Sociable Objects Workshop

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Plan for Today

- Card Assignment Presentations
- Sensor/Actuator Update
- Gateway Basics
- ConnectPort Overview
- ConnectPort Demo
- Readings & Assignments

Observation Assignment Presentations

Observation Assignment

- What were you assigned to do?
- What was your experience with the assignment?
- What did you observe that you might not have seen otherwise?
- What was strong about this assignment and what could have made it better?

Sensor/Actuator Progress Report

Gateway Basics

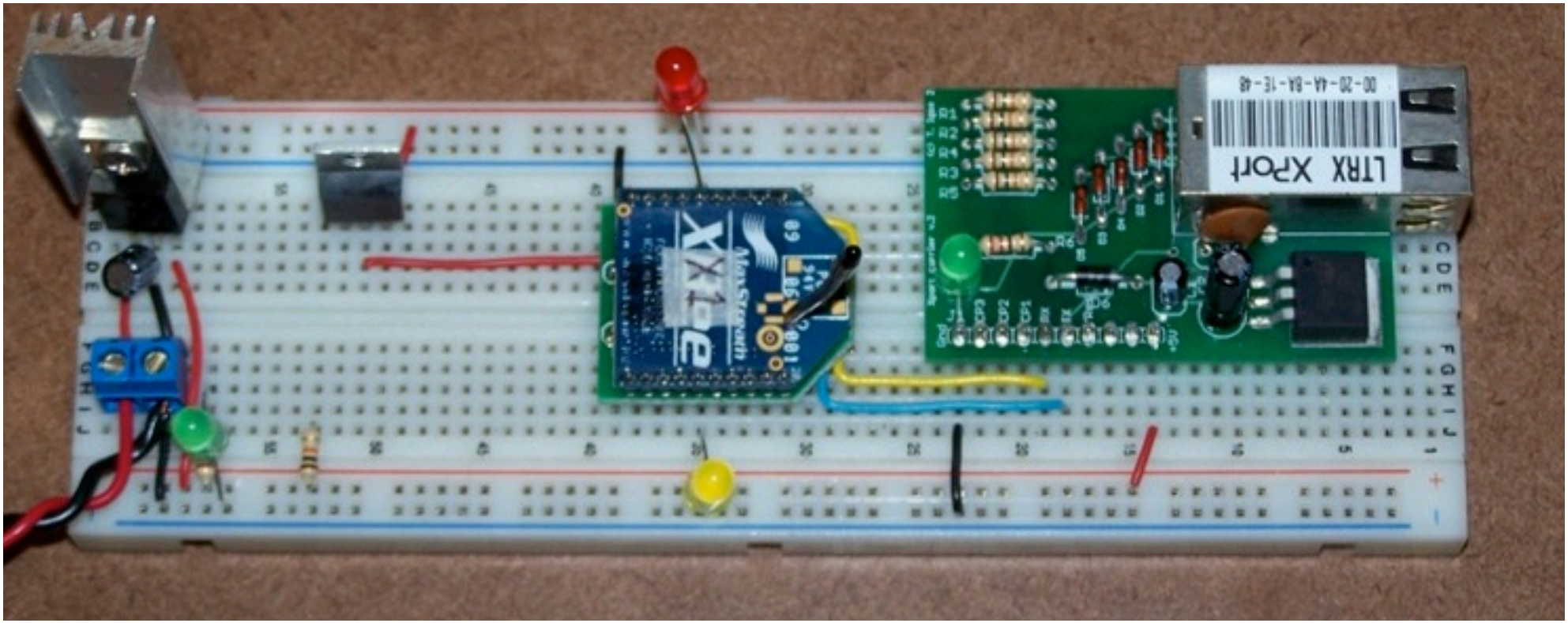
Types of Gateways

- Bridging
- Routing
- Transformation
  - aggregation
  - filtration
  - applications

