



PRESENTS

NETWORLD INTEROP



Bluetooth & Beyond: Wireless Networks for Industrial Applications

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Background

 Aeroquip

Roadranger

EATON

Diversified Industrial Company
Multiple Wireless Applications

- Industrial
 - Power Distribution & Protection
 - Controls & Automation
 - Sensors
- Automotive
- Truck
- Fluid Power
 - Aerospace
 - Mobile



VICKERS



 Cutler-Hammer

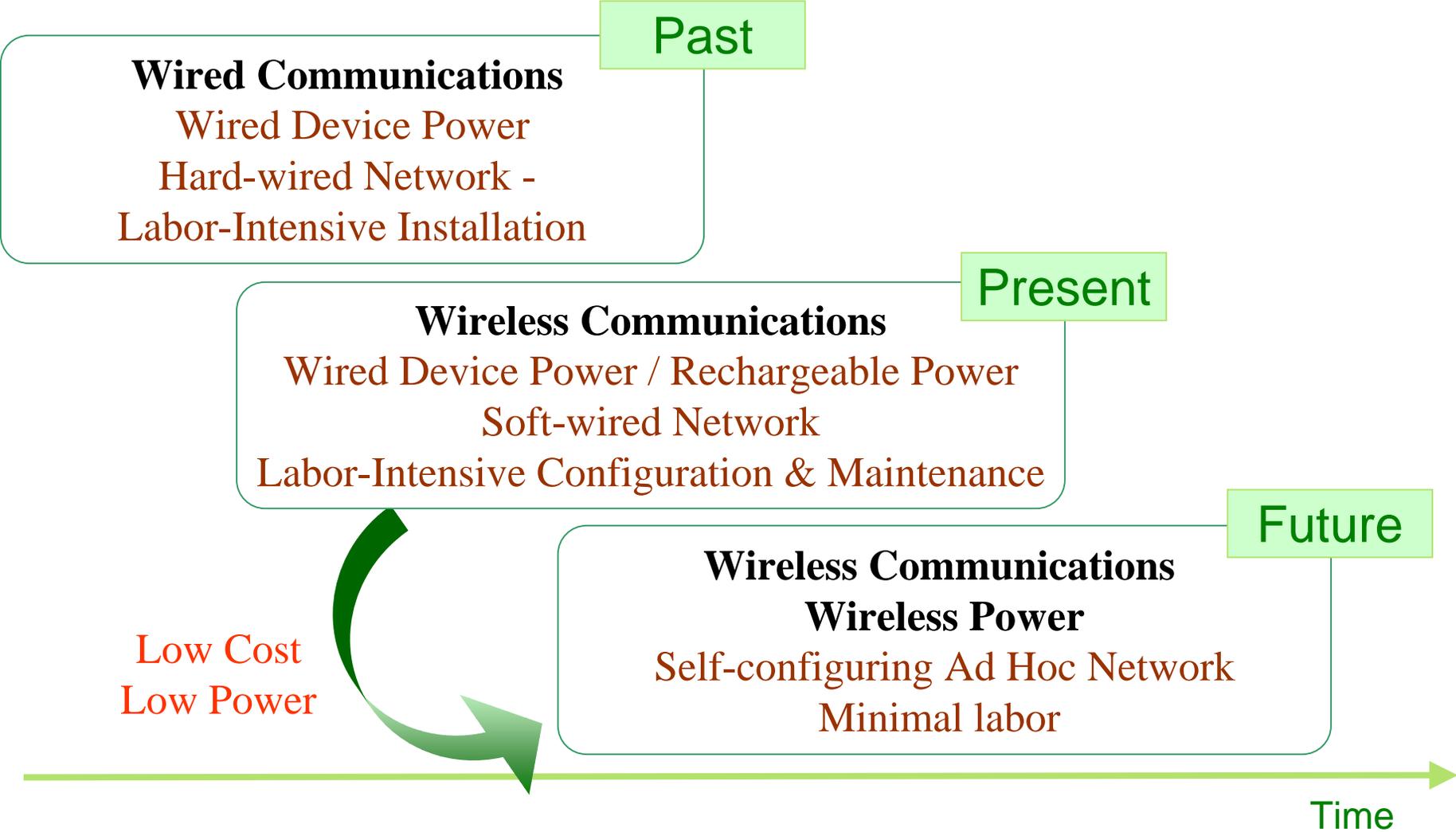
Eaton
