:fe57:5761	2001:2b8:10:fffe:3171:9805:7024:4bb1	ICMPv6	82	Echo (ping) request id=0
4	0.0009…	fe80::200:87ff:fe08:4c81	2001:2b8:10:1:208:dcff:fe57:5761	ICMPv6	150	Redirect
5	0.0013…	2001:2b8:10:fffe:3171:9805:7024:4bb1	2001:2b8:10:1:208:dcff:fe57:5761	ICMPv6	82	Echo (ping) reply id=0x5
6	0.0018…	2001:2b8:10:fffe:3171:9805:7024:4bb1	2001:2b8:10:1:208:dcff:fe57:5761	ICMPv6	82	Echo (ping) reply id=0x5

Figure 8 Source - Auto, Destination - GUA

No.	Time	Source	Destination	Protocol	Length	Info
1	0.0000…	fe80::208:dcff:fe57:5761	ff02::1:ff24:4bb1	ICMPv6	86	Neighbor Solicitation fo
2	0.0010…	fe80::208:dcff:fe57:5761	fe80::3171:9805:7024:4bb1	ICMPv6	86	Neighbor Advertisement t
3	0.0010…	fe80::3171:9805:7024:4bb1	fe80::208:dcff:fe57:5761	ICMPv6	86	Neighbor Advertisement t
4	0.0017…	fe80::208:dcff:fe57:5761	fe80::3171:9805:7024:4bb1	ICMPv6	82	Echo (ping) request id=0
5	0.0018…	fe80::3171:9805:7024:4bb1	fe80::208:dcff:fe57:5761	ICMPv6	82	Echo (ping) reply id=0x5

Figure 9 Source - LLA, Destination - LLA

No.	Time	Source	Destination	Protocol	Length	Info
1	0.0000…	fe80::208:dcff:fe57:5761	ff02::1:ff08:4c81	ICMPv6	86	Neighbor Solicitation fo
2	0.0005…	fe80::200:87ff:fe08:4c81	fe80::208:dcff:fe57:5761	ICMPv6	86	Neighbor Advertisement t
3	0.0005…	fe80::208:dcff:fe57:5761	2001:2b8:10:fffe:3171:9805:7024:4bb1	ICMPv6	82	Echo (ping) request id=0
4	0.0011…	fe80::200:87ff:fe08:4c81	fe80::208:dcff:fe57:5761	ICMPv6	150	Redirect
5	0.0015…	fe80::208:dcff:fe57:5761	2001:2b8:10:fffe:3171:9805:7024:4bb1	ICMPv6	86	Neighbor Advertisement t
6	0.0015…	2001:2b8:10:fffe:3171:9805:7024:4bb1	fe80::208:dcff:fe57:5761	ICMPv6	82	Echo (ping) reply id=0x5
7	5.7325…	fe80::200:87ff:fe08:4c81	fe80::208:dcff:fe57:5761	ICMPv6	86	Neighbor Solicitation fo
8	5.7325…	fe80::208:dcff:fe57:5761	fe80::200:87ff:fe08:4c81	ICMPv6	86	Neighbor Advertisement t

Figure 10 Source - LLA, Destination - GUA

No.	Time	Source	Destination	Protocol	Length	Info
1	0.0000…	fe80::208:dcff:fe57:5761	ff02::1:ff24:4bb1	ICMPv6	86	Neighbor Solicitation fo
2	0.0009…	fe80::208:dcff:fe57:5761	fe80::3171:9805:7024:4bb1	ICMPv6	86	Neighbor Advertisement t
3	0.0010…	fe80::3171:9805:7024:4bb1	fe80::208:dcff:fe57:5761	ICMPv6	86	Neighbor Advertisement t
4	0.0017…	fe80::208:dcff:fe57:5761	fe80::3171:9805:7024:4bb1	ICMPv6	82	Echo (ping) request id=0
5	0.0017…	fe80::3171:9805:7024:4bb1	fe80::208:dcff:fe57:5761	ICMPv6	82	Echo (ping) reply id=0x5

Figure 11 Source -GUA, Destination - LLA

No.	Time	Source	Destination	Protocol	Length	Info
1	0.0000…	2001:2b8:10:1:208:dcff:fe57:5761	ff02::1:ff08:4c81	ICMPv6	86	Neighbor Solicitation fo
2	0.0004…	2001:2b8:10:fffe::2	2001:2b8:10:1:208:dcff:fe57:5761	ICMPv6	86	Neighbor Advertisement t
3	0.0004…	2001:2b8:10:1:208:dcff:fe57:5761	2001:2b8:10:fffe:3171:9805:7024:4bb1	ICMPv6	82	Echo (ping) request id=0
4	0.0011…	fe80::200:87ff:fe08:4c81	2001:2b8:10:1:208:dcff:fe57:5761	ICMPv6	150	Redirect
5	0.0015…	2001:2b8:10:fffe:3171:9805:7024:4bb1	2001:2b8:10:1:208:dcff:fe57:5761	ICMPv6	82	Echo (ping) reply id=0x5
6	0.0018…	2001:2b8:10:fffe:3171:9805:7024:4bb1	2001:2b8:10:1:208:dcff:fe57:5761	ICMPv6	82	Echo (ping) reply id=0x5
7	5.4691…	2001:2b8:10:fffe::2	2001:2b8:10:1:208:dcff:fe57:5761	ICMPv6	86	Neighbor Solicitation fo

Figure 12 Source - GUA, Destination - GUA

4 Document History Information

Version	Date	Descriptions
Ver. 1.0.0	Feb, 2019	Release

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