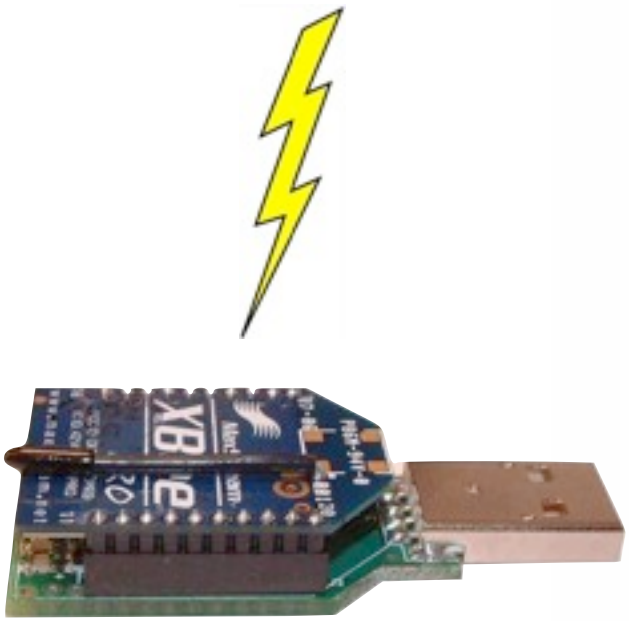
Protocols

- Ethernet
- WiFi
- Bluetooth
- GSM
- Twitter
- SQL
- Mail
- FTP
- SMS
- Telephone
- Chat
- Speech
- MIDI
- everything else!

Simple Serial Methods



Computer as Gateway



```
# select (r,w,e) returns a tupple of the sockets that are actually readable, writeable
rlist, wlist, xlist = select(rlist, wlist, [])
if sd in rlist:
    try:
        # Receive from the socket:
        print "receiving data"
        payload, src_addr = sd.recvfrom(72)
        print 'Source: ' + src_addr[0] +' sent: ' + payload
    except Exception, e:
        print '* receive failed *'
        print e
if sd in wlist:
    if (time.clock() - lastRequest > requestInterval):
        lastRequest = time.clock()
        try:
            # Send to the socket:
            print "sending request",
            print requestString
            count = sd.sendto(requestString, 0, (monitor_addr, 0xe8, 0, 0x11))
                ## Slice off count bytes from the buffer,
                ## useful for if this was a partial write:
                # payload = payload[count:]
        except Exception, e: #general exception handler
            print '* send failed *'
            print type(e)
            print e
```

```
import java.io.*;  // this is the input/output library needed for data streams
import java.net.*; // this is the network library needed for sockets

String host;
int port;
Socket mySocket;                    // declare Socket
DataInputStream myInputStream;      // declare data input stream. This will run within a socket, bringing data into Java
DataOutputStream myOutputStream;    // declare data output stream. This will run within a socket, sending data out from Java
byte myDataIn, myDataOut;           // declare some variables to store the data we're sending and receiving

void setup(){
```

