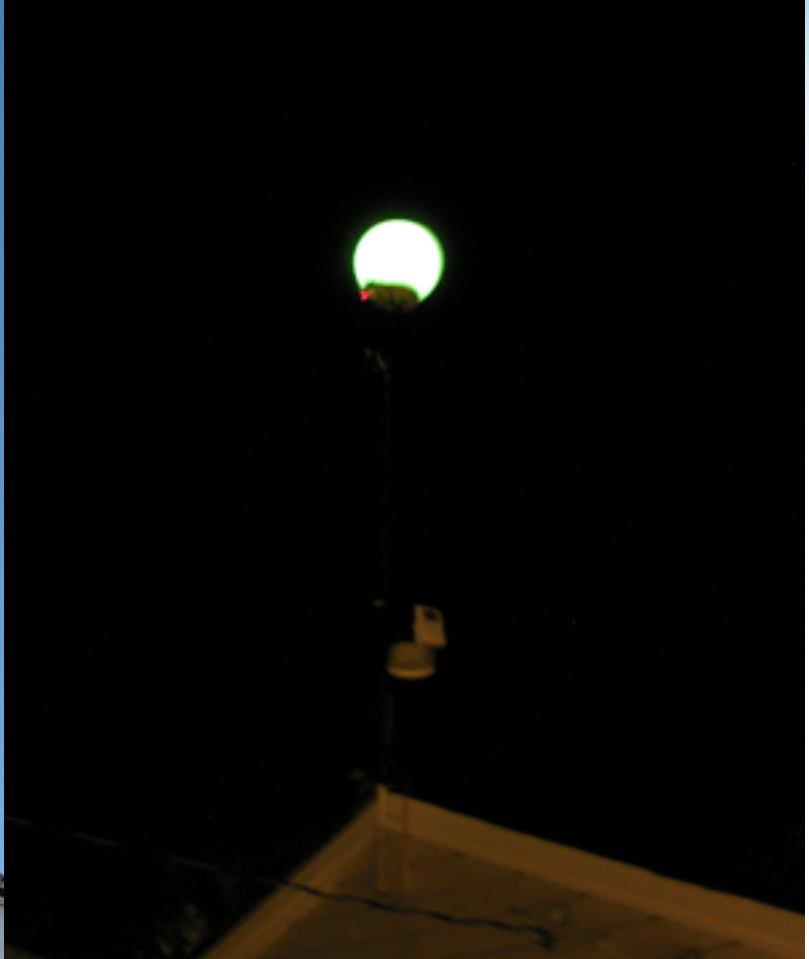
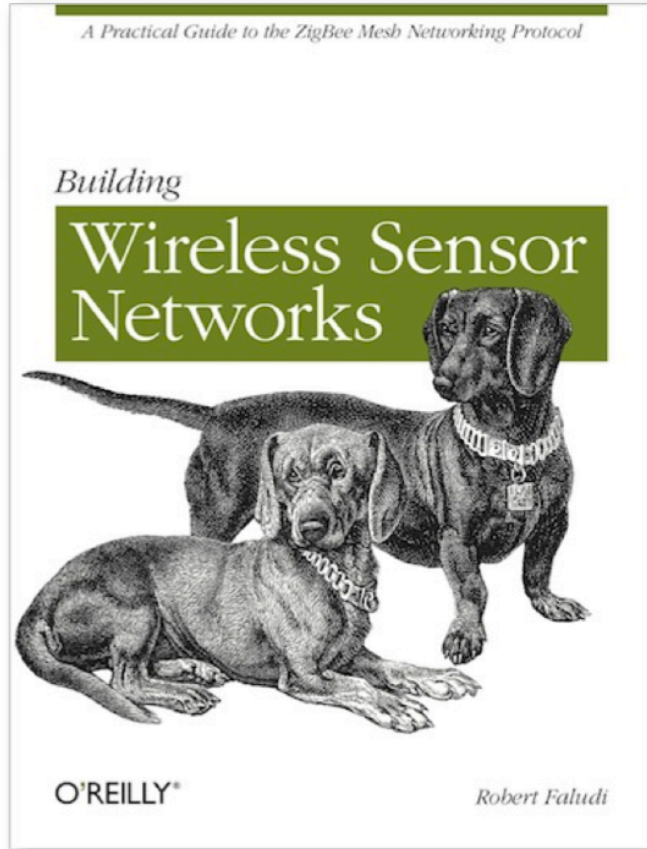


