

# TOE2-IP Demo on SP605 Instruction

Rev1.0 11-Dec-12

This document describes the instruction to run TOE2-IP for transferring data between SP605 development board and PC through Gigabit Ethernet. This demo can select to run with supported and not supported Jumbo frame PC.

## 1 Environment Setup

As shown in Figure 1, to run TOE2-IP send demo, please prepare

- 1) SP605 Development board
- 2) PC which support Gigabit Ethernet
- 3) Ethernet cable (Cat5e or Cat6) for network connection between SP605 Development board and PC
- 4) mini USB cable for programming FPGA between SP605 Development board and PC
- 5) "send\_tcp\_client.exe" and "rcv\_tcp\_client.exe", provided by Design Gateway, which are test application available on PC

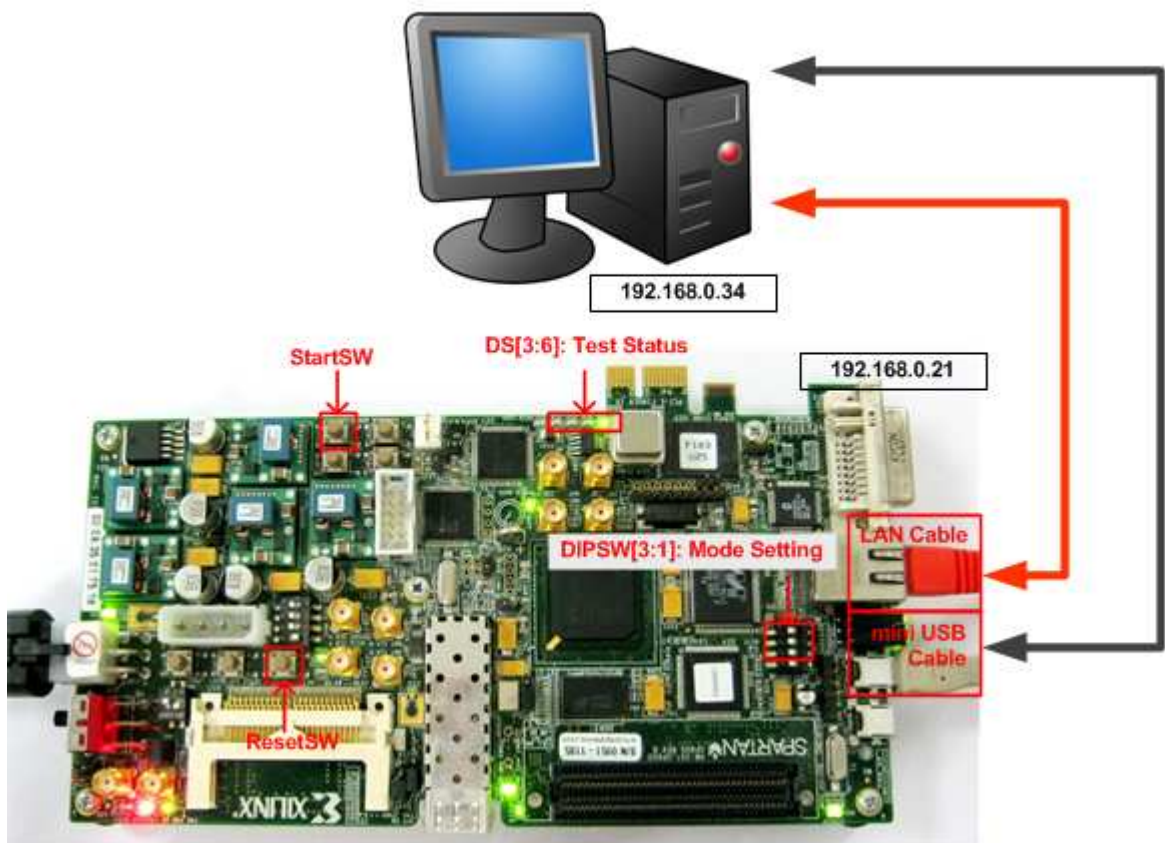


Figure 1 TOE2-IP Send Demo Environment Setup

## 2 Demo description

There are two test modes, i.e. sending mode and receiving mode between SP605 development board, running as TCP Server, and PC which running as TCP Client. Each transfer mode requires different test application on PC and different DIPSW setting on SP605 development board. The definition of DIPSW and LED on SP605 development board are described in Table 1 and Table 2.

Table 1 DIPSW Setting Definition

DIPSW	OFF	ON
Bit 1	Sending mode by using non-Jumbo frame (1460 bytes)	Sending mode by using Jumbo frame (8960 bytes)
Bit 2	Sending mode	Receiving mode
Bit 3	Receiving mode without data verification	Receiving mode with data verification

Table 2 LED Definition

LED	ON	OFF
DS3	IP initialize complete	Not complete. Please check that StartSW (SW8) has already been pressed and confirm IP address setting on PC that is correct.
DS4	Port is established.	Port is still not established. Please check that Test application has already run.
DS5	Sending mode in Jumbo frame.	Sending mode in non-jumbo frame.
DS6	LED BLINK when data verification is fail in receiving mode.	No error detect from data verification

More details about each test mode are follows.

## 2.1 Sending mode

In this mode, 4 GB data will be transferred from SP605 development board to PC, and “recv\_tcp\_client.exe” application will operate on PC for data verification. If data value is not correct, test application will show error message on console.

