Communication
Internet of Things

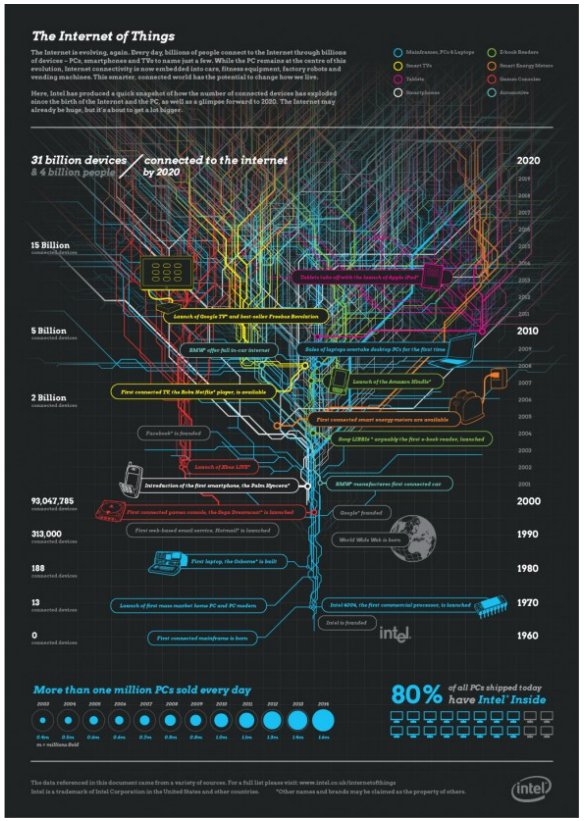
Designed Intelligence Group

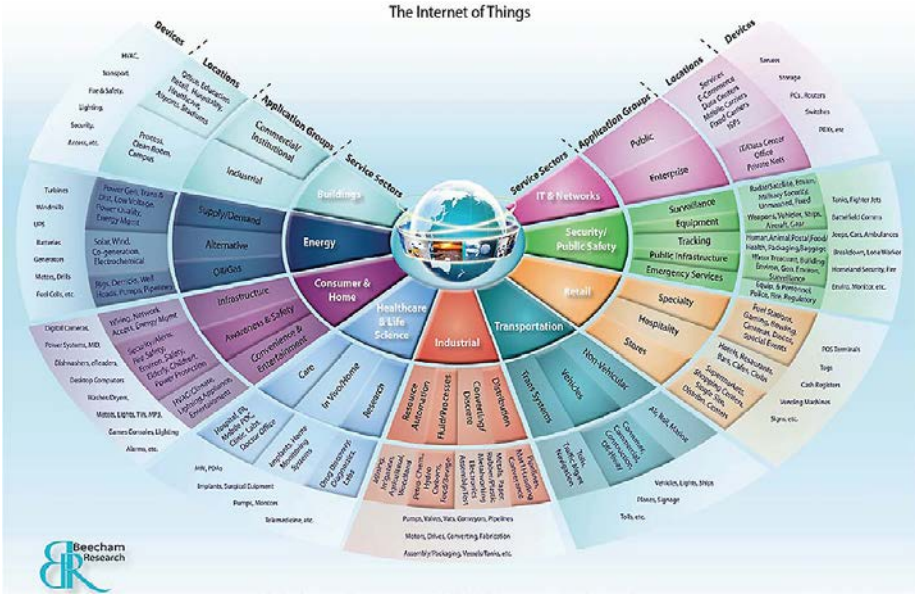
TU/e Technische Universiteit Eindhoven University of Technology

