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DE MÁLAGA

Wireless Sensor Networks and the Internet of Things:

Do We Need a Complete Integration?

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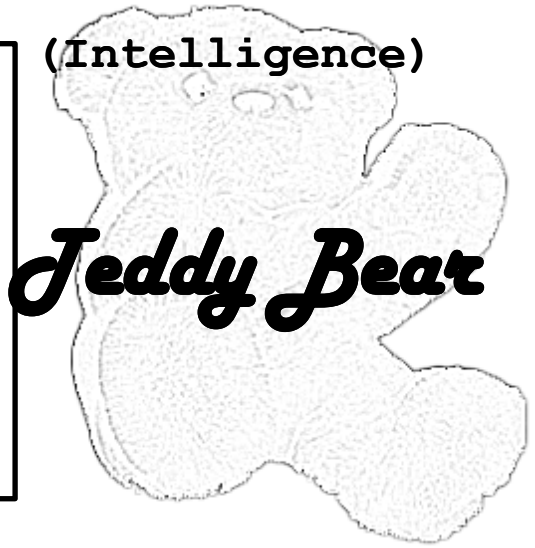
IoT, Sensor Networks

Precioso osito de peluche de 35 cms, suave y blandito, ideal para decorar la habitación de bebé, como regalo de nacimiento o para el primer cumpleaños. Ver más

Imagenes: Feli (http://ftapigo.blogspot.com/), decoraciona.com, decorailumina.com, decoracion.in

FEATURES

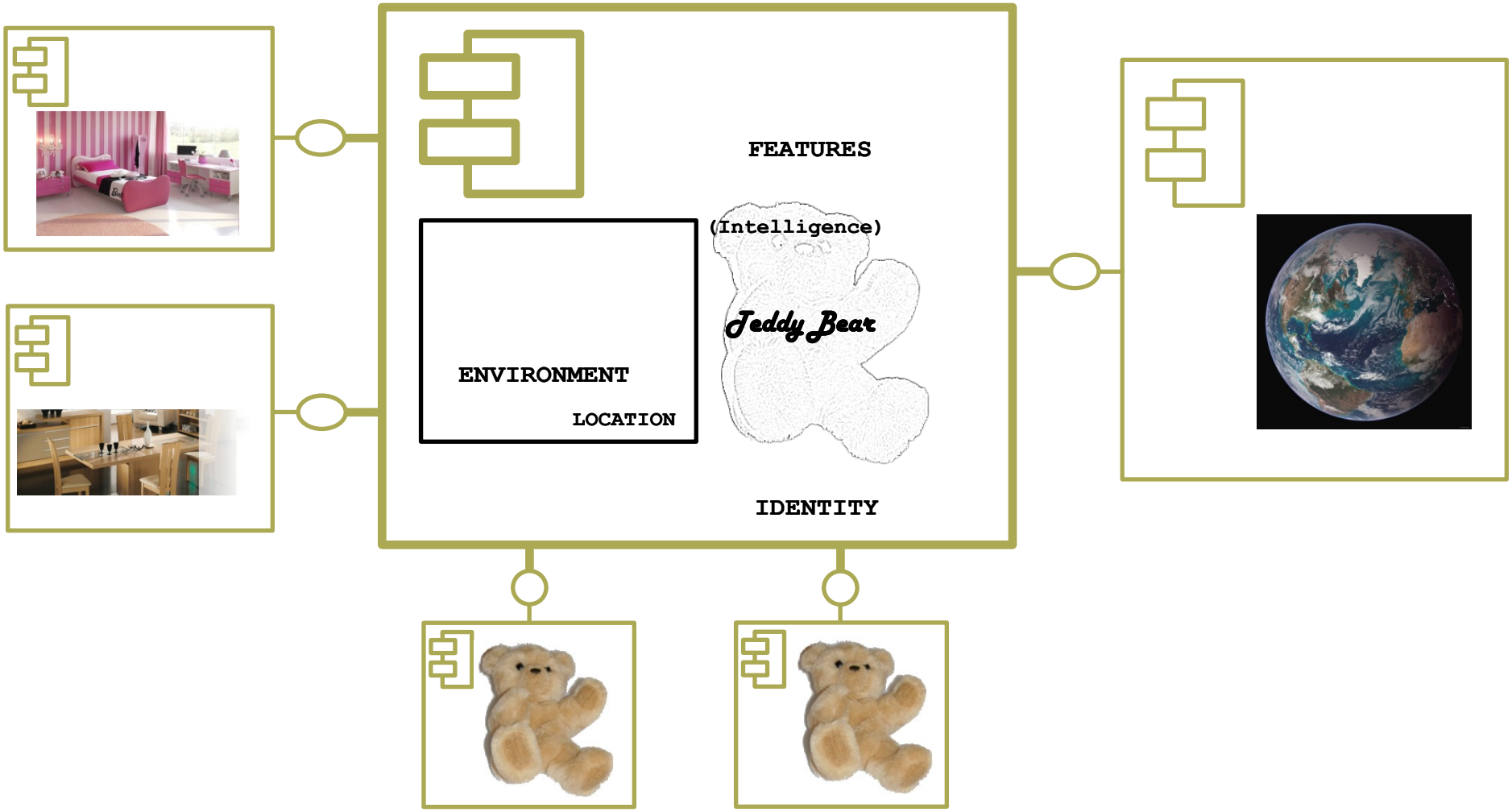
(Intelligence)