User can select 2 transfer packet sizes by DIPSW[1] setting, i.e. 1460 data byte for running with not supported Jumbo frame PC, and 8960 data byte for running with supported Jumbo frame PC. User can confirm this setting from DS5 status.

The operation sequence for sending mode is follows.

- 1) TOE2-IP within SP605 development board initializes parameters in system such as Packet size, transfer size, MAC and IP address, and then waits open connection from PC.
- 2) Test application on PC opens connection to connect with SP605 development board, and wait data sending.
- 3) TOE2-IP starts to send 4 GB data to PC while PC verifies receiving data that is correct.
- 4) After all data are transferred, TOE2-IP sends packet to close connection.
- 5) PC sends acknowledge to close connection. Then, operation will run as loop from Step2) to Step5) until operation cancelled.

## 2.2 Receiving mode

In this demo, data will be transferred from PC to SP605 development board. By using “send\_tcp\_client.exe” operating on PC, data will be sent out until number of transferred data equal to setting value. This test can run as 2 modes, i.e. performance test and data verification. In performance test, all ‘0’ data will be sent out from PC and verification module within SP605 development board will be OFF for achieving best performance transfer. In data verification mode, 32-bit increment data will be generated from PC and verification module will be ON for data verification. LED error will blink if any error is detected. Verification ON/OFF within hardware is set from DIPSW[3] while test application can be set as option value in command line.

The operation sequence for receiving mode is follows.

- 1) Similar to Step 1) in Sending mode.
- 2) Test application on PC opens connection to connect with SP605 development board, and then start transferring all ‘0’ or increment data out until complete.
- 3) TOE2-IP receives data and verify data if enable.
- 4) After all data are transferred, Test application sends packet to close connection.
- 5) TOE2-IP sends acknowledge to close connection. This mode will run only 1 time, not in loop like Sending mode.

### 3 PC Setup

Before running demo, user needs to setup network setting on PC as follows.

#### 3.1 IP Setting

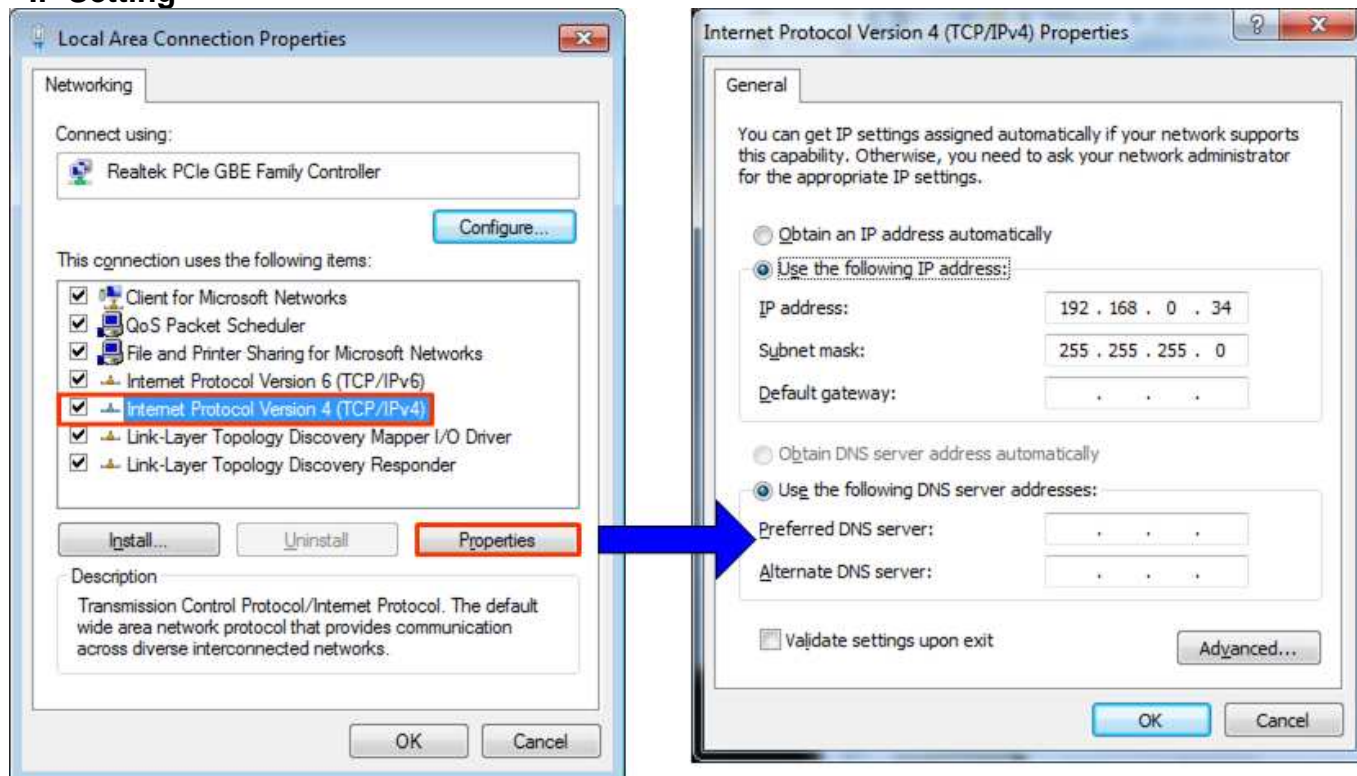


Figure 2 IPv4 Setting

- Open Local Area Connection Properties of test connection, as shown in left window of Figure 2.
- Select "TCP/IPv4" and then click Properties.
- Set IP address = 192.168.0.34, and Subnet mask = 255.255.255.0, as shown in right window of Figure 2.