Where innovation starts

What is the Internet of Things

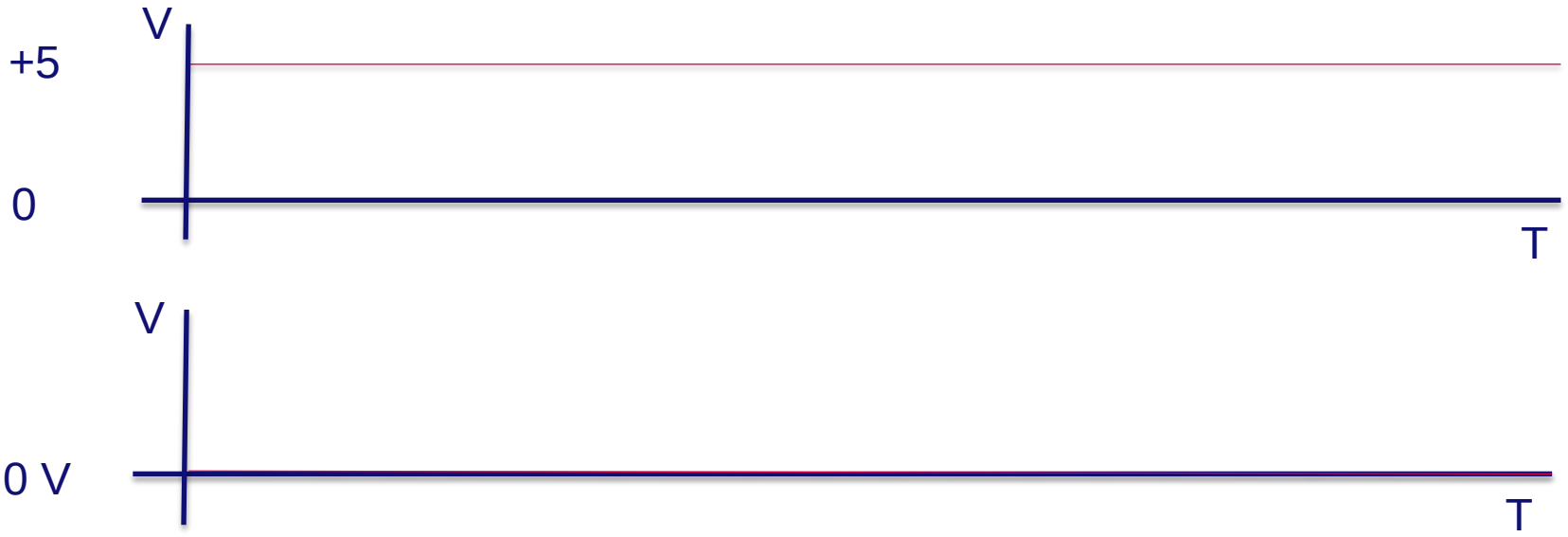
- **The Internet of Things refers to uniquely identifiable objects (things) and their virtual representations in an Internet-like structure**





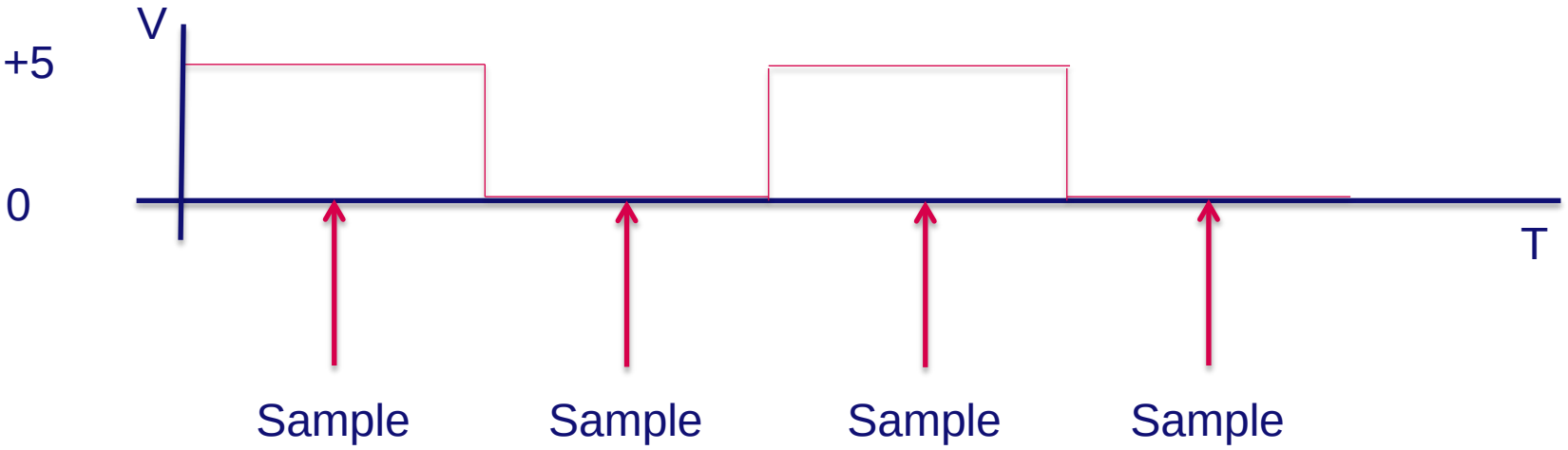
http://www.symplio.com/2011/09/4-infographics-about-internet-of-things/