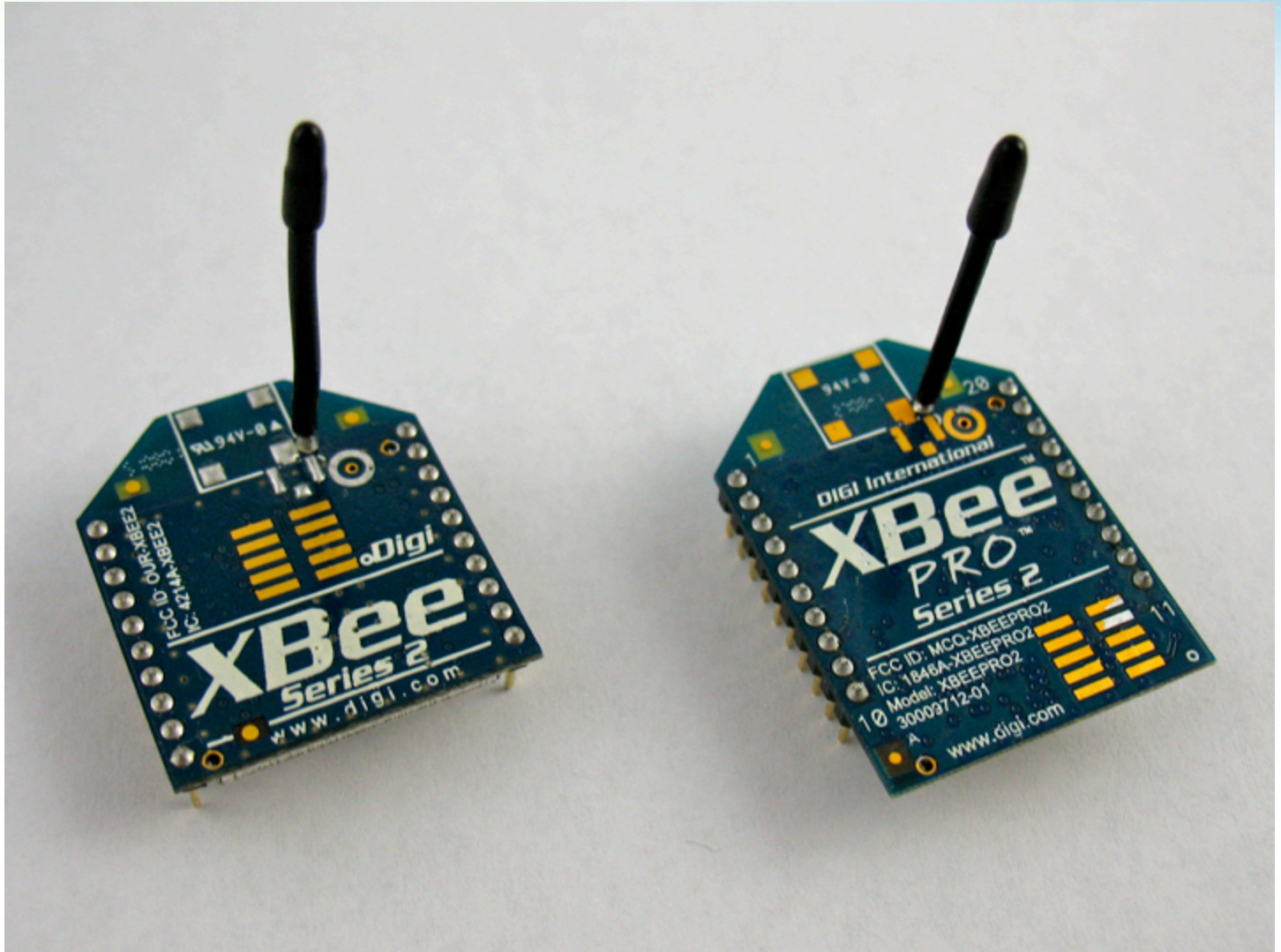
Fun with XBees

Rob Faludi, Collaborative Strategy Leader, R&D
rob.faludi@digicom.com

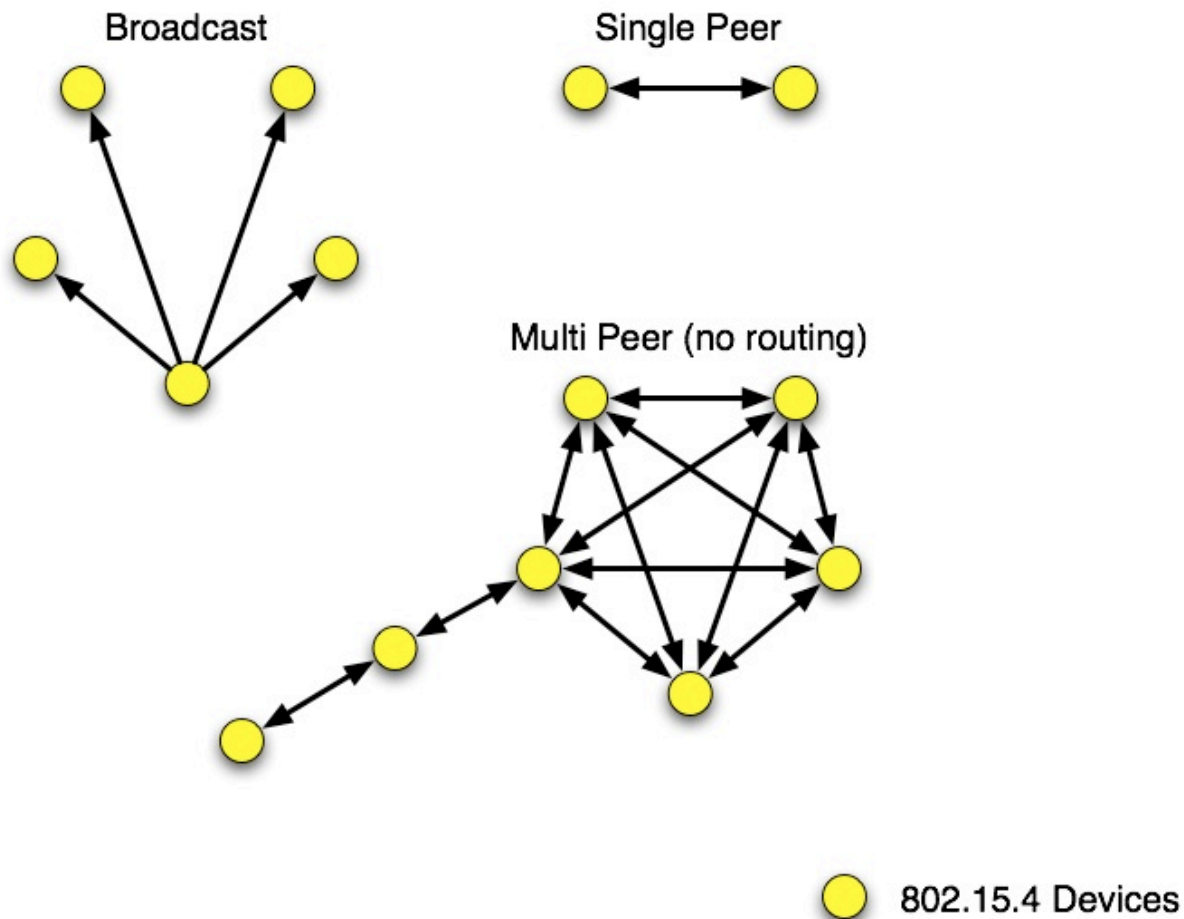




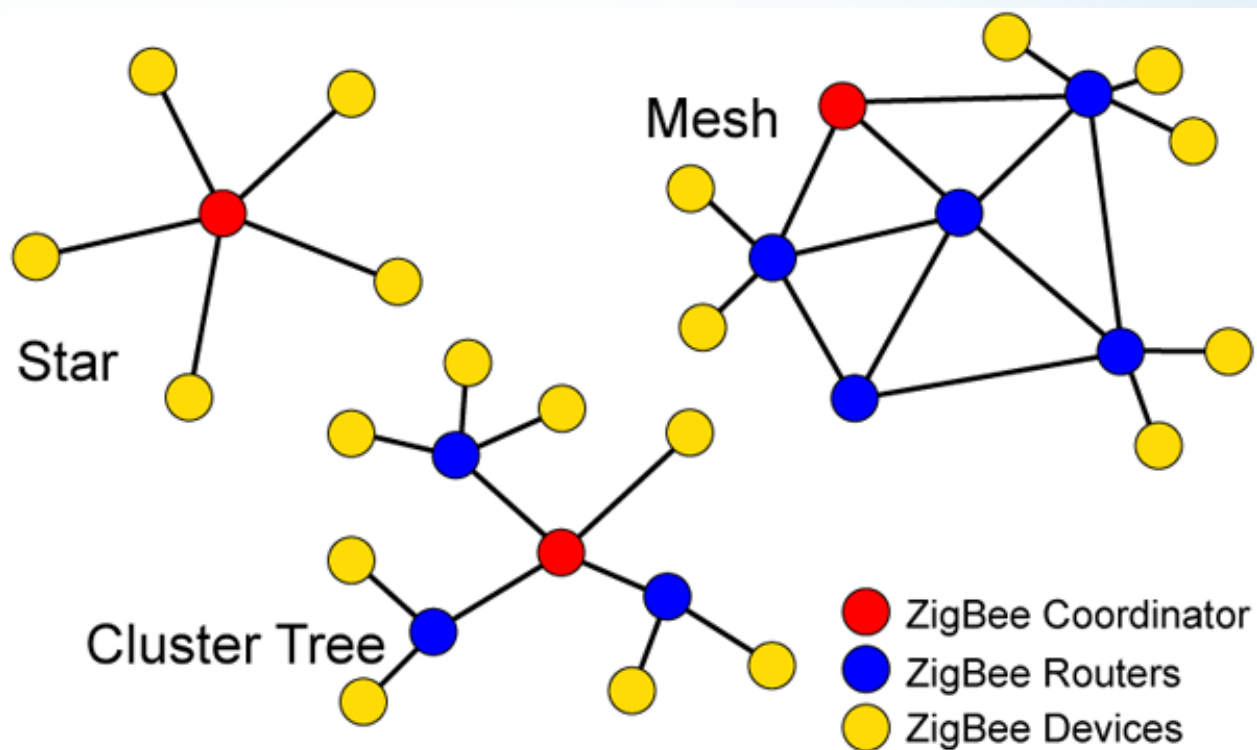