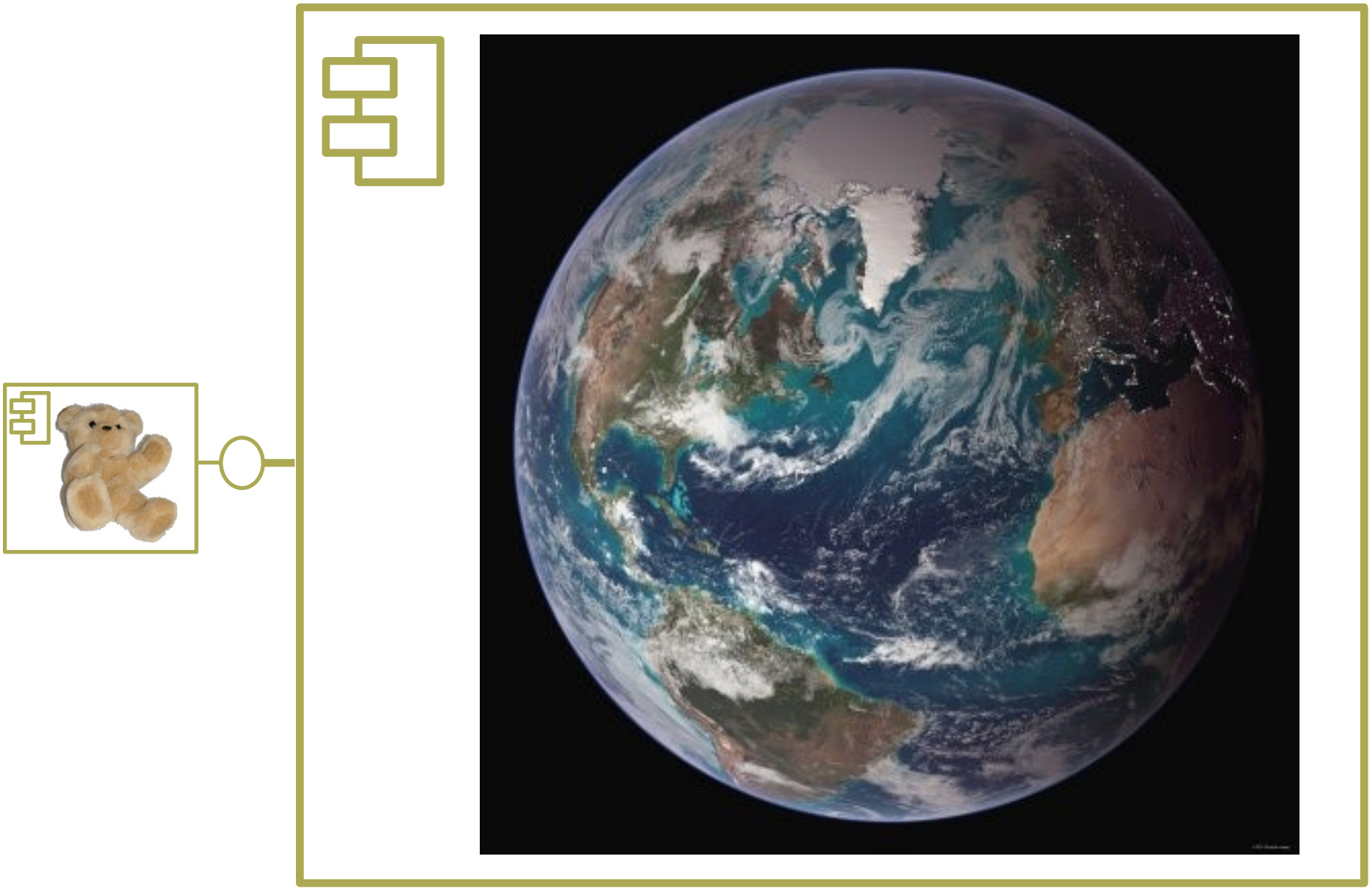


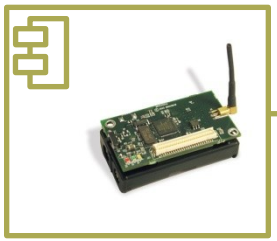
ENVIRONMENT

LOCATION

IDENTITY

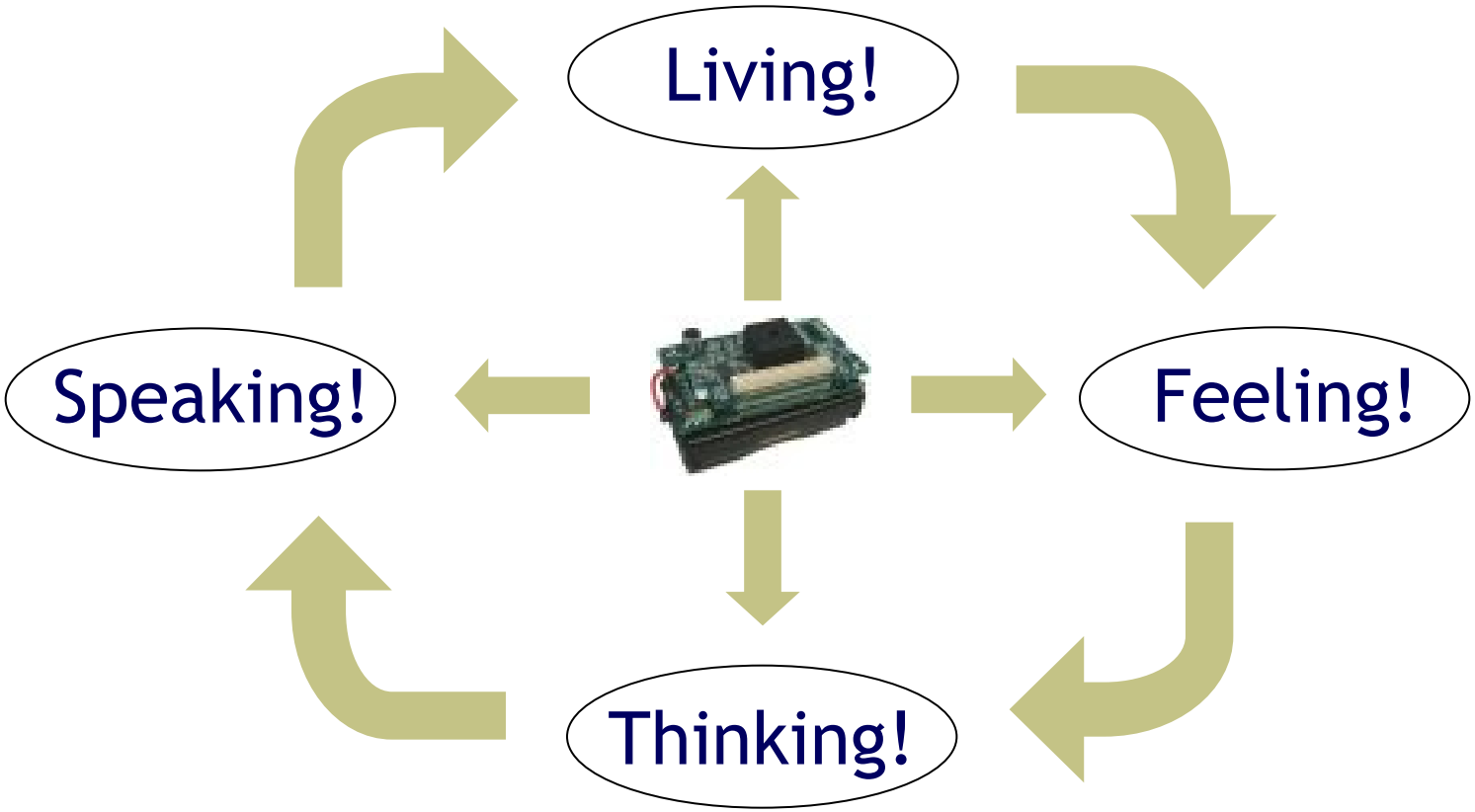

FEATURES
(Intelligence)
Teddy Bear
ENVIRONMENT
LOCATION
IDENTITY





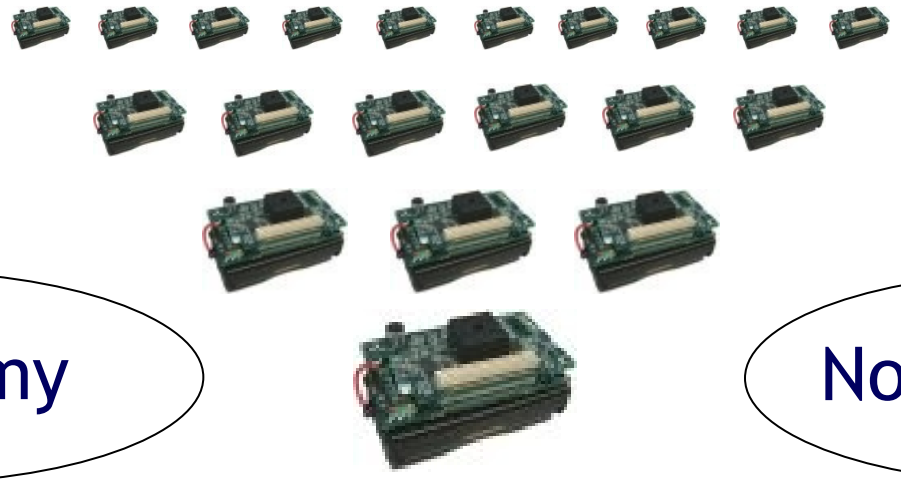