Its all about communication

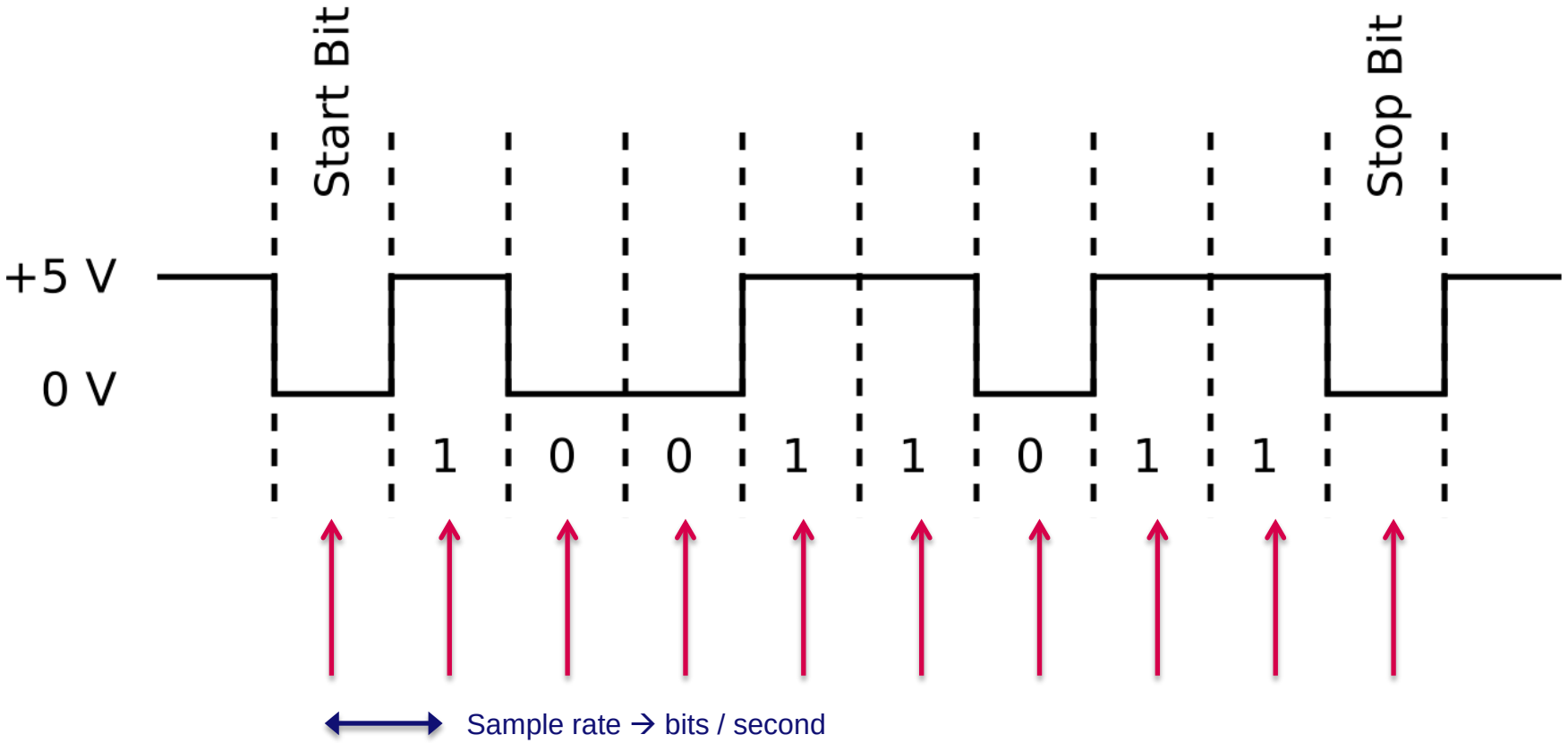


2 possibilities: 0V or 5V

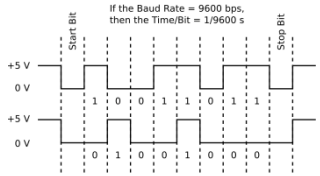
Its all about communication



Its all about communication

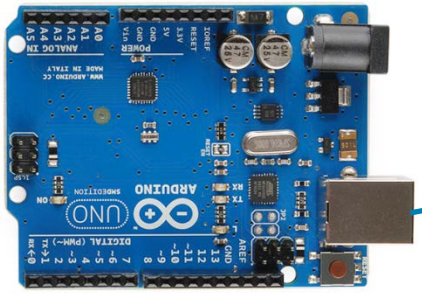


