SOCKET-less Command
Application Note

Version 1.0.0
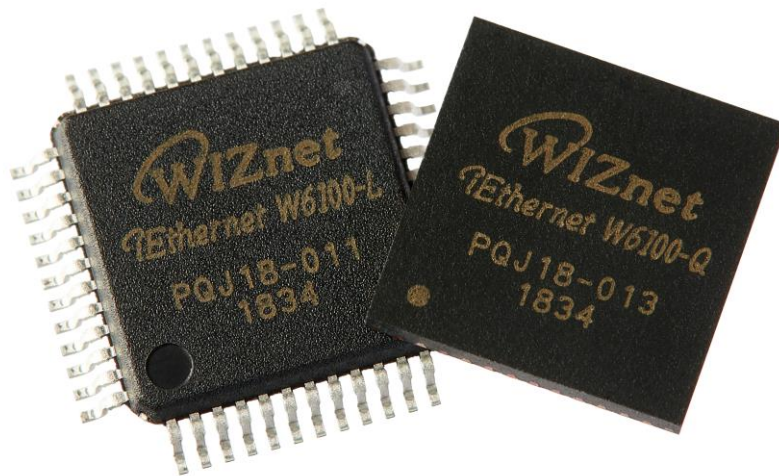
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1   Introduction

W6100 transmits specific packet through SOCKET-less Commands without separate SOCKET OPEN.

The result of the packet transmission is known through the SLIR register, and confirms information about the reply packet received through specific registers. Also, SOCKET-less Commands can not be performed concurrently until the previous command completes execution.

2   SOCKET-less Commands

SOCKET-less Commands should be executed after setting related information through specific registers. The types of commands are as follows.

- ARP4 Command
- PING4 Command
- ARP6 Command
- PING6 Command
- NS Command
- RS Command
- UNA Command

Commands except for UNA Command transmit a request in the request-reply structure and then wait for a reply. If a Reply Packet is not received within the time set by SLRCR and SLRTR, TOUT Interrupt occurs. When a Reply Packet is received, the corresponding packet interrupt is occurred.

Unsolicited NA Command does not wait for reply. If message transmission is completed, TOUT Interrupt occurs.

Also, since SOCKET-less Commands can not be executed simultaneously, if you want to execute several commands, check the interrupt for the previous command and execute the next command.

2.1 ARP(Address Resolution Protocol)

ARP is a message for getting the MAC address of the other party in the request-reply structure. ARP Request Message to request the MAC address of the corresponding IP address and get the MAC address through the ARP Response Message. The ARP request message is the same as the Neighbor Solicitation message in IPv6, the ARP reply message is the same as the Neighbor Advertisement message in IPv6.

When the W6100 is set to Connect command in TCP communication or Send Command in IPRAW or UDP communication, ARP is executed and MAC address is got and the packet is transmitted to the corresponding address. When the Socket is set to the Destination Hardware address mode, the packet is transmitted to the MAC address set by the user in the Sn_DHAR without ARP process. In addition, if you want to send ARP separately, you can send it through SOCKET-less command and check MAC address through SLDHAR register.
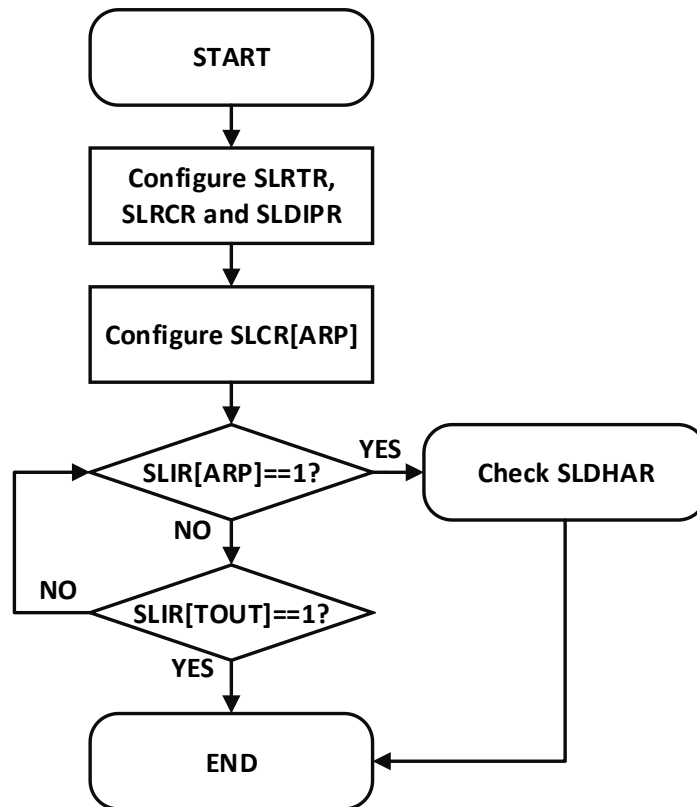
```
          ┌─────────────┐
          │    START    │
          └──────┬──────┘
                 ▼
        ┌────────────────┐
        │ Configure SLRTR,│
        │ SLRCR and SLDIPR│
        └────────┬───────┘
                 ▼
        ┌────────────────┐
        │Configure SLCR[ARP]│
        └────────┬───────┘
                 ▼
          ╱───────────╲        YES   ┌──────────────┐
     ┌──<  SLIR[ARP]==1? >──────────>│ Check SLDHAR │
     │    ╲───────────╱              └──────┬───────┘
     │        │ NO                          │
     │        ▼                             │
     │ NO ╱───────────╲                     │
     └──<  SLIR[TOUT]==1? >                 │
          ╲───────────╱                     │
              │ YES                         │
              ▼                             │
          ┌─────────┐                       │
          │   END   │<──────────────────────┘
          └─────────┘
```