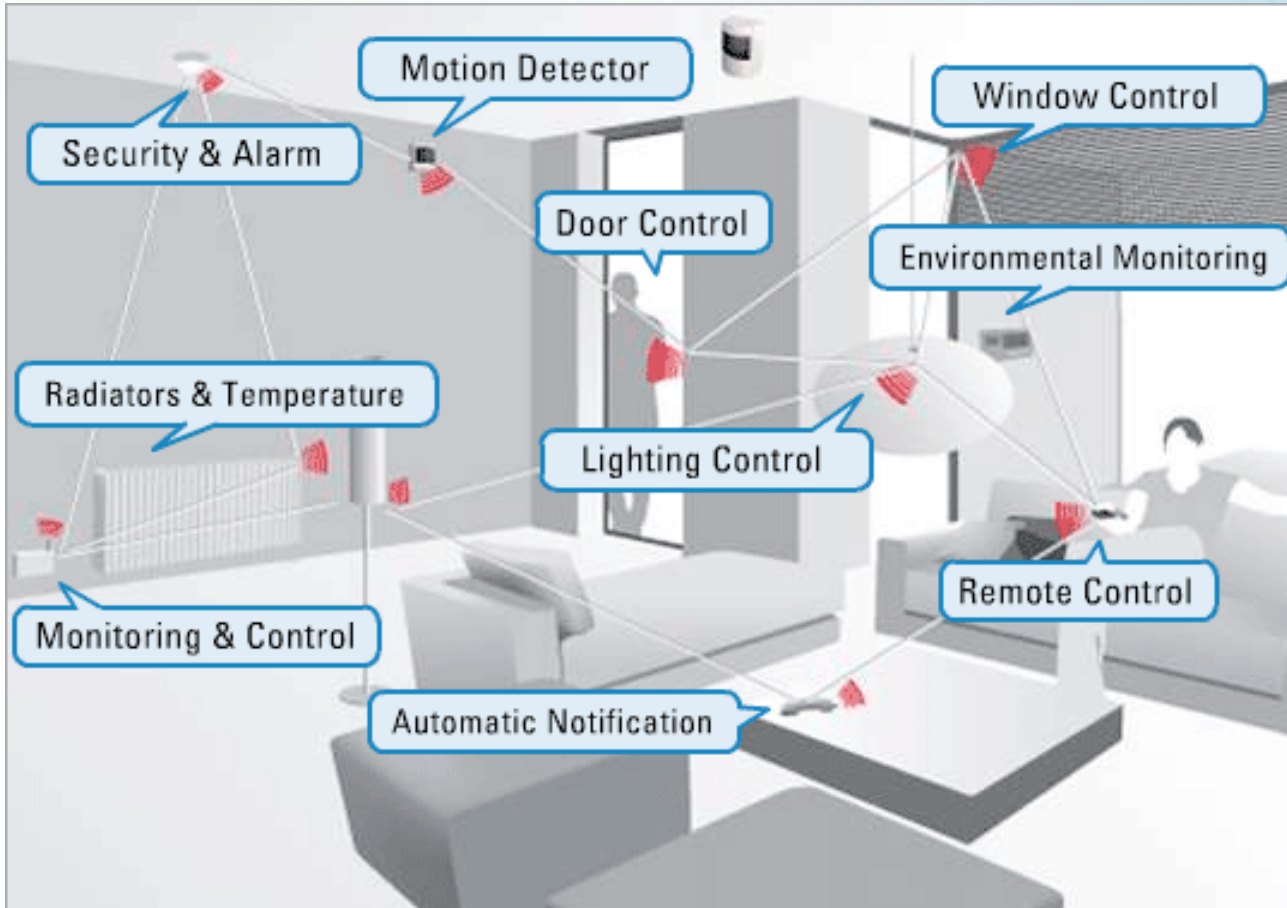


Point-to-point



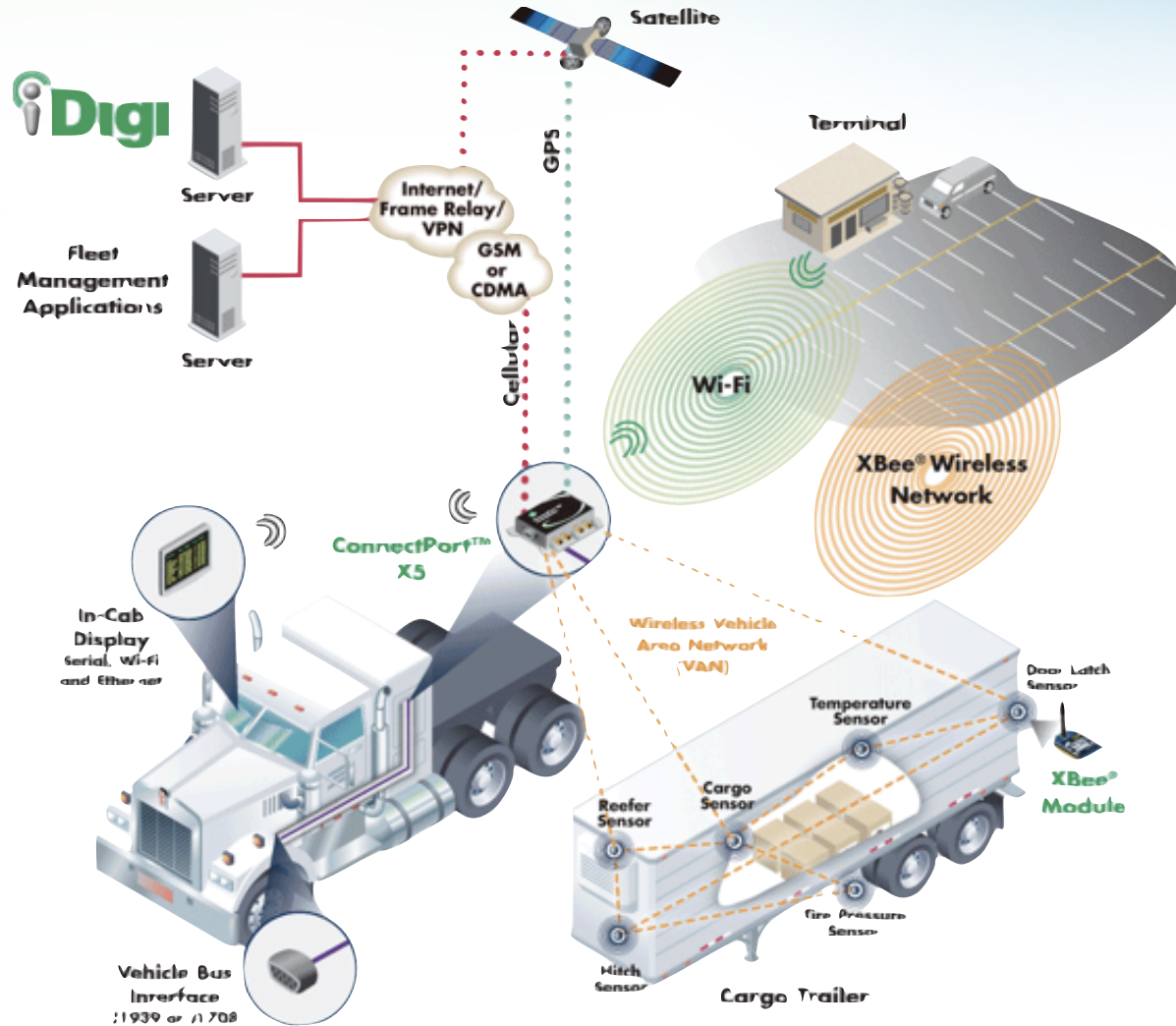
Mesh



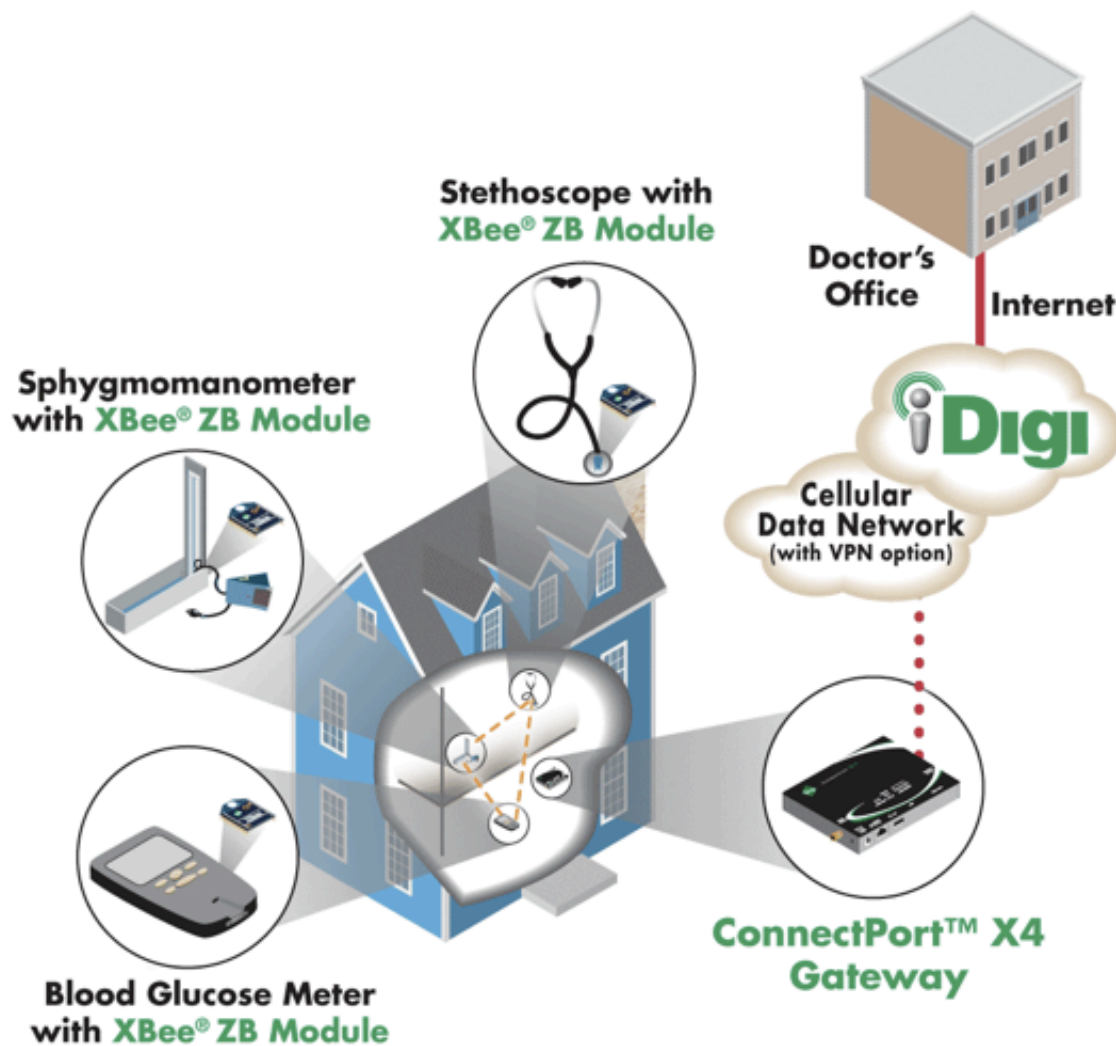


Digi Industrial Solutions...