VORAD



Fleet Advisor

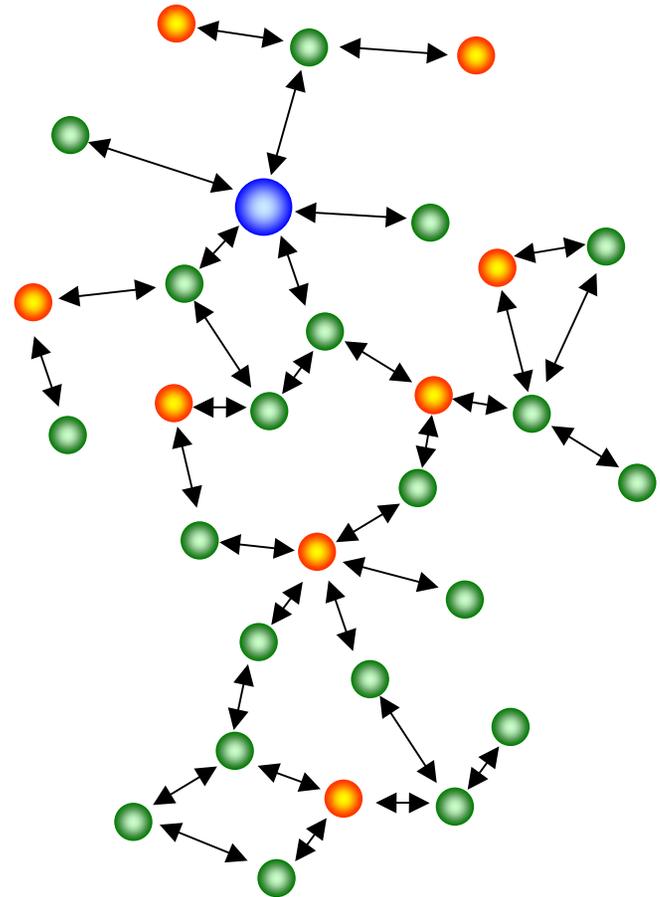


Industrial Communications - Trends

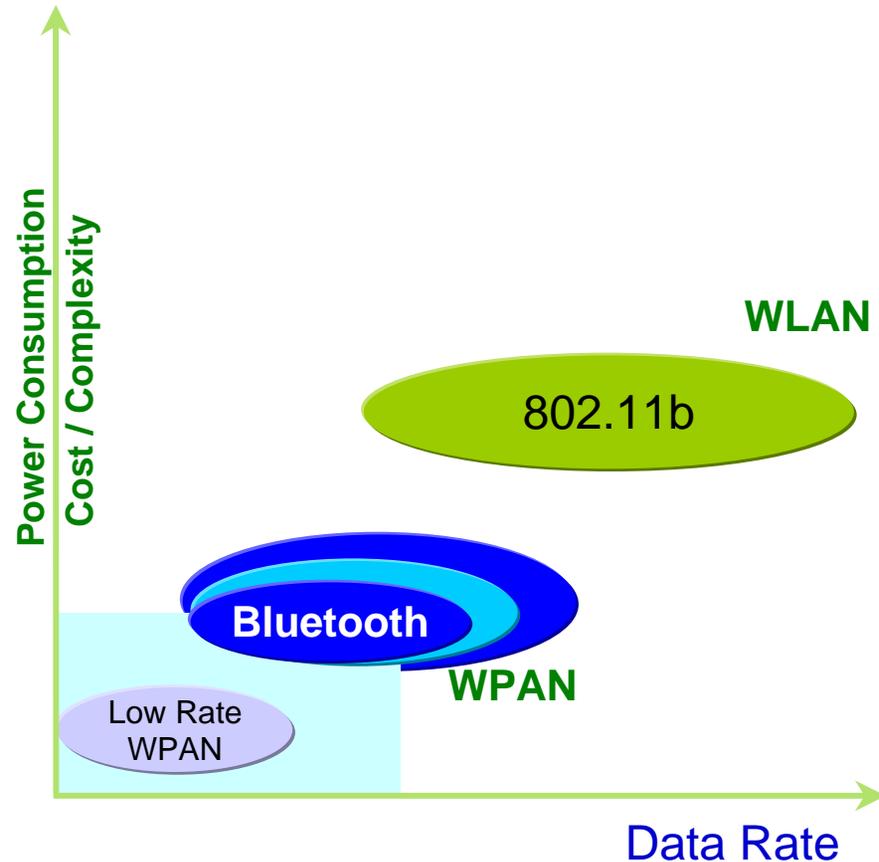


Industrial WPAN Market Focus

- Low Cost
 - \$1 / node enables new opportunities
 - fast retrofit
 - Self-configuring - Reduced labor
- High Reliability
 - No connectors
 - Robust Operation
 - Self-healing
 - Multiple years of battery life
- Application Domain
 - Safe/Flexible connectivity
 - Low data rate
 - Low traffic applications

