

Internet of Things



Designed
Intelligence
Group

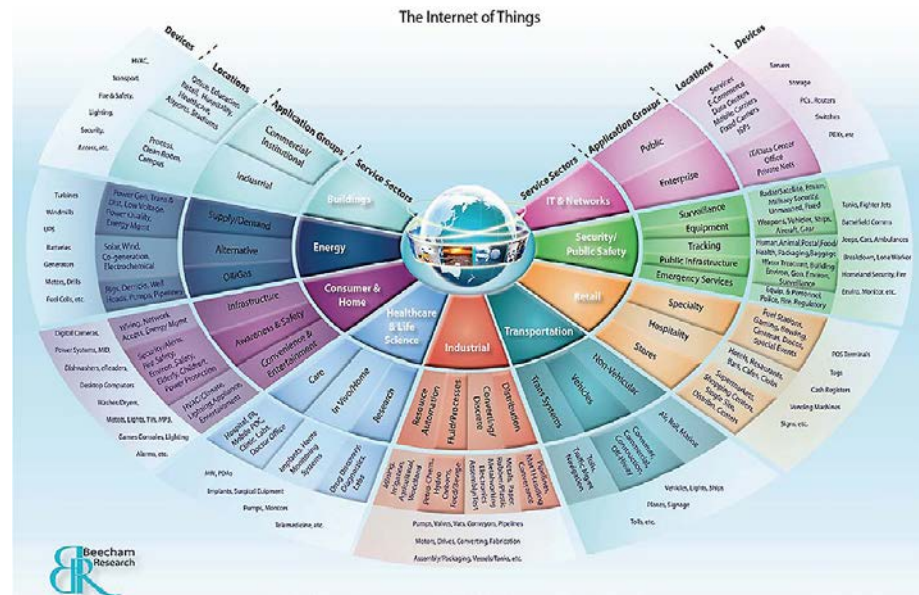
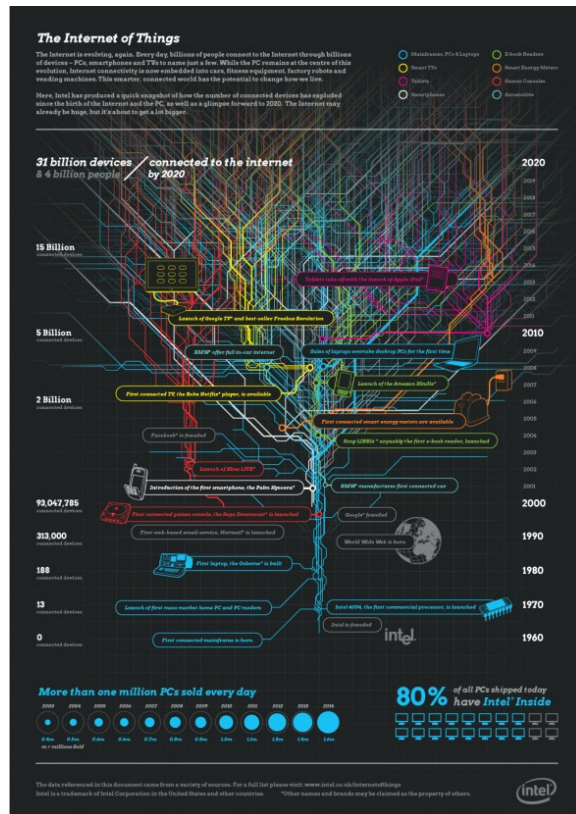
TU / **e**