Figure 1 ARP Command Operation Flow

2.2 PING

PING is a message for confirming the network status of the other party in the request-reply structure. After transmitting the PING Request Message, it waits for a response and checks the network status of the other party through Response Message.

If you want to transmit PING in W6100, you can send it through SOCKET-less command. You can check the MAC address obtained through ARP process, which was performed automatically before transmitting PING request, through SLDHAR register.
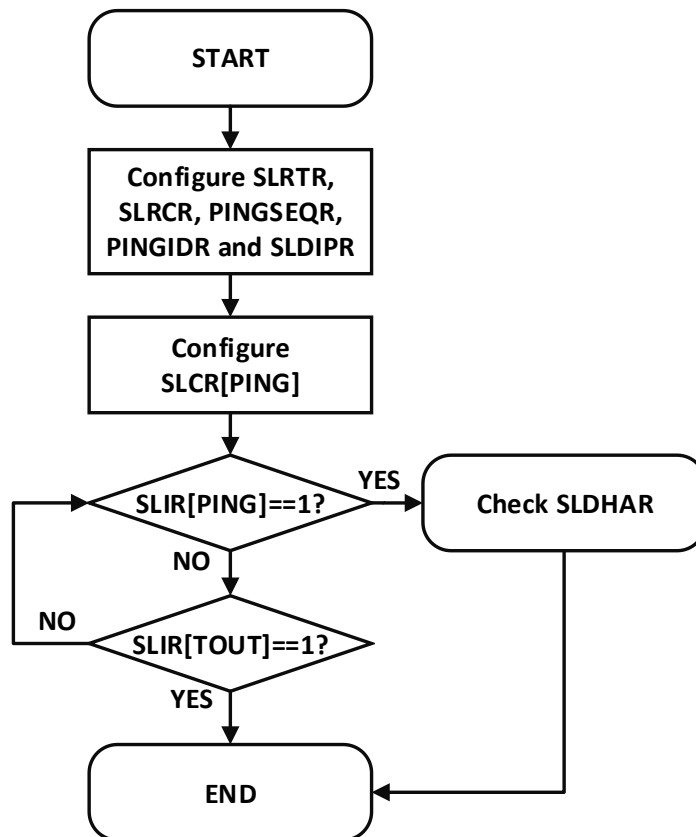

Figure 2 PING Command Operation Flow

2.3 NS&RS(Neighborhood Solicitation & Router Solicitation)

In IPv6, Host IP Address is generated by stateful auto-configuration method and stateless auto-configuration method. Stateless auto-configuration is a method in which a host generates its own address. In the case of LLA (Link Local Address), it can be generated by NS Command, and in case of GUA (Global Unicast Address), RS Command.

The LLA generates the prefix information by attaching the interface ID information to the prefix information, and performs the DAD (Duplicate Address Detection) process to use the generated LLA. DAD process can detect duplicate address by receiving NA packet after transmitting NS packet.

10 bits	54 bits	64 bits
1111 1110 10	0	Interface ID

Table 1 Link-Local Address Format

To execute DAD process, Set the LLA created in SLDIPR and transmit NS Packet via NS Command. If NA Packet is not received for a certain period of time, the LLA can be used as uniquely verified. However, if the NA Packet is received in reply to the NS Packet, the LLA is already in use and can not be used.

Unlike LLA, Prefix information is not fixed for GUA. Therefore, in case of LLA, NS packet is transmitted to perform DAD, but in case of Global Unicast address, RS packet is transmitted to the router in order to obtain information necessary for address setting.

To get necessary information, set the IP address of Router in SLDIPR register, and then transmit RS packet through RS Command. If RA packets are received in reply to RS Packet, generate GUA using Prefix information and Interface ID obtained from RA Packet. Prefix Length, Valid Life Time, Preferred Life Time, and Prefix Address can be checked through PLR, PFR, VLTR, PLTR, and PAR, respectively.

48bits	16bits	64 bits
Prefix	Subnet ID	Interface ID

Table 2 Global Unicast Address Format

For more details, refer to Auto-Configuration Application note.

