Java UDP Socket Programming

- UDP chatting Program
  - UDP Echo Program
  - UDP Chatting Program
    - Main
    - no-GUI vs. GUI
    - Socket Interface
    - Chatting Protocol

UDP Echo programming

Goal: UDP를 사용하여 메시지를 주고 받음

UDPMyEchoServer에서는 포트번호를 매개변수로 받아 DatagramSocket 타입의 socket 객체를 만듬. DatagramPacket의 객체를 이용하여 패킷을 수신하고 동일 패킷을 에코한다. UDPMyEcho에서는 DatagramSocket을 만들고 키보드에서 입력을 받아 서버로 보내고 그 결과를 받아 화면에 프린트한다.

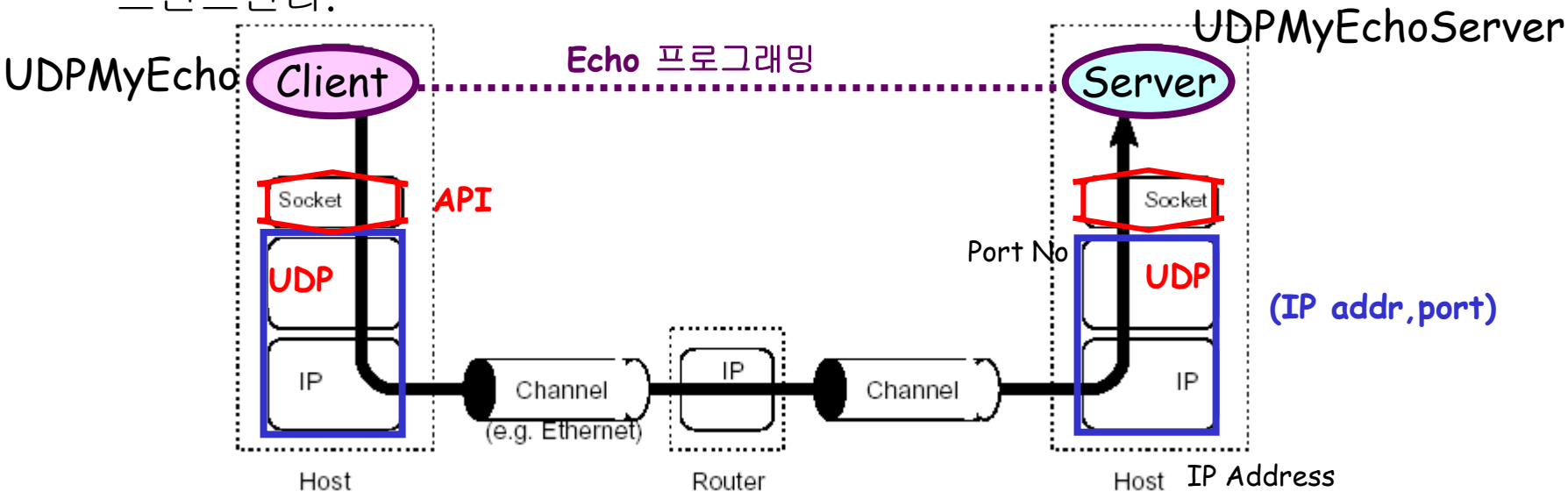
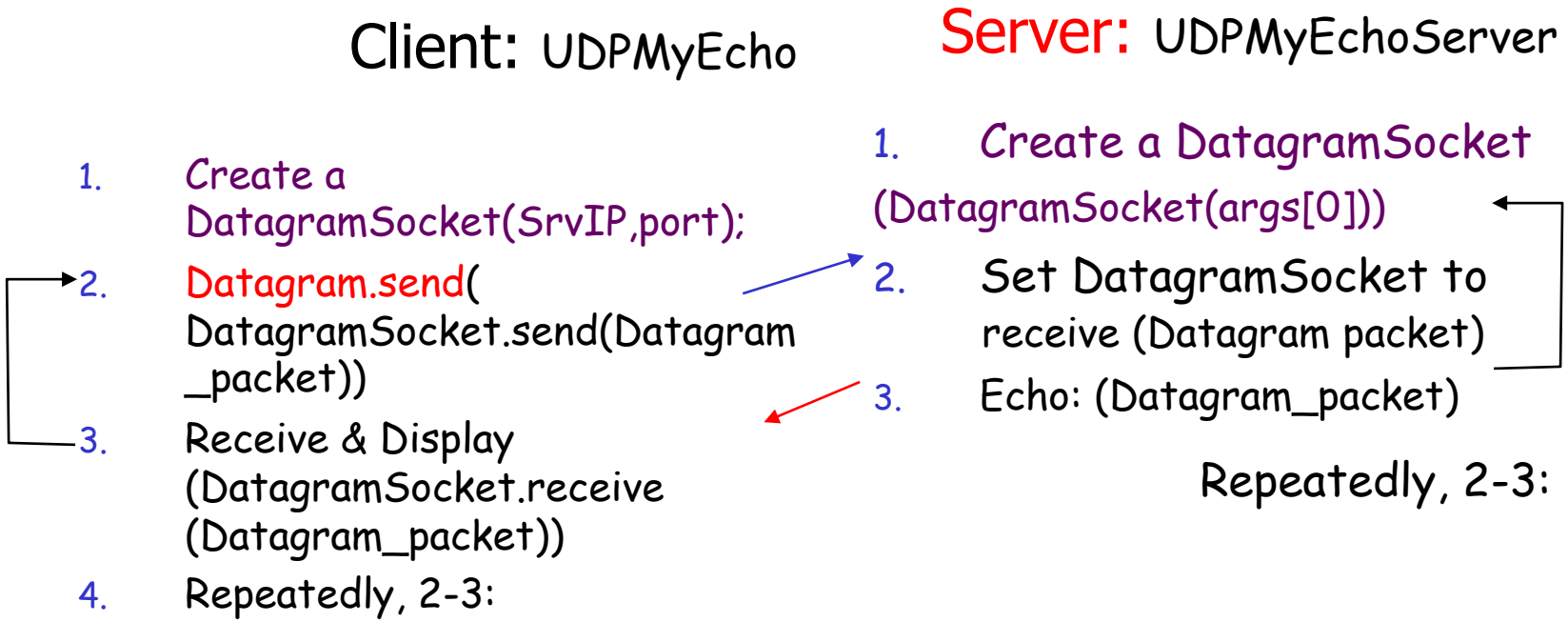