### 3.2 Speed and Frame Setting

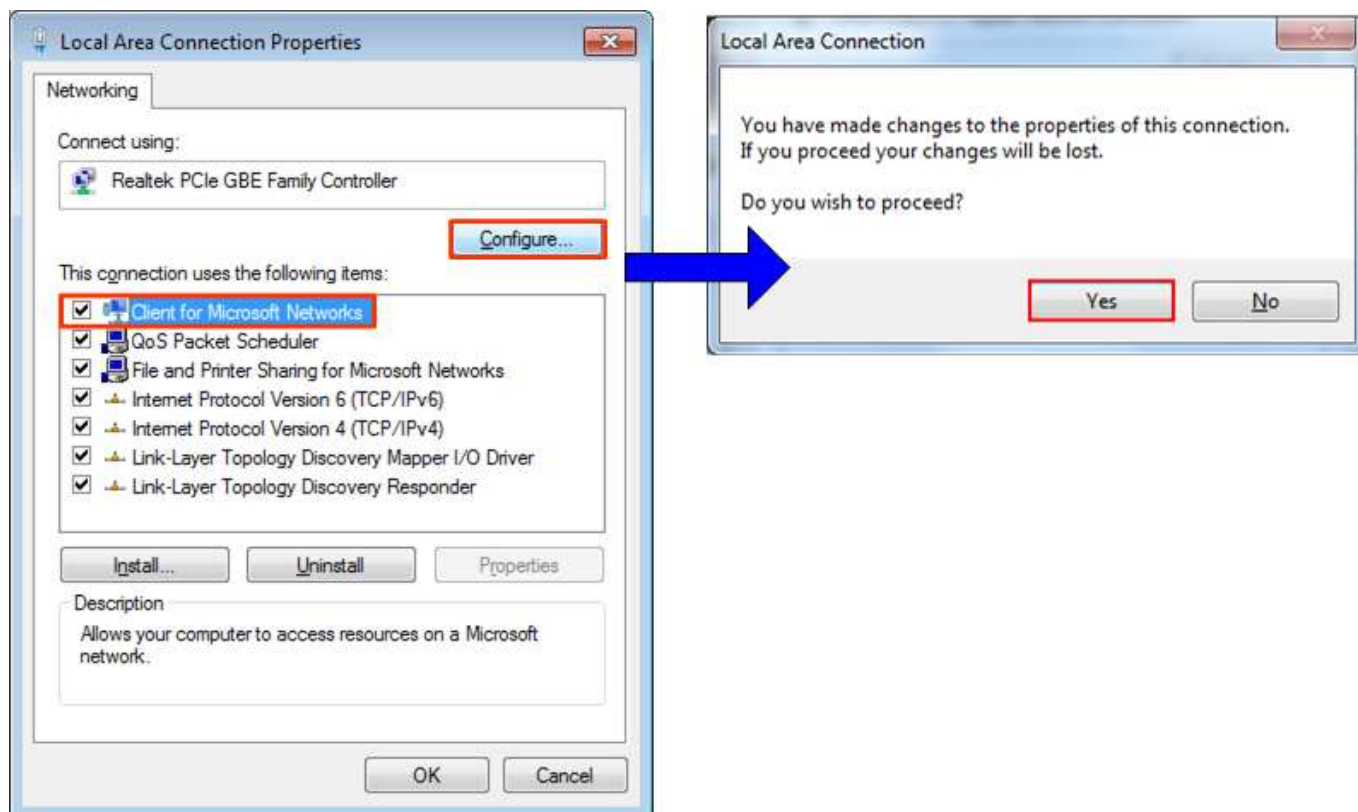


Figure 3 Network Configure

- On Local Area Connection Properties window, select “Client for Microsoft Networks”, and then click “Configure”, as shown in Figure 3.