Technische Universiteit
Eindhoven
University of Technology

Where innovation starts

What is the Internet of Things

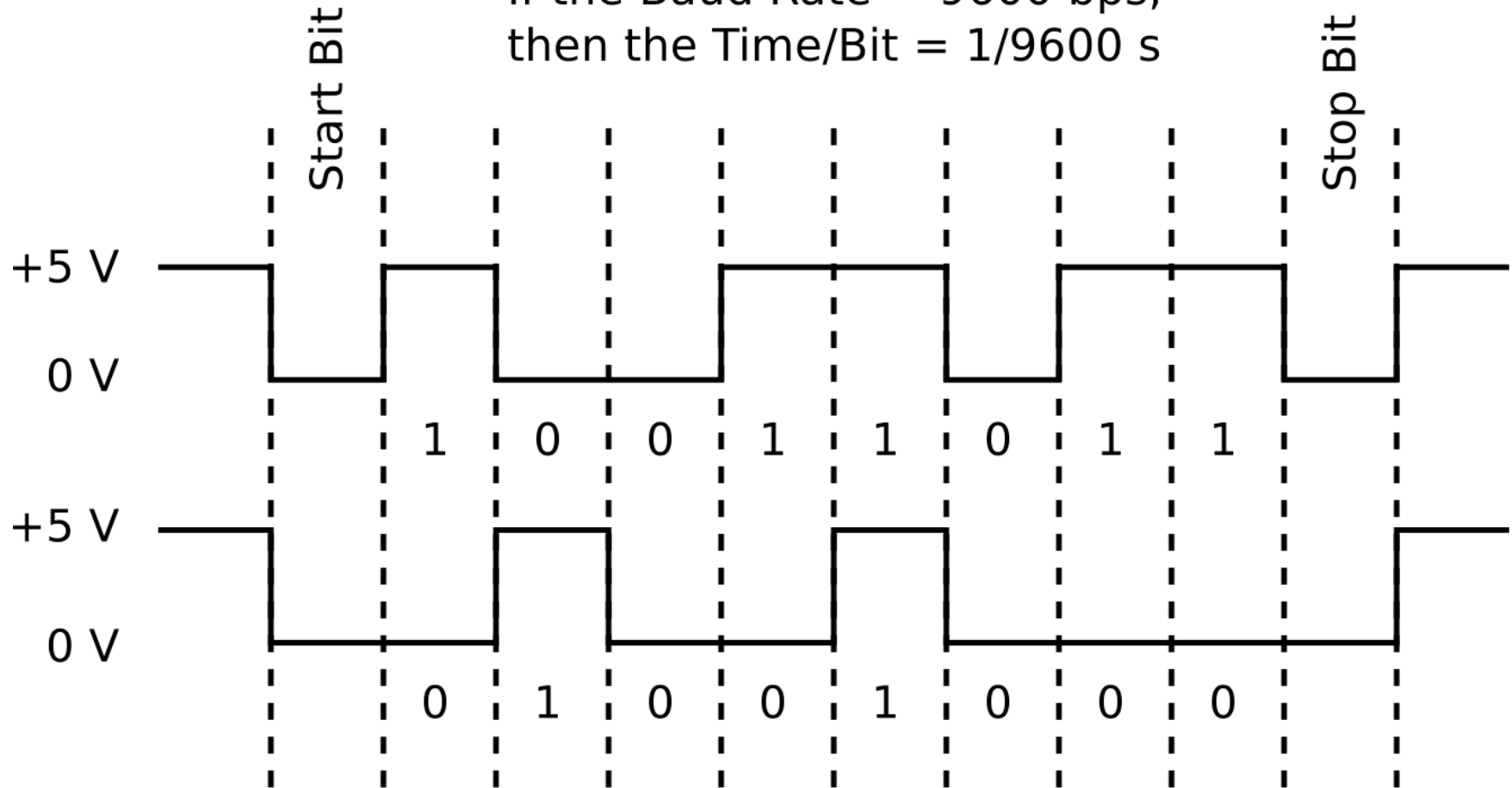
- The Internet of Things refers to **uniquely identifiable** objects (things) and their **virtual representations** in an **Internet-like** structure