Figure 1.1: A TCP/IP Network

UDP Echo Working Chat

- Client: Initiates the connection



Mission 1: local IP addr & port

- Server: initially waits to respond

```
// 파일명 : UDPMyEchoServer.java
import java.net.*;
import java.io.*;
public class UDPMyEchoServer {
        final int MAXBUFFER = 512;
        public static void main (String[] args) {
                int arg_port = Integer.parseInt(args[0]);// 포트 번호
                new UDPMyEchoServer().work(arg_port);
        }
        void work(int arg_port) {
                int port = arg_port;
                try {
                        /*
                         * UDP Socket 생성 (UDP server Socket)
                        */
                        DatagramSocket Dsocket /* Fill in the blank */;
                        System.out.println ("Running the UDP Echo Server...");
                        while (true) {
                                /* UDP Packet 생성
                                 * (UDP server Socket으로부터 데이터 수신을 위한 UDP packet 생성)
                                 * UDP Server Socket에서 UDP packet을 받기 위한 대기
                                */
                                DatagramPacket recv_packet /* Fill in the blank */;
                                Dsocket.receive (/* Fill in the blank */);

                                // 으로부터 Echo을 위한 송신 UDP packet 생성
                                // 에코 데이터 생성을 위해 수신된 UDP packet
                                DatagramPacket send_packet /* Fill in the blank */;
                                Dsocket.send (send_packet);
                        }
                } catch(IOException e) {
                        System.out.println(e);
                }
        }
}
```