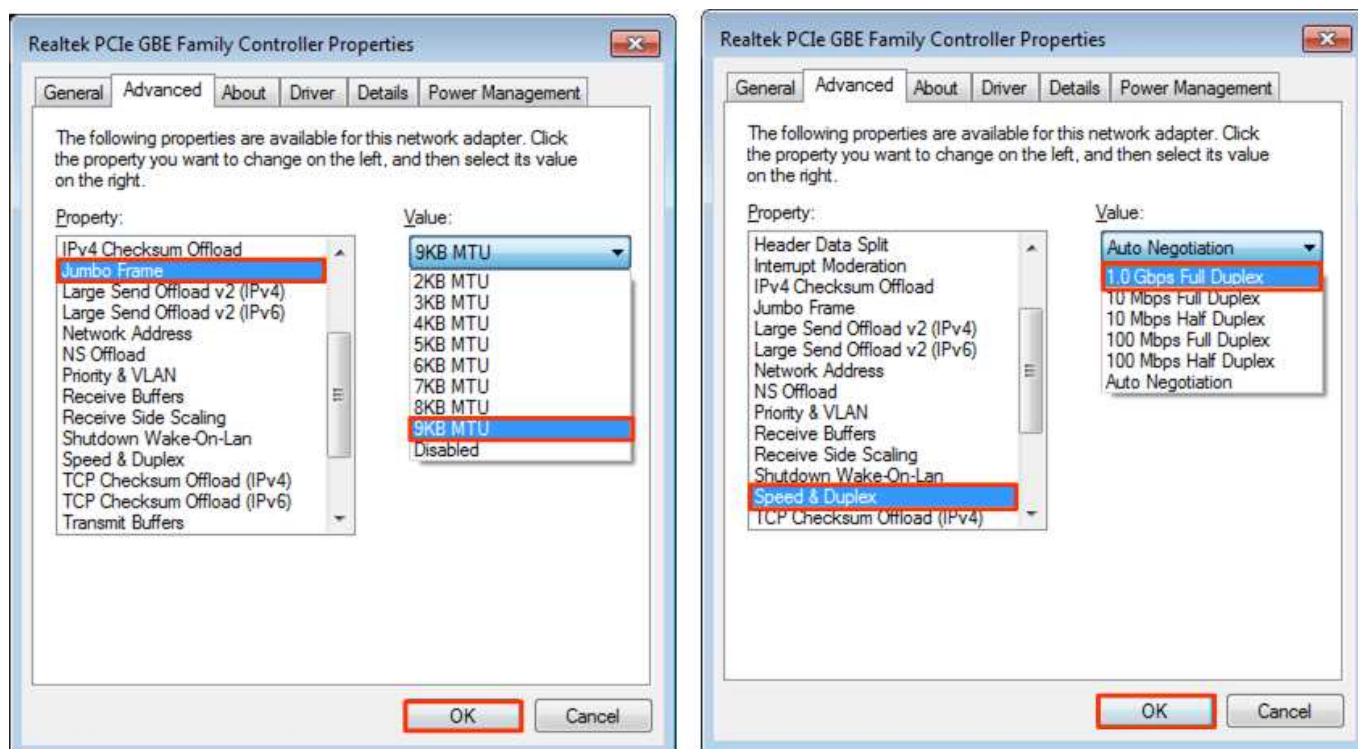


Figure 4 Link speed and Jumbo frame setup

- On Advanced Tab, select “Jumbo Packet” and then set Value to “9KB MTU” for Jumbo Frame support or set value to “Disabled” for non-Jumbo Frame support, as shown in left window of Figure 4.
- On Link Speed, select “1.0 Gbps Full Duplex” for running Gigabit transfer test, as shown in right window of Figure 4.

## 4 How to run demo

Both Sending and Receiving demo requires same initial steps to set up hardware as follows.

- Connect mini USB cable from SP605 development board to PC and connect power supply to SP605 board.
- Connect Ethernet cable between SP605 development board and PC.
- Set up network setting on PC, following Topic 3.
- Power on SP605 development board.
- Open iMPACT and download “toe2iptest.bit” to SP605 development board, as shown in Figure 5.

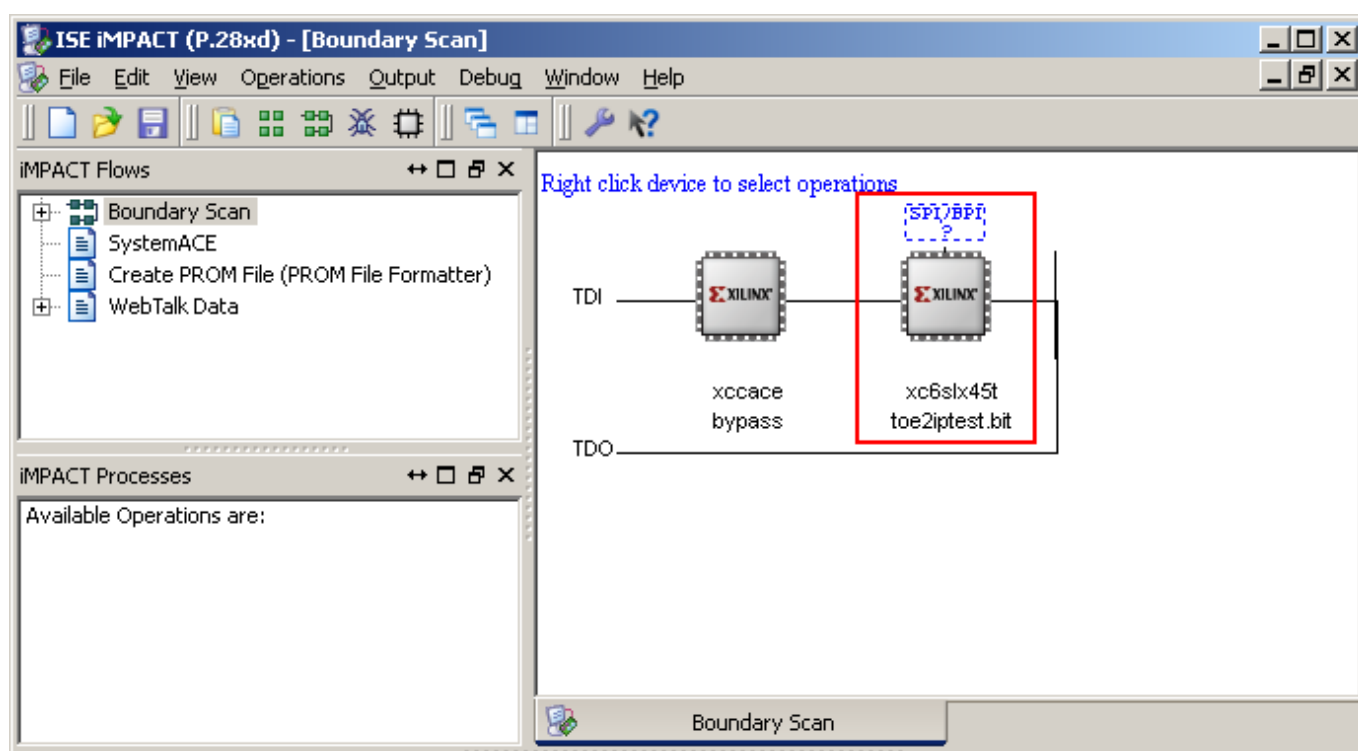


Figure 5 Programmer Environment

- Check LED status on SP605 development board now and DS[3:6] are all turn off.
- Press StartSW as shown in Figure 1 (SW8) to initialize parameter in system, and then DS3 will turn on, as shown in Figure 6 and Figure 7 following DIPSW[1] setting.