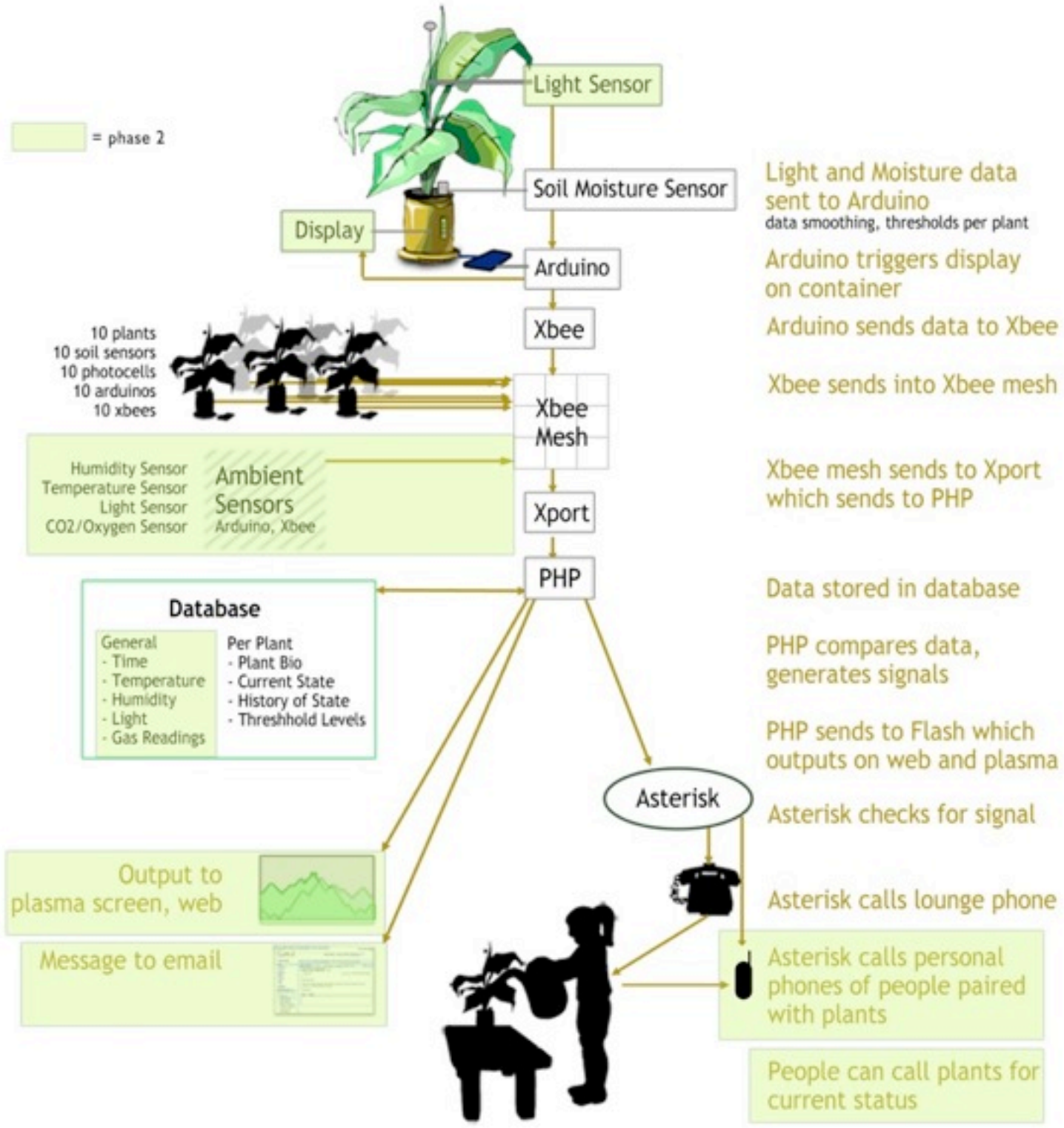
Dedicated Gateways

- lower power use
- always on
- cheaper,
- smaller,
- more stable,
- sometimes...