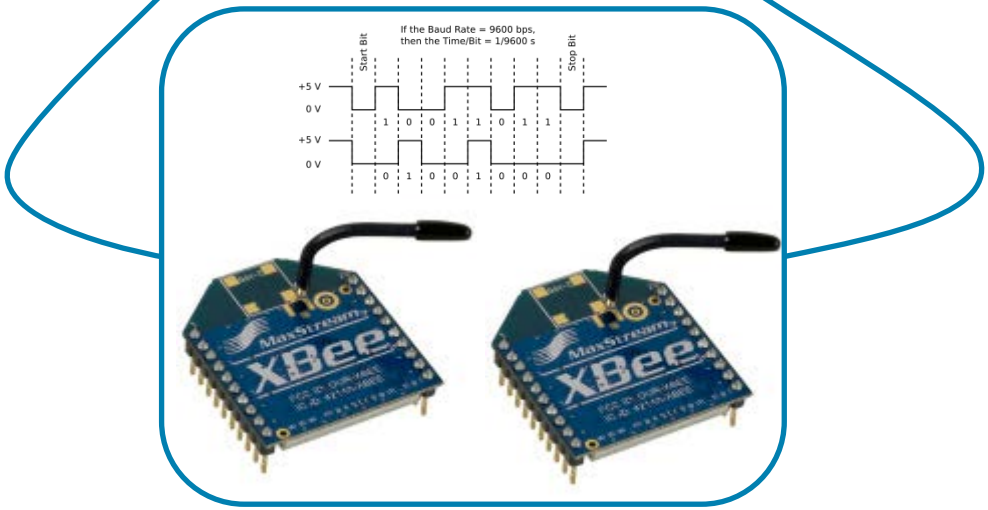
Serial connection to notebook



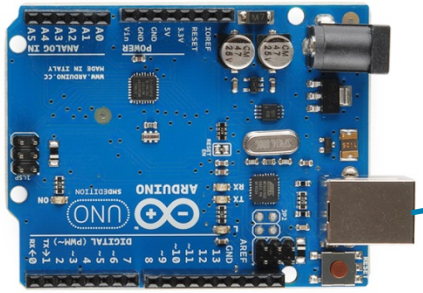
USB cable

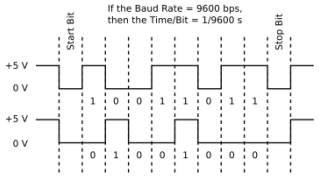
Serial connection to notebook





