Preferred Source Address Application Note

Version 1.0.0

For more information, visit our website at http://www.wiznet.io

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1 Introduction

IPv6 통신에서 모든 Interface는 1개 이상의 Address를 가질 수 있다. Link Local Address의 경우 자신이 속한 네트워크를 위해 제어 메시지 교환 등의 용도로 사용된다. 단일 링크 내로 범위가 제한되며, 외부로의 Packet은 Router가 자동으로 폐기한다. Global Unicast Address의 경우 외부와의 통신을 위해 사용된다. W6100은 사용자의 설정에 따라 Source IPv6 Address가 Link Local Address 또는 Global Unicast Address로 설정된다.

2 SOCKET Prefer Source IPv6 Address

W6100에서 사용자는 Sn_PSR 레지스터를 통해 TCP6, TCPD, UDP6, UDPD, IPRAW6 mode에서 전송되는 Packet의 Source IPv6 Address의 선택이 가능하다. Auto로 설정 시 Destination IPv6 Address에 따라 결정되며, LLAR 또는 GUAR 에 저장되어있는 IPv6 Address로 결정된다. 또한 SOCKET 별로 Source IPv6 Address를 다르게 설정할 수 있다. Source IPv6 Address의 default값을 Auto mode이다.

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

아래는 Socket을 TCP Client로 Open하여 Source IPv6 Address를 Link Local Address로 설정하고, Destination Address를 Link Local Address로 설정하여 Loopback test를 할 때의 예시이다. 각 Source IPv6 Address와 Destination IPv6 Address를 다르게 설정하였을 때의 Packet을 Capture하였으므로 참고하라.

```
{
    /* 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 fo
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=0
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=1
6	0.0103…	fe80::3171:9805:7024:4bb1	fe80::208:dcff:fe57:5761	TCP	1494	5000 → 50000 [ACK] Seq=1
7	0.0138…	fe80::208:dcff:fe57:5761	fe80::3171:9805:7024:4bb1	TCP	74	50000 → 5000 [ACK] Seq=1
8	0.0139…	fe80::3171:9805:7024:4bb1	fe80::208:dcff:fe57:5761	TCP	1494	5000 → 50000 [ACK] Seq=1
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=1

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

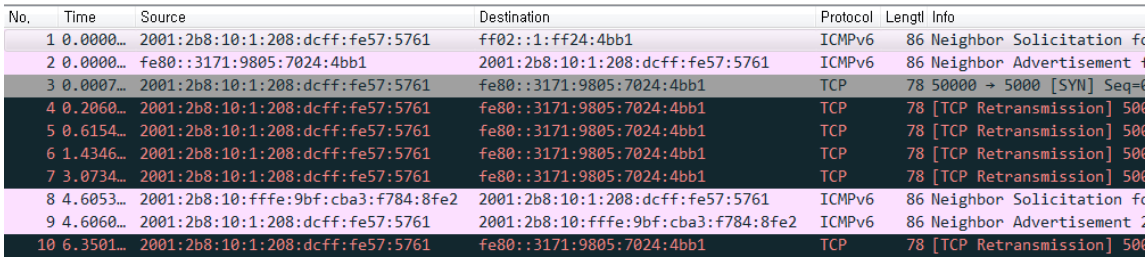
Figure 2 Source - Auto, Destination - GUA

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

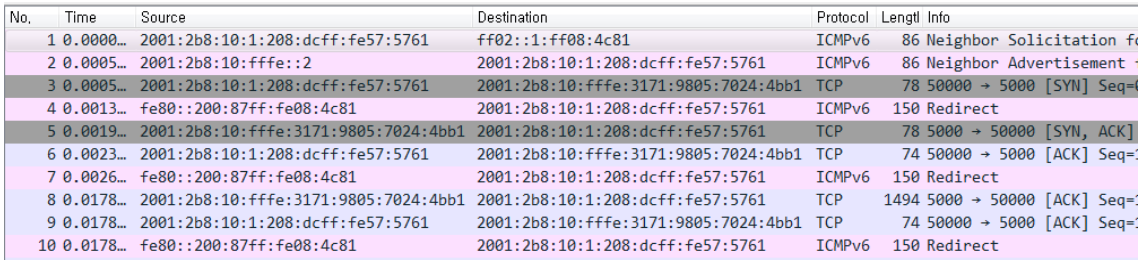
No.	Time	Source	Destination	Protocol	Lengtl	Info
1	0.0000…	fe80::208:dcff:fe57:5761	ff02::1:ff08:4c81	ICMPv6	86	Neighbor Solicitation fo
2	0.0006…	fe80::200:87ff:fe08:4c81	fe80::208:dcff:fe57:5761	ICMPv6	86	Neighbor Advertisement
3	0.0006…	fe80::208:dcff:fe57:5761	2001:2b8:10:fffe:3171:9805:7024:4bb1	TCP	78	50000 → 5000 [SYN] Seq=0
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=1
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=1
10	0.0154…	fe80::208:dcff:fe57:5761	2001:2b8:10:fffe:3171:9805:7024:4bb1	TCP	74	50000 → 5000 [ACK] Seq=1

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

W6100에서 사용자는 SLPSR 레지스터를 통해 SOCKET-less Command로 전송되는 Packet의 Source IPv6 Address의 선택이 가능하다. Auto로 설정 시에는 Destination IPv6 Address에 따라 결정되며, LLAR 또는 GUAR 에 저장되어있는 IPv6 Address로 결정된다. default값은 Auto mode이다.

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

Table 2 SOCKET-less Prefer Source

아래는 Source IPv6 Address를 Global Link Address로 설정하고, Destination Address를 Link Local Address로 설정하여 PINGv6 Message를 전송 할 때의 예시이다.
각 Source IPv6 Address와 Destination IPv6 Address를 다르게 설정하였을 때의 Packet을 Capture하였으므로 참고하라.

```
{
    /* 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
3	0.0010…	fe80::3171:9805:7024:4bb1	fe80::208:dcff:fe57:5761	ICMPv6	86	Neighbor Advertisement
4	0.0017…	fe80::208:dcff:fe57:5761	fe80::3171:9805:7024:4bb1	ICMPv6	82	Echo (ping) request id=(
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
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=(
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
3	0.0010…	fe80::3171:9805:7024:4bb1	fe80::208:dcff:fe57:5761	ICMPv6	86	Neighbor Advertisement
4	0.0017…	fe80::208:dcff:fe57:5761	fe80::3171:9805:7024:4bb1	ICMPv6	82	Echo (ping) request id=(
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
3	0.0005…	fe80::208:dcff:fe57:5761	2001:2b8:10:fffe:3171:9805:7024:4bb1	ICMPv6	82	Echo (ping) request id=(
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
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

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
3	0.0010…	fe80::3171:9805:7024:4bb1	fe80::208:dcff:fe57:5761	ICMPv6	86	Neighbor Advertisement
4	0.0017…	fe80::208:dcff:fe57:5761	fe80::3171:9805:7024:4bb1	ICMPv6	82	Echo (ping) request id=(
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 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	ICMPv6	82	Echo (ping) request id=
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=0x
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=0x
7	5.4691…	2001:2b8:10:fffe::2	2001:2b8:10:1:208:dcff:fe57:5761	ICMPv6	86	Neighbor Solicitation f

Figure 12 Source - GUA, Destination - GUA

4 Document History Information

Version	Date	Descriptions
Ver. 1.0.0	Feb, 2019	Release

Technical support : https://forum.wiznet.io/
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For more information, visit our website at http://www.wiznet.io and
visit our wiki site at http://wizwiki.net/