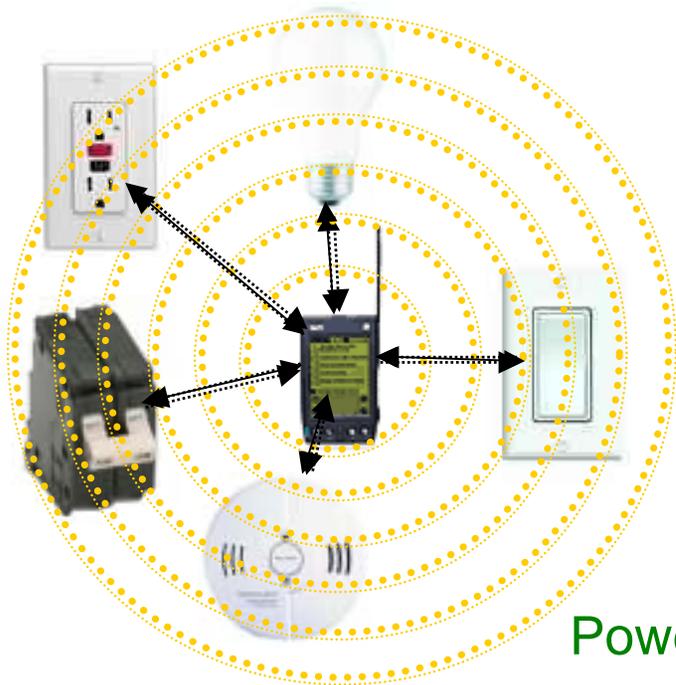


Technology Options - Beyond Bluetooth



	LR-WPAN	Bluetooth™	WLAN
Range	10 m	~10 - 100 m	~100 m
Data Throughput	< 0.1 MBPS	1 MBPS	~2-11 MBPS
Power Consumption	< BT / 10	BT	> BT
Size	Smallest	Smaller	Larger
Nodes/Net	>>BT	BT	>BT
Cost	~\$1	~\$10-\$15	~\$40

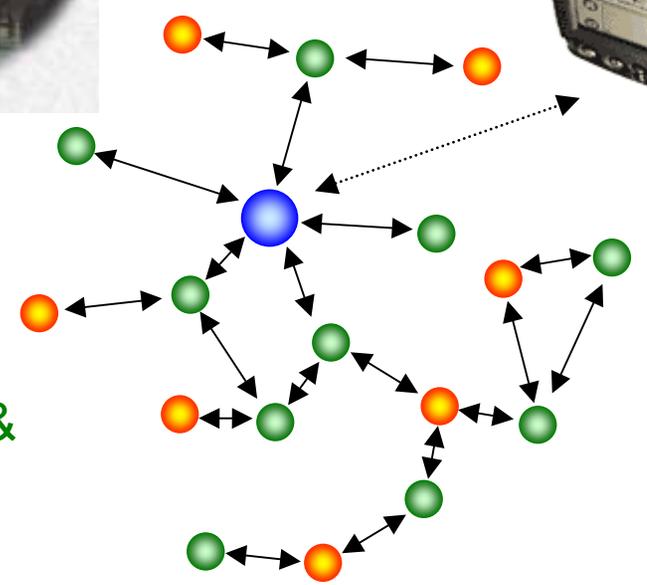
Most industrial applications require lower cost and device power than mainstream wireless technology can achieve