Figure 6 LED Status after push StartSW when DIPSW[1]=OFF



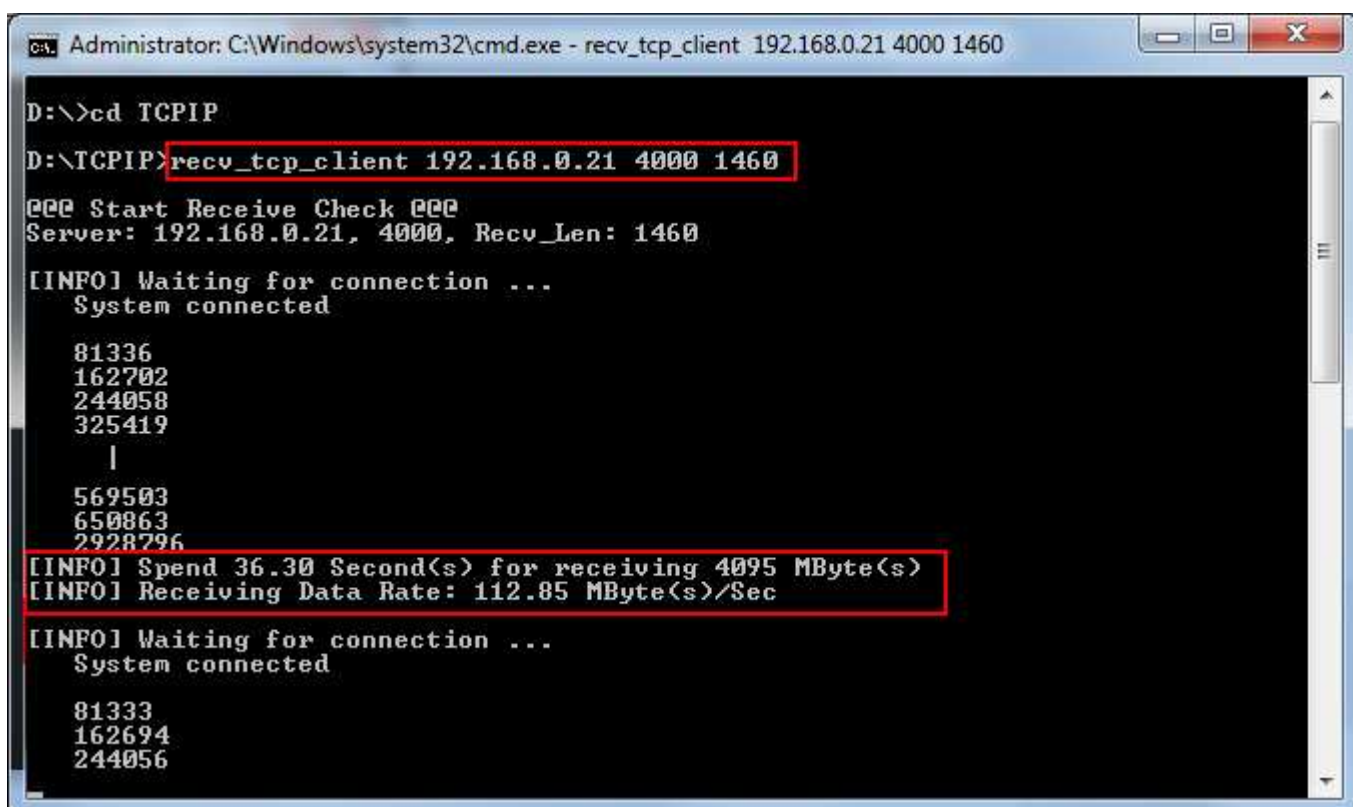
Figure 7 LED Status after push StartSW when DIPSW[1]=ON

Now system is ready to transfer data. The step to test Sending and Receiving data is described in next topic.

## 4.1 Run Sending Demo

### 4.1.1 Non-Jumbo frame mode

- Set DIPSW[2] = OFF to run Sending demo.
- Set DIPSW[1] = OFF and confirm that DS5 status is OFF.
- Open “command prompt” on PC, and run “recv\_tcp\_client” test application by following command  
 >> recv\_tcp\_client <FPGA IP address> <FPGA port number> <number of data in packet>  
 For example,  
 >> recv\_tcp\_client 192.168.0.21 4000 1460  
 Note: This demo fixes IP address, port number, and number of data. So, please don't change any value without vhdl code modification.
- Test application displays current packet number during transferring and time usage with performance will be displayed when complete each loop transfer, as shown in Figure 8.
- User can cancel operation by pressing “Ctrl+C”.



```

Administrator: C:\Windows\system32\cmd.exe - recv_tcp_client 192.168.0.21 4000 1460
D:\>cd TCPIP
D:\TCPIP>recv_tcp_client 192.168.0.21 4000 1460
@@@ Start Receive Check @@@
Server: 192.168.0.21, 4000, Recv_Len: 1460

[INFO] Waiting for connection ...
System connected

81336
162702
244058
325419
|
569503
650863
2928796
[INFO] Spend 36.30 Second(s) for receiving 4095 MByte(s)
[INFO] Receiving Data Rate: 112.85 MByte(s)/Sec

[INFO] Waiting for connection ...
System connected

81333
162694
244056
  