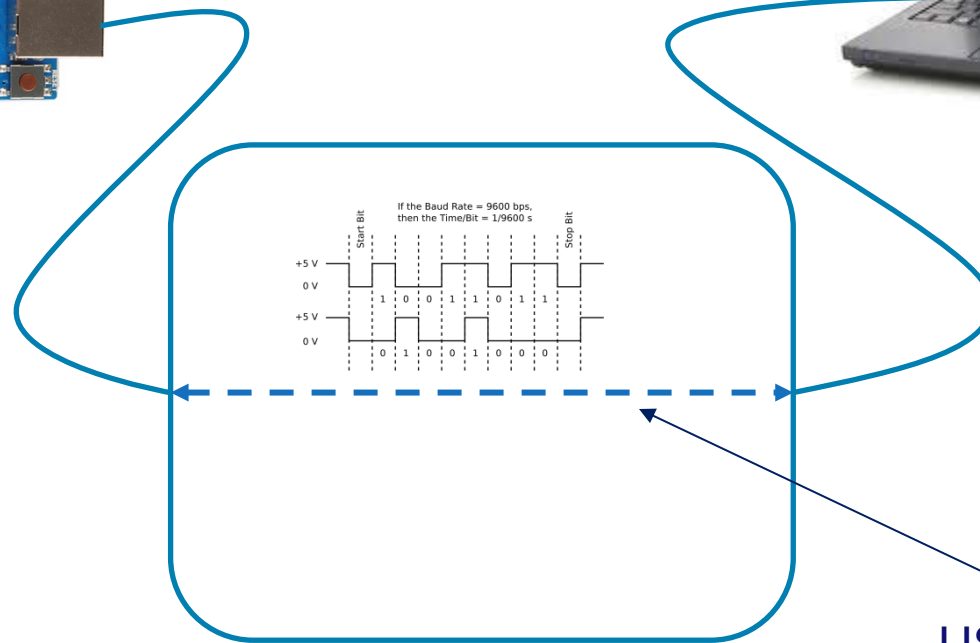
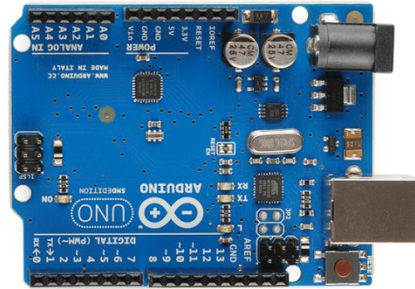
<http://www.symplio.com/2011/09/4-infographics-about-internet-of-things/>

Its all about communication

If the Baud Rate = 9600 bps,
then the Time/Bit = $1/9600$ s

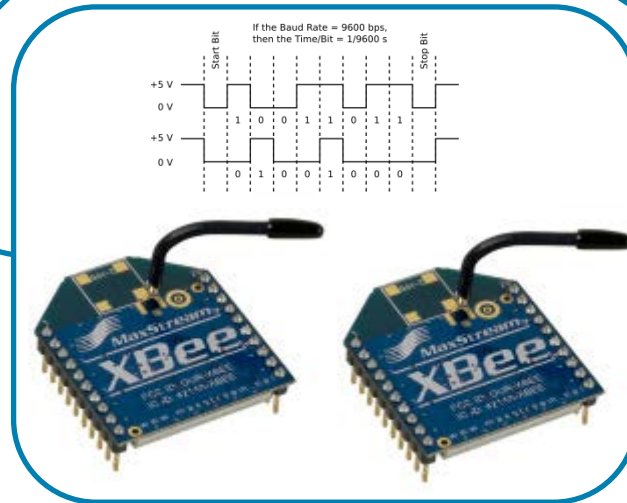
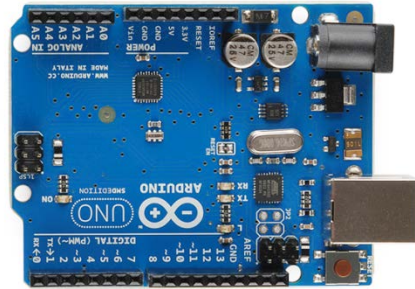


