Sociable Objects Workshop

Instructor: Rob Faludi

Plan for Today

- Romance Light Sensors: review
- API Mode continued...
    - API for I/O Mode Details
- Simple Sensor Network
- Readings & Assignments

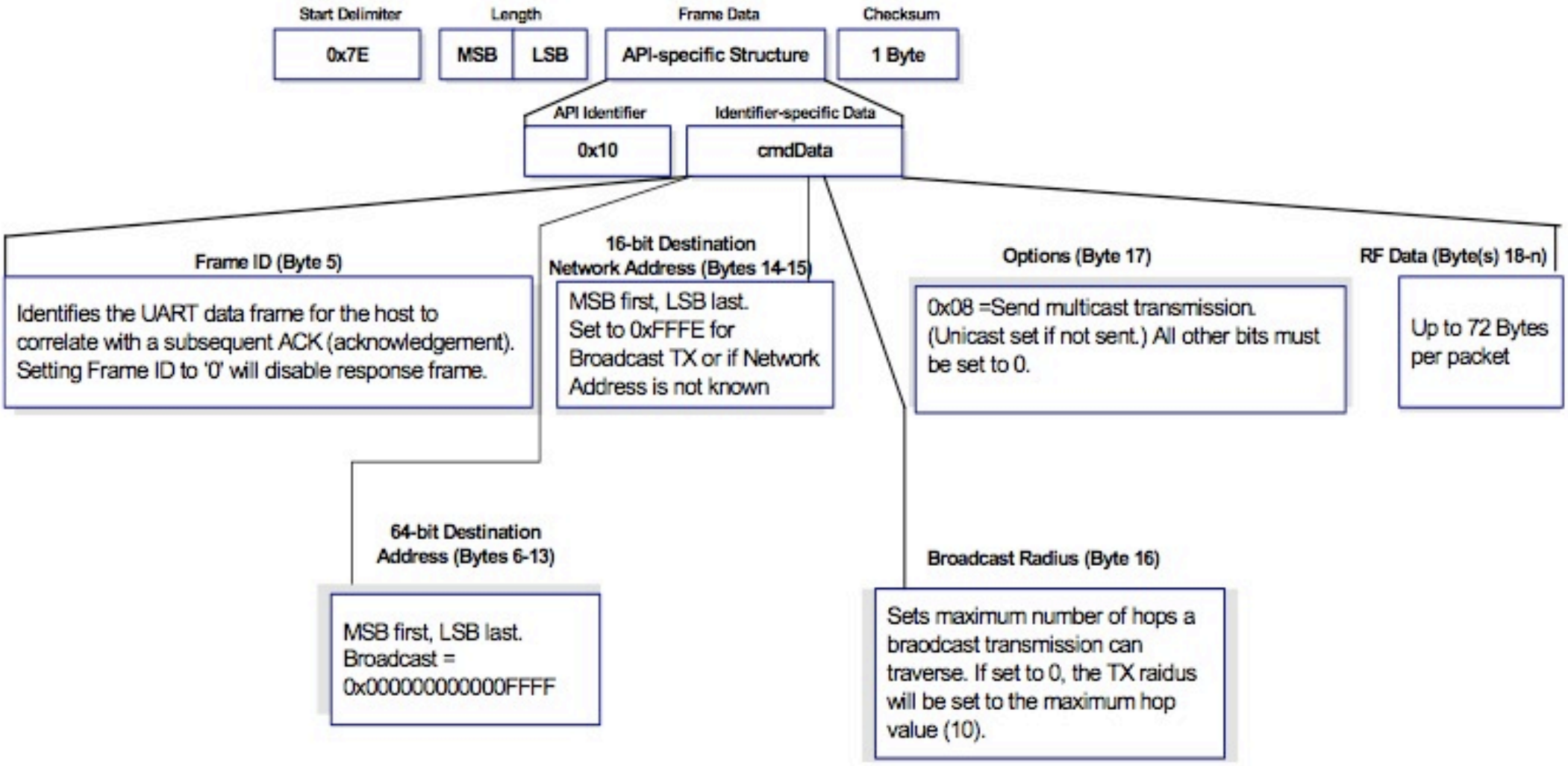