Wireless Sensor Networks (and the IoT)

…Sensor Nodes!...



...WSN?...

…WSN!



Autonomy

Not Expensive

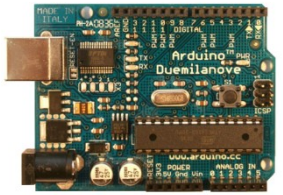
Lifetime

Easy to deploy

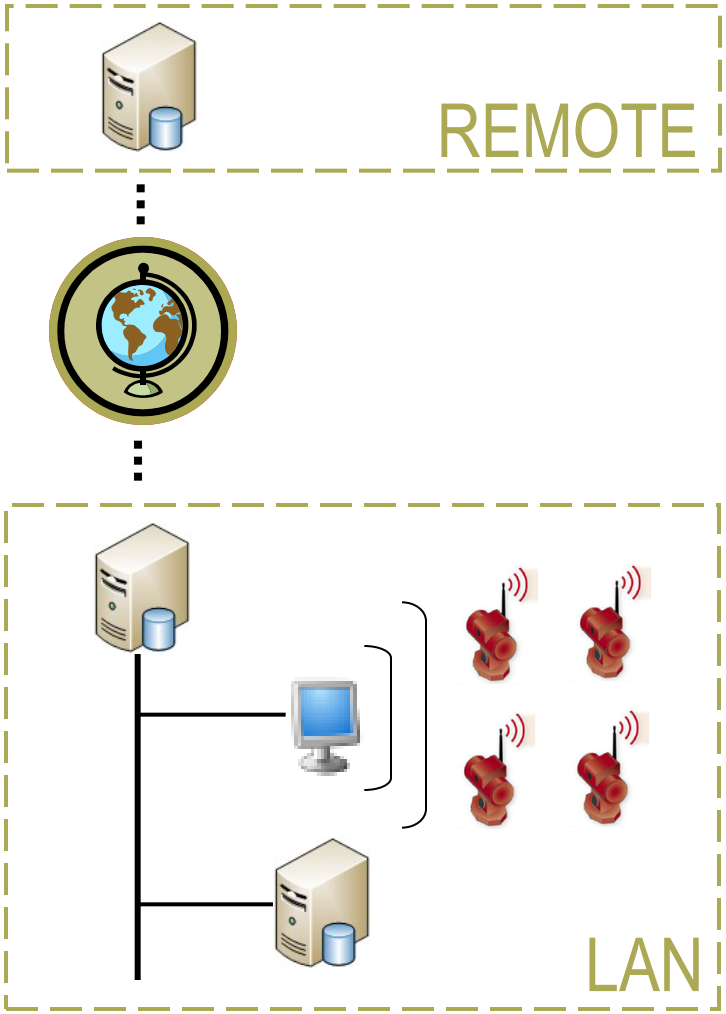
Self-*

Sensor Nodes Features?