Ways to serial connect to notebook

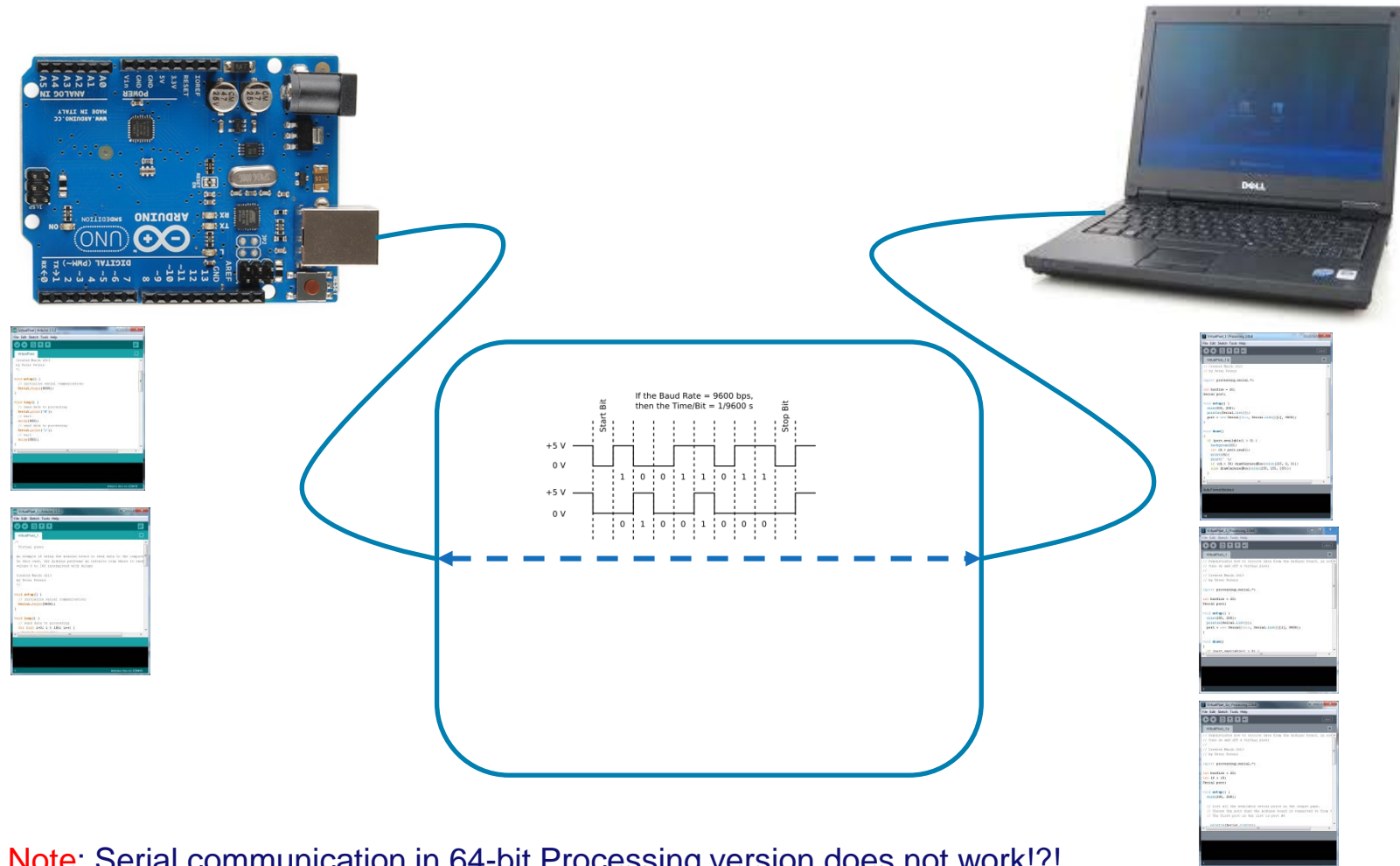


USB cable

Ways to serial connect to notebook

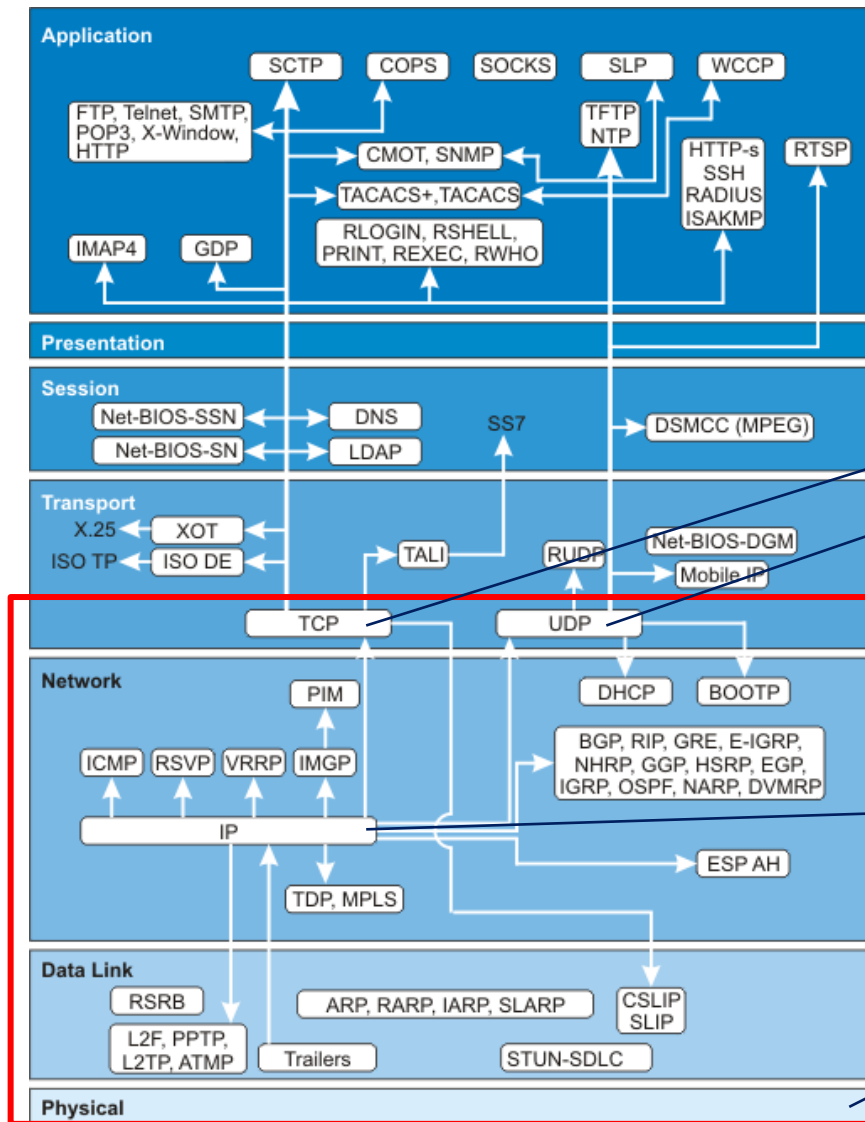


How to do serial communication



Note: Serial communication in 64-bit Processing version does not work!?!)

Its all about communication (again)