Additional Mission 1: 다음을 찾아 **Display** 할것
자신 **IP** 주소와 자신의 **UDP Port** 번호

Mission 2: remote IP addr & port

- Client: Initiates the connection

```
// 파일명: UDPMyEcho.java
import java.net.*;
import java.io.*;
public class UDPMyEcho {
final static int MAXBUFFER = 512;
        public static void main(String[] args) {
                if (args.length != 2) {System.out.println("사용법: java UDPMyEcho localhost port"); System.exit(0);}
                int port = Integer.parseInt(args[1]);
                try {
                        InetAddress inetaddr =  Fill in the blank  args[0]);
                        DatagramSocket socke  Fill in the blank
                        DatagramPacket send_packet;// 송신용 데이터그램 패킷
                        DatagramPacket recv_packet;// 수신용 데이터그램 패킷
                        BufferedReader br = new BufferedReader(new InputStreamReader(System.in));
                        while (true) {   // 키보드 입력 읽기
                                byte buffer[] = new byte[MAXBUFFER];
                                System.out.print("Input Data : ");
                                String data = br.readLine();
                                if (data.length() == 0)                         break;
                                buffer = data.getBytes();// 스트링을 바이트 배열로 바꿈
                                // 데이터 송신
                                send_packet =  Fill in the blank
                                socket.send (send_packet);
                                // 에코 데이터 수신
                                recv_packet =  Fill in the blank
                                socket.receive (recv_packet);
                                // 화면 출력
                                String result = new String(buffer);
                                System.out.println("Echo Data : " + result);
                        }
                } catch(UnknownHostException ex) {
                        System.out.println("Error in the host address ");
                } catch(IOException e) {
                        System.out.println(e);
                }
        }
}
```

