

# The Data-Driven World of IoT

RIPE NCC - Levant Regional Meeting

April 25th, 2016

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@mourcous



**DATACONSULT**

# Agenda

- The business background
- The IOT Ecosystem
- The sensor data aggregation challenge
- The IOT Data flow

## Will not cover:

- IOT Security
- Smart Device's IOT

## Cisco Completes Jasper Acquisition

Simplifying IoT for Enterprises and Service Providers

[Read Press Release](#) 



## **Samsung snaps up SmartThings, embracing Internet of Things**

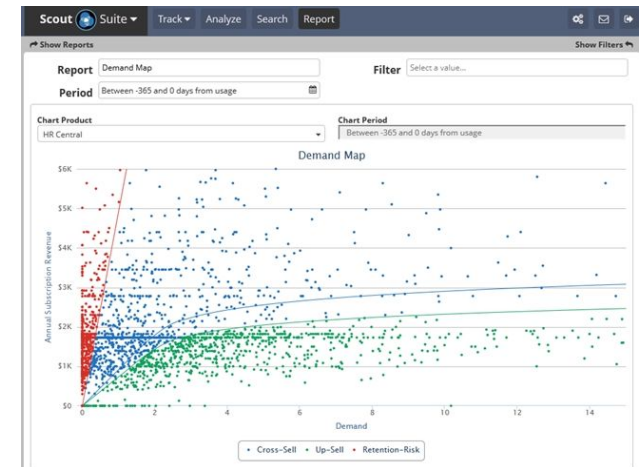
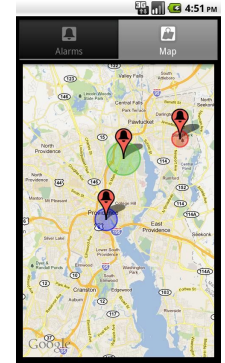
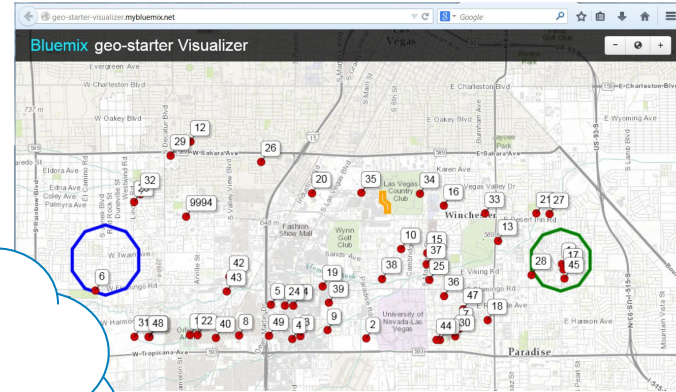
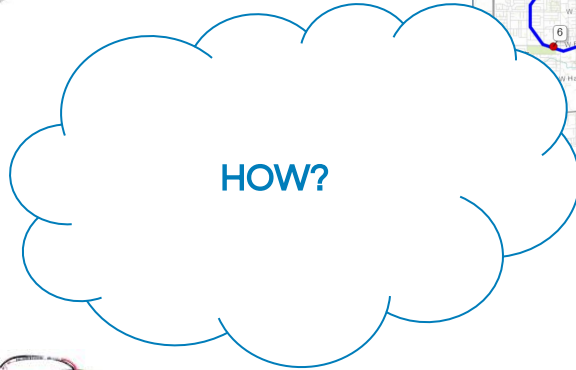
The tech giant acquires the open platform for smart home devices to "improve the convenience and services in people's lives."