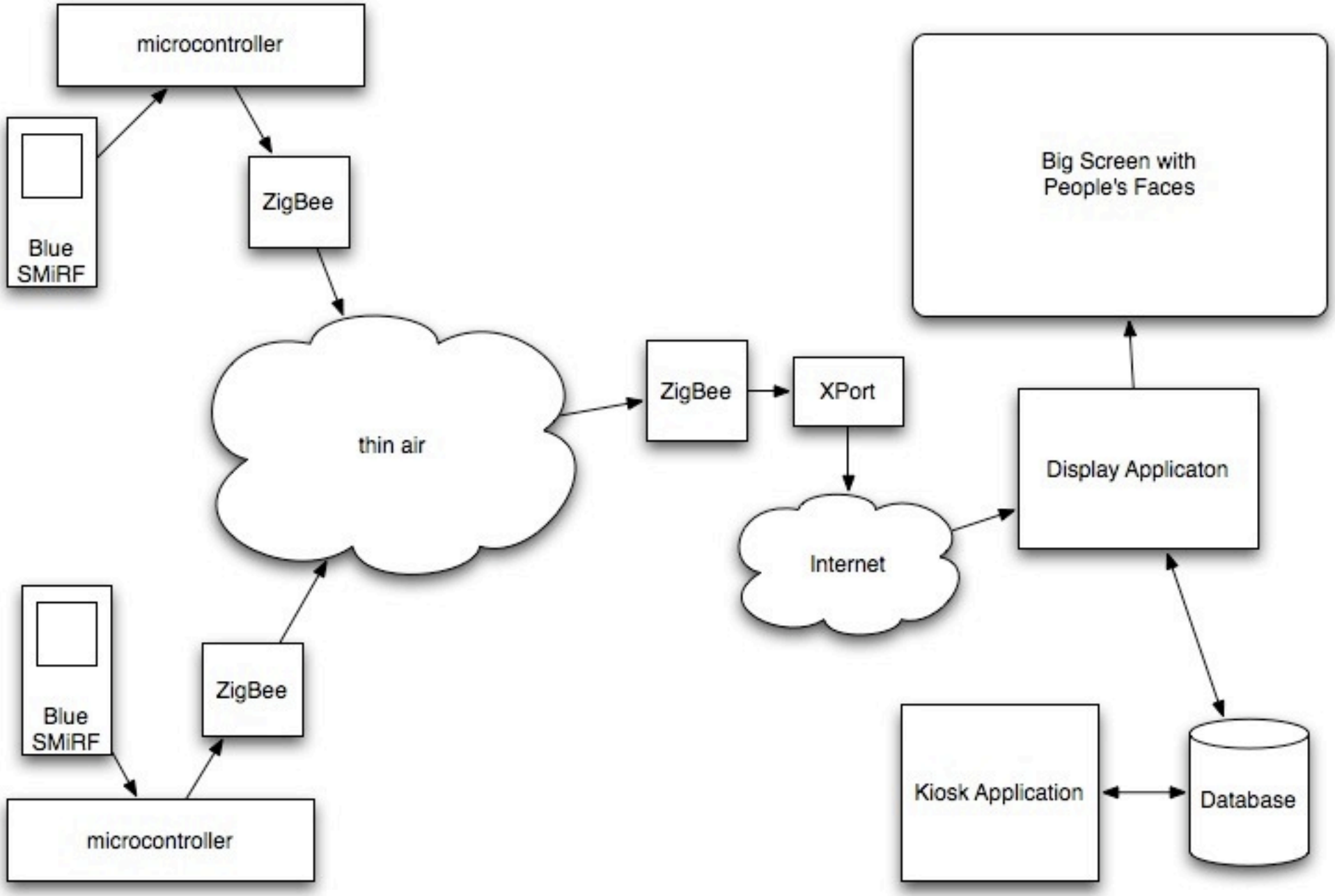
Hacked

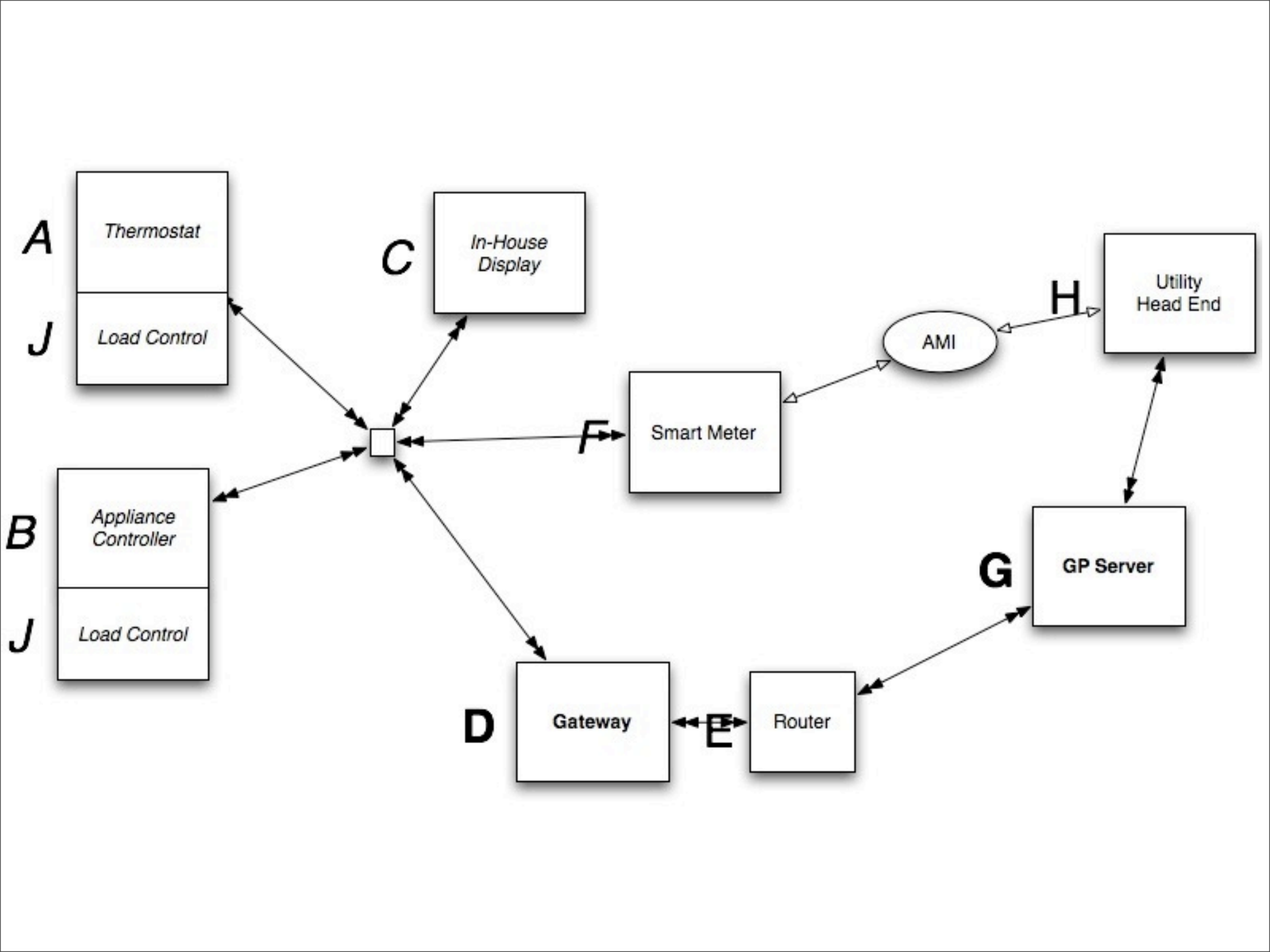
Manufactured

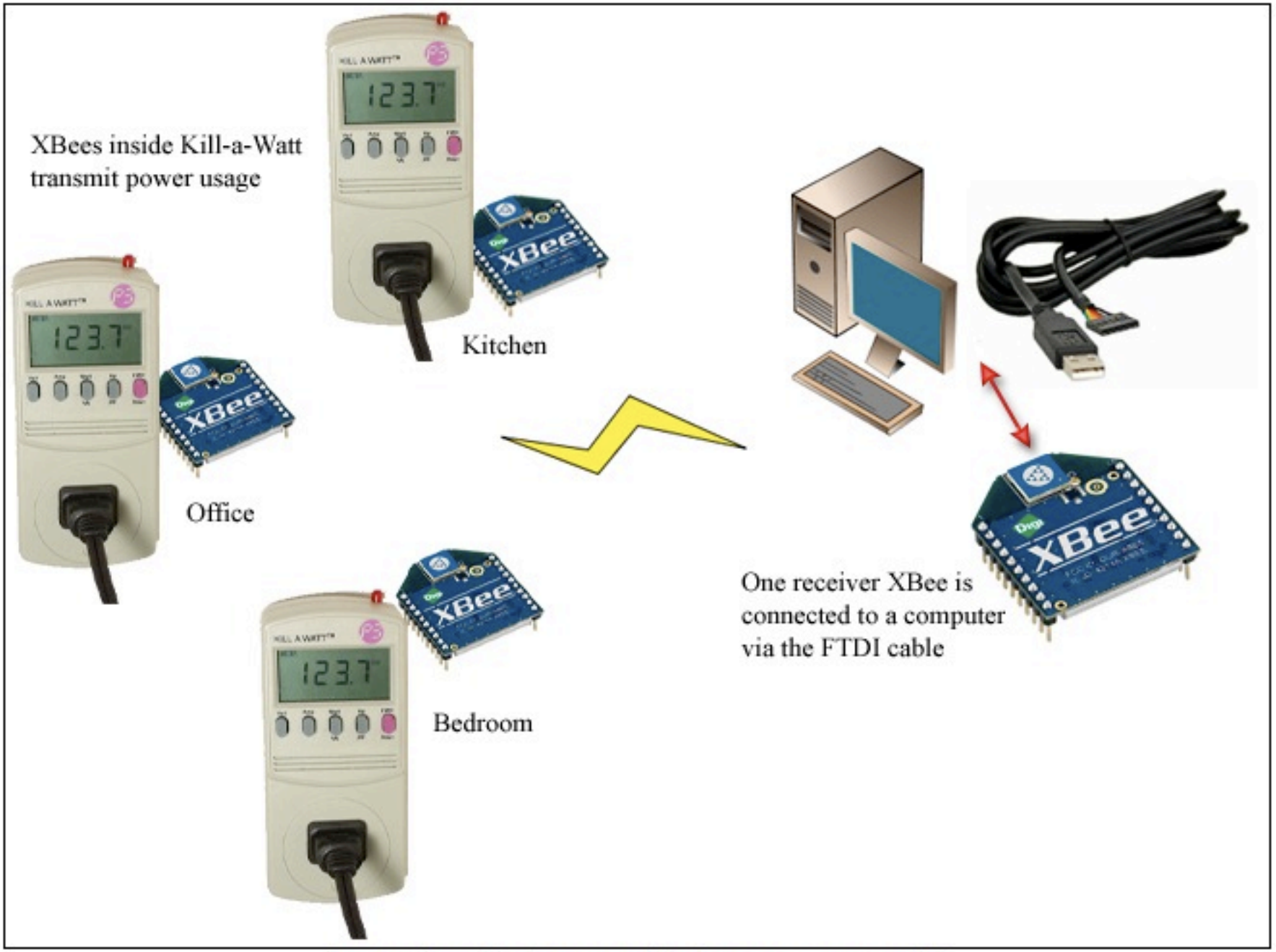
Gateway Examples


= phase 2
Light Sensor
Soil Moisture Sensor
Display
Arduino
Light and Moisture data sent to Arduino
data smoothing, thresholds per plant
Arduino triggers display on container
Xbee
Arduino sends data to Xbee
10 plants
10 soil sensors
10 photocells
10 arduinos
10 xbees
Xbee Mesh
Xbee sends into Xbee mesh
Humidity Sensor
Temperature Sensor
Light Sensor
CO2/Oxygen Sensor
Ambient Sensors
Arduino, Xbee
Xport
Xbee mesh sends to Xport which sends to PHP
PHP
Database
General
- Time
- Temperature
- Humidity
- Light
- Gas Readings
Per Plant
- Plant Bio
- Current State
- History of State
- Threshhold Levels
Data stored in database
PHP compares data, generates signals
PHP sends to Flash which outputs on web and plasma
Asterisk
Asterisk checks for signal
Output to plasma screen, web
Asterisk calls lounge phone
Message to email
Asterisk calls personal phones of people paired with plants
