

# **Visible Assets, Inc.**

## **RuBee™ Visibility Networks IEEE P1902.1 (Pending)**

**November 2006**

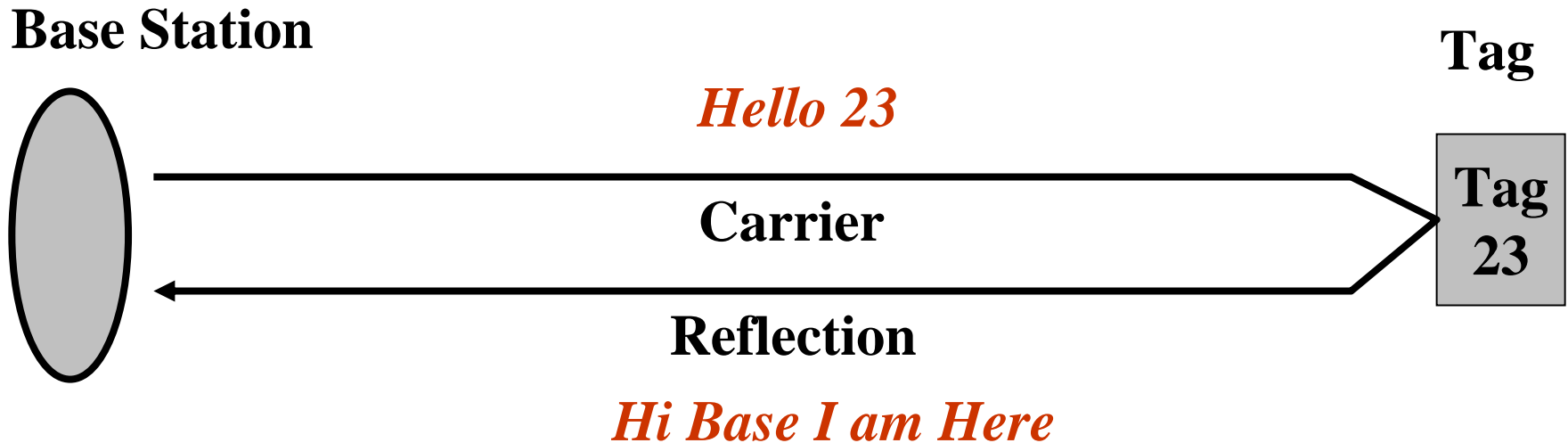
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# The Technology

Standard	WiFi 802.11	ZigBee 802.15.4	Bluetooth 802.15.1	RuBee P1902.1	RFID
Application	Voice Data	Monitor Control	Cable Replace	Visibility	Tracking
Data	1 MB +	4 -32KB	250 KB	5KB	0.1 KB
Battery Days	.5-1	10-100	1-7	4,000	NA
Bandwidth KB/s	11,000	20-150	720	1 + Clip	100
Net Size	32	No-limit	7	No Limit	48
Range M	1-300	1-100	1-10	1-30	1-5
Security	High	High	High	High	Low
Base \$	\$60-\$500	\$100-\$500	\$50	\$1 - \$200	\$500-\$1,500
Node \$	\$15-\$50	\$15-\$50	\$50	\$0.1-\$10	\$0.05-\$4

# RFID

Transponder Passive/Active Backscattered Non Radiating





# Maxwell's Equations

$$\nabla \cdot \vec{E} = \frac{\rho}{\epsilon_0} \quad (\text{Gauss' Law - electrostatics})$$

$$\nabla \cdot \vec{B} = 0 \quad (\text{Gauss' Law - magnetostatics})$$

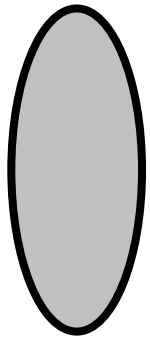
$$\nabla \times \vec{E} = -\frac{\partial \vec{B}}{\partial t} \quad (\text{Faraday's Law})$$

$$\nabla \times \vec{B} = \mu_0 \vec{J} + \mu_0 \epsilon_0 \frac{\partial \vec{E}}{\partial t} \quad (\text{Ampère-Maxwell Law})$$