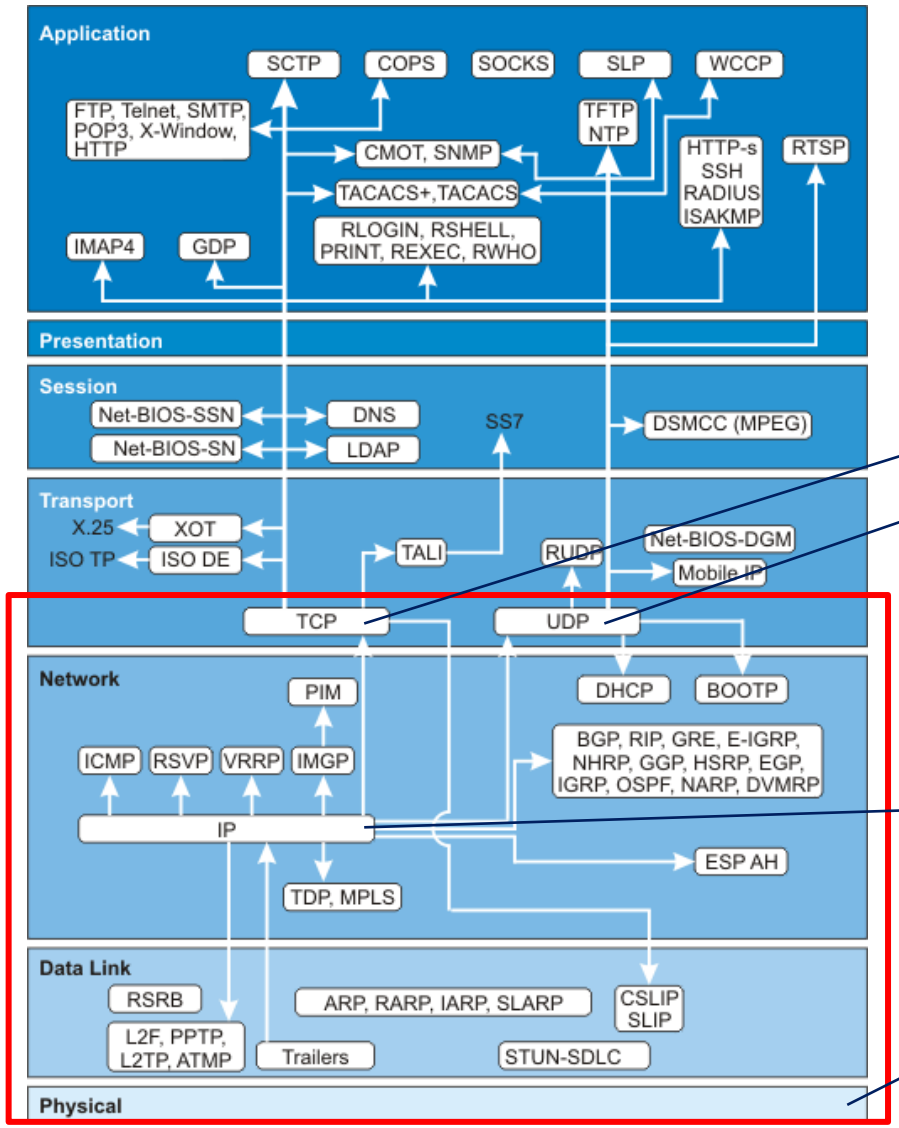
How to do serial communication





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

Its all about communication (again)



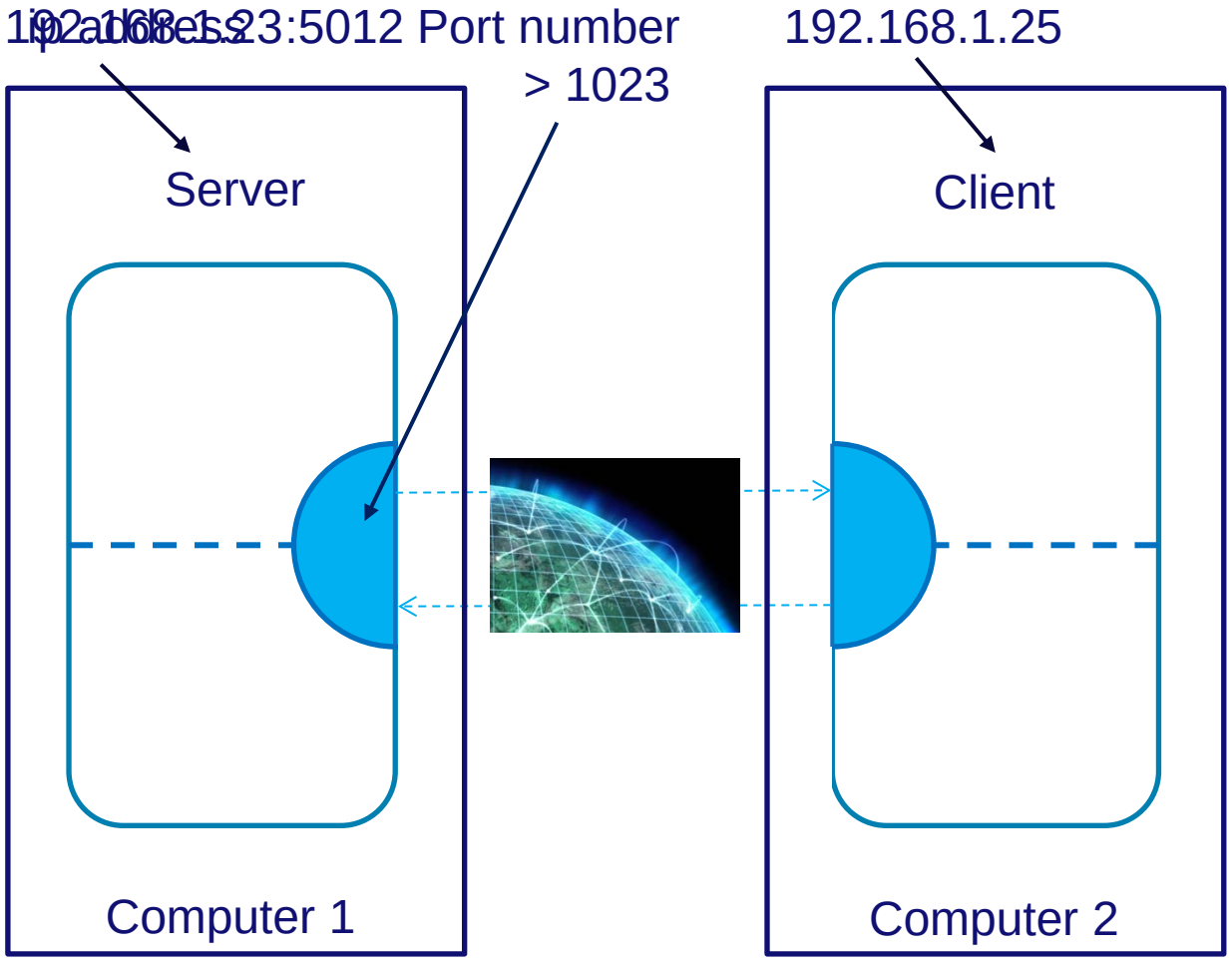
Transport Control Protocol (TCP)

