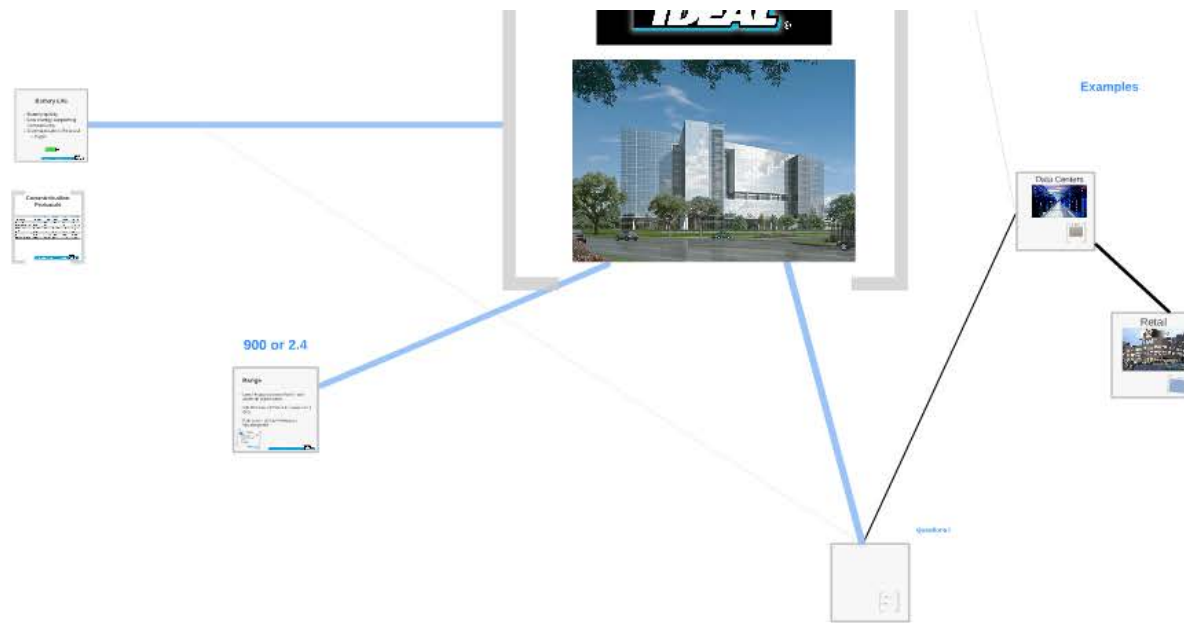


Wireless HVAC and Lighting Control Ready for Prime Time?





Wireless HVAC and Lighting Control Ready for Prime Time?

Market Drivers for HVAC & Lighting Control

- Reduce energy consumption
- LEED certification/Green initiatives
- Regulatory requirements
- Increased automation
- Remote monitoring/control
- Improved occupant comfort



ADVANCED WIRELESS SOLUTIONS BY



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What's Holding Us Back?

- Reliability

- Reliability
- Maintenance
- Security
- Manufacturer Risk
- Cost
- Fear of New Technology
- Is it the right choice? Betamax
- Scalability
- Ease of integration
- Available Sensor Types

Wired or Wireless?

	Wireless	Wired
Hardware Cost	✗	✓
Installation Cost	✓	✗
Installation Time	✓	✗
Flexibility	✓	✗

	Wireless	Wired
Hardware Cost	x	✓
Installation Cost	✓	x
Installation Time	✓	x
Flexibility	✓	x
Maintenance	x	✓
Least Invasive	✓	x

900 or 2.4

Range

- Lower frequencies travel further and penetrate objects better
- 900 MHz has 2.67 times the range of 2.4 GHz
- Path Loss = $20 \log(4\pi * \text{distance} / \text{Wavelength}) \text{dB}$



Reliability



- 2.4GHz is crowded = higher probability of interference
 - BlueTooth
 - WiFi
 - Small appliances
 - Home phones



Battery Life

- Battery quality
- Low energy supporting componentry
- Communication Protocol
 - mesh



Communication Protocols

	IDEAL	Wi-Fi	Zigbee	KNX-RF	EnOcean
Technology	Proprietary	Standard	Standard	Standard	Standard
Interference	Low	High	High	Low	Low
Power Consumption	Very Low	High	Low	Low	Harvesting
Battery Life	25 years	N/A	2+ years	3+ years	N/A
Range	300 ft	100 ft	100 ft	300 ft.	300 ft
Band	900MHz	2.4GHz	2.4 GHz	800MHz	900MHz
Bandwidth	140KHz	20-40 MHz	5 MHz	300 KHz	280 KHz
Network Topology	Ad-hoc	Point2hub	Mesh	Ad-hoc	Ad-hoc

When Wireless Makes the Most Sense



Retrofit

- Opening walls/ceilings is impractical or not cost effective
- Time Sensitive: Need to complete install with least disruption to operations
- Asbestos: Having to open walls can expose occupants to dangerous asbestos or may incur high asbestos abatement costs

Flexibility

- Frequent space reconfiguration for retail purposes
- Tenant turnover in other commercial spaces
 - Property Manager



Aesthetics

- Nobody wants to look at wires
- The forward trend is towards sleek, wireless products

ADVANCED WIRELESS SOLUTIONS BY



Aesthetics

- Nobody wants to look at wires
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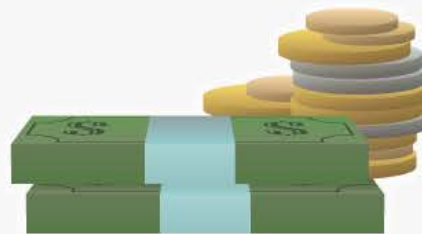
Running long wire through buildings is ultimately cost prohibitive



ADVANCED WIRELESS SOLUTIONS BY



Running long wire
through buildings is
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Examples

Data Centers



Hospitals



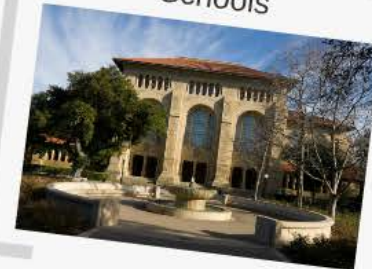
Hospitals



Retail



Schools



Schools





Questions?

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