	Speed	RAM	ROM	Energy
Class I	4 Mhz	1 KB	4-16 KB	1.5 mA
Class II	4-8 Mhz	4-10 KB	48-128 KB	2-8 mA
Class III	13-180 Mhz	256-512 KB	4-32 MB	40 mA



Connecting WSN ↔ Internet

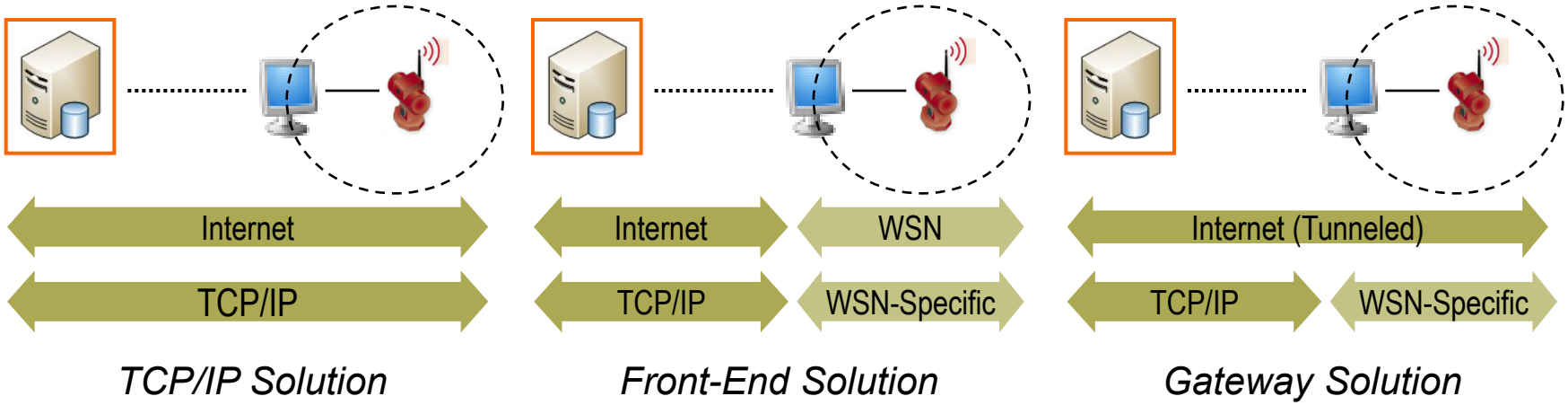


IETF

IPv6

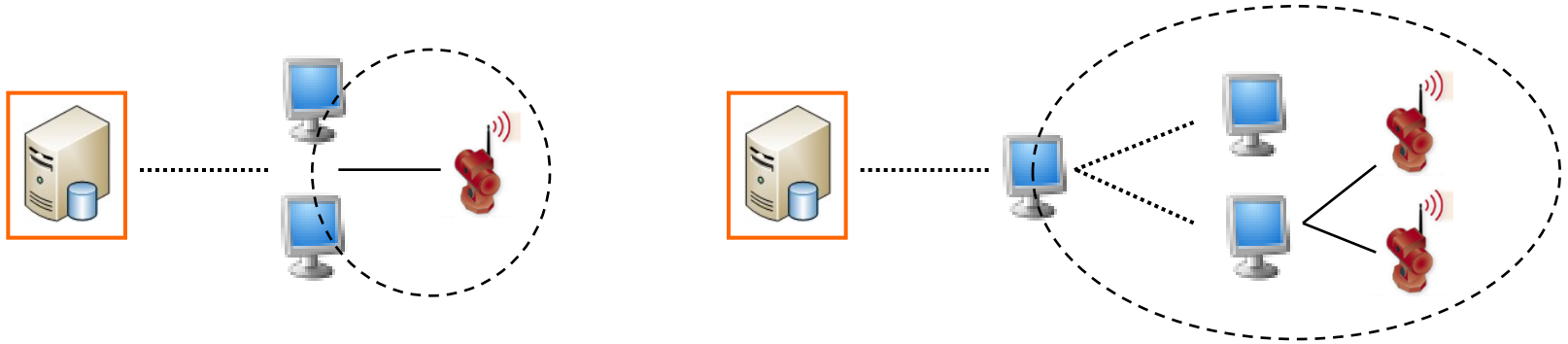
6LoWPAN

Integration Strategies



TCP/IP Solution *Front-End Solution* *Gateway Solution*

Stack-Based Approaches



Hybrid Solution *Access Point Solution*

Topology-Based Approaches

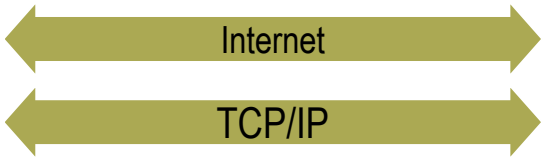
When should we integrate WSN – IoT?

What we need to consider?

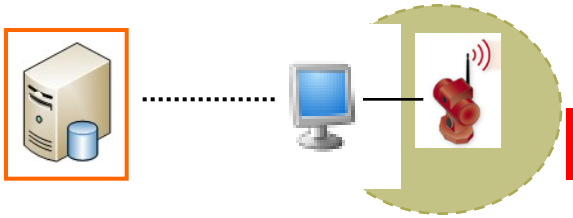
Factors to consider on the Integration WSN-IoT

Integration Strategies – Security Factors

Entity Authentication/Authorization



TCP/IP Solution

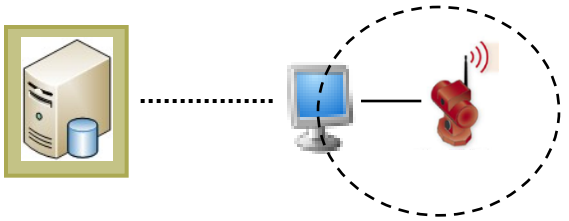


Distributed?

Efficient? (TLS? Kerberos?)

Front-End Solution

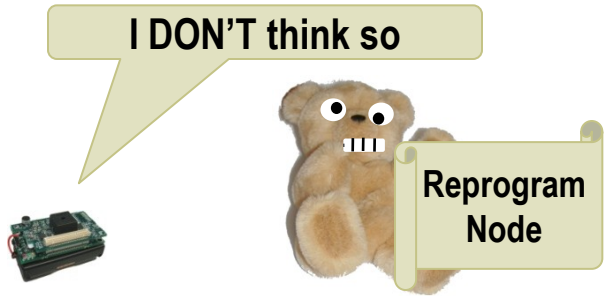
WWW/Other

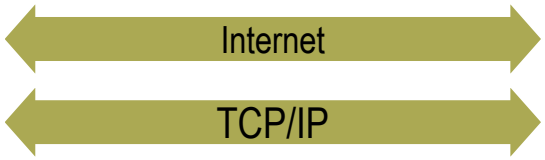


Trust the B.S.