User Datagram Protocol (UDP)

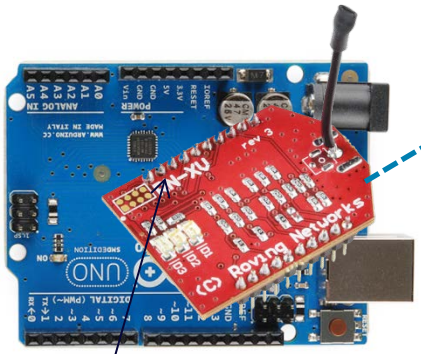
Internet Protocol (IP)

Serial

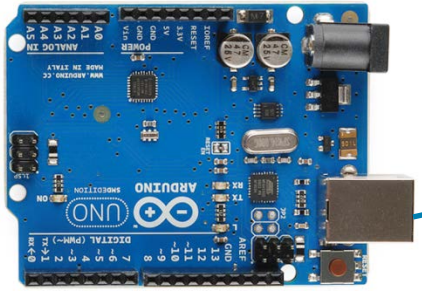
Socket communication

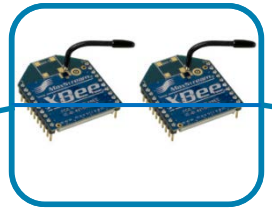


Ways to connect to Internet

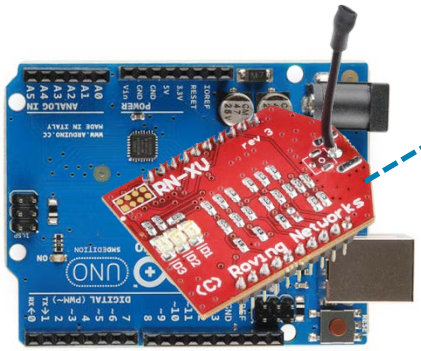


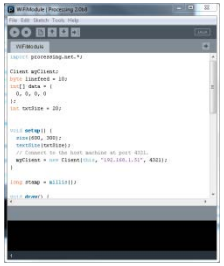
Wifi Module





How to connect with a Wifi module

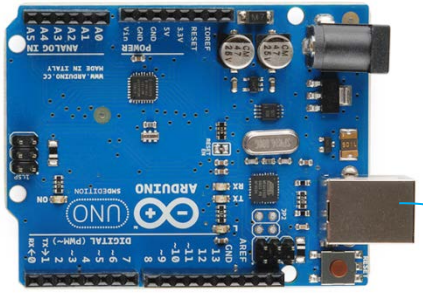




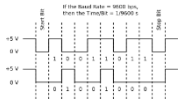
Processing

```
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



PiraCom
SerProxy



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.**

Resources

- **You may look at:**
  - **Tutorial serial communication Arduino – Processing**
    - **http://www.youtube.com/watch?v=GJX0BRUagCg**
  - **Xively/Pachube/Cosm**
    - **http://xively.com/, https://xively.com/dev/tutorials/**