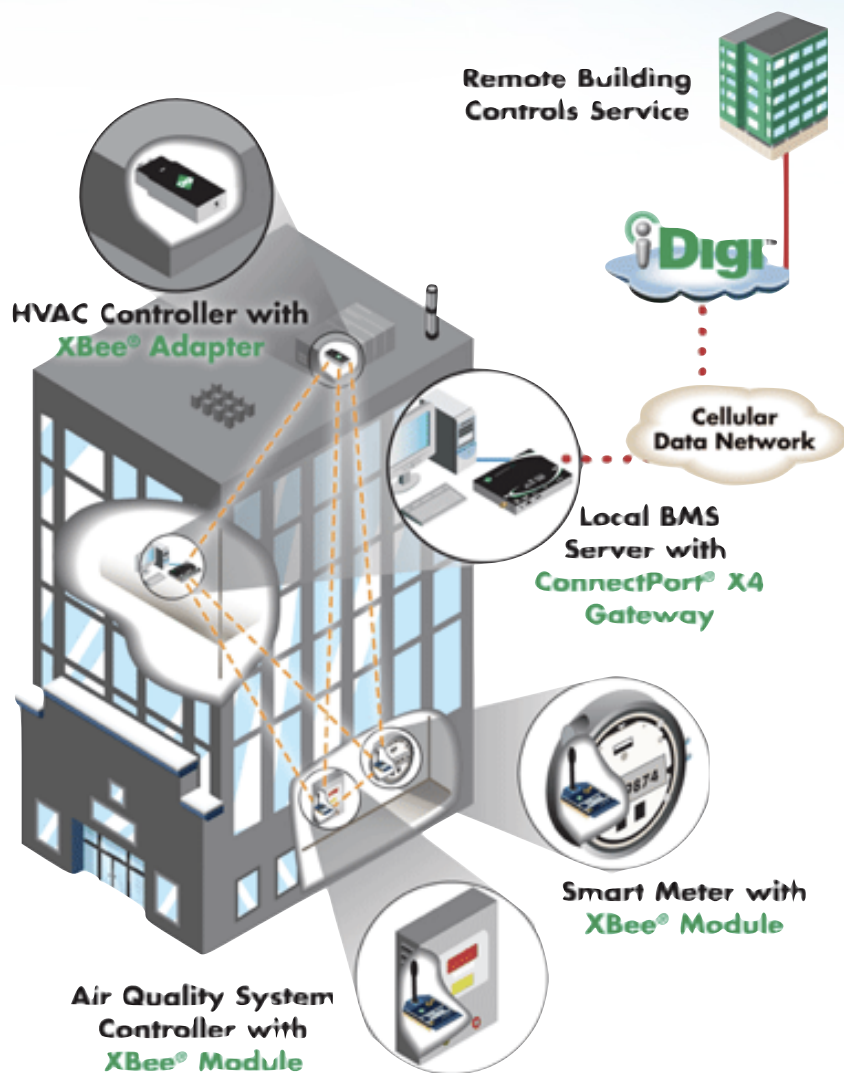
Refrigerated Truck Fleet Mgmt



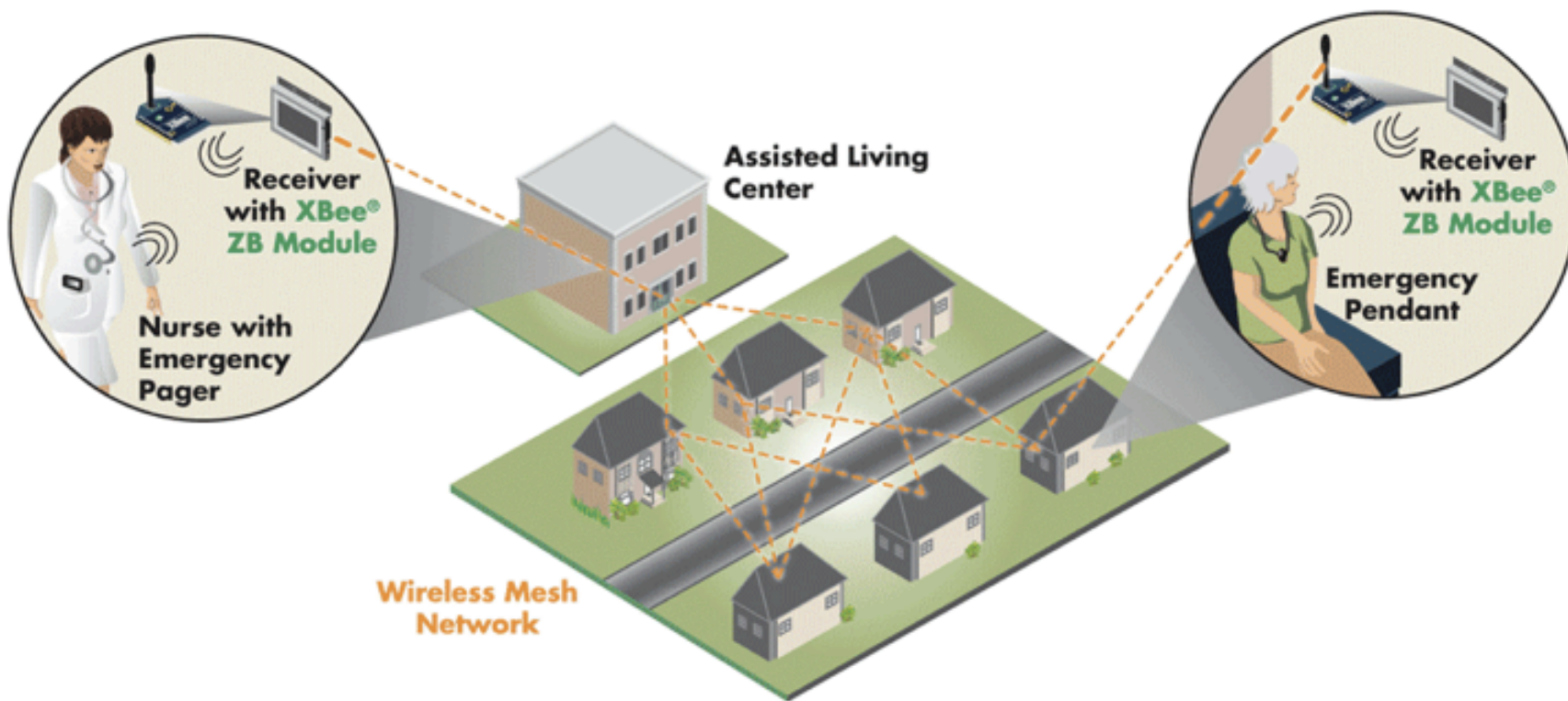
Home Health Care Monitoring



Building Systems Management



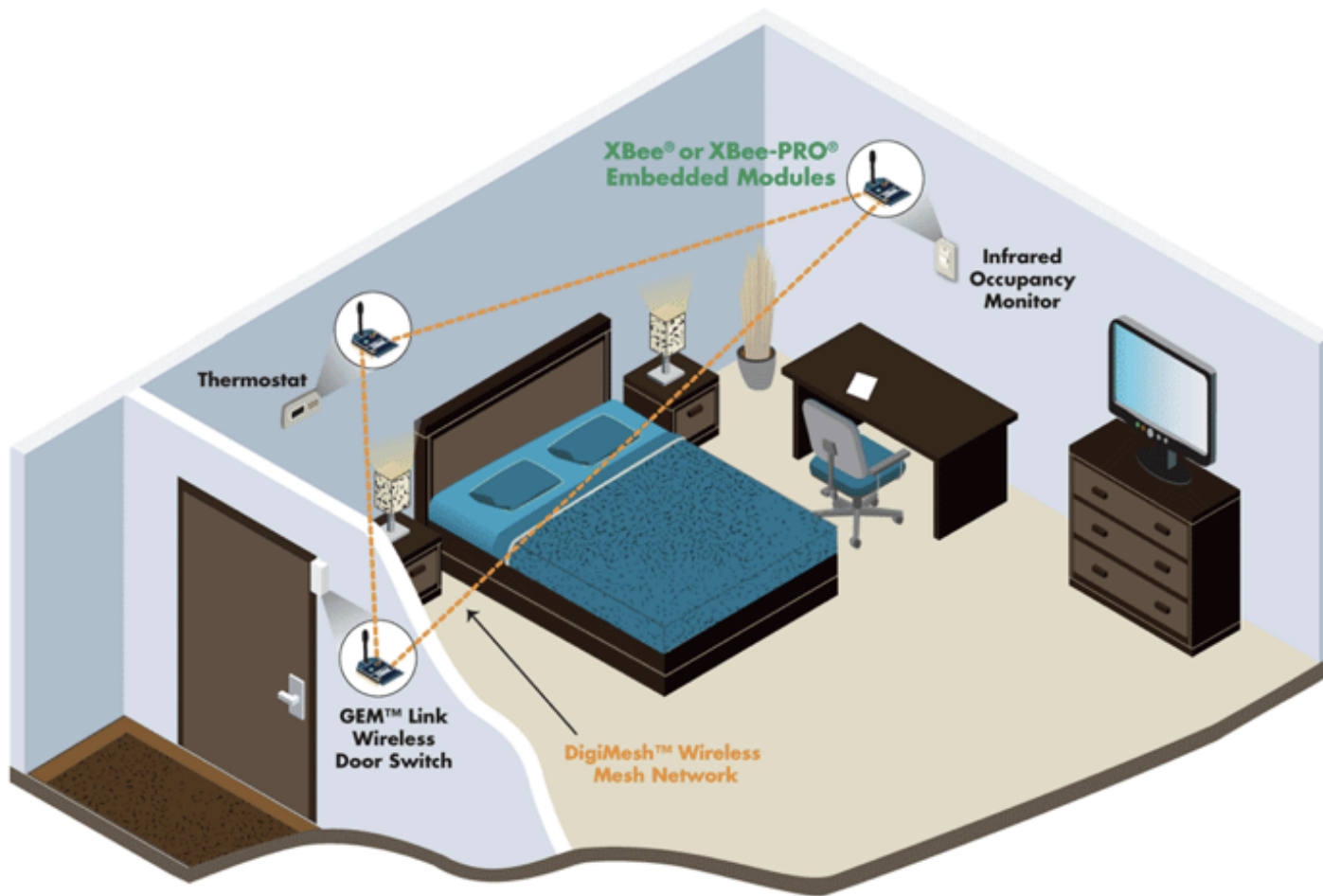
Assisted Living



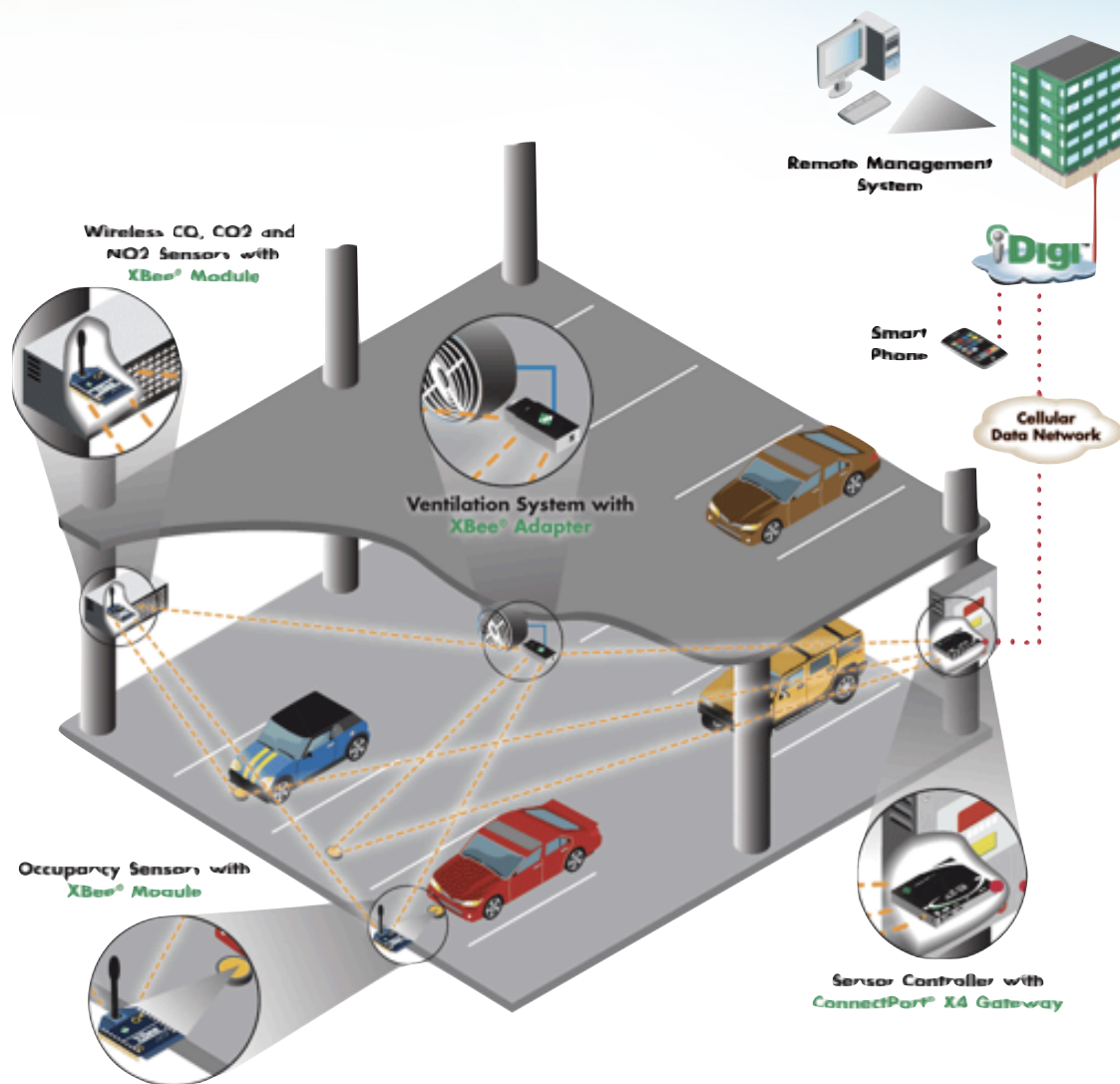
Energy Consumption



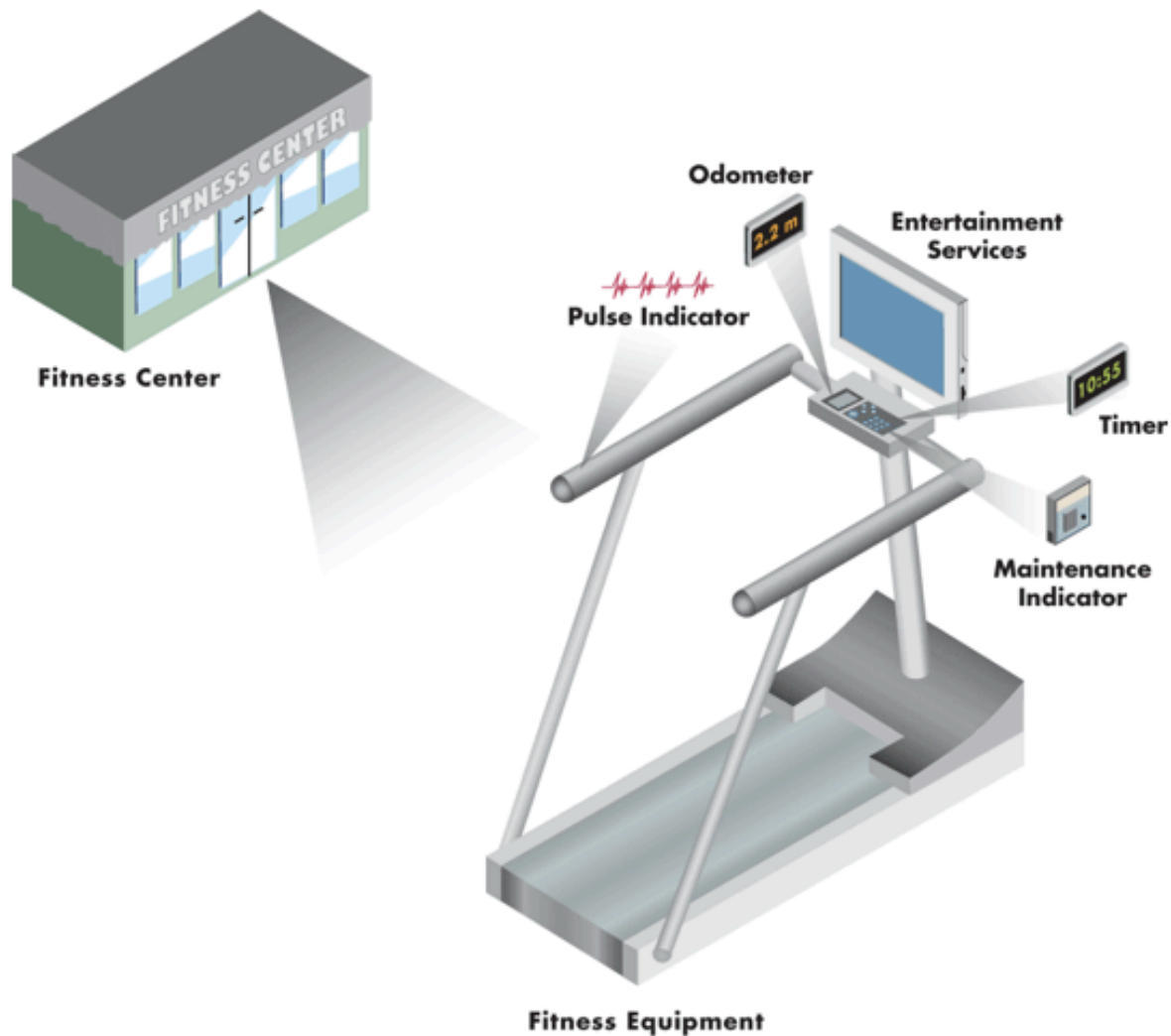
Hotel management



Automated parking structures



Fitness centers



Great applications

- What else can we do?



“The trick to having good ideas is not to sit around in glorious isolation and try to think big thoughts. The trick is to get more parts on the table.”

“-Steven Johnson, Where Good Ideas Come From

Parts to the Table

1. Find creative inventions
2. Create creative inventors

What's out There Now?

- Adidas Megalizer
- iDigi Garden
- Botanicalls
- The Pool
- Tweet-a-Watt
- Wind-up Birds
- Dream Squawk
- Ciroc Moment
- Ninja Gloves
- Urbana Lighting sculpture
- BeatFeet
- Plug-in-Play
- Office Music Democratizer
- Dream Jammies
- Spin on the Waltz
- Touched by Strangers
- BeeSim Game
- Networked On-air Light
- Blendophone
- Wireless Sound Objects
- Juggling Sound Ball
- LEGO NXT Controller
- Reporting Toxic Chemicals
- BubbleViz
- Wireless Speech-Controlled Robot
- Wayward Soles
- Esper Domino
- Luminode Light Control
- Yarn Monster