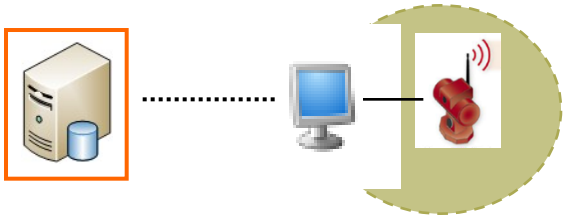
Integration Strategies – Security Factors

Access Control





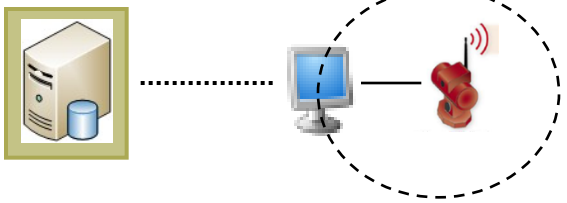
TCP/IP Solution



…

Front-End Solution

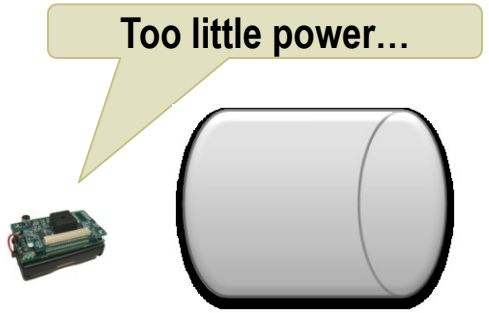
ACL, AC,…

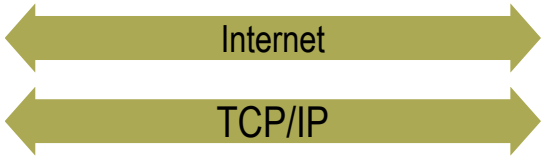


Trust the B.S.

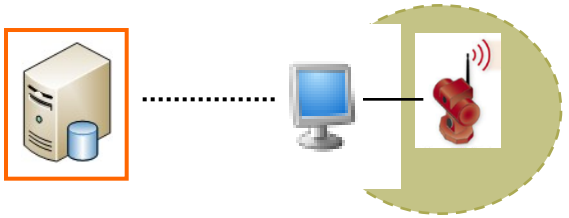
Integration Strategies – Security Factors

Secure Communication





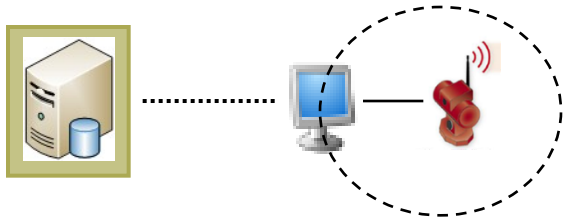
TCP/IP Solution



TLS? IPsec?

Front-End Solution

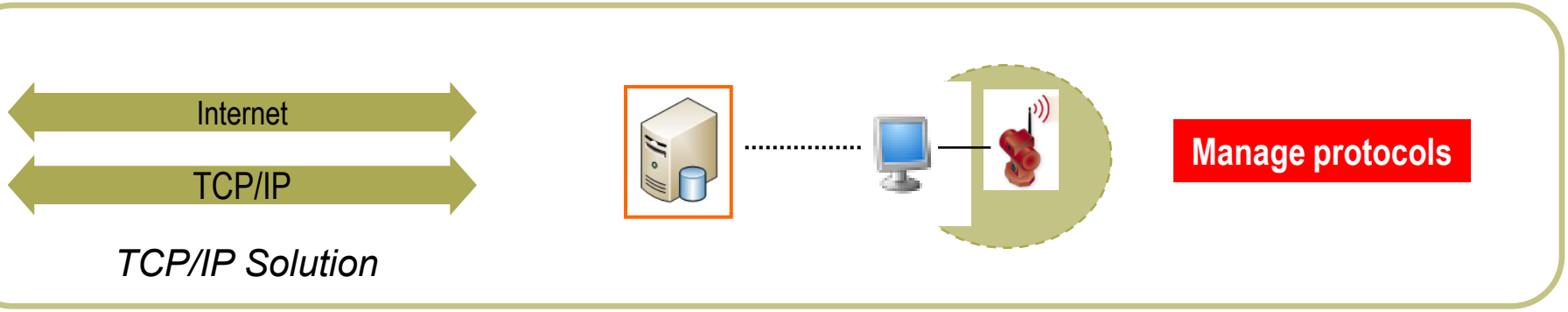
TLS, IPsec



Standards

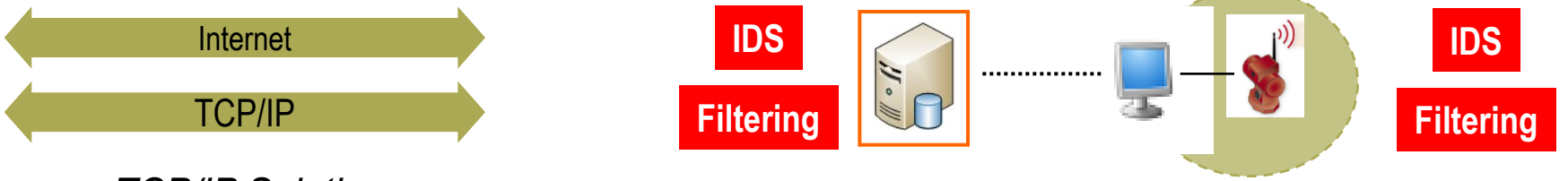
Integration Strategies – Security Factors