People can call plants for current status

BlueWay System Diagram




A
Thermostat
J
Load Control
C
In-House Display
B
Appliance Controller
J
Load Control
F
Smart Meter
AMI
H
Utility Head End
G
GP Server
D
Gateway
E
Router



I spent about 10 minutes on this diagram… can you tell?

ConnectPort Basics

ConnectPort X2 Configuration and Management

Help

- Home
- **Configuration**
  - Network
  - XBee Network
  - System
  - Remote Management
  - Security
- **Applications**
  - Python
- **Management**
  - Connections
  - Event Logging
- **Administration**
  - File Management
  - Backup/Restore
  - Update Firmware
  - Factory Default Settings
  - System Information
  - Reboot
- Logout

Home

Getting Started

Tutorial Not sure what to do next? This Tutorial can help.

System Summary

Model:	ConnectPort X2
Ethernet MAC Address:	00:40:9D:38:05:71
Ethernet IP Address:	10.0.1.100
Description:	None
Contact:	None
Location:	None
Device ID:	00000000-00000000-00409DFF-FF380571

ConnectPort X2 Configuration and Management

Help

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Network Configuration

Ethernet IP Settings

- ( ) Obtain an IP address automatically using DHCP *
- (•) Use the following IP address:

* IP Address:	10.0.1.100
* Subnet Mask:	255.255.255.0
Default Gateway:	10.0.1.1

- [x] Enable AutoIP address assignment

* Changes to DHCP, IP address, and Subnet Mask may effect your browser connection.

Apply

Network Services Settings

Advanced Network Settings

XBee Configuration

Network View of the XBee Devices

Node ID	Network Address	Extended Address	Node Type	Product Type
	[fffe]!	00:13:a2:00:40:31:7c:80!	router	
	[fffe]!	00:13:a2:00:40:31:f9:f5!	router	
	[51e9]!	00:13:a2:00:40:30:d0:22!	router	Unspecified
GORDIE	[d21c]!	00:13:a2:00:40:30:cf:e3!	router	Unspecified
QUIET	[7b76]!	00:13:a2:00:40:30:d0:0e!	router	Unspecified
RECEPTION	[f43e]!	00:13:a2:00:40:30:cf:dc!	router	Unspecified
ROB	[fffe]!	00:13:a2:00:40:31:f9:ee!	router	Unspecified
ZIG Coordinator	[0000]!	00:13:a2:00:40:54:ae:03!	coordinator	X2 Gateway