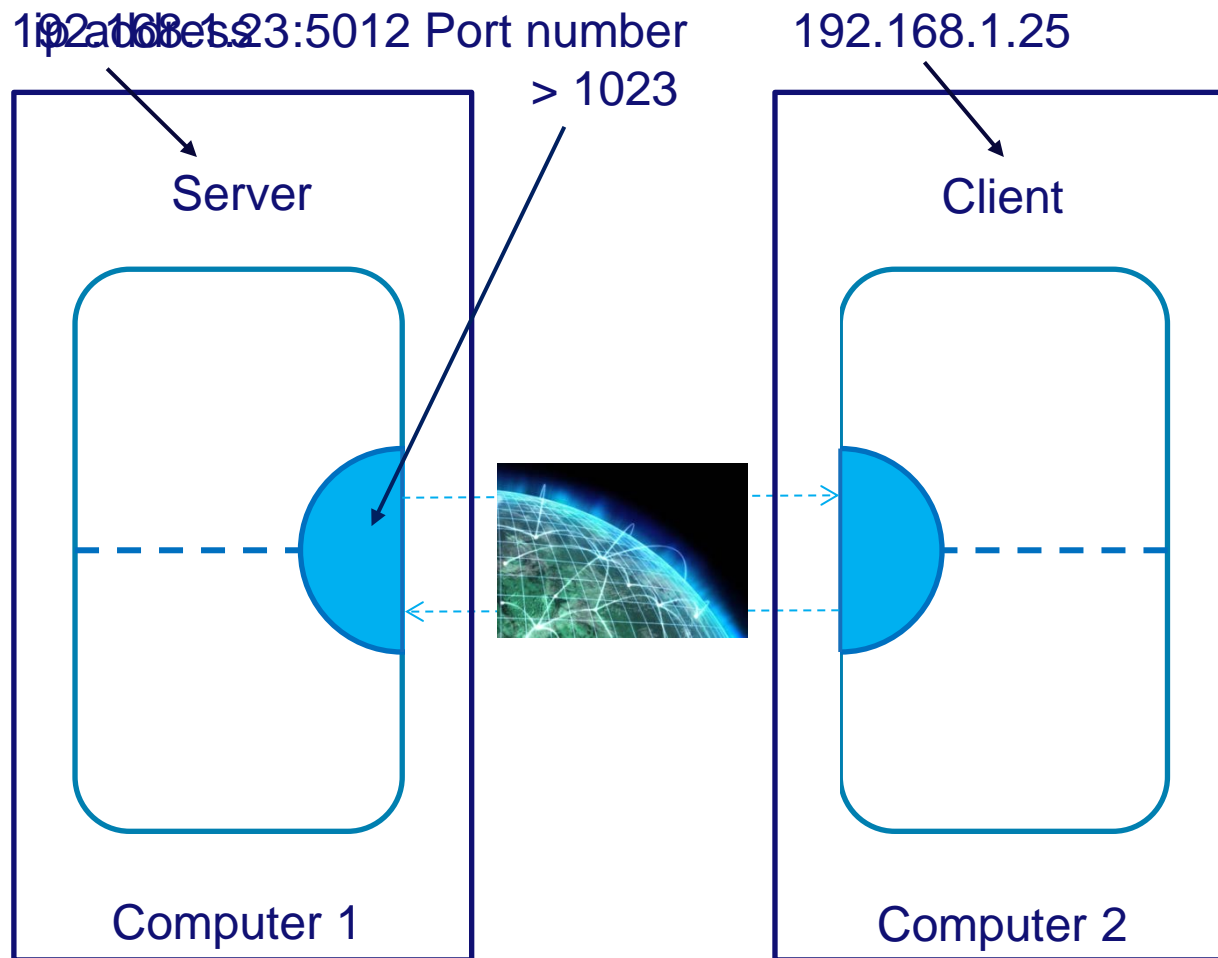


Transport Control Protocol (TCP)
User Datagram Protocol (UDP)

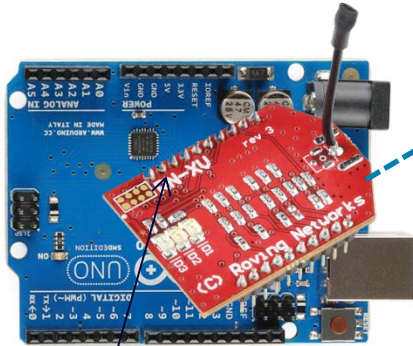
Internet Protocol (IP)