Mission 2: 다음을 찾아 Display 할것
상대 IP 주소와 상대의 UDP Port 번호

InetAddress

Goal: InetAddress 형태의 주소로부터 정보를 받음

string getHostName(): domain name 획득

String getHostAddress(); dotted decimal 주소 획득

Byte[] getAddress(): 4 byte IP address

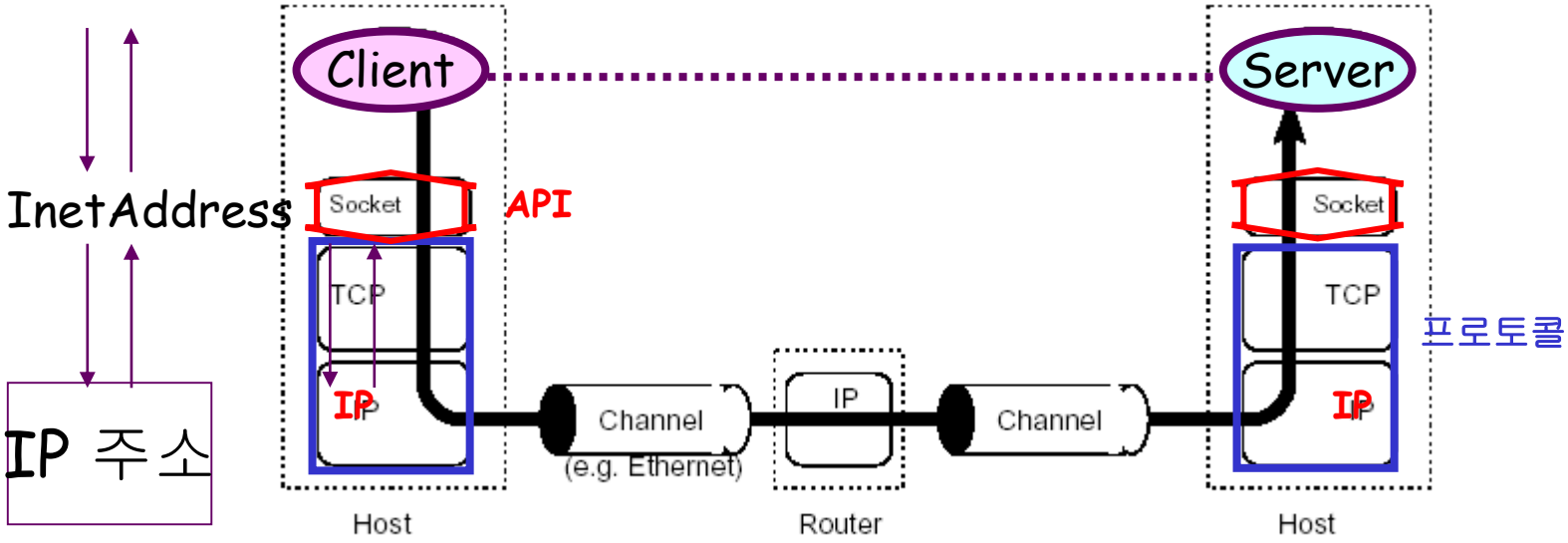


Figure 1.1: A TCP/IP Network

InetAddress programming

```
public class IPAddress {
        TextField inputText; // 호스트 이름 입력 창
        TextArea output;// 결과 출력 창
        public static void main (String args[]) {
                new IPAddress().work();
        }
        public void work() {
                makeFrame();
                // 자신의 IP 주소 찾기
                try {
                        InetAddress inetaddr = InetAddress.getLocalHost();
                        output.append("₩nYour Host name is : " + inetaddr.getHostName ());
                        output.append ("₩n Your IP Adress is : " + inetaddr.getHostAddress ());
                } catch (UnknownHostException ex) {
                        output.append ("₩nError in getLocalHost()₩n");
                        // 임의의 호스트 IP 주소 찾기
                }
        }
        class AddressListener implements ActionListener {
                public void actionPerformed(ActionEvent ae) {
                        String h_name = inputText.getText();  //domain name or IP 주소
                        try {
                                InetAddress inetaddr = InetAddress.getByName(h_name);
                                output.append ("₩n₩nFor the Host : " + inetaddr.getHostName());
                                output.append ("₩n IP Address is : " + inetaddr.getHostAddress());
                        } catch (UnknownHostException ex) {
                                output.append ("₩nFailed to find : " + h_name);
                        }
                }
        }
}
```

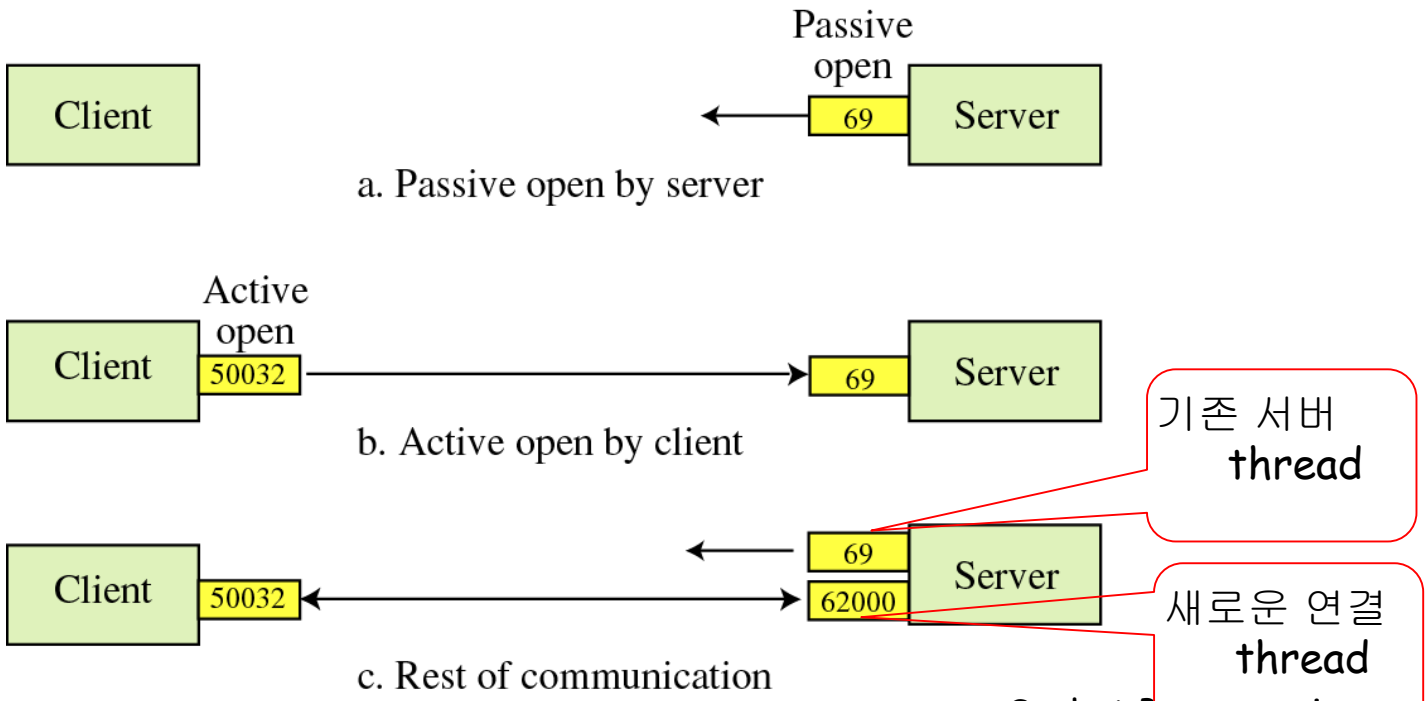
Mission 3: UDP Echo programming with multiple Threads

Goal: UDP를 사용한 Echo program,
단, client 당 하나의 Thread 할당.