# RuBee

131 KHz Battery + Crystal

**Base Station**



**Transmit TX**

*Hello 23*

**Receive RX**

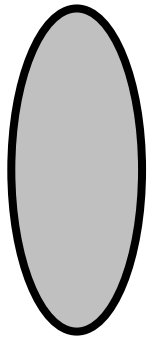
**Tag**



# RuBee

*131 KHz TCP/IP IPv6 Protocol*  
*IEEE P1902.1 – Pending*

Base Station



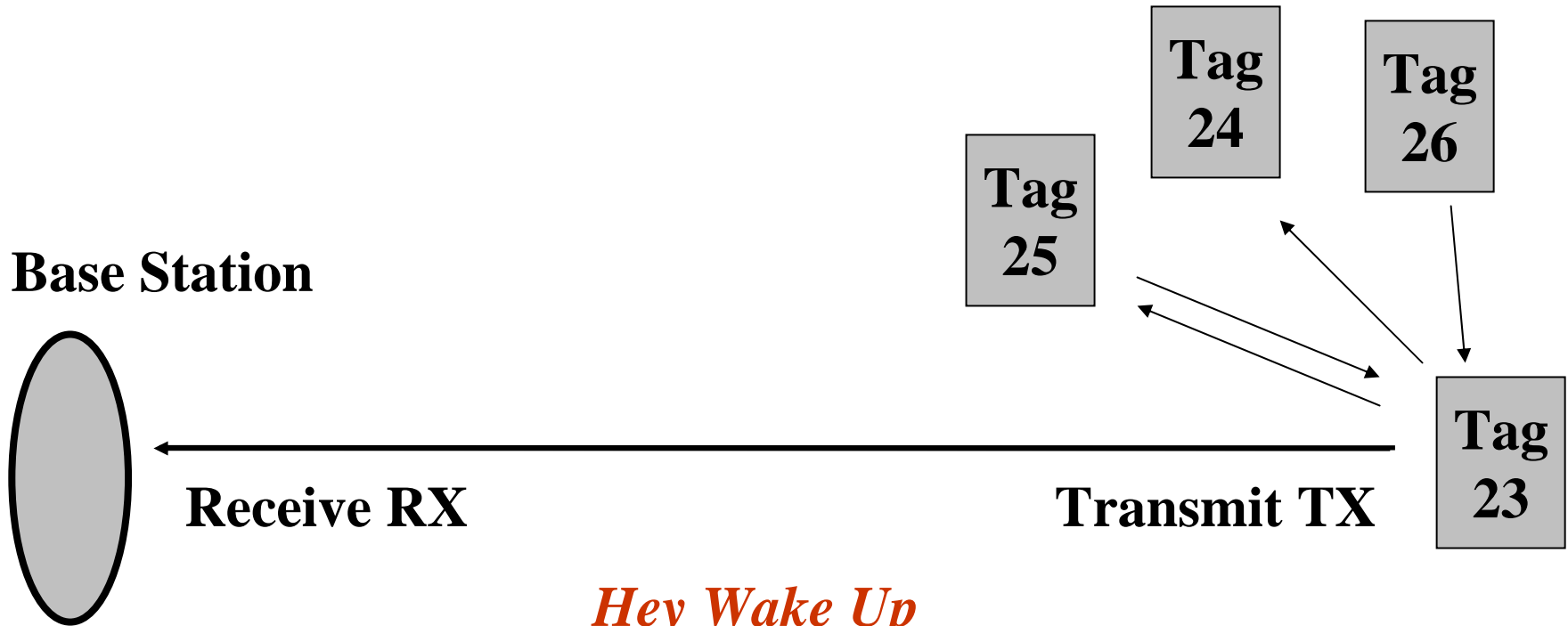
Tag

Tag  
23

*“WiFi, Zigbee, Bluetooth”*  
*802.11 abgd, 802.15.4*

# RuBee

## Peer to Peer



*Hey Wake Up*  
*Base – I'm Sick*  
*Need Help SOS SOS*

# The RuBee Tags

## Form Factors

**Rubee Smart Tags**  
**2mm - 0.78mm thick**





# The RuBee Tags

## The Data



<b>Tag IP</b>	<b>11.11.11.00</b>
<b>Tag Subnet</b>	<b>11.11.11.1</b>
<b>MAC:</b>	<b>77-AC-D8-9A-99-AC</b>
<b>Object Name</b>	<b>Hip 23678</b>
<b>Size</b>	<b>23mm x 18mm</b>
<b>Birthdate</b>	<b>11/23/2004</b>
<b>Expirydate</b>	<b>11/2007</b>
<b>Serial Number</b>	<b>6778895</b>
<b>Lot Number</b>	<b>7878789905</b>
<b>Manf. Site</b>	<b>Ireland</b>
<b>Manufacture</b>	<b>Medco</b>
<b>CRC</b>	<b>34567</b>