## **Huawei buys Cambridge Internet of Things pioneer Neul**

## Ericsson buys MetraTech to muscle in on IoT

# The IOT Paradigm

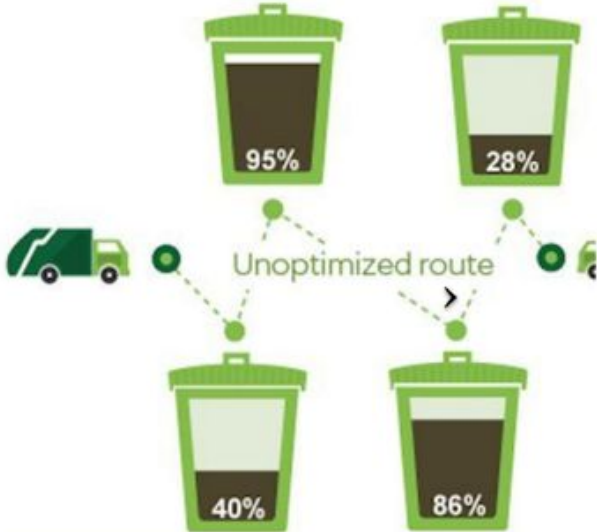
## How do we get there?



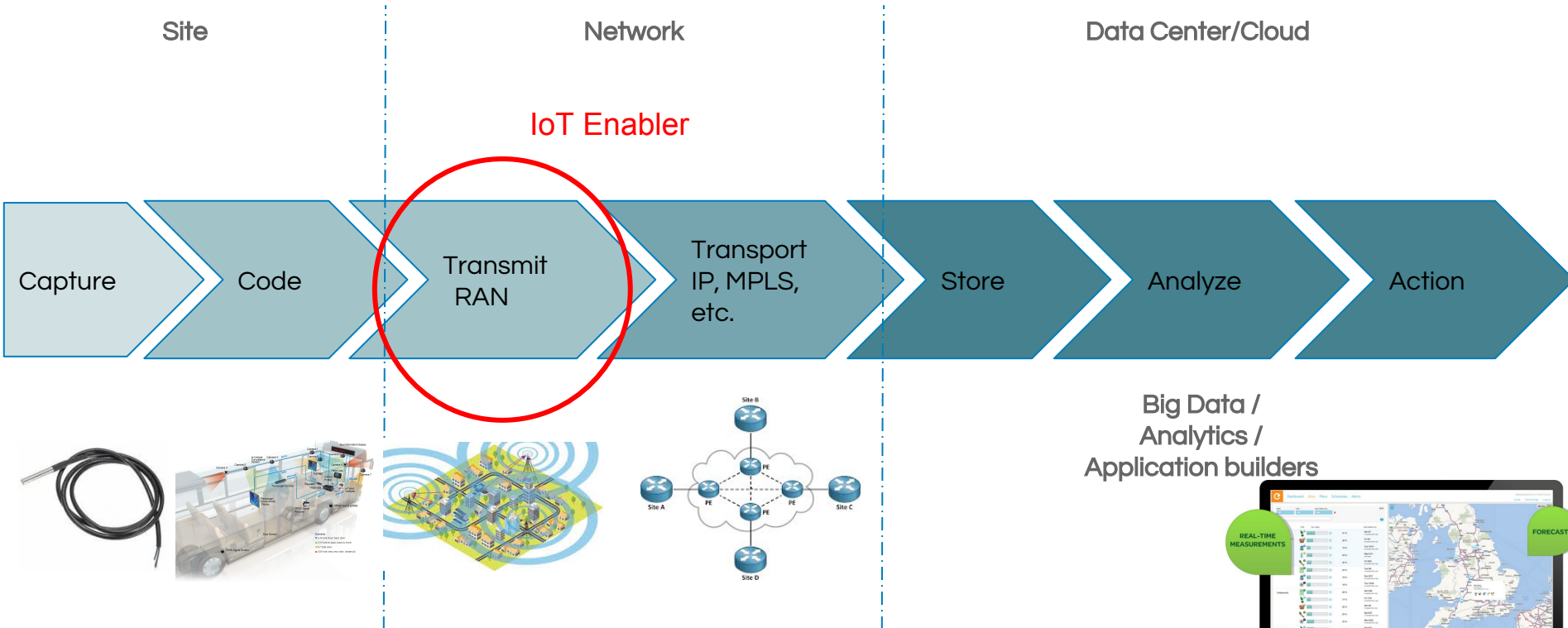
## Mapping the business case: waste management



