- Application Note for W3150A -

How to connect ADSL

Document History

Ver 1.0 (OCT 26, 2005)	First release

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S0_CR (Socket 0 Command Register) [R/W] [0x0401] [0x00]

About PPPoE command

Value	Symbol	Description
0x23	PCON	Start of ADSL connection (start PPPoE Discovery)
0x24	PDISCON	END of ADSL connection
0x25	PCR	Send REQ message in each Phase (About each phase in detail, Refer to the below.)
0x26	PCN	Send NAK message in each Phase
0x27	PCJ	Send REJECT message in each Phase

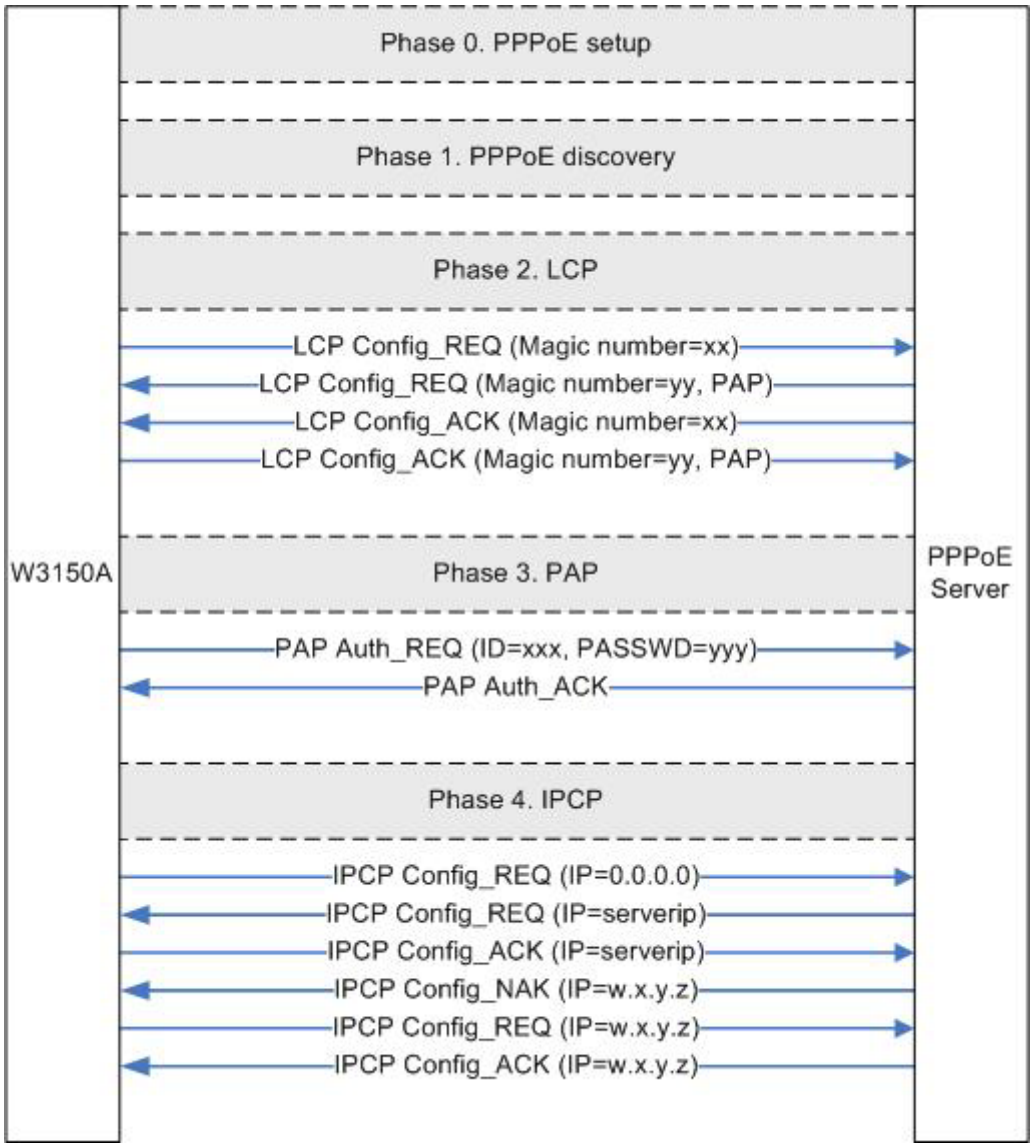
S0_IR (Socket n Interrupt Register) [R] [0x0402] [0x00]