Romance Light Sensors: review

Code walk-through

More API

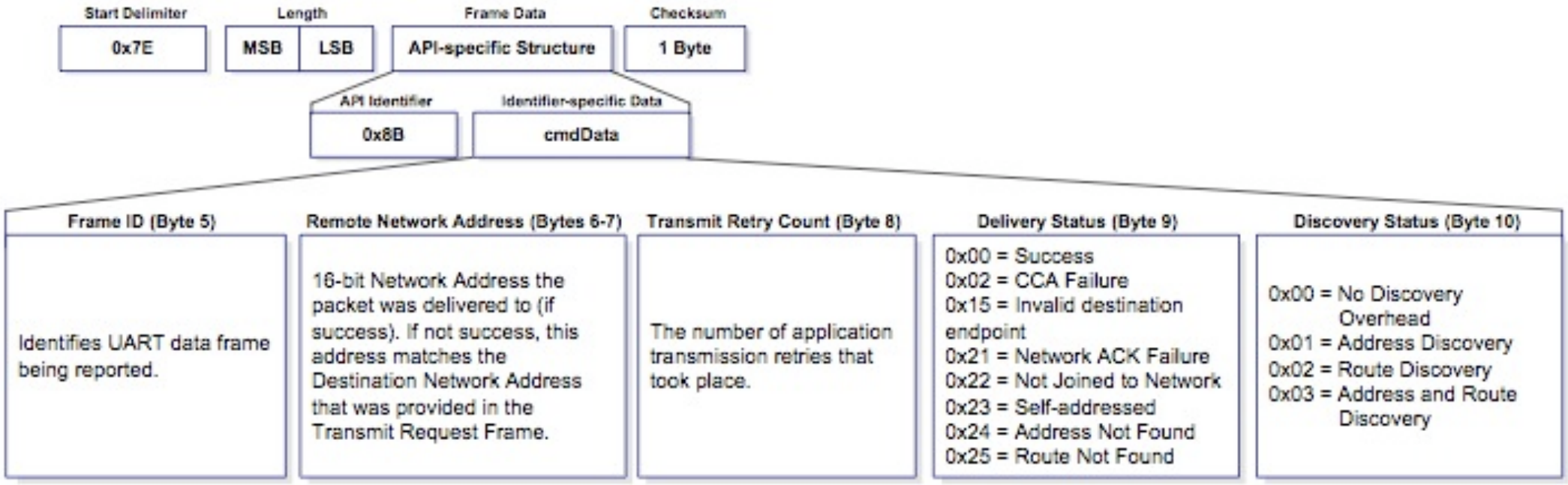
TX (Transmit) Request

- Remember that this is a request. Results can be checked by Frame ID



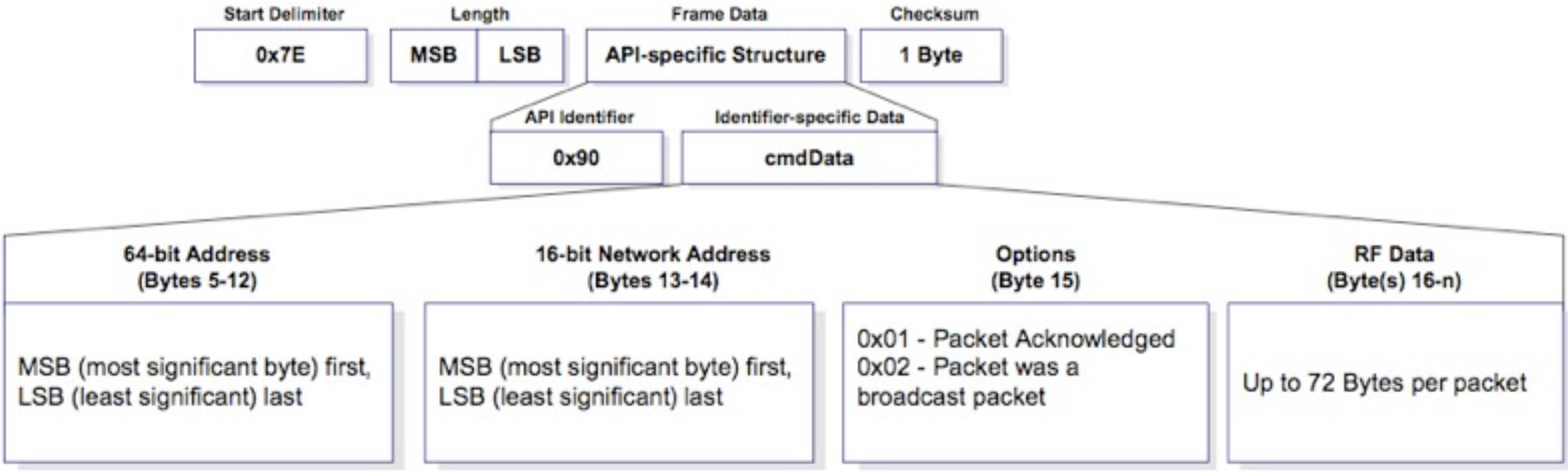
TX Status (Results)