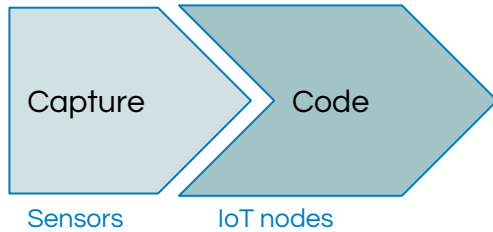
Optimized route vs. unoptimized route



Optimized route vs. unoptimized route



## Within the Site

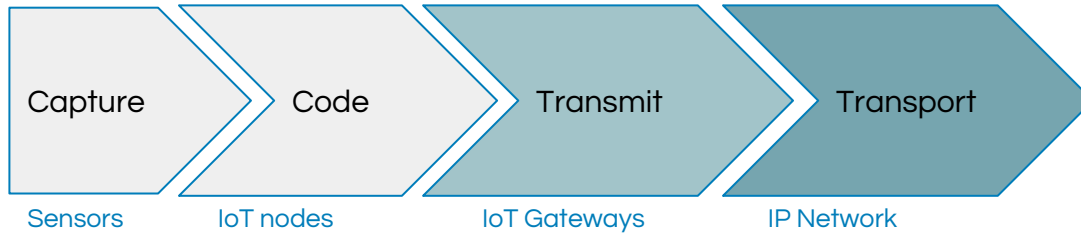


- Part of Operation Technology (OT);
- Sensors with analog (0-10V) or digital electrical outputs;
- Powered by the IOT node or through an external source;
- The IOT node transforms the electrical signal into data packets;
- Message Queuing Telemetry Transport (MQTT)
- Rugged design;
- Or Sensors can take form of any IP based protocol.

IoT nodes connect one or multiple sensors and translate an analog signal into packets.



## Radio Access Network: Transmitting the M2M chatter



- Collecting data from on a massive scale while preserving the sensor battery life is a challenge;
- Ferocious competition for the Low Power Wide Area (LPWA) technology dominance;
- The "LPWAR": lets look at the market alternatives in this area:
  - Sigfox
  - LoRaWAN
  - LTE-M, NB-LTE & 5G
  
  - Wifi + 3/4G
  - Zigbee + 3/4 G



Privately owned, French.

## Technology

- Ultra narrow band 868Mhz - 100Hz
- 140 messages per unit per day. 1 every 10 minutes
- 12 bytes per message
- 15 km
- High battery life

## Applications

- Limited bandwidth applications
- City wide deployments, short message communications
- Shipping and very active

El Towers and SIGFOX to Connect Italy to SIGFOX Internet of Things Global Network

SIGFOX and Internet of Things Company Thinextra Connect Australia & New Zealand to SIGFOX Global Network

**SOGEDO Chooses SIGFOX's Internet of Things Network To Bring Enhanced Water-management Services to Customers**

Posted by M2M.World.News | Date: November 03, 2015 | in: Smart Cities & Homes

OCT 27, 2015 @ 08:00 AM 5,751 VIEWS

## San Francisco Now Has Its Own Cellular Network Just For The 'Internet Of Things'

**SIGFOX and Omantel Join Forces to Roll Out Dedicated Internet of Things Network in Sultanate of Oman**

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LoRa Alliance, backed by Cisco, IBM

## Technology

- Star of Stars topology, Encrypted protocol
- Wideband CDMA: 868Mhz - <500kHz
- 0.3kbps - 50kbps
- 15 km
- High battery life
- 3 Classes:
  - A: similar to Sigfox. Receiver Initiated Transmission Strategy (RIT)
  - B: scheduled downlink slot, intermittent device sleep.
  - C: always on. Mains Powered.

**Tata Communications to deploy LoRa network in India**

**Telstra to trial LoRaWAN IoT wireless technology in Melbourne**

## Applications

- Just getting started.
- City wide deployments with 2 way communications.