Adidas Megalizer

Didier Brun

Sneakers control the music

Adidas Megalizer





BeatFeet

Mika, Ho, Vidich, at ITP

Audio controller hat and footwear



Touched by Strangers

Alex Reeder & Yutaka Kitamura

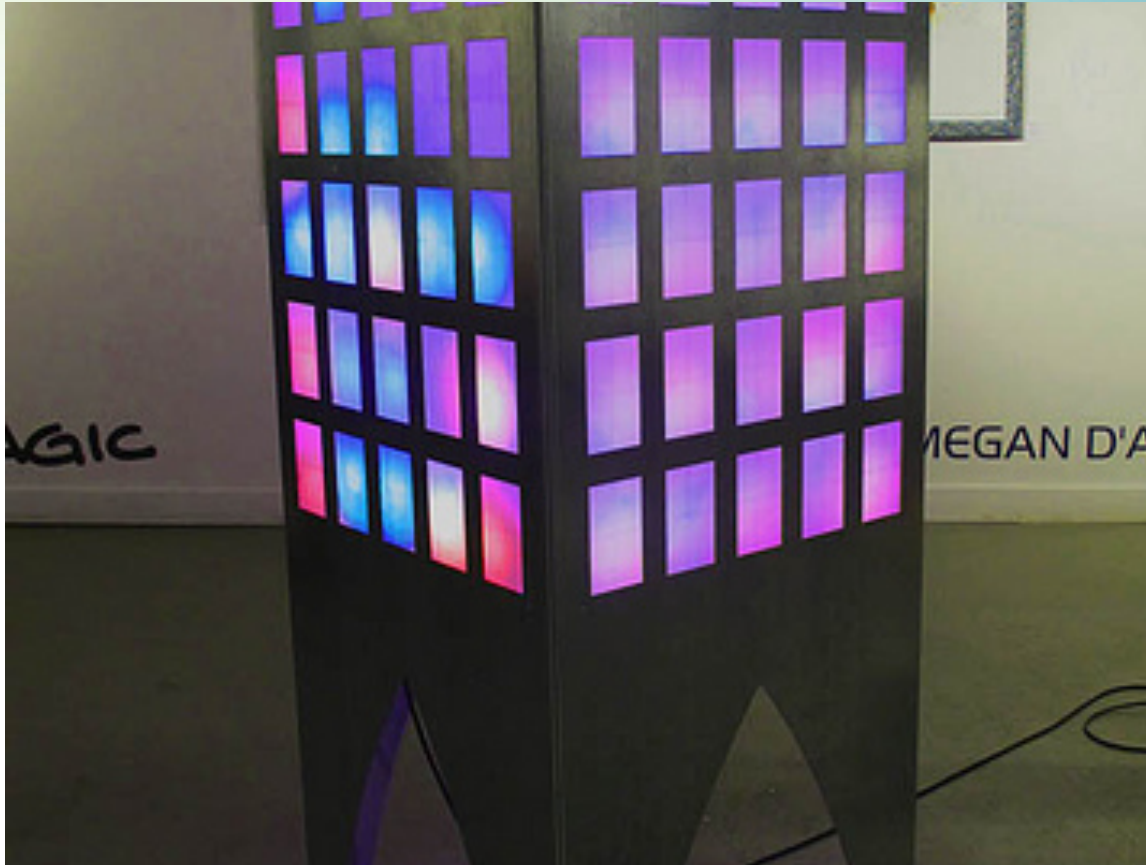
interactive dance performance suits



Dream Squawk

Amy Khoshbin, at ITP

hand-crafted bird mask controller for vocal effects processor & sampler



Urbana Lighting sculpture

The Latest Artists

light sculpture dynamically emulates an apartment building



Ciroc Moment

Daniel Hirschmann, Tom Sloan and Wanju Kim

Networked social drinking interface



The Pool

Jen Lewin

collaborative interactive sculpture

The Pool

JEN LEWIN
The Pool



Blendophone

John Park & Usman Muzaffar

“musical” instrument made from eight blenders



Wireless Sound Objects

Eric Beug

generate and control each other's music



Dream Jammies

Alex Reeder, at ITP

body aware pajamas for communicating across multiple time zones



Roller Derby Hit Tracker

Tom Igoe

tracks body checks in roller derby; build one yourself




Plug-in-Play

Rockwell Group

large-scale interactive environment in a public plaza

Plug-in-Play

 LAB at rockwellgroup



BeeSim Game

Peppler et al., Indiana University

educational game to teach children complexity theory



iDigi Garden

Digi International

automated watering and monitoring environment



Botanicalls

Rob Faludi, Kate Hartman, Kati London, Rebecca Bray

plants phone you to discuss their needs

Botanicals





Alchemists Wand for the 21st Century

Lynn Hershman with Gian Pablo Villamil

set of brooms that detect toxic substances in the environment



AirPenguin

Festo

wireless penguins that float in the air

AirPenguin





Weather Beacon

Tim Dye

roof mast globe displays colors to broadcast weather predictions



FarmBoz

Niall Dempsey

robotic shepherd

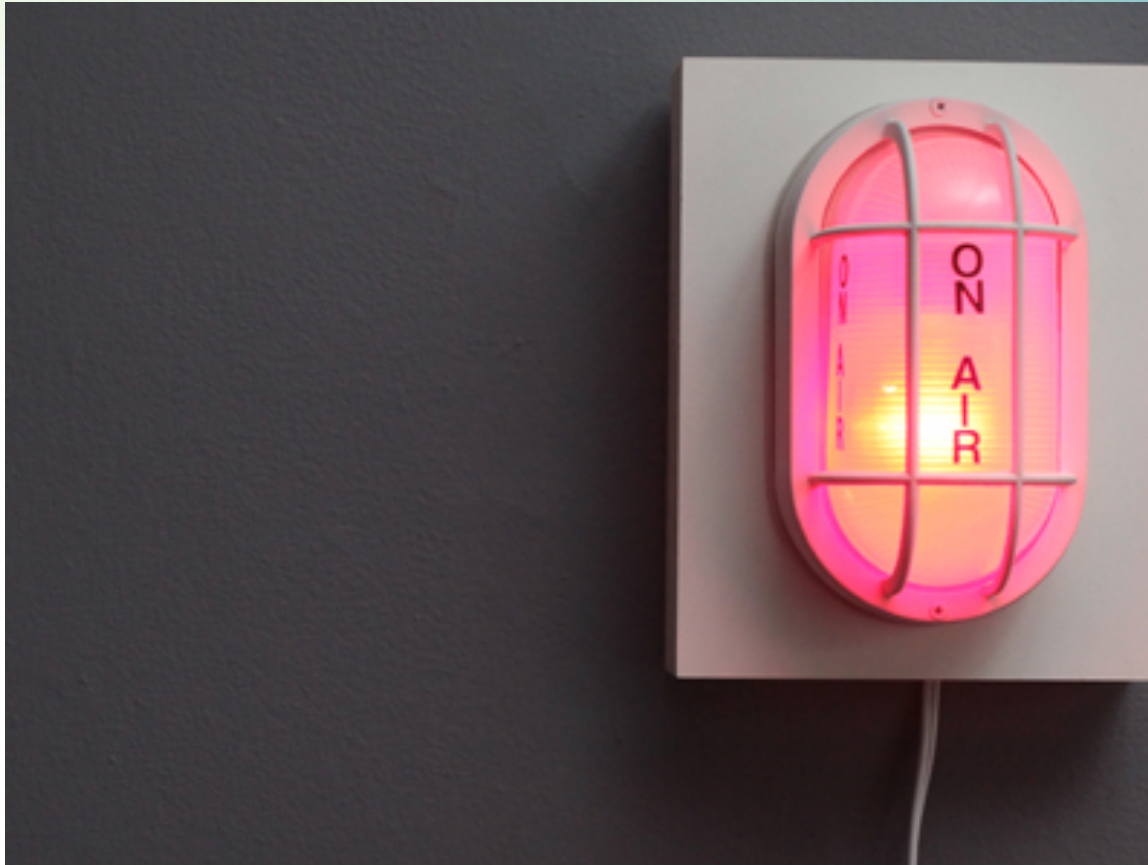
FarmBoz



FarmBoz

Sheep Herding





Networked On-air Light

Matt Richardson

remotely signals broadcasting status



Twit-ear

Elly Bowness

monitors office sounds and reports over Twitter



Tweet-a-Watt

Limor Fried, Adafruit

DIY wireless home-power tweeter



Radish

Aaron Spangler, Google

environmentally friendly conference room scheduling sign



Office Music Democratizer

Breakfast NYC

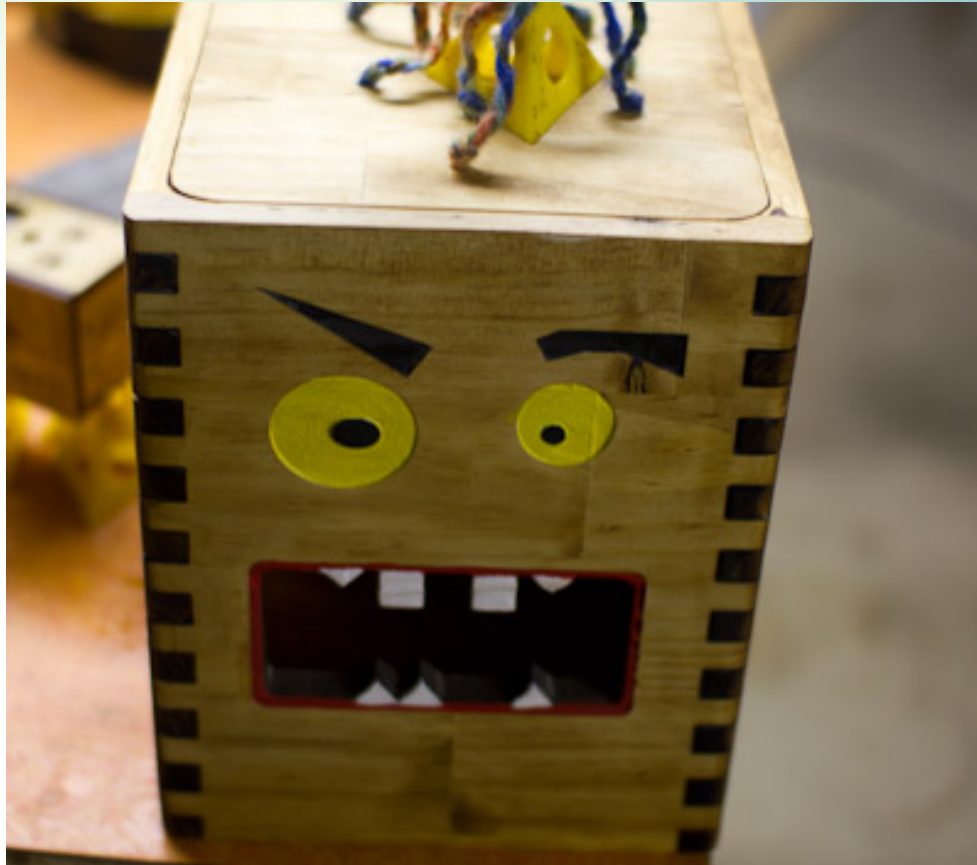
shared remote control for group online listening



Ask-Poly

Elly Bowness

3-d physical bar graphs

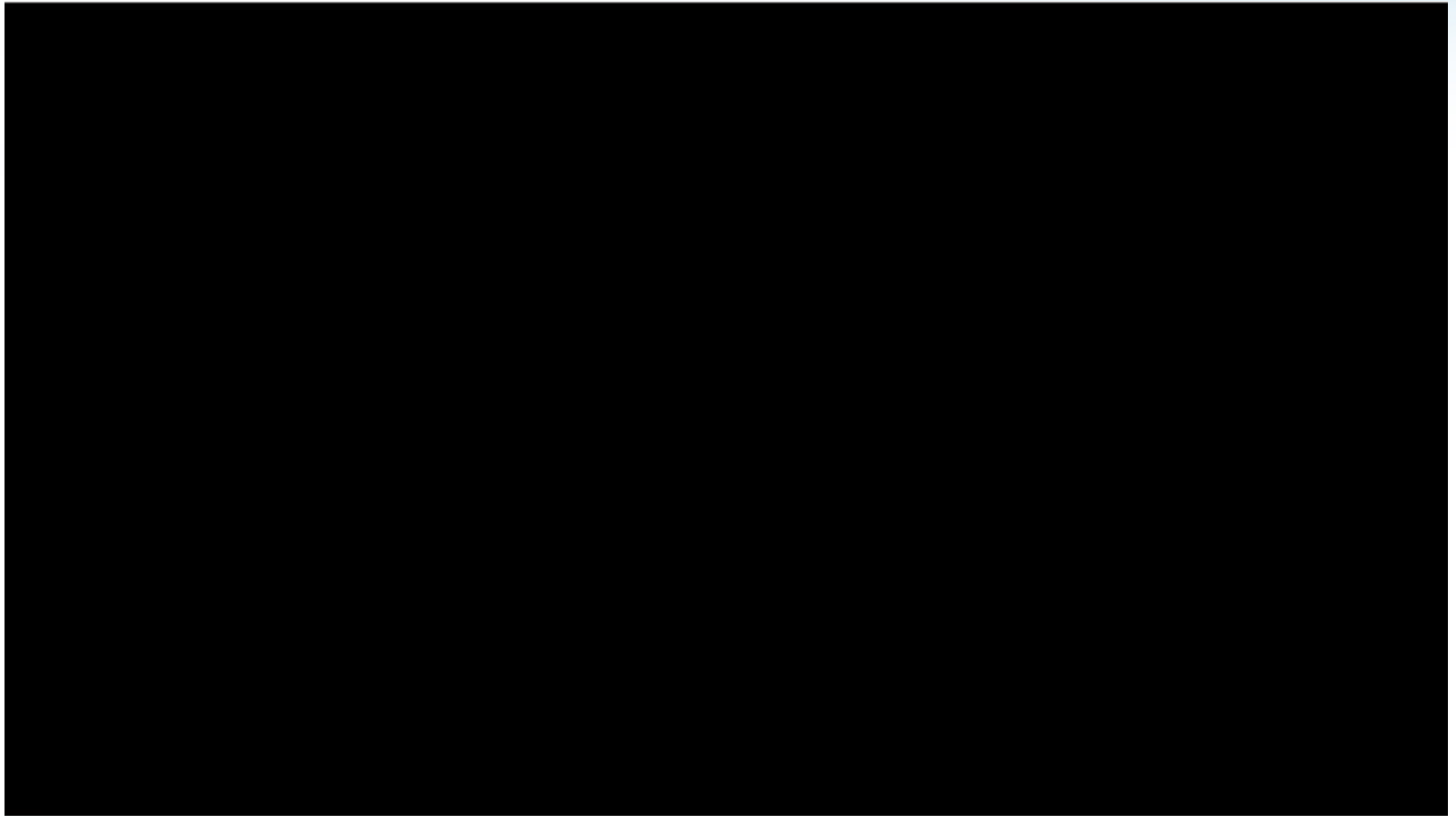


Yarn Monster

Union Bridge Labs

Eats yarn into a perfect ball

Yarn Monster





Reporting Toxic Chemicals

Tom Igoe

cymbal monkey remotely alerts to toxic workshop spills



Ninja Gloves

Nick Bilton, Alicia Gibb, via Faludi & Hartman

whimsical wearable example project for quiet communications



Wayward Soles

Daniel Liss

a when-is-daddy-getting-home device

Learning to make Your Own

Get an XBee



Read the product manual

XBee®/XBee-PRO® ZB RF Modules

ZigBee RF Modules by Digi International

Models: XBEEZ, XBEEPRO2, PRO S2B

Hardware: S2 and S2B

Firmware Versions:

- 20xx - Coordinator - AT/Transparent Operation
- 21xx - Coordinator - API Operation
- 22xx - Router - AT/Transparent Operation
- 23xx - Router - API Operation
- 28xx - End Device - AT/Transparent Operation
- 29xx - End Device - API Operation



Digi International Inc.
11001 Bren Road East
Minnetonka, MN 55343
877 912-3444 or 952 912-3444
<http://www.digi.com>