Power Management & Monitoring



Diagnostics



Sensors & Actuators Control

Plant Automation



LR-WPAN - Application Requirements

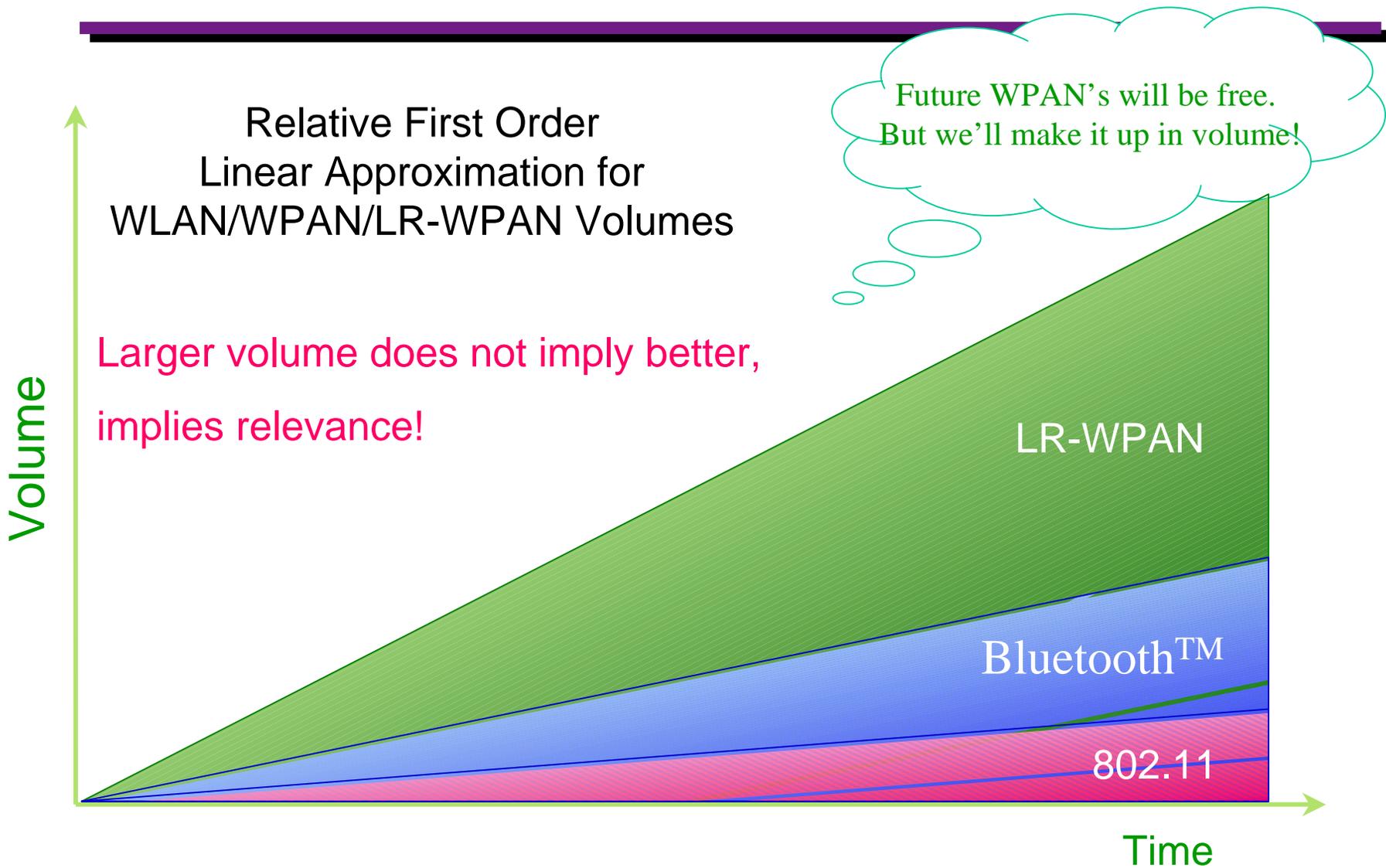
Our Applications DO require

- **Very Low Power Consumption**
 - Disposable wireless sensors
 - Long-battery life (month to years)
 - Parasitic devices
- **Low Cost**
 - Automotive applications
- **Robustness in industrial & vehicular environments**
 - Temperature
 - Vibration
 - Humidity, EMC, etc