HW Capabilities



Integration Strategies – Security Factors

Resilience

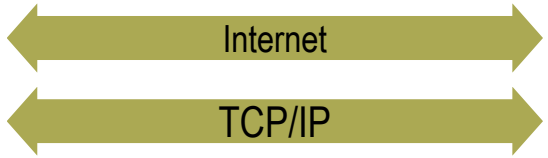


TCP/IP Solution

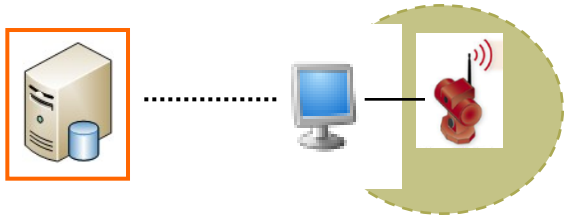
Front-End Solution

Integration Strategies – Security Factors

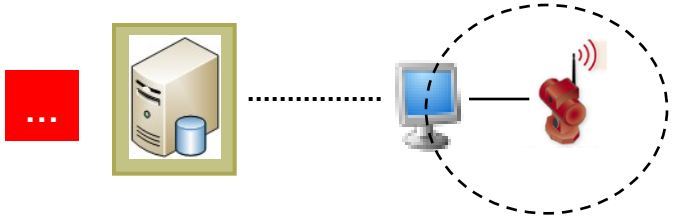
Resilience (2)



TCP/IP Solution

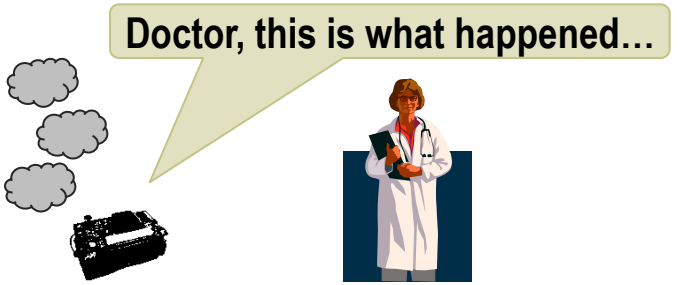


Front-End Solution



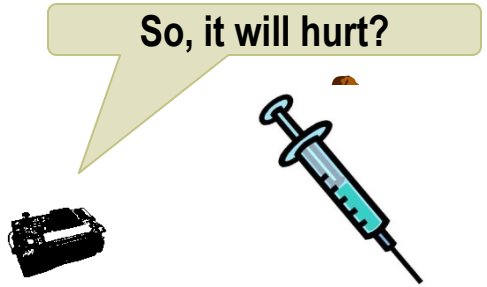
Integration Strategies - Other Factors

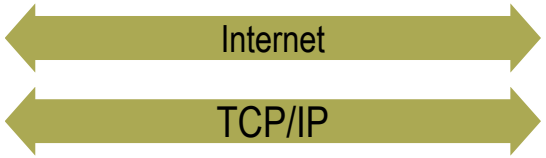
Accountability



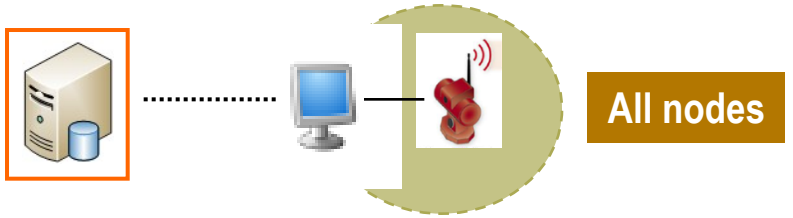
Integration Strategies - Other Factors

(SW) Maintainability

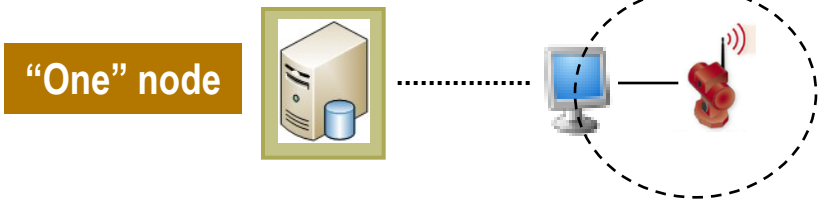




TCP/IP Solution

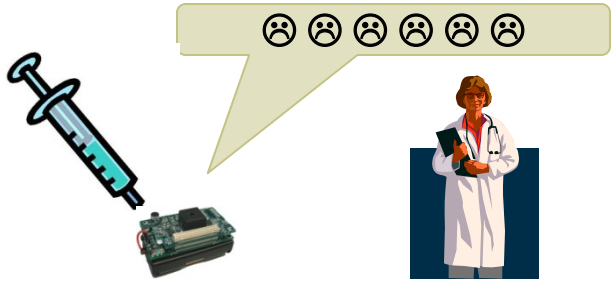


Front-End Solution



Integration Strategies - Other Factors

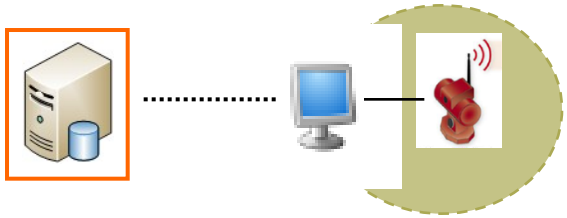
Maintainability (Availability)