- See if your message was transmitted or not
- Use your Frame ID to see which message is being described

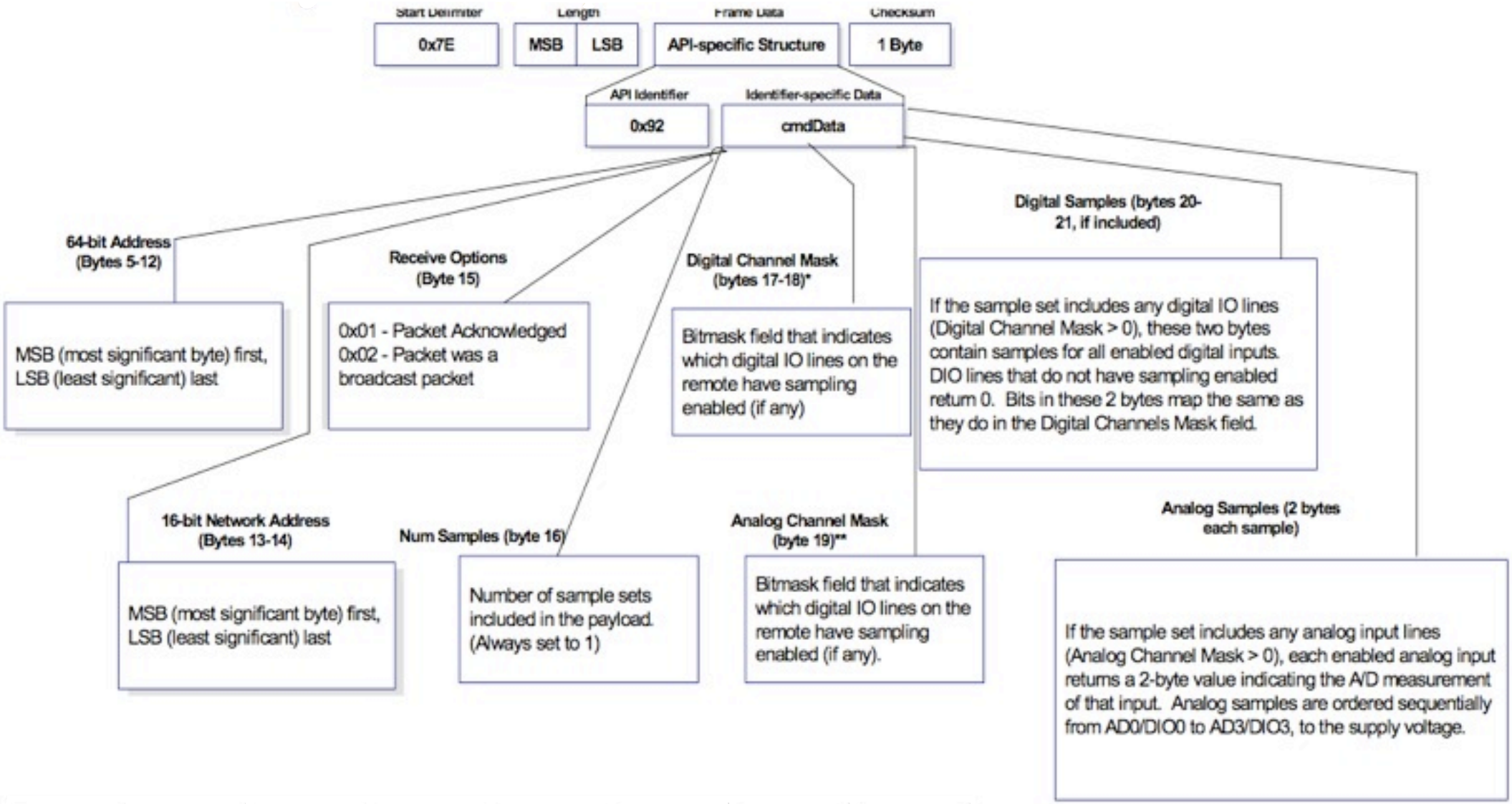


RX Packet

- Maximum of 72 bytes of data per packet
- RF Data section is basis for I/O packets