Clear list before performing refresh

Refresh

Firmware Update

Python Configuration

Python Files

Upload Files

Upload Python programs

Upload File: Choose File no file selected

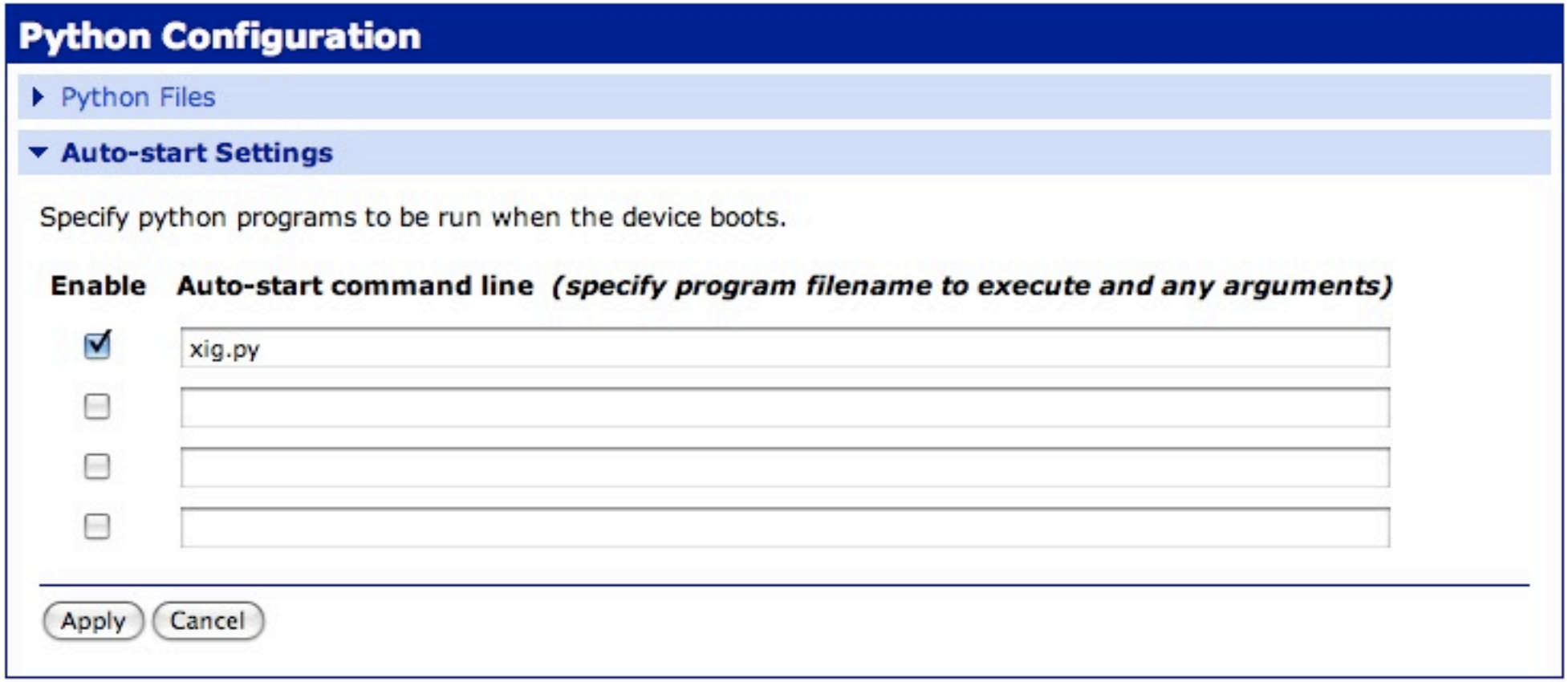
Upload

Manage Files

Action	File Name	Size
☐	zigbee.py	1147 bytes
☐	python.zip	129910 bytes
☐	xig.py	3802 bytes
☐	url_libs.zip	47321 bytes
☐	base64.py	11261 bytes
☐	mimetypes.py	17638 bytes
☐	email.zip	155588 bytes
☐	quopri.py	6969 bytes
☐	ftplib.py	26935 bytes

Delete

Auto-start Settings


Python Configuration
Python Files
Auto-start Settings
Specify python programs to be run when the device boots.
Enable
Auto-start command line (specify program filename to execute and any arguments)
xig.py
Apply
Cancel

XBee Configuration

Extended Address: 00:13:a2:00:40:30:cf:dc!
Product Type: Unspecified
Firmware Version: 0x2241

Basic Settings

Basic Radio Settings

Extended PAN ID (ID): 0x000000000000aaaa 8 hex bytes

Setting to 0 allows a random extended PAN ID to be used.

Note: Changing the PAN ID may make this node inaccessible.

Node Identifier (NI): RECEPTION

Discover Timeout (NT): 60 tenths of second (1-255)

Scan Channels (SC): 0x1ffe hex (0xffff=all channels)

Scan Duration (SD): 3 (0-7)

Advanced Radio Settings

Transmit Power Level (PL): Maximum (4)

Allows Join Time (NJ): 255 seconds (0-255. 255=always)

Broadcast Hops (BH): 0 (0-30, 0=maximum)