About PPPoE Interrupt

7	6	5	4	3	2	1	0
PRECV	PFAIL	PNEXT	Reserved	TIMEOUT	RECV	DISCON	CON

Bit	Symbol	Description
7	PRECV	Indicate receiving no support option data
6	PFAIL	Indicate PAP Authentication Fail
5	PNEXT	Go next phase (About each phase in detail, Refer to the below.)
4	Reserved	Refer to the W3150A Datasheet.
3	TIMEOUT	
2	RECV	
1	DISCON	
0	CON	

Below figure shows the ADSL connection process.



Phase 0> PPPoE Setup

```
{
PHASE0 :
/* Set PPPoE bit in MR(Mode Register). */
    MR = 0x08;
/* Set the value of PTIMER and PMAGIC */
    PTIMER = 200; // set about 5 second
    PMAGIC = 0x01;
/* Set PPPoE mode on socket 0 mode register */
```

```
    S0_MR = 0x05;
/* Set OPEN command */
    S0_CR = OPEN;
}
```

Phase 1> PPPoE discovery

Through the step of PPPoE discovery, ADSL server(PPPoE server) information and session ID will be assigned.

```
{
/* Set PCON command for starting to connect to ADSL server */
    S0_CR = PCON;
    while
    {
        wait some time
        /* check PNEXT bit of S0_IR is set */
        if (S0_IR(PNEXT) == '1')
        {
            /* save ADSL server information */
            /* These information uses to disconnect to ADSL server */
            PPPoE_Server = S0_DHAR;
            PPPoE_Session_ID = S0_DPORT;
            goto PHASE2;
        }
        if (overtime) goto PHASE0;
    }
}
```

Phase 2> LCP

By using LCP(Link Control Protocol), the information of authentication protocol type and MRU is negotiated. W3150A supports options of Maximum Receive Unit(0x01), Authentication Protocol (0x03, PAP/CHAP supported), and Magic-number(0x05).

```
{
    /* prepare option field of LCP */
    option_array = {0x05, 0x06, PMAGIC, PMAGIC, PMAGIC, PMAGIC};
    copy option_array to socket 0 TX memory;
    /* for copying, refer to TCP sending process in 5.Functional description of datasheet.*/
```

```
/* send LCP Config_REQ message */
S0_CR = PCR;
while
{
    wait some time
    /* check PRECV bit of S0_IR is set */
    if (S0_IR(PRECV) == '1')
    {
        Get the option_array from RX memory of socket 0;
        /* for getting the data, refer to TCP receiving process in 5.Functional description
           of datasheet */
        Parsing option_array and save reject option to reject_option_array
```