90000976_F
5/17/2010

Use online resources

Xbee Adapter

http://www.ladyada.net/make/xbee/point2point.html

```
ATID
3137
ATWR
OK
```

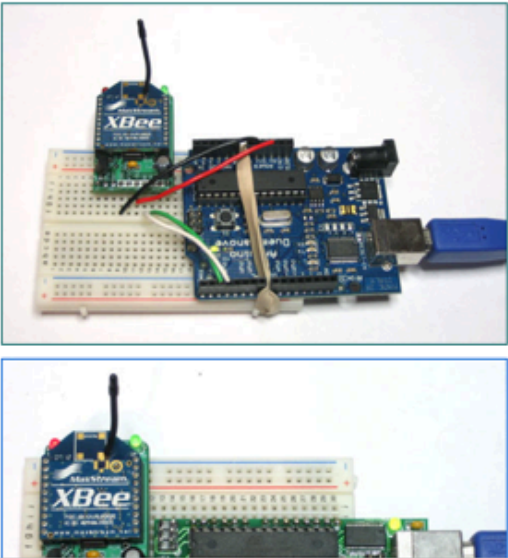
Connected 0:01:45 Auto detect 9600 8-N-1 SCROLL CAPS NUM Capture Print ed

Connecting to Arduino or Boarduino

Lets set up an example where the computer is going to talk to a microcontroller project such as an Arduino or Boarduino. If you're using a different microcontroller or communicating between two microcontrollers, its going to be pretty similar

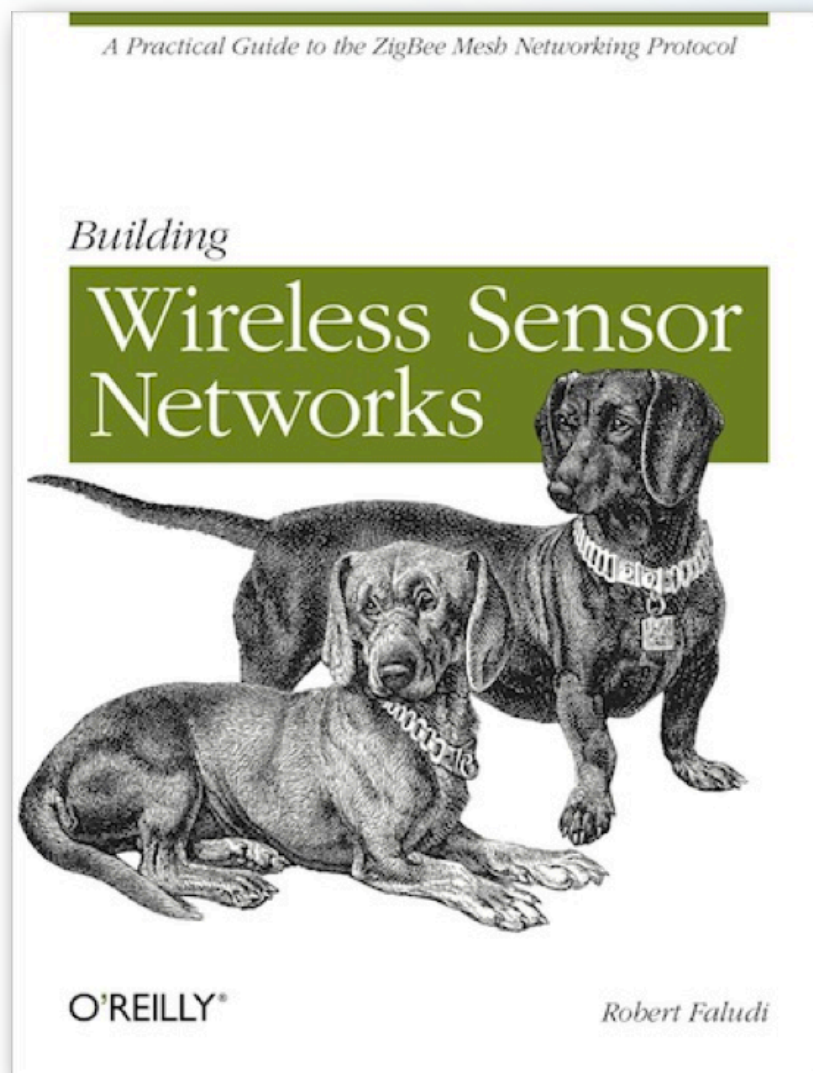
Start by first setting up the PAN ID and baud rate for the two modems. For this example I will assume that they are set up for the default baud rate of 9600

Connect one module to your microcontroller. First connect +5V and Ground to provide power. Make sure the XBee's green LED is blinking. Next connect the RX line (input) of the XBee to the TX line (output) of the microcontroller and vice versa. For the Arduino/Boarduino below I will be using a "Software Serial" program and use pin #2 as the RX and pin #3 as the TX. This allows me to use the default hardware USB serial port without conflicting. (For example, I can still upload a sketch)



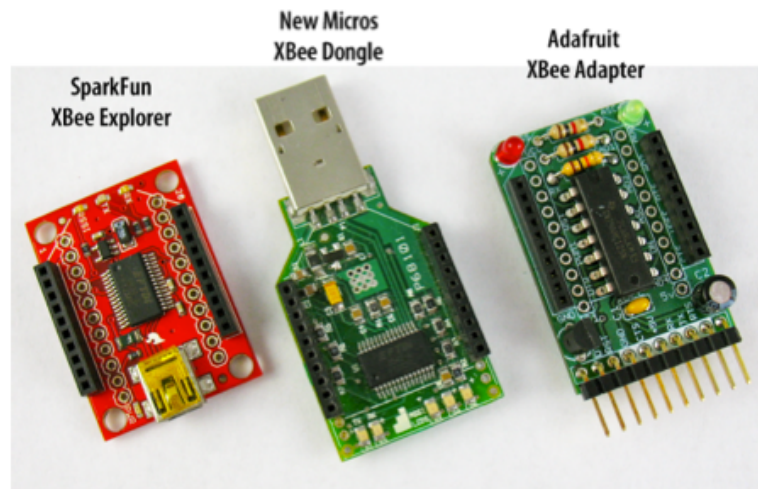
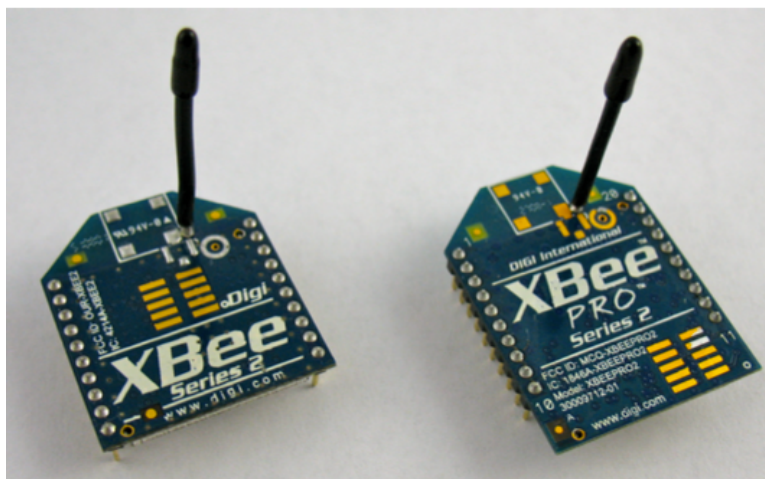
Display a menu for "http://www.ladyada.net/images/xbee/arduinowiresimple.jpg"

...and you can try my book



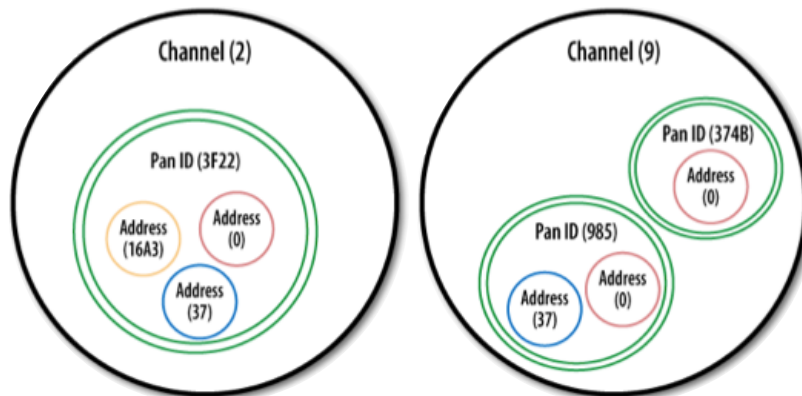
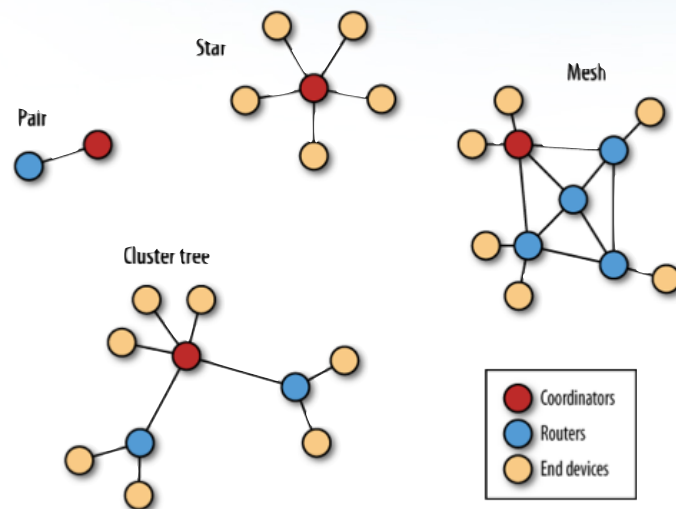
Getting Ready