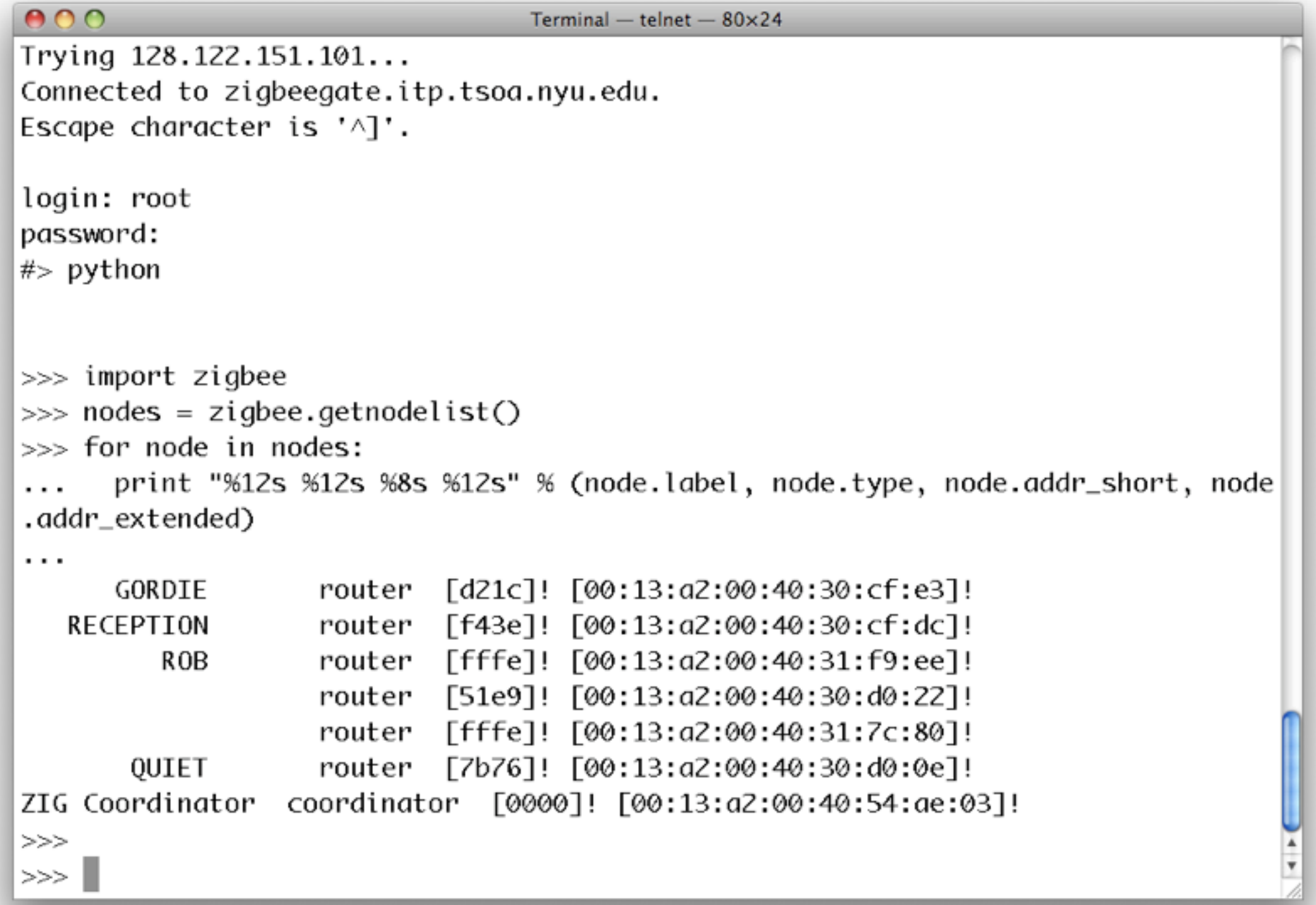
RSSI PWM (P0): ☑ Enable RSSI PWM

RSSI Timer (RP): 40 tenths of second (0-255)

Associate LED (D5): LED Blinks When Associated

Serial Interface Settings

Baud Rate (BD): 9600


Terminal — telnet — 80×24
Trying 128.122.151.101...
Connected to zigbeegate.itp.tsoa.nyu.edu.
Escape character is '^]'.
login: root
password:
#> python
>>> import zigbee
>>> nodes = zigbee.getnodelist()
>>> for node in nodes:
...   print "%12s %12s %8s %12s" % (node.label, node.type, node.addr_short, node
.addr_extended)
...
      GORDIE   router [d21c]! [00:13:a2:00:40:30:cf:e3]!
   RECEPTION   router [f43e]! [00:13:a2:00:40:30:cf:dc]!
         ROB   router [fffe]! [00:13:a2:00:40:31:f9:ee]!
                   router [51e9]! [00:13:a2:00:40:30:d0:22]!
                   router [fffe]! [00:13:a2:00:40:31:7c:80]!
       QUIET   router [7b76]! [00:13:a2:00:40:30:d0:0e]!
ZIG Coordinator coordinator [0000]! [00:13:a2:00:40:54:ae:03]!
>>>
>>>

Readings and Assignments

- Readings
  - handout
  - ThinkCSpy:
    How to Think Like a Computer Scientist, Learning with Python
    http://openbookproject.net/thinkCSpy
- Assignments
  - Sensor/Actuator Project
  - Final Project Proposals