I/O RX Packet


Start Delimiter
0x7E
Length
MSB
LSB
Frame Data
API-specific Structure
Checksum
1 Byte
API Identifier
0x92
Identifier-specific Data
cmdData
64-bit Address
(Bytes 5-12)
MSB (most significant byte) first, LSB (least significant) last
Receive Options
(Byte 15)
0x01 - Packet Acknowledged
0x02 - Packet was a broadcast packet
Digital Channel Mask
(bytes 17-18)*
Bitmask field that indicates which digital IO lines on the remote have sampling enabled (if any)
Digital Samples (bytes 20-21, if included)
If the sample set includes any digital IO lines (Digital Channel Mask > 0), these two bytes contain samples for all enabled digital inputs. DIO lines that do not have sampling enabled return 0. Bits in these 2 bytes map the same as they do in the Digital Channels Mask field.
16-bit Network Address
(Bytes 13-14)
MSB (most significant byte) first, LSB (least significant) last
Num Samples (byte 16)
Number of sample sets included in the payload. (Always set to 1)
Analog Channel Mask
(byte 19)**
Bitmask field that indicates which digital IO lines on the remote have sampling enabled (if any).
Analog Samples (2 bytes each sample)
If the sample set includes any analog input lines (Analog Channel Mask > 0), each enabled analog input returns a 2-byte value indicating the A/D measurement of that input. Analog samples are ordered sequentially from AD0/DIO0 to AD3/DIO3, to the supply voltage.

I/O Digital Channel Mask and Digital Data

Digital Channel Mask (bytes 17-18)*

Bitmask field that indicates which digital IO lines on the remote have sampling enabled (if any)

*

N/A	N/A	N/A	CD/DIO 12	PWM/DI O11	RSSI/DI O10	N/A	N/A
CTS/DI O7	RTS/DI O6	ASSOC/ DIO5	DIO4	AD3/DI O3	AD2/DI O2	AD1/DI O1	AD0/DI O0

Digital Samples (bytes 20-21, if included)

If the sample set includes any digital IO lines (Digital Channel Mask > 0), these two bytes contain samples for all enabled digital inputs. DIO lines that do not have sampling enabled return 0. Bits in these 2 bytes map the same as they do in the Digital Channels Mask field.

I/O Analog Channel Mask and Analog Samples

Analog Channel Mask (byte 19)**

Bitmask field that indicates which digital IO lines on the remote have sampling enabled (if any).

**

Supply Voltage	N/A	N/A	N/A	AD3	AD2	AD1	AD0

Analog Samples (2 bytes each sample)

If the sample set includes any analog input lines (Analog Channel Mask > 0), each enabled analog input returns a 2-byte value indicating the A/D measurement of that input. Analog samples are ordered sequentially from AD0/DIO0 to AD3/DIO3, to the supply voltage.

I/O Structure Reviewed

- Num Samples (1 byte)
- Digital Channel Mask (2 bytes)
- Analog Channel Mask (1 byte)
- Two bytes of digital data IF ANY DIGITAL CHANNELS ENABLED followed by...
- ...two bytes for EACH analog channel enabled...

  - Q: How many bytes ATD02 ATD12 ATD23?