# RuBee

## Selective Encrypted Security

Rijndael (AES), LZW,  
Eliptic, PGP, TWOFISH,  
BLOWISH, CAST,  
MARS, TEA

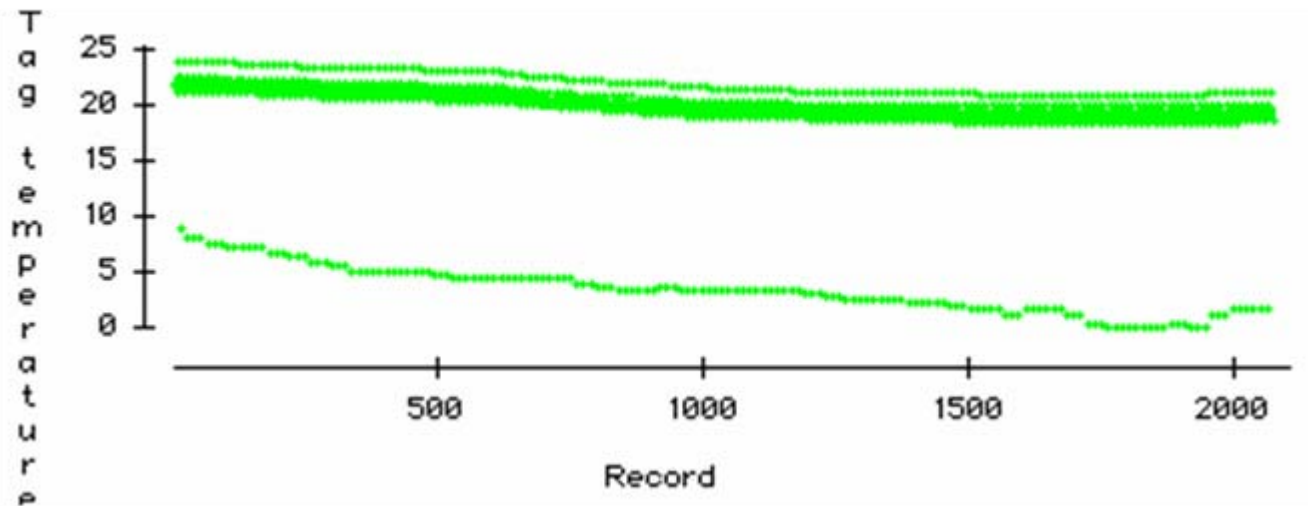
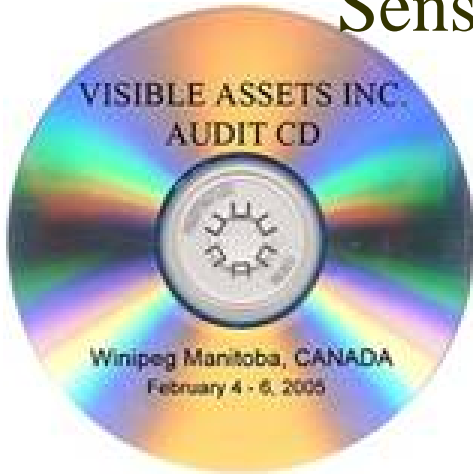