Internet

TCP/IP

TCP/IP Solution



Internet

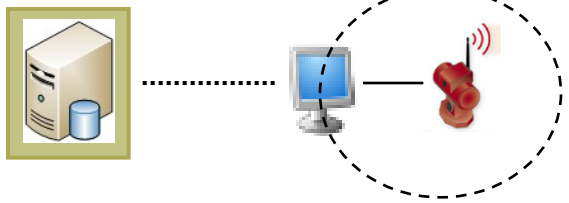
WSN

TCP/IP

WSN-Specific

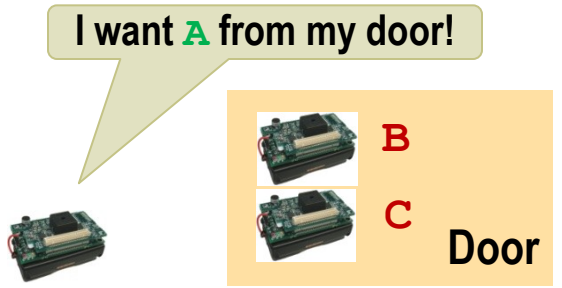
Front-End Solution

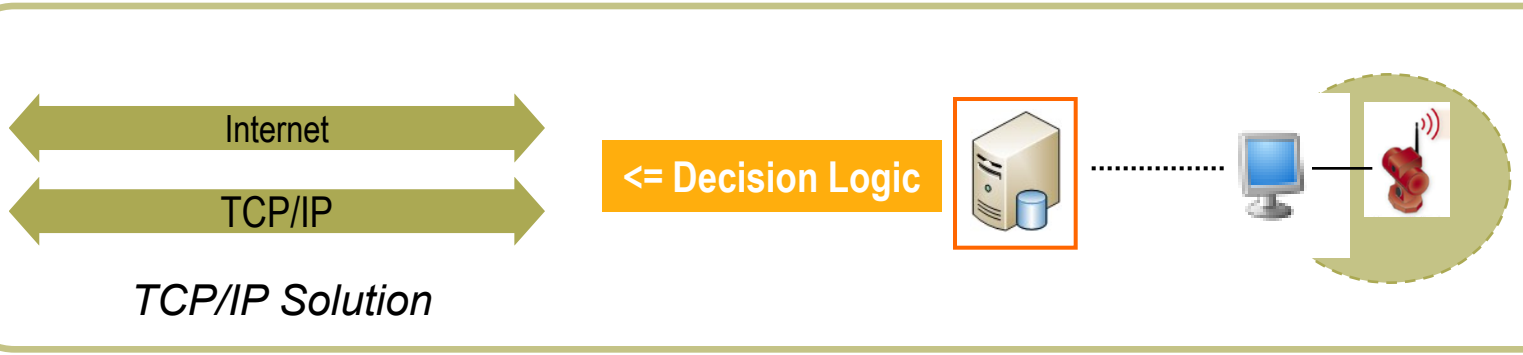
(All WSN?)



Integration Strategies - Application Factors

Network Redundancy



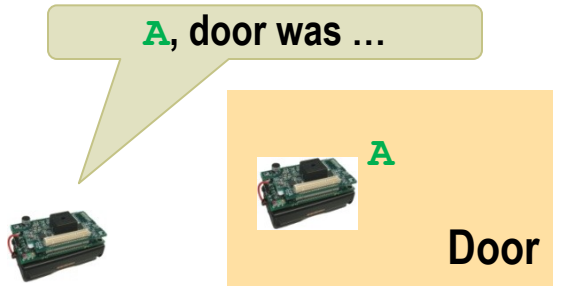


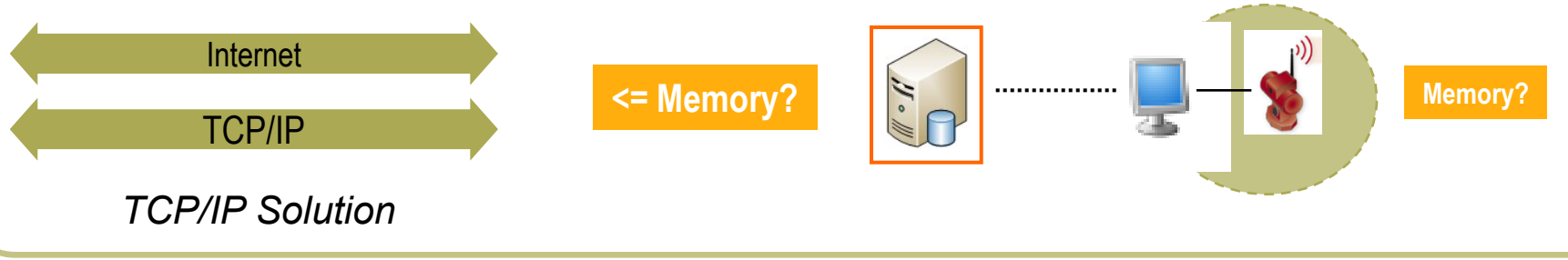
TCP/IP Solution

Front-End Solution

Integration Strategies - Application Factors

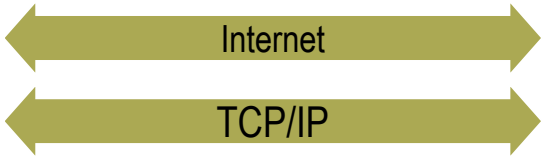
Network Redundancy (2)



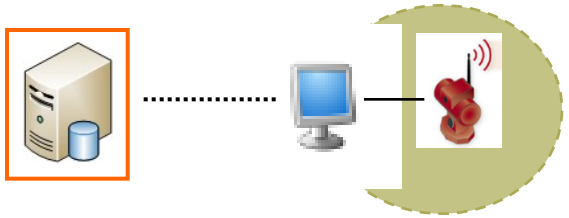


Integration Strategies - Application Factors

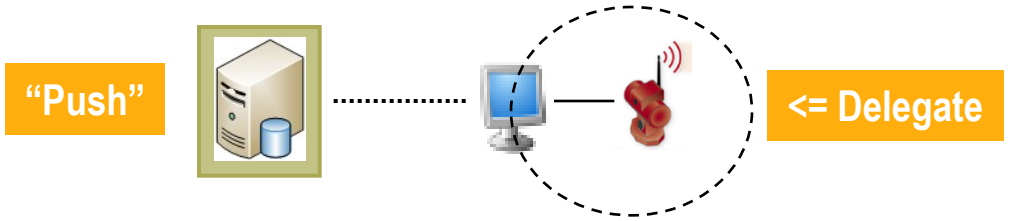
Intelligence



TCP/IP Solution

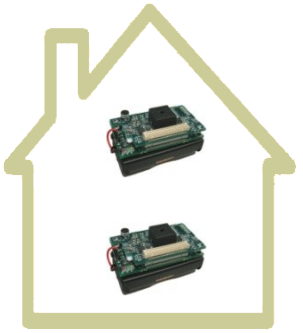


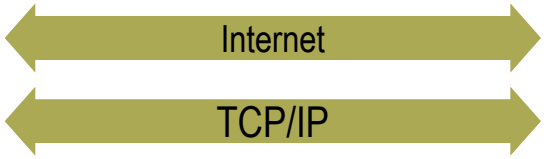
Front-End Solution



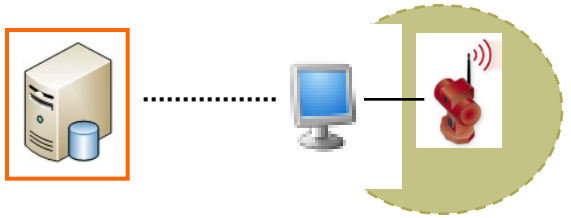
Integration Strategies - Application Factors