Simple Sensor Network

Simple Sensor Network: a group project

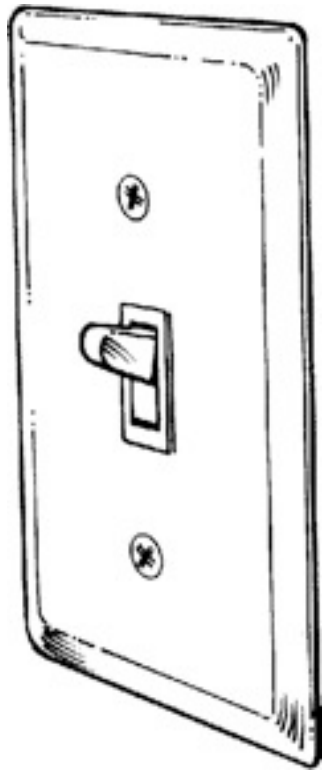
- Create a network with at least four sensor nodes and one base station
- The sensors will be *interesting* switches
- The base station will receive data from the sensors and display current readings (logging and graphical display are optional)
- Everyone will work together on this project. It needs to be done and documented by the next class

Simple Sensor Network: tasks

- switch circuit, power, diagnostic lights
- configure XBee sensors
- network design & placement
- configure XBee base and set up base computer
- software to obtain readings and display them
- overall coordination
- documentation photos
- circuit and configuration documentation
- documentation write up

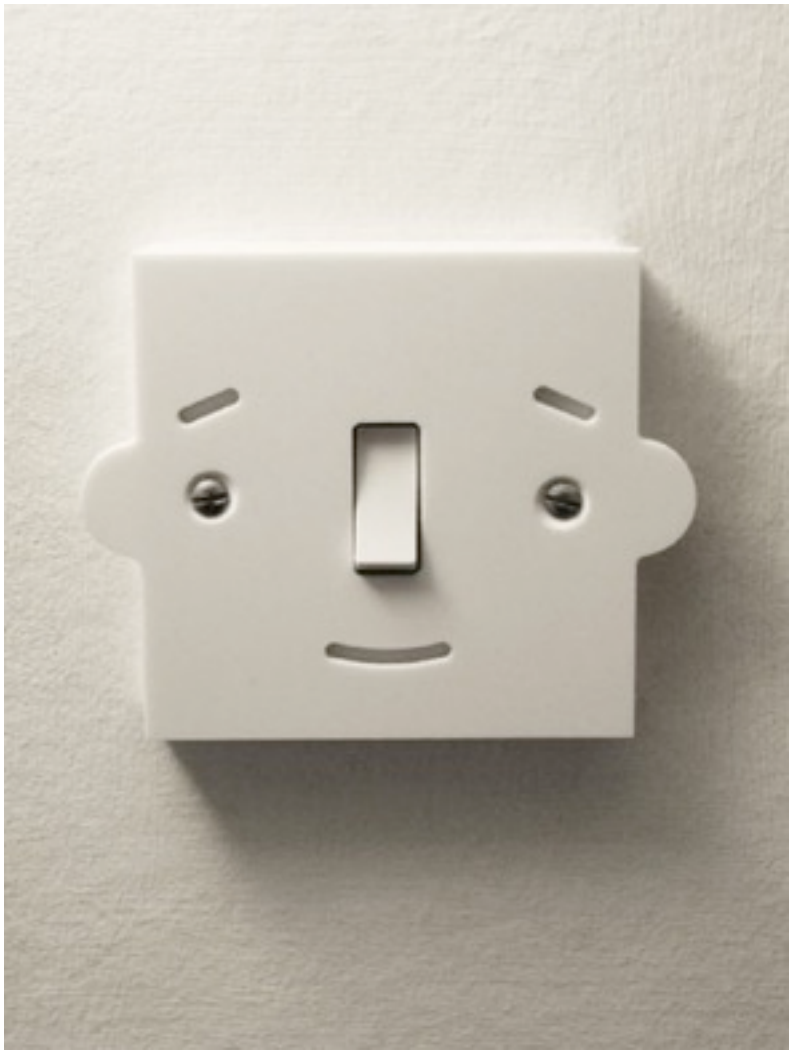
Brainstorming a Switch

- Brainstorming rules:
  - Come up with lots and lots of ideas
  - be as zany and creative as possible
  - don't critique ideas at all during the session
  - try to build upon or recombine the ideas that are already out there
- log all the ideas where your group can see them



Critiquing a Switch

- Present ideas and filter for:
  - intriguing
  - engaging
  - probability of completion
  - feasibility
  - well-enough defined



Readings and Assignments

- Readings
  - “How Management Teams Can Have a Good Fight”
  - XBee ZB Manual:
    - Chpt 8: XBee Analog/Digital I/O
    - Chpt 6: End Device Operation, especially Pin Sleep and Cyclic Sleep
- Assignments
  - Simple Sensor Network