Our Applications do NOT require

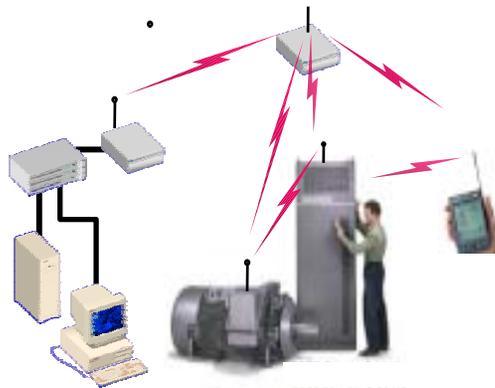
- **High Data Rate**
- **High Duty Cycles (Real-Time)**
- **Long Ranges**
- **High Level of Security**
- **Connection Handling: Hand-off**

LR-WPAN - Market Forecast



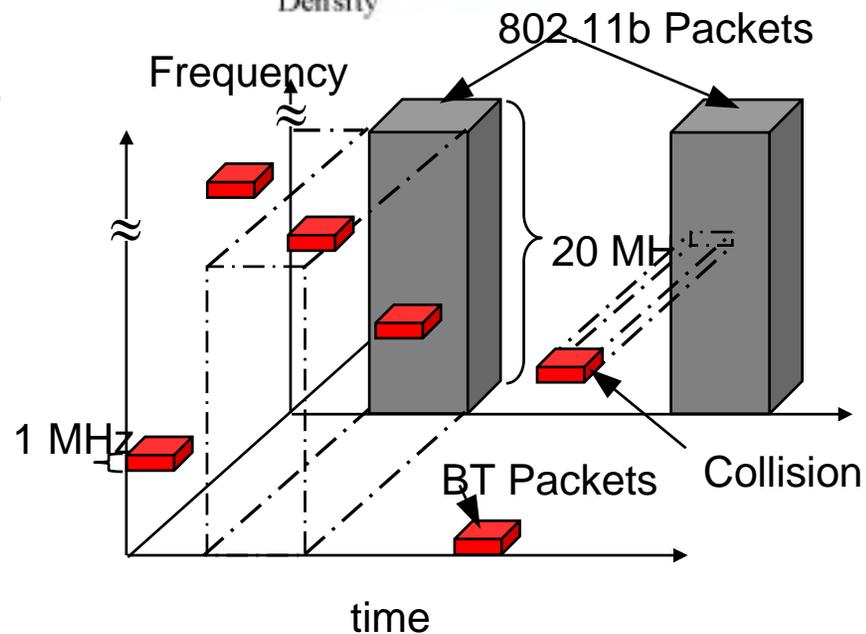
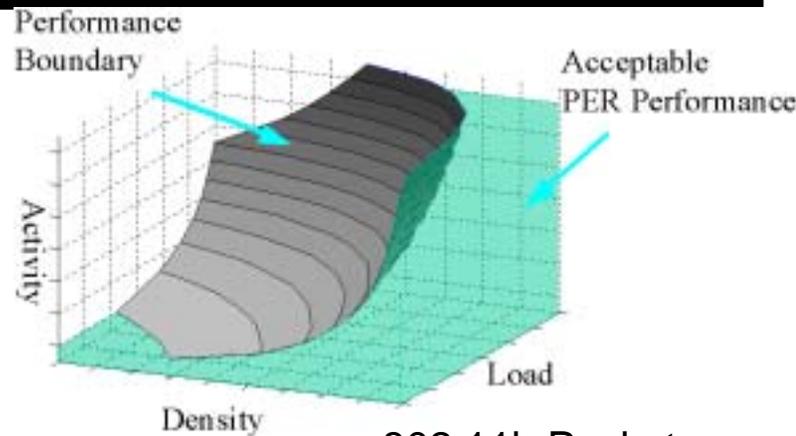
Issues

- **Interoperability**



- **Coexistence**

- Need to expand the coverage of previous coexistence studies to address different application scenarios.
- LR-WPAN is not expected to have significant coexistence issues:
 - Use of Multiple bands
 - Low Tx Power
 - Low Duty Cycle



Conclusions

- **One technology does not fit all applications.**
 - **Separate Standards for different market spaces.**
 - **Bluetooth has its own market space (although it is being stretched)**
- **LR-WPAN is a new Non-Competing technology that complements the range of wireless technologies available.**
- **Creation of a LR-WPAN technology improves Bluetooth focus.**
- **LR-WPAN is an enabler of several industrial applications requiring low-cost, low-power wireless connectivity.**
- **IEEE's efforts are focused in solutions that the industry can use effectively**
- **Eaton Corp. will continue to support WPAN technology with a major emphasis in maintaining its leadership in LR-WPAN.**

Thanks

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