Sensitive Buildings 2012

Instructor: Rob Faludi

Plan for Today

- Final Project Update
- Gateway Basics
- ConnectPort Overview
- iDigi Overview
- XBee Internet Gateway
- Readings & Assignments

Final Project Update

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() - lastReguest > reguestInterval):
        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; DataInputStream myInputStream; DataOutputStream myOutputStream; byte myDataIn, myDataOut;

// declare Socket

// declare data input stream. This will run within a socket, bringing data into Java
// declare data output stream. This will run within a socket, sending data out from Java
// declare some variables to store the data we're sending and receiving

Dedicated Gateways

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

Hacked



Manufactured



Gateway Examples







ConnectPort Basics



ConnectPort X2 Configuration and Management



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

lome	
Getting Started	
Tutorial Not sure wh	nat 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:	0000000-0000000-00409DFF-FF380571





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- Logout

			ricip
Network Configurat	tion		
▼ Ethernet IP Settings			
Obtain an IP address a	utomatically using	DHCP *	
Use the following IP ad	dress:		
* IP Address:	10.0.1.100		
* Subnet Mask:	255.255.255.0		
Default Gateway:	10.0.1.1		
 Enable AutoIP address * Changes to DHCP, IP add 	assignment ress, and Subnet M	ask may effect your browser connection.	
Apply			_
Network Services Settings	5		
Advanced Network Setting	gs		

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	e performing refresh			
Refresh				
Firmware Update				

X	В	e	e	(2	0	n	f	ic	1	I	r	a	t	1	0	ī	1
		-			_	-					-							

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

Basic Settings

Extended PAN ID (ID):	0x0000000000aaaa 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)
dvanced Radio Settings	
ransmit 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
erial Interface Settings	
Baud Rate (BD):	9600

Configuration

	riles	
Jpload Fi	les	
Upload Py	thon programs	
Upload Fi	le: Choose File	no file selected
Upload		
Manago P	iloc	
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
	mains abundant mut	17638 bytes
	mimetypes.py	
	email.zip	155588 bytes
	email.zip quopri.py	155588 bytes 6969 bytes

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)

1	

```
0 0
```

```
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)
. . .
                   router [d21c]] [00:13:02:00:40:30:cf:e3]]
      GORDITE
```