Protocol Optimization



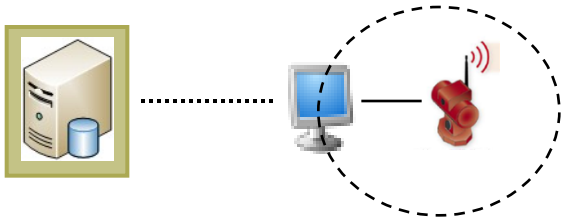


TCP/IP Solution



IP. ROLL…

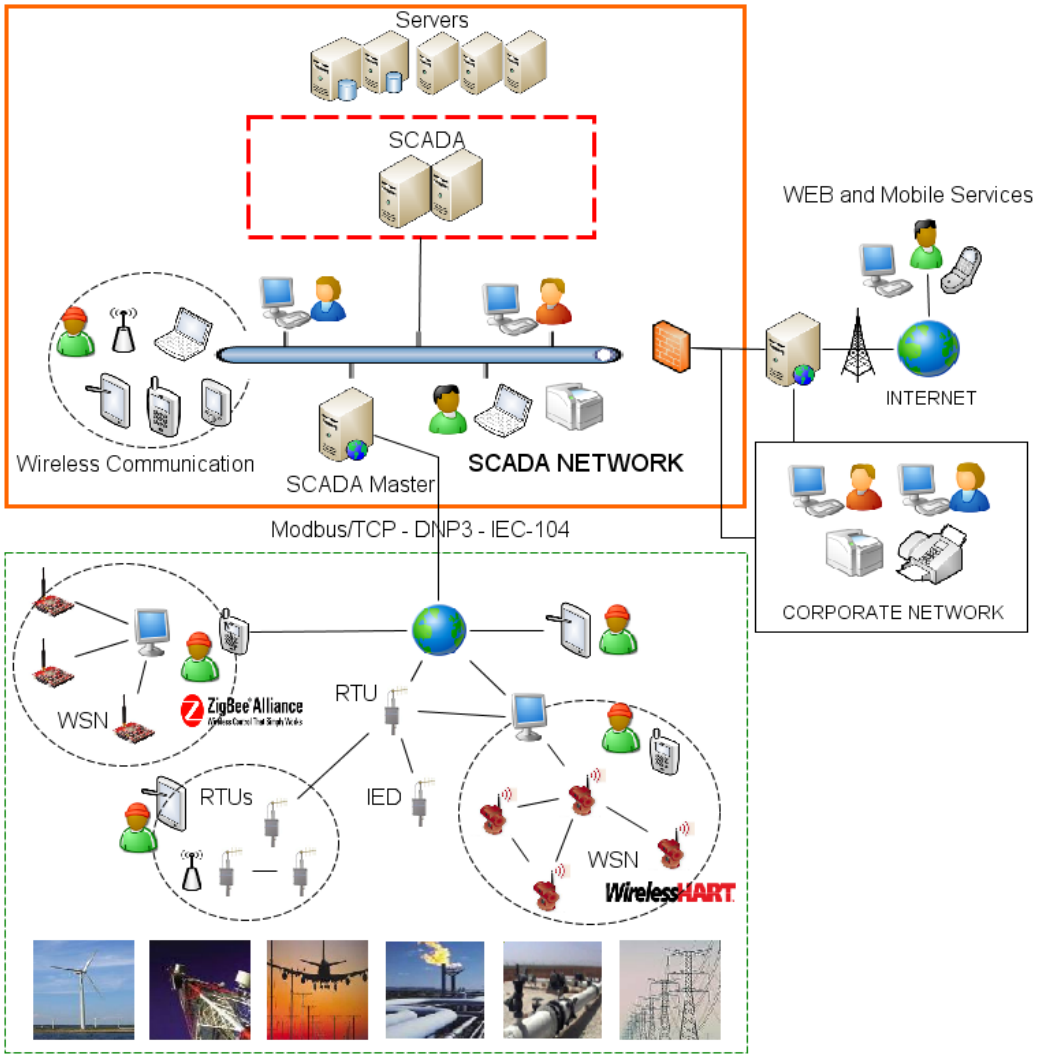
Front-End Solution



Network-specific Protocols

Scenarios and Analysis

SCADA/Industrial Systems



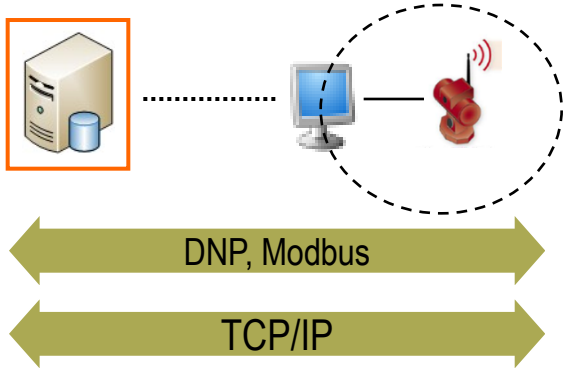
SCADA/Industrial Systems

Louis Hippolyte Lafontaine Bridge-Tunnel (Barco)

First Responder (Emergency) Systems

Photo by SkyWideDesign

Integration Strategies Analysis



TCP/IP Solution

SCADA

- Robustness - SPoF
- Accountability / Mem
- Maintainability
- Resilience / Others
- Protocol Opt.

Emergencies

- Resilience / Others
- Robustness - SPoF
- Limited Overhead
- "Push" Model
- Decentralized Model

Conclusions

When? Where? How?

…depends on Application Requirements

The End ☺