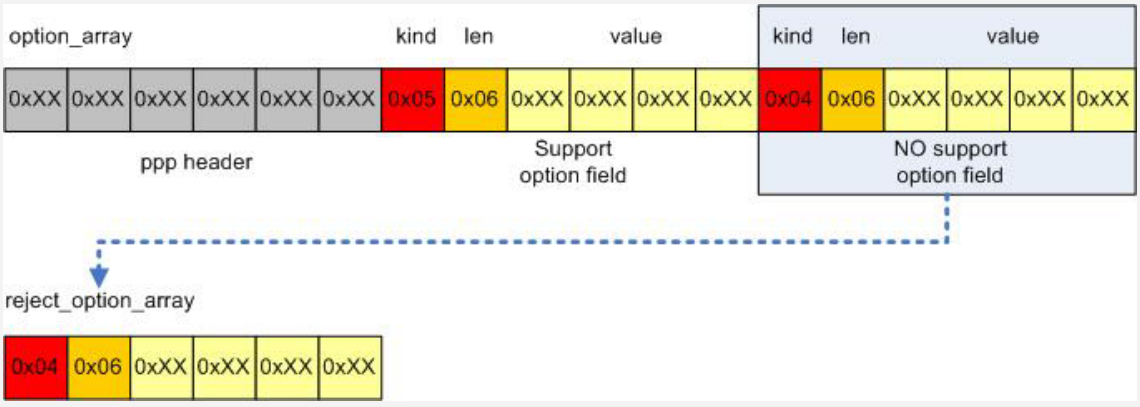


Figure 1. save reject option

```
        {
            Skip 6 bytes in option_array; // ppp header 6 bytes
            /* each option field consist of [ kind(1) | len(1) | value(n) ] */
            Parsing all option fields as below
            {
                while (exist option field)
                {
                    /* check support option kind */
                    if (option(kind) != {0x01, 0x02, 0x03, 0x05})
                    save the option fields to reject_option_array;
                }
            }
```

```
            }
            Copy reject_option_array to socket 0 TX memory;
            /* send LCP Config_REJ message */
            S0_CR = PCJ;
        }
        /* check PNEXT bit of S0_IR is set */
        if (S0_IR(PNEXT) == '1') goto PHASE3;
        if (overtime) goto PHASE0;
    }
}
```

Phase 3> PAP

Now, perform authentication process with ID and Password by using Authentication Protocol acquired by Phase 2. In this document, the process is described with PAP generally used in ADSL.

```
{
    /* prepare option field of PAP Auth_REQ */
    /* [ IDlen(1) | ID(IDlen) | PWDlen(1) | PWD(PWDlen) ] */
    Save { IDlen(1),ID(IDlen),PWDlen(1),PWD(PWDlen) } to option_array
    copy option_array to TX memory of socket 0;
    /* send PAP Auth_REQ */
    S0_CR = PCR;
    while
    {
        wait some time
        /* check PRECV bit of S0_IR is set */
        if (S0_IR(PFAIL) == '1')
        {
            Re-check ID, Password
            goto PHASE0;
        }
        /* check PNEXT bit of S0_IR is set */
        if (S0_IR(PNEXT) == '1') goto IPCP;
        if (overtime) goto PHASE0;
    }
}
```

Phase 4> IPCP

In this phase, IP address is assigned by using IPCP. (If necessary, DNS and Gateway IP can be acquired, but only IP address is enough in ADSL)

```
{
    /* prepare option field of IPCP */
    option_array = {0x03, 0x06, 0x00, 0x00, 0x00, 0x00};
    copy option_array to socket 0 TX memory;
    /* send IPCP Config_REQ message */
    S0_CR = PCR;

    while
    {
        wait some time
        /* check PRECV bit of S0_IR is set */
        /* It is because IP address assigned to NAK message is sent from a server. */
        if (S0_IR(PRECV) == '1')
        {
            Get the received data of socket 0 RX memory and save to ip_option_array;
            {
                /* Parsing ip_option_array as below */
                Skip 6 bytes in ip_option_array; // ppp header 6 bytes
                {
                    /* Parsing all option fields as below */
                    /* each option field consist of [ kind(1) | len(1) | value(n) ] */
                    while (exist option field)
                    {
                        /* check ip option field */
                        if (option(kind) == 0x03)
                        {
                            save the option fields to option_array;
                            goto IPCP_END;
                        }
                    }
                }
            }
```

```
        }
        if (overtime) goto PHASE0;
    }
IPCP_END:
    Copy option_array to socket 0 TX memory;
    /* resend IPCP Config_REQ message */
    S0_CR = PCR;
    while
    {
        wait some time
        /* check PNEXT bit of S0_IR is set */
        if (S0_IR(PNEXT) == '1') goto PHASE5;
        if (overtime) goto PHASE0;
    }
}
```

Phase 5 > End

All the process for ADSL connection is finished. Close the 0th socket and use it.

```
{
    /* set CLOSE command */
    S0_CR = CLOSE;
}
```

Phase 6 > ADSL Disconnection

```
{
    /* Set PPPoE bit in MR(Mode Register). */
    MR = 0x08;
    /* Set PPPoE mode on socket 0 mode register */
    S0_MR = 0x05;
    /* set the ADSL server information */
    S0_DHAR = PPPoE_Server ;
    S0_DPORT = PPPoE_Session_ID;
    /* Set OPEN command */
    S0_CR = OPEN;
```

```
    /* Set PDISCON command for starting to disconnect to ADSL server */
    S0_CR = PDISCON;
    /* set CLOSE command */
    S0_CR = CLOSE;
}
```