←	kapn	←	John
→	JsgH	→	John
→	Agtd	→	John
→	Htua	→	John

**Single Use Key or OTP**

# The RuBee Tags

## Sensors + Temperature Data Logs



# RuBee Routers and Dot-Tag Servers



# Safety

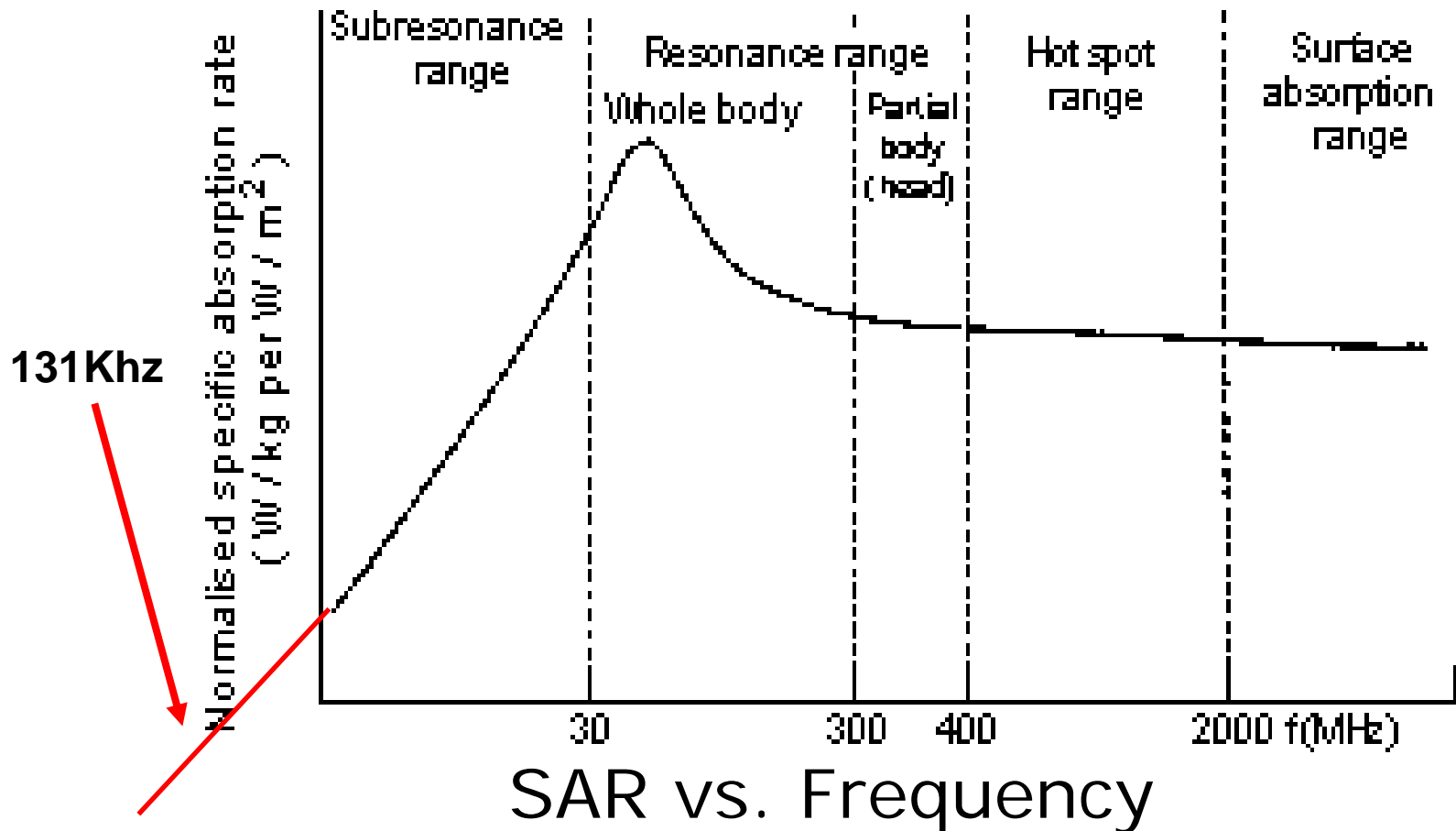
## **RuBee Max Field Strength**

**E = 40 nanowatts**

**B = 800 milligauss**

# OSHA Specific Absorption Rate

IEEE C95.1 Absorbed power in Watts/kg



# Rubee P1902.1 Summary

- ✓ **Long Battery Life**
- ✓ **Long Range**
- ✓ **Volumetric Reads**
- ✓ **Noise Immunity**
- ✓ **Liquid Immunity**
- ✓ **Steel Friendly**
- ✓ **High Security**
- ✓ **High Safety**
- ✓ **Competitive Costs**