	GONDIE	router	Lactel.	Looi toi dei o	of for solution of the solutio	
F	RECEPTION	router	[f43e]!	[00:13:a2:0	0:40:30:cf:dc]!	
	ROB	router	[fffe]!	[00:13:a2:0	0:40:31:f9:ee]!	
		router	[51e9]!	[00:13:a2:0	0:40:30:d0:22]!	
		router	[fffe]!	[00:13:a2:0	0:40:31:7c:80]!	
	QUIET	router	[7b76]!	[00:13:a2:0	0:40:30:d0:0e]!	
ZIG	Coordinator	coordinat	or [0000	0]! [00:13:a	Z:00:40:54:ae:03]]!
>>>						
~~~						

Exploring a Mesh Network

### XBee ZigBee Node Indicators

- ATNI Node Indicator
- ATND Node Discovery
- ATDN Destination Node

- Also:
  - ATDB signal strength in DBm
  - AT%V Voltage

## Transmitting Data

• Read a list of all nodes on the network using ATND

MY<CR> SH<CR> SL<CR> NI<CR> (Variable length) PARENT_NETWORK ADDRESS (2 Bytes)<CR> DEVICE_TYPE<CR> (1 Byte: 0=Coord, 1=Router, 2=End Device) STATUS<CR> (1 Byte: Reserved) PROFILE_ID<CR> (2 Bytes) MANUFACTURER_ID<CR> (2 Bytes) <CR>

• Set the Destination Node using ATDN

### ConnectPort via Telnet

## Command Line

- telnet
- port 23 is default
- hostname or IP address needed

• telnet xig.faludi.com 25

### ConnectPort via HTTP

### HTTP

- web access
- port 80 is default

• http://xig.faludi.com

# ConnectPort via iDigi

# iDigi

- web access
- my.idigi.com
- user itpatnyu pass <given in class>

http://my.idigi.com

XBee Internet Gateway

### What's the XIG?



- Easy Internet communication for devices
- Initially developed as XBee-enabled tool for students...web browser for devices
- Now enables much more
- Puts your XBee on the Internet!

### The big picture






### Short History

- Me initiated project at ITP
- Students & fans added code & features
- Building Wireless Sensor Networks public
- Jordan Husney scale
- ...recently:
- Michael Sutherland ported to mac/win/linux

### Contributors

- Rob Faludi
- Ted Hayes
- Jordan Husney
- Corey Menscher
- Brian Jepson
- Kate Hartman
- Michael Sutherland
- Tom Collins and many more...





#### How to XIG

Basics





http://code.google.com/p/xig/

0 0	🔀 Digi 🛙	Device Discovery		
	IP Address 🗠	MAC Address	Name	Device
Device Tasks	<b>22</b> 10.0.1.183	00:40:9D:3D:6F:35		ConnectPort X2
Open web interface Telnet to command line Configure network settings Restart device Other Tasks Refresh view Help and Support	200 2010.0.1.202	00:40:9D:3A:E2:7B 00:40:9D:3D:6F:68		ConnectPort X2 ConnectPort X2
Details ConnectPort X2 Configured (DHCP) IP address: 10.0.1.183 Subnet mask: 255.255.255.0 Default gateway: 10.0.1.1 Serial ports: 1 Firmware: 82001596_F3				
3 devices				My Device Network



#### **ConnectPort X2 Configuration and Management**

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

<b>es</b>					
S					
Upload Python programs					
:	Browse				
es					
ile Name	Size				
igbee.py	1147 bytes				
ython.zip	129910 bytes				
kig.py	11150 bytes				
_xig.zip	77413 bytes				
	es File Name Rigbee.py bython.zip kig.py _xig.zip	es File Name Size Rigbee.py 1147 bytes python.zip 129910 bytes Rig.py 11150 bytes Rig.zip 77413 bytes	es File Name Size Rigbee.py 1147 bytes python.zip 129910 bytes Rig.py 11150 bytes _xig.zip 77413 bytes		

Help



< b

+ Shttp://10.0.1.183/admin/reboot.htm

C Q- Google



A

Α

#### **ConnectPort X2 Configuration and Management**

Help

0

#### Home

#### Configuration

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File Management Backup/Restore Update Firmware Factory Default Settings System Information Reboot

#### Logout

The reboot process will take approximately 1 minute to complete. Click Reboot now to reboot the ConnectPort X2.

Reboot

Reboot

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	•			XIG				
localhost:8000				☆ ▽ C 🚼 ▾ Google 🔍 🍙 🖾 י				
Configu	Console Help	net Ga	teway	0				
		iDigi		ХВее				
9	Statu Device I Descriptio	us: Connecte ID: 588035FF on: XIG Maci	rd F-FFF66FEA intosh	Status: Joined or Formed Network EUI-64: 00:13:A2:00:40:53:CA:80 COM Port: /dev/tty.usbserial-AH00SBSE : Baud: 57600 :				