Serial

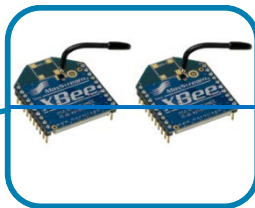
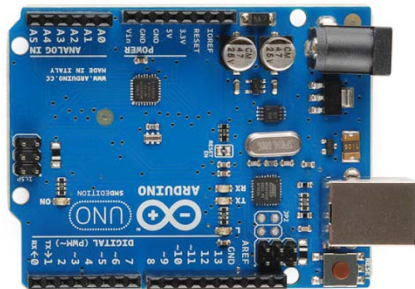
Socket communication

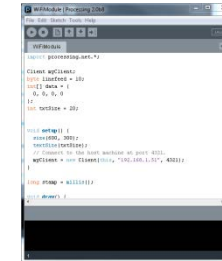
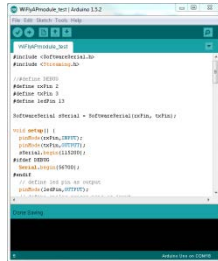


Ways to connect to Internet



Wifi Module





Processing

```
import processing.net.*;

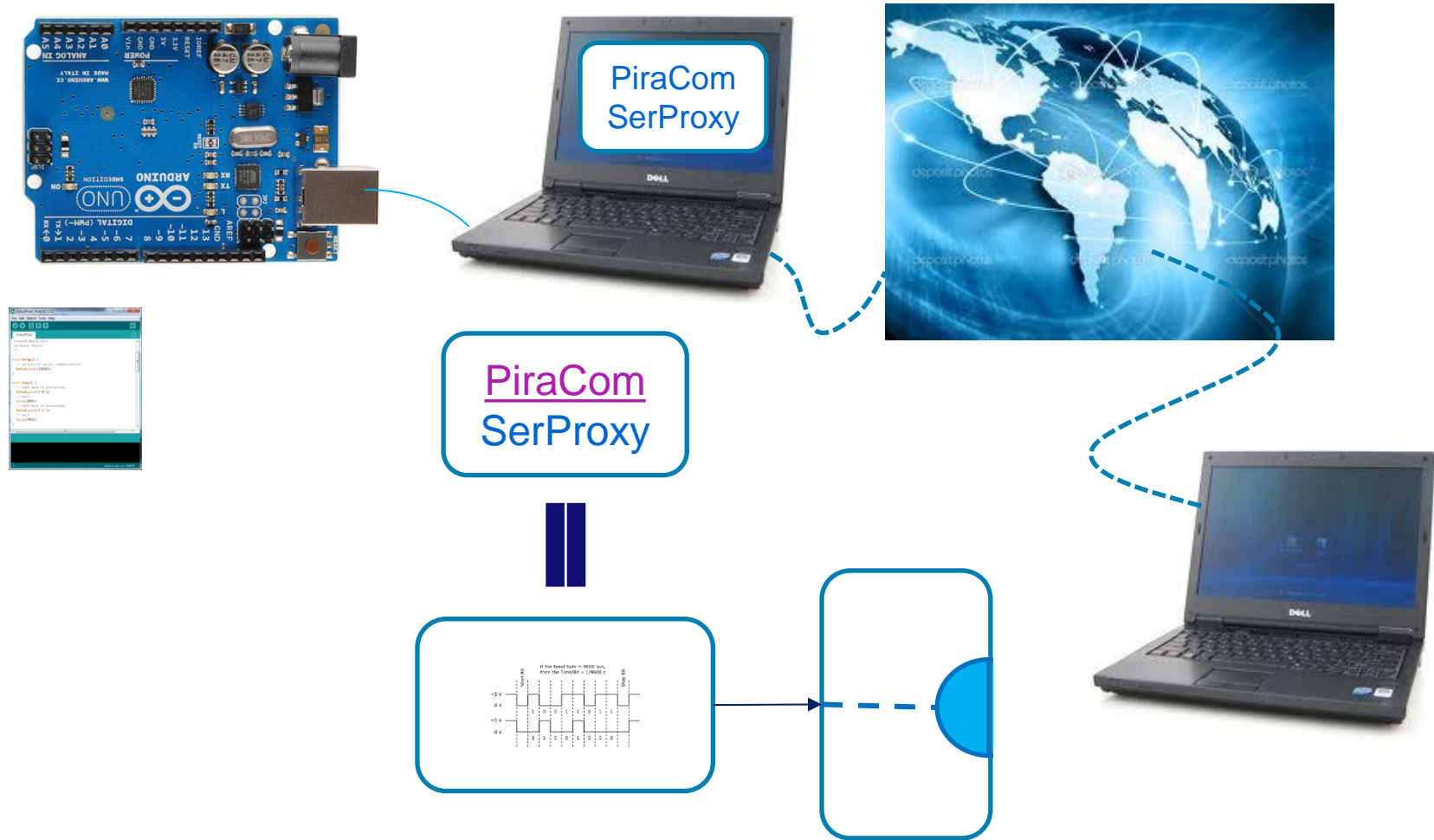
Client myClient;
int[] data;

void setup() {
    // Connect to the host machine at port 4321.
    myClient = new Client(this, "192.168.1.51", 4321);
}

void draw() {
    if (checkForNewData()) {
        background(0);
        for (int i=0; i<data.length; i++) {
            // do something with data
        }
    }
}

boolean checkForNewData() {
    if (myClient.available() > 0) {
        String inString = myClient.readString();
        if (inString != null) {
            data = int(split(trim(inString), ','));
            return true;
        }
    }
    return false;
}
```