```

Figure 8 Non-Jumbo frame Sending Demo

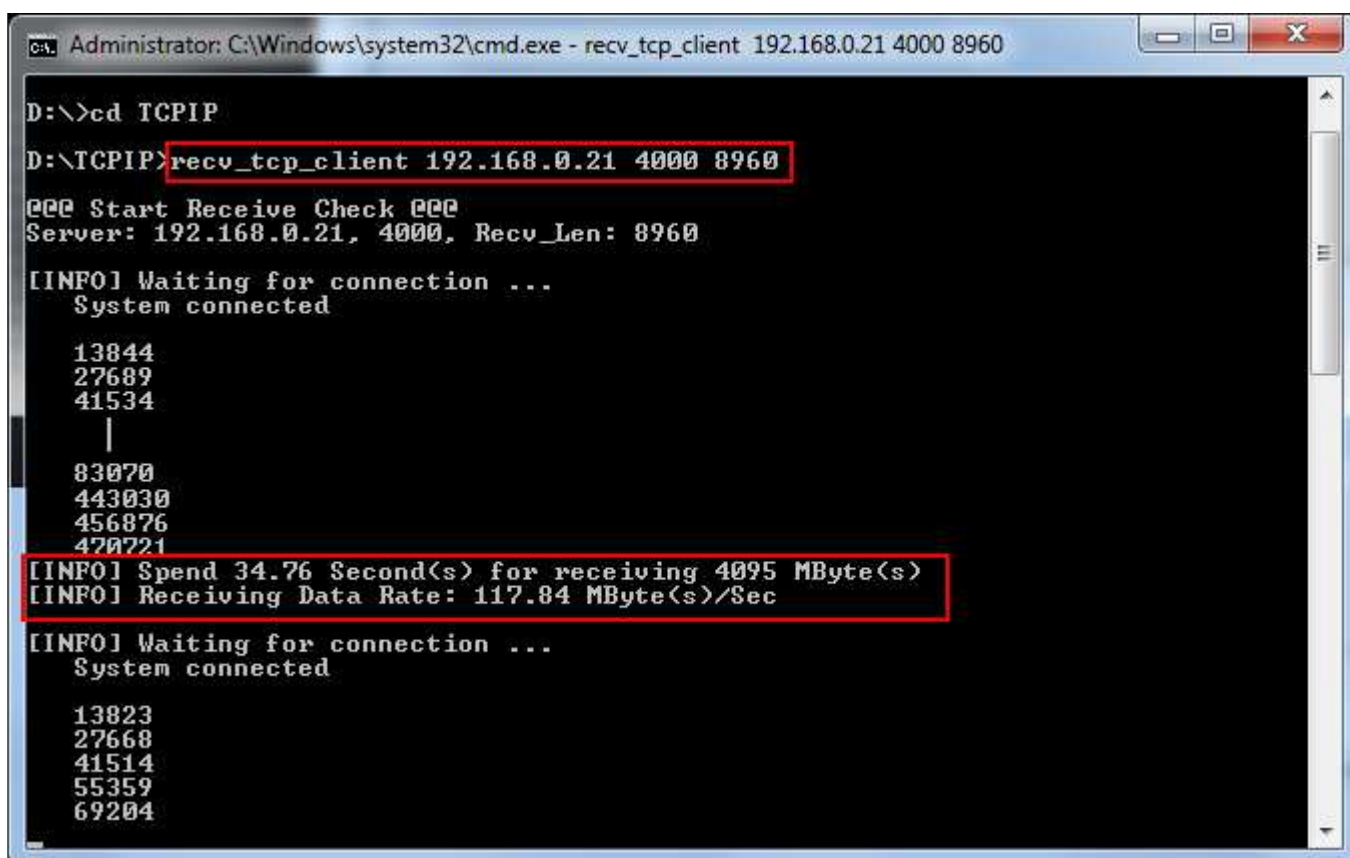


Figure 9 LED Status when running Sending Demo with Non-Jumbo frame



#### 4.1.2 Jumbo frame mode

- Set DIPSW[2] = OFF to run Sending demo.
- Set DIPSW[1] = ON and confirm that DS5 status is ON.
- Open “command prompt” on PC, and run “recv\_tcp\_client” test application by following command  
 >> `recv_tcp_client 192.168.0.21 4000 8960`  
 Note: This demo fixes IP address, port number, and number of data. So, please don't change any value without vhd code modification.
- Test application displays current packet number during transferring and time usage with performance will be displayed when complete each loop transfer, as shown in Figure 10.
- User can cancel operation by pressing “Ctrl+C”.



```

Administrator: C:\Windows\system32\cmd.exe - recv_tcp_client 192.168.0.21 4000 8960
D:\>cd TCPIP
D:\TCPIP>recv_tcp_client 192.168.0.21 4000 8960
@@@ Start Receive Check @@@
Server: 192.168.0.21, 4000, Recv_Len: 8960

[INFO] Waiting for connection ...
System connected

13844
27689
41534
|
83070
443030
456876
470721
[INFO] Spend 34.76 Second(s) for receiving 4095 MByte(s)
[INFO] Receiving Data Rate: 117.84 MByte(s)/Sec

[INFO] Waiting for connection ...
System connected

13823
27668
41514
55359
69204
  