Logs								
				Logs				
D	Timestamp	Severity	Logger	Logs Message				
1D 0	Timestamp Thu May 31 15:17:10 2012	Severity INFO	Logger webpage	Logs Message Connected to XIG server				
1D 0 1	Timestamp Thu May 31 15:17:10 2012 Thu May 31 15:17:11 2012	Severity INFO INFO	Logger webpage cp4pc.edp	Logs Message Connected to XIG server my device ID is: 00000000-0000000-58B035FF-FFF66FEA				
ID 0 1 2	Timestamp Thu May 31 15:17:10 2012 Thu May 31 15:17:11 2012 Thu May 31 15:17:11 2012	Severity INFO INFO INFO	Logger webpage cp4pc.edp cp4pc.edp	Logs Message Connected to XIG server my device ID is: 00000000-0000000-58B035FF-FFF66FEA my IP is 10.0.1.10				
ID 0 1 2 3	Timestamp     Thu May 31 15:17:10 2012     Thu May 31 15:17:11 2012	Severity INFO INFO INFO INFO	Logger webpage cp4pc.edp cp4pc.edp xig.io_kernel	Logs   Message   Connected to XIG server   my device ID is: 0000000-0000000-58B035FF-FFF66FEA   my IP is 10.0.1.10   XBee Version = 10ED, Series = 1				
ID 0 1 2 3 4	Timestamp     Thu May 31 15:17:10 2012     Thu May 31 15:17:11 2012	Severity INFO INFO INFO INFO DEBUG	Logger webpage cp4pc.edp cp4pc.edp xig.io_kernel xig.io_kernel	Logs   Message   Connected to XIG server   my device ID is: 0000000-0000000-58B035FF-FFF66FEA   my IP is 10.0.1.10   XBee Version = 10ED, Series = 1   XBee reliable transmit enabled				
ID 0 1 2 3 4 5	Timestamp     Thu May 31 15:17:10 2012     Thu May 31 15:17:11 2012	Severity INFO INFO INFO INFO DEBUG INFO	Logger webpage cp4pc.edp cp4pc.edp kig.io_kernel xig.io_kernel xig.io_kernel	Logs   Message   Connected to XIG server   my device ID is: 0000000-0000000-58B035FF-FFF66FEA   my IP is 10.0.1.10   XBee Version = 10ED, Series = 1   XBee reliable transmit enabled   Enabling UDP listener on port 5649				
ID 0 1 2 3 4 5 6	Timestamp     Thu May 31 15:17:10 2012     Thu May 31 15:17:11 2012	Severity INFO INFO INFO INFO DEBUG INFO DEBUG	Logger webpage cp4pc.edp cp4pc.edp xig.io_kernel xig.io_kernel xig.io_kernel xig.io_kernel	Logs   Message   Connected to XIG server   my device ID is: 0000000-0000000-58B035FF-FFF66FEA   my IP is 10.0.1.10   XBee Version = 10ED, Series = 1   XBee reliable transmit enabled   Enabling UDP listener on port 5649   XBee MTU = 100 bytes				
ID 0 1 2 3 4 5 6 6 7	Timestamp     Thu May 31 15:17:10 2012     Thu May 31 15:17:11 2012	Severity INFO INFO INFO INFO DEBUG INFO DEBUG INFO	Logger webpage cp4pc.edp cp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.ed	Logs   Message   Connected to XIG server   my device ID is: 0000000-0000000-58B035FF-FFF66FEA   my IP is 10.0.1.10   XBee Version = 10ED, Series = 1   XBee reliable transmit enabled   Enabling UDP listener on port 5649   XBee MTU = 100 bytes   Loading and initializing configured session types				
ID 0 1 2 3 4 5 6 7 8	Timestamp     Thu May 31 15:17:10 2012     Thu May 31 15:17:11 2012	Severity INFO INFO INFO INFO DEBUG INFO DEBUG INFO INFO	Logger webpage cp4pc.edp cp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp	Logs   Message   Connected to XIG server   my device ID is: 0000000-0000000-58B035FF-FFF66FEA   my IP is 10.0.1.10   XBee Version = 10ED, Series = 1   XBee reliable transmit enabled   Enabling UDP listener on port 5649   XBee MTU = 100 bytes   Loading and initializing configured session types   do_command target 'xig' registered				
ID 0 1 2 3 4 5 6 7 7 8 9	Timestamp     Thu May 31 15:17:10 2012     Thu May 31 15:17:10 2012     Thu May 31 15:17:11 2012	Severity INFO INFO INFO INFO DEBUG INFO DEBUG INFO INFO INFO	Logger webpage cp4pc.edp cp4pc.edp xig.io_kernel xig.io_kernel xig.io_kernel xig.io_kernel xig.io_kernel xig.io_kernel xig.io_kernel cp4pc.rci	Logs   Message   Connected to XIG server   my device ID is: 0000000-0000000-58B035FF-FFF66FEA   my IP is 10.0.1.10   XBee Version = 10ED, Series = 1   XBee version = 10ED, Series = 1   XBee reliable transmit enabled   Enabling UDP listener on port 5649   XBee MTU = 100 bytes   Loading and initializing configured session types   do_command target 'xig' registered   Received query_state request				