Multi-Thread Program

UDPMyEcho

UDPMyEchoServer



Clients and Servers (UDP) with multiple Threads

The Server-Thread Class

```
public class UDPMyEchoServerMultiThread {
        final int MAXBUFFER = 512;
                private static int a;
        static DatagramSocket Dsocket;
        public static void main (String[] args) {
                int arg_port = Integer.parseInt(args[0]);// 포트 번호
                work(arg_port);
        }

        static void work(int port) {
                try {
                        DatagramSocket Dsocket /* Fill in the blank */ ;
                        Thread r1 /* Fill in the blank */ ;
                        r1.start();
                } catch (SocketException e) {
                        // TODO Auto-generated catch block
                        e.printStackTrace();
                }
```

```
public class receiveFrame extends Thread {
        DatagramSocket Dsocket;
        receiveFrame (DatagramSocket s) {
                Dsocket = s;
        }
        public void run() {
                while (true) {
                        // 데이터 수신
                        // 에코 데이터 생성 및 송신
                        byte buffer[] = new byte[512];
                try {
                        DatagramPacket recv_packet /* Fill in the blank */ ;
                        Dsocket.receive (/* Fill in the blank */ );
                        DatagramPacket send_packet /* Fill in the blank */ ;
                        Dsocket.send (send_packet);
                } catch(IOException e) {
                        System.out.println(e);
                }
                        }
        }
} // end ReceiverThread class
```

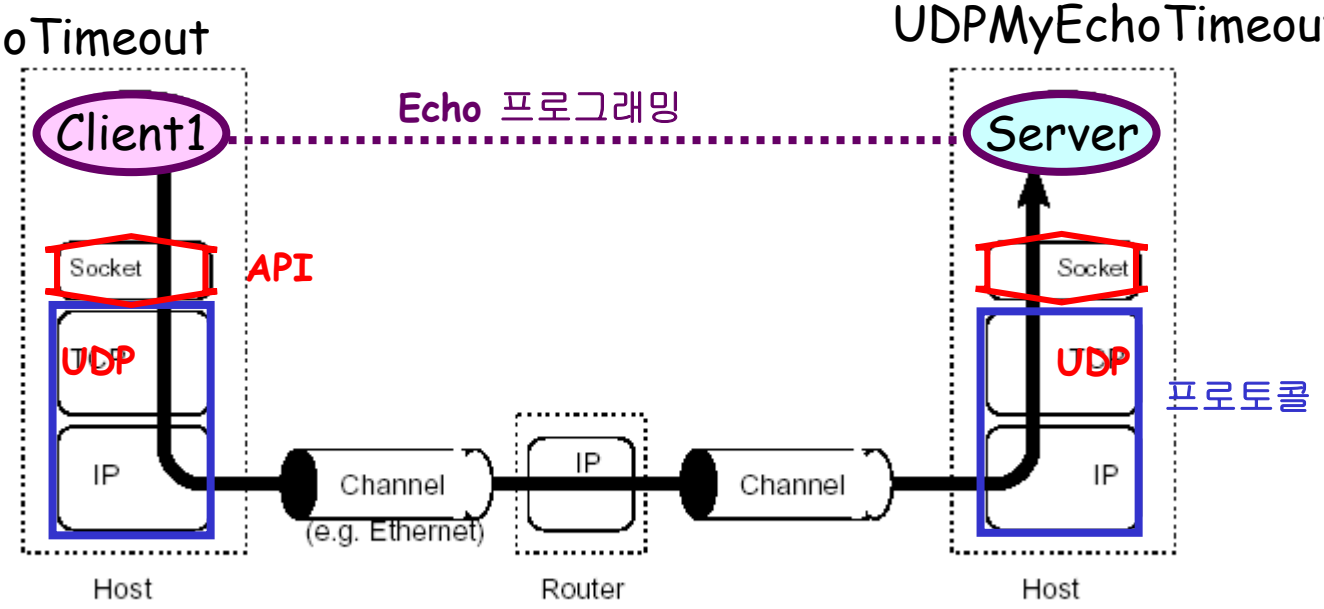
Mission 4: UDP Echo programming with Timeout

Goal: UDP를 사용한 Echo program,

단, 송신 결과에 대한 Timeout 설정.

서버가 Timeout 이내에 client에게 받은 메시지를 되돌려 보냄.

Timeout tclick = new Timeout(); tout.Timeoutset(sn,1000,pp)



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