```

Figure 10 Jumbo frame Sending Demo

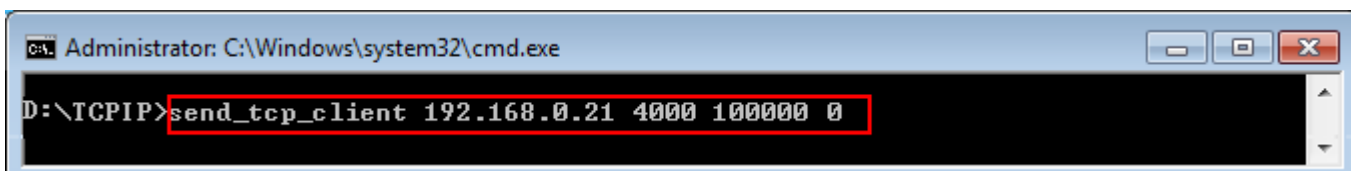


Figure 11 LED Status when running Sending Demo with Jumbo frame

## 4.2 Run Receiving Demo

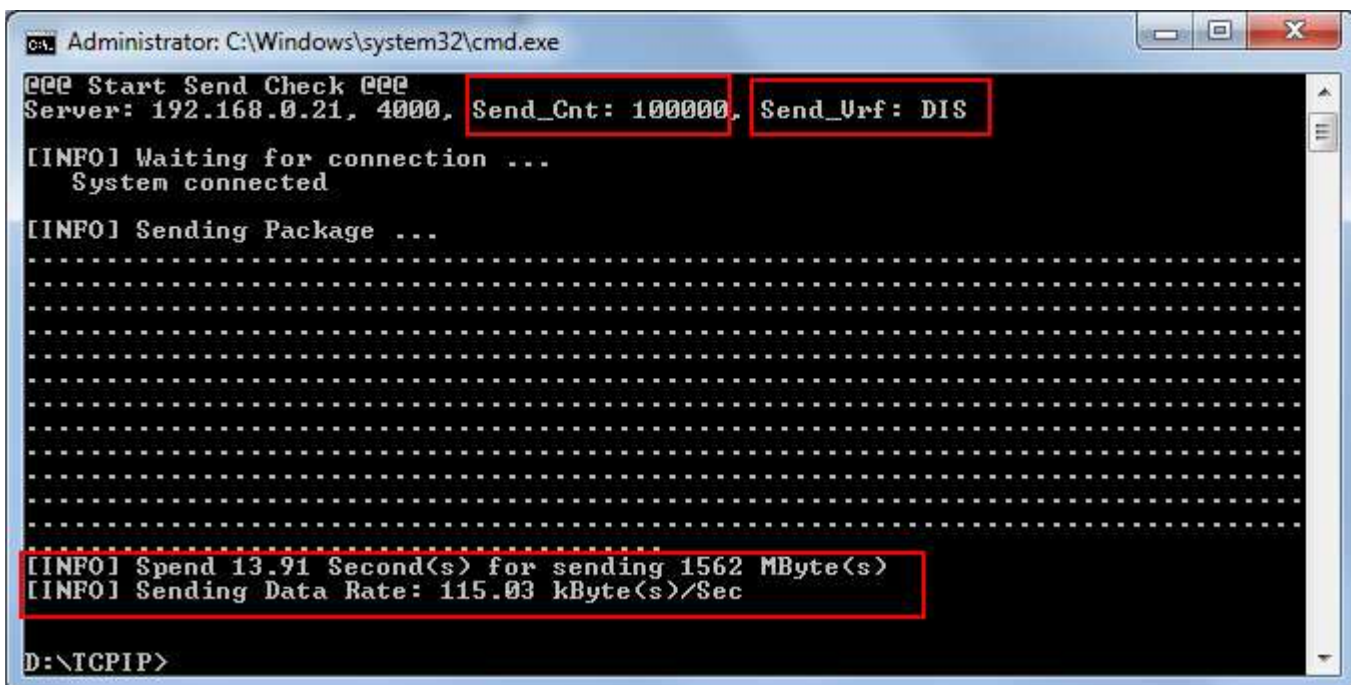
### 4.2.1 Performance test mode

- Set DIPSW[2] = ON to run Receiving demo.
- Set DIPSW[3] = OFF.
- Open “command prompt” on PC, and run “send\_tcp\_client” test application by following command  
 >> send\_tcp\_client <FPGA IP address> <FPGA port number> <transfer size in 16kbyte unit> <mode>  
 For example,  
 >> send\_tcp\_client 192.168.0.21 4000 100000 0  
 Note:
  - o Similar to Sending demo, IP address and port number cannot change without vhdl code modification.
  - o User can set transfer size in 16kByte unit which is buffer size in test application. In this example, 100000 means 1600 MByte data is transferred.
  - o Mode: ‘0’- All ‘0’ pattern are sent for performance test.
- Test application displays “...” during transferring packet and time usage with performance will be displayed when complete data transfer, as shown in Figure 13.



```
Administrator: C:\Windows\system32\cmd.exe
D:\TCPIP>send_tcp_client 192.168.0.21 4000 100000 0
```