ID 0 1 2 3 4 5 6 7 7 8 9 9 10	Timestamp     Thu May 31 15:17:10 2012     Thu May 31 15:17:10 2012     Thu May 31 15:17:11 2012	Severity INFO INFO INFO INFO DEBUG INFO DEBUG INFO INFO INFO INFO	Logger webpage cp4pc.edp cp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.edp icp4pc.rel icp4pc.rel icp4pc.rel icp4pc.rel	Logs   Message   Connected to XIG server   my device ID is: 0000000-0000000-S8B03SFF-FFF66FEA   my IP is 10.0.1.00   XBee Version = 10ED, Series = 1   XBee reliable transmit enabled   Enabling UDP listener on port 5649   XBee MTU = 100 bytes   Loading and initializing configured session types   do_command target 'xig' registered   Received query_state request   Starting scheduler				

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#### Using XBee Internet Gateway











### Send a request

Serial.println("<u>http://faludi.com/test.html");</u>

#### Read a response

<html> <head> <title>Rob Faludi's Test Page</title> </head> <body> This is a very simple test page. </body> </html>

### Send a value



#### See the values

				Help & Downloads 👻	-
		IE IDIGI MANAGER PR	0 DATA SERVICES	WEB SERVICES C	ONSOLE
Files	Data Streams				
🔗 Refresh	Properties				x • Q
Stream 00000009/set	nsor0/temperature	Last Updated 0/20/12 11:31 AM	Current Value	Units	Data Type
dia/channel/00	000000-0000000-12300000-00000009/sensor0/light	6/26/12 11:51 AM	40		LONG
dia/channel/00	000000-0000000-12300000-00000009/sensor0/humidity	6/26/12 11:51 AM	36		LONG
dia/channel/00 00000008/se	000000-0000000-12300000- nsor0/temperature	6/26/12 11:51 AM	26		LONG
dia/channel/0	000000-0000000-12300000-0000008/sensor0/tempe	rature			
Charts	Show Last: 1 Hour 1 Day 7 Days 1 Month 6 Month	s 1 Year		Average	
Raw Data	70 80 50 40 30 20 10 0	~~~~	~~~	~~~	~
Ready			dymn	mp	

#### Give a command



#### See the results



## Lots of help

- Documentation
- Videos
- Examples site

#### Jordan: XIG Getting Started



# Getting Started http://code.google.com/p/xig/

## Jordan: XIG Getting Started

### Digi XBee Examples



Providy powered by WordPress.

## examples.digi.com



Commands & Services Details

#### Commands

help or xig://help: displays this file quit or xig://quit: quits program abort or xig://abort: aborts the current session time or xig://time: prints the time in ISO format

## HTTP: Prototyping with URLs

- Shared access good for groups
- Fast development
- Simple for web developers
- Powerful, flexible, extensible approach

### HTTP examples

- http://www.whattimeisit.com
- <u>http://yourwebapplication.appspot.com/?name=sensor1&temp=72</u>

### I/O Samples via HTTP

- Sends data to any server in a standard format
- Config:

io_sample_destination_url = <u>http://xbee-data.appspot.com/</u> io_sample

 Returned to server: http://xbee-data.appspot.com/io_sample?addr="00:13:a2:00:40:3a:8b: 90"&DIO2=1&DIO3=1&DIO0=1&DIO1=1

Comment by Siegfried.Loeffler, Oct 11, 2011

Delete comment

The "I/O Sample HTTP Trigger" rocks. I just enabled this to post data from the wall router and temperature sensors that came with my starter kit into a mysql database. Took me less than half a day to get everything set up. This allows to build a quite sophisticated sensor network in very short time, and you can even do so without having to put Arduinos next to each sensor. Thank you very much.
# Sending Sample Data to iDigi

- By default, I/O sample frames sent to XIG will be uploaded to iDigi and available as a file and via the iDigi Dia interface
- Calls to this URL:
   <u>http://(my|developer).idigi.com/ws/</u>
   <u>DiaChannelDataHistoryFull</u>
- Return the following XML:

# Getting Samples from iDigi

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<result>
```