- Buying an XBee Radio
- Buying an Adapter
- Choosing a Terminal Program



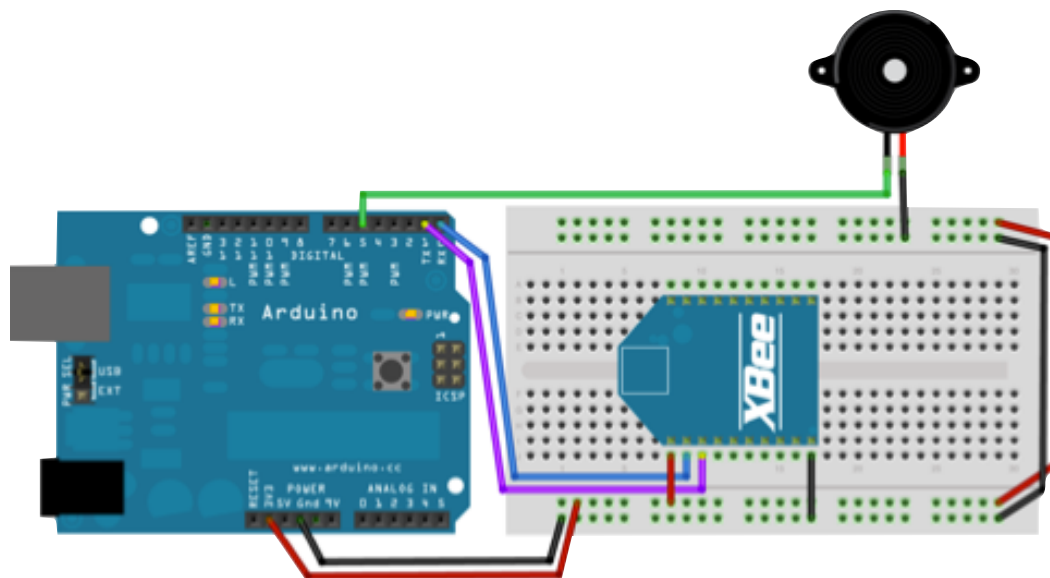
Up and Running

- Radio Basics
- Introduction to ZigBee
- XBee Firmware Updates
- Configuring XBee
- Basic ZigBee Chat



Build a Better Doorbell

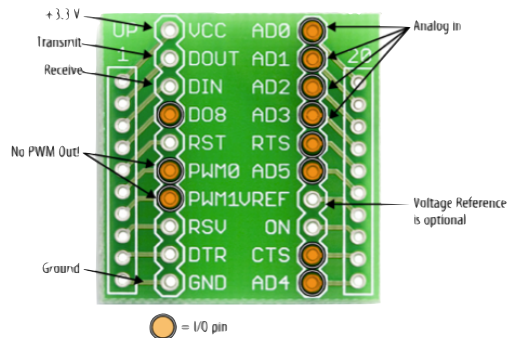
- ZigBee and Arduino
- Doorbell Projects



Ins and Outs

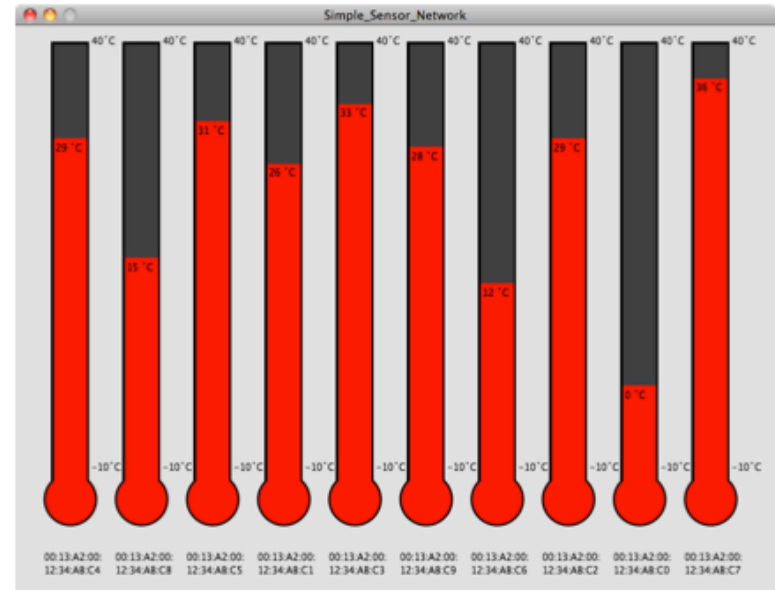
- The Story of Data
- I/O Concepts
- Romantic Lighting Sensor

$$V_{out} = \frac{R_2}{R_1 + R_2} \times V_{in}$$



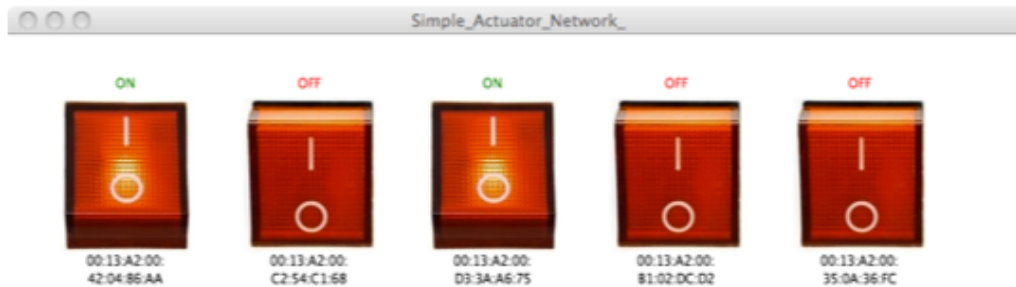
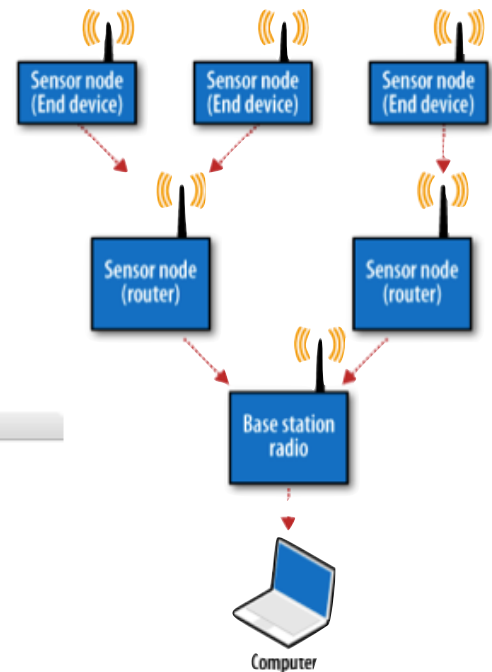
API and a Sensor Network

- What's an API?
- Protocols
- XBee API Protocol
- API Frame Types
- Simple Sensor Network



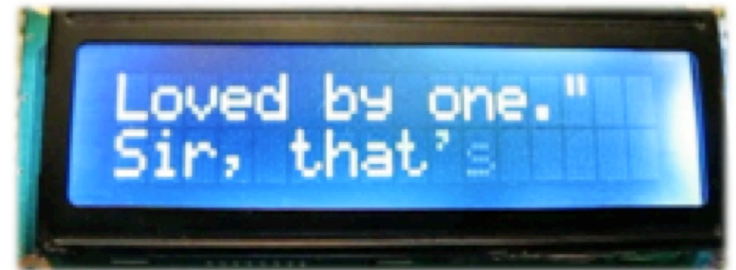
Sleeping, Then Changing the World

- Sleep Mode
- Simple Sensor with Sleep Project
- Direct Actuation
- Direct Actuation Example



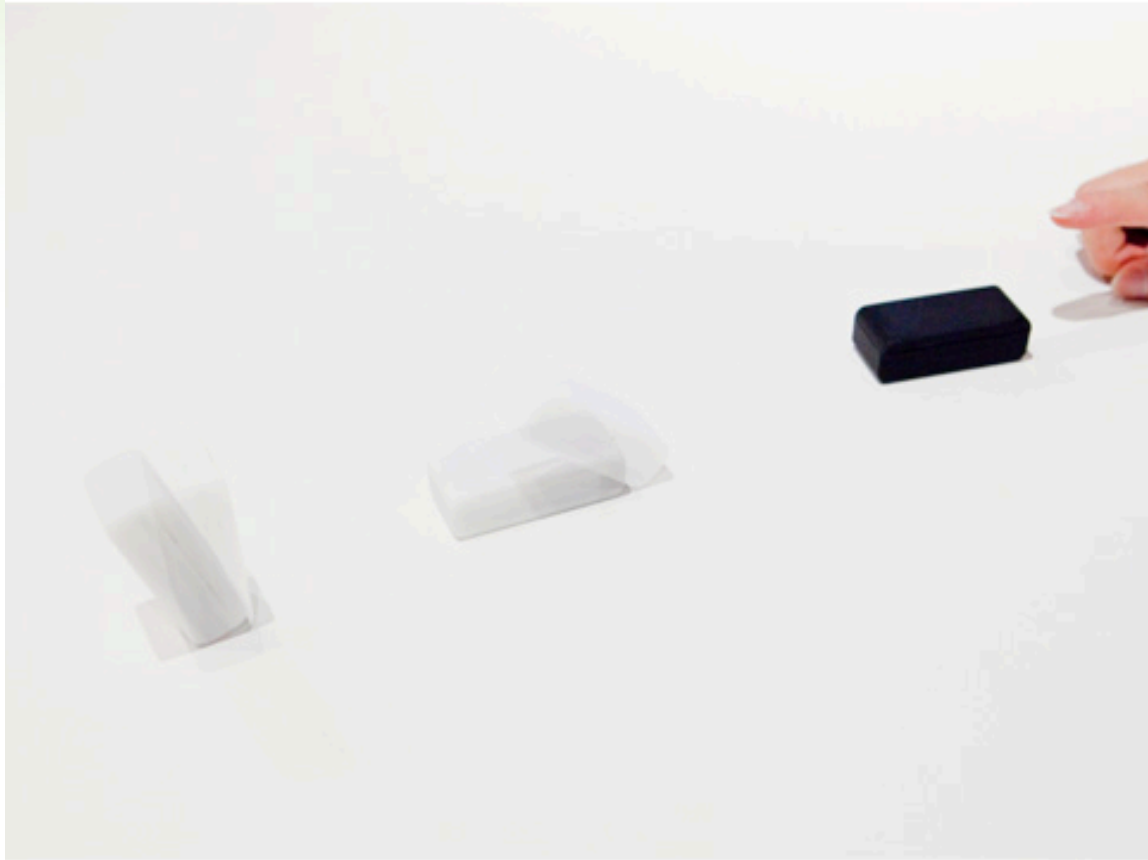
Over the Borders

- Gateways
- ConnectPorts
- Remote Management
- XBee Internet Gateway (XIG)
- Twitter Reader



Next Steps

- build things!
- tell us about great projects
- help people who are doing innovative work
- share your work
- build even more things!



Esper Domino

Jarashi Suki & IAMAS Ubiquitous Interaction Research Group

wireless digital kinetic dominoes

Esper Domino



Fun with Xbees

Rob Faludi

Collaborative Strategy Leader

rob.faludi@digicom.com

THANKS!





Luminode Light Control

Rockwell Group

full room lighting and sound control devices

Luminode