Figure 12 Command line for receiving demo on Performance test mode



```
Administrator: C:\Windows\system32\cmd.exe
@@@ Start Send Check @@@
Server: 192.168.0.21, 4000, Send_Cnt: 100000, Send_Urf: DIS
[INFO] Waiting for connection ...
System connected
[INFO] Sending Package ...
.....
[INFO] Spend 13.91 Second(s) for sending 1562 MByte(s)
[INFO] Sending Data Rate: 115.03 kByte(s)/Sec
D:\TCPIP>
```

Figure 13 Receiving Demo on Performance test mode

#### 4.2.2 Verification mode

- Set DIPSW[2] = ON to run Receiving demo.
- Set DIPSW[3] = ON to enable verification module.
- Open “command prompt” on PC, and run “send\_tcp\_client” test application by following command  
 >> send\_tcp\_client <FPGA IP address> <FPGA port number> <transfer size in 16kbyte unit> <mode>  
 For example,  
 >> send\_tcp\_client 192.168.0.21 4000 100000 1  
 Note:
  - o Similar to Sending demo, IP address and port number cannot change without vhdl code modification.
  - o User can set transfer size in 16kByte unit which is buffer size in test application. In this example, 100000 means 1600 MByte data is transferred.
  - o Mode: ‘1’- 32-bit increment data are sent for data verification.
- Test application displays “...” during transferring packet and time usage with performance will be displayed when complete data transfer, as shown in Figure 15.

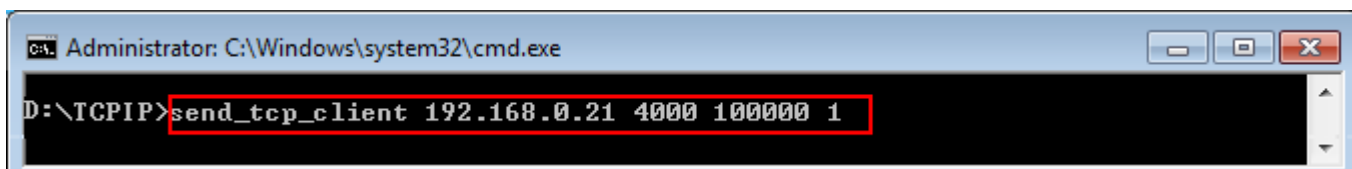


Figure 14 Command line for receiving demo on Verification mode

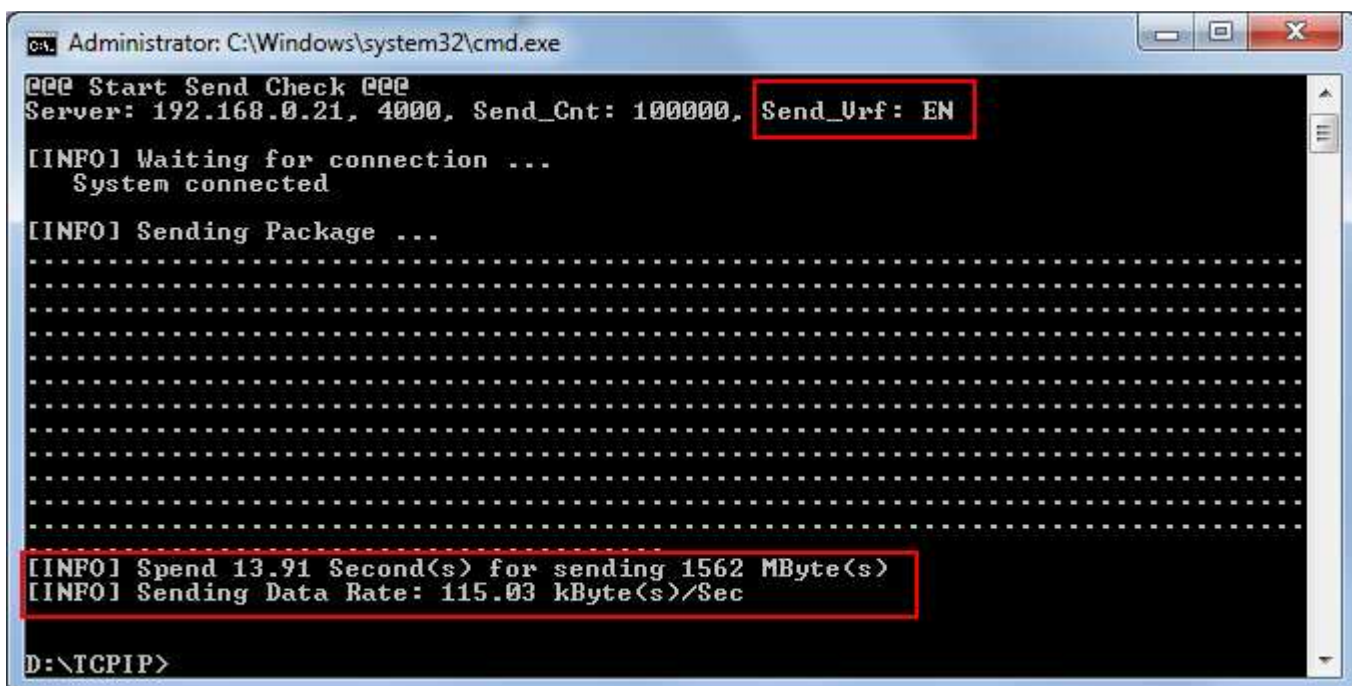


Figure 15 Receiving Demo on Verification mode

- DS6 will blink if any error data detects from Verification module.



Figure 16 LED Status when Verification error

## 5 Revision History

Revision	Date	Description
1.0	11-Dec-12	Initial version release