<resultTotalRows>8</resultTotalRows>

<requestedStartRow>0</requestedStartRow>

<resultSize>8</resultSize>

<requestedSize>1000</requestedSize>

```
<remainingSize>0</remainingSize>
```

<DiaChannelDataFull>

```
<id>
```

<devConnectwareId>0000000-0000000-00409DFF-FF43FA07</devConnectwareId>

<ddInstanceName>XBee_40485A23</ddInstanceName>

<dcChannelName>AD3</dcChannelName>

</id>

<cstld>93</cstld>

<xpExtAddr>00:13:A2:00:40:3B:CD:B8</xpExtAddr>

<dcDataType>0</dcDataType>

<dcdUpdateTime>2012-01-21T13:35:33.607Z</dcdUpdateTime>

<dcdStringValue>520</dcdStringValue>

<dcdIntegerValue>520</dcdIntegerValue>

</DiaChannelDataFull>

## Viewing Samples on iDigi

			Help & Downloads	s <b>-</b> -
	ME IDIGI MANAGER	PRO DATA SERVICE	S WEB SERVIC	ES CONSOLE
Files Data Streams				
	1			x • Q
Stream 0000009/sensor0/temperature	Last Updated 0/20/12 11:31 AM	Current Value	Units	Data Type
dia/channel/00000000-00000000-12300000-00000009/sensor0/light	6/26/12 11:51 AM	40		LONG
dia/channel/00000000-0000000-12300000-00000009/sensor0/humidity	6/26/12 11:51 AM	36		LONG
dia/channel/00000000-00000000-12300000- 00000008/sensor0/temperature	6/26/12 11:51 AM	26		LONG
dia/channel/00000000-00000000-12300000-00000008/sensor0/tempe	erature			
Charts Show Last: 1 Hour 1 Day 7 Days 1 Month 6 Month	hs 1 Year		Average	
Raw Data				
Raw Data 70 80 50 40 30 20 10 7	~~~~	~~~	~~	$\sim$

#### Sending Messages from the Internet to an XBee Using iDigi RCI

ŵ	Home	SCI Targets Examples - B Export - Send K Clear	
	Welcome Services My Account	Path: /ws/sci	Web Services Respon
4	iDigi Manager Pro		
	Devices XBee Networks Storage	<pre>1 &lt;1 2 See http://www.digi.com/wiki/developer/index.php/Rci for 3 an example of a python implementation on a NDS device to 4 bandle this SCL request</pre>	
	Web Services Console	5>	
Ô	Administration	<pre>6 <sci_request version="1.0"> 7 <send_message></send_message></sci_request></pre>	
	Subscriptions	8 <targets></targets>	Documentation
	Operations	<pre>10  11 <rci_request version="1.1"> 12 <do_command target="rci_callback_example"></do_command></rci_request></pre>	Example #1 This example will prin
		13 ping 14	import rci
		<pre>15  16  17  10 10 10 10 10 10 10 10 10 10 10 10 10</pre>	def rci_callback() print xml return "re
		10	rci.add_rci_callbo
			Running this, send a

#### Sending Messages from the Internet to an XBee Using iDigi RCI

```
<sci_request version="1.0">
```

<send_message>

<targets>

<device id="0000000-0000000-00409DFF-FF43FA07"/>

</targets>

<rci_request version="1.1">

<do_command target="xig">

<send_data hw_address="00:13:a2:00:40:3a:8b:90!">Hello World!\r\n</
send_data>

</do_command>

</rci_request>

</send_message>

</sci_request>

# Remote XBee AT Settings via iDigi RCI

Change remote radio's configuration via POSTing XML to iDigi:

```
<sci_request version="1.0">
<send_message>
<targets>
<device id="00000000-0000000-00409DFF-FF43FA07"/>
</targets>
<rci_request version="1.1">
<do_command target="xig">
<do_command target="xig">
<at hw_address="00:13:a2:00:40:48:5a:23!" command="D0" value="2" />
<at hw_address="00:13:a2:00:40:48:5a:23!" command="IR" value="0x3E8" />
<at hw_address="00:13:a2:00:40:48:5a:23!" command="IR" value="0x3E8" />
<at hw_address="00:13:a2:00:40:48:5a:23!" command="IR" value="0x3E8" />
<at hw_address="00:13:a2:00:40:48:5a:23!" command="WR" apply="True" />
</do_command>
</rci_request>
</sci_request>
```

### More Features

- Time
- UDP
- OSC

### Demo



Let's try for a live

# Readings and Assignments

- Readings
  - Building Wireless Sensor Networks, Chapter 7
- Assignments
  - Final Project Prototypes