START
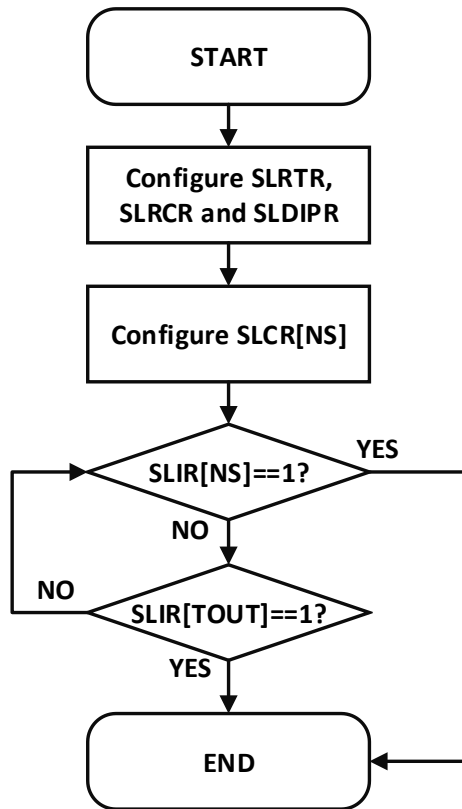
Configure SLRTR,
SLRCR and SLDIPR

Configure SLCR[NS]

SLIR[NS]==1? YES

NO

SLIR[TOUT]==1? NO

YES

END

Figure 3 NS Command Operation Flow

START

Configure SLRTR,
SLRCR and SLDIPR

Configure SLCR[RS]

SLIR[RS]==1? YES Check PLR, PFR,
VLTR, PLTR and PAR
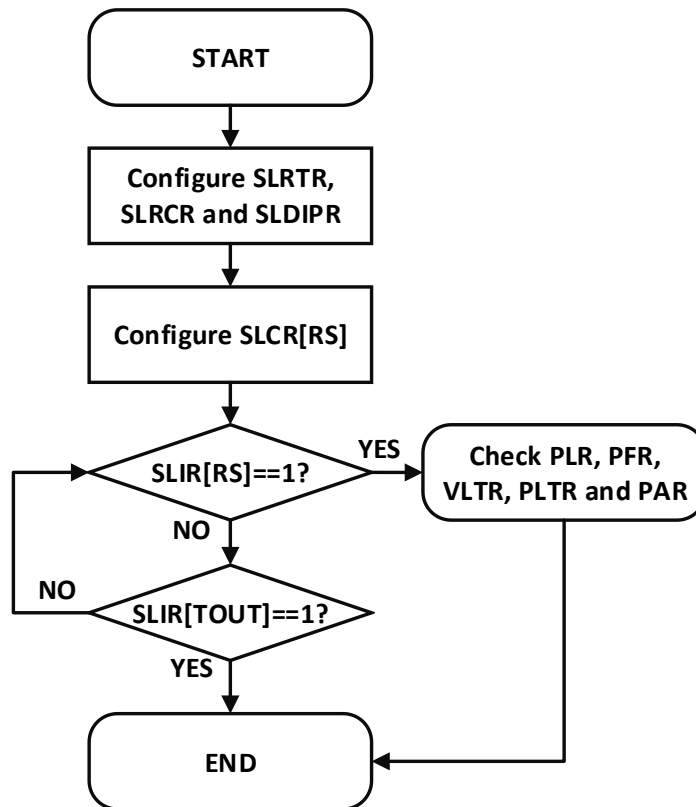
NO

SLIR[TOUT]==1? NO

YES

END

Figure 4 RS Command Operation Flow

2.4 UNA (Unsolicited Neighbor Advertisement)

An NA message is generally used as a response to an NS message, but it is used to notify of a change even if it is not received. Unlike other commands, the TOUT interrupt is generated when the message transmission is completed.
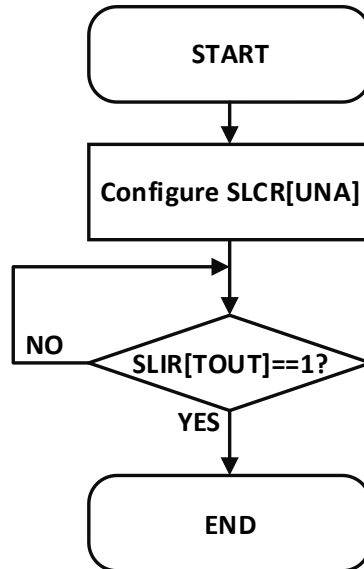
```
        ┌──────────────┐
        │    START     │
        └──────┬───────┘
               │
        ┌──────▼───────┐
        │Configure SLCR[UNA]│
        └──────┬───────┘
               │
       ┌───────▼────────┐
  NO   ◄  SLIR[TOUT]==1? ►
       └───────┬────────┘
              YES
        ┌──────▼───────┐
        │     END      │
        └──────────────┘
```

Figure 5 UNA Command Operation Flow

3   Document History Information

Version	Date	Descriptions
Ver. 1.0.0	Jan, 2019	Release

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