How to connect with a Serial/Socket proxy



So far

- **Arduino connects to notebook via cable (serial)**
- **Notebook connects to Internet (socket)**

- **Arduino connects to Xbee1 (serial)**
- **Xbee1 connects to Xbee2 (wireless serial)**
- **Xbee2 connects to notebook (serial)**
- **Notebook connects to Internet (socket)**

- **Arduino connects to WiFi module (serial)**
- **WiFi module connects to Internet(socket)**

Possibilities

- Make sensors available for reading worldwide
- Make actuators available worldwide
- Send sensor values to server location where it can be read by many. (Patchube/COSM)



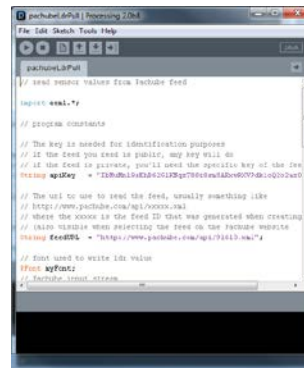
```
File Edit Sketch Tools Help
patchubeLibPush [Processing 2.0.1]
// Send values that are transmitted to the serial port
// and push them to a Patchube instance

import serial.*;
import processing.serial.*;

// program constants
// ARDU is used as the delimiter mark by the transmitting side i.
// indicate the end of a one data transmission
int lineFeed = 10; // ARDU is used

// The key is needed for identification purposes
// If the feed you send is public, any key will do
// If the feed is private, you'll need the specific key of the feed
String apiKey = "23a0b13d8d02d10394706b8c4d0e007d0c0d02b0d";

// The url to use to send the feed, usually something like
// http://www.patchube.com/api/xxxxx.rail
// where the xxxxx is the feed ID that was generated when creating
// the feed in patchube, you'll need the specific key of the feed
```



```
File Edit Sketch Tools Help
patchubeLibPush [Processing 2.0.1]
// Send values that are transmitted to the serial port
// and push them to a Patchube instance

import serial.*;
import processing.serial.*;

// program constants
// ARDU is used as the delimiter mark by the transmitting side i.
// indicate the end of a one data transmission
int lineFeed = 10; // ARDU is used

// The key is needed for identification purposes
// If the feed you send is public, any key will do
// If the feed is private, you'll need the specific key of the feed
String apiKey = "23a0b13d8d02d10394706b8c4d0e007d0c0d02b0d";

// The url to use to send the feed, usually something like
// http://www.patchube.com/api/xxxxx.rail
// where the xxxxx is the feed ID that was generated when creating
// the feed in patchube, you'll need the specific key of the feed
```