Le réseau LoRa de Bouygues Telecom accueille ses premiers clients



Le réseau LoRa de Bouygues Telecom dédié à l'Internet des Objets, équipé par Sagemcom, commence à accueillir ses premiers clients.

Une couverture pour 1er semestre 2016

**Amsterdam bets on LoRaWAN for IoT city network**

3GPP, Huawei (Neul acquisition)

## Technology

- LTE-M - 1.4Mhz (1Mbps/1Mbps)
- NB LTE-M - 200khz (200kbps/144kbps)
- One LTE cell can handle 100k LTE-M devices
- 10 years battery life (200 bytes daily update)
- Low cost terminal
- Leverage the LTE network with a software upgrade.
- LTE-M +15dB link budget (x7 coverage)
- NB LTE-M +20dB link budget (x10 coverage)

## Applications

- 3GPP Rel. 13 - Q1 2016
- Coming with LTE Advanced (4.5G)
- Mobile operators become IoT operators.

**Deutsche Telekom & Huawei strike back with a 'pre-standard' NB-IoT trial**

► IOT / IOT STRATEGIES

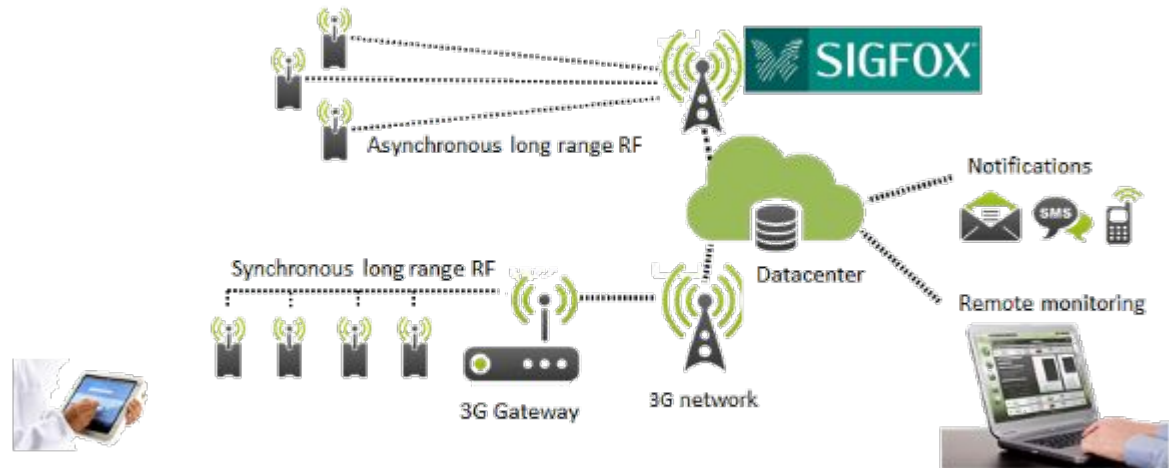
**Huawei Strikes Strategic Alliance With  
Vodafone Global Enterprise**

## Technology

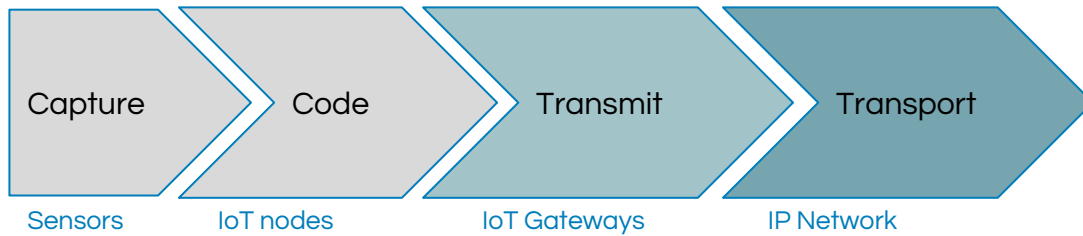
- Local Aggregation of IOT nodes is done through:
  - Wifi
  - Zigbee / 802.15.4
- Uplink from the site is done through 3g/4g
- Need external power source
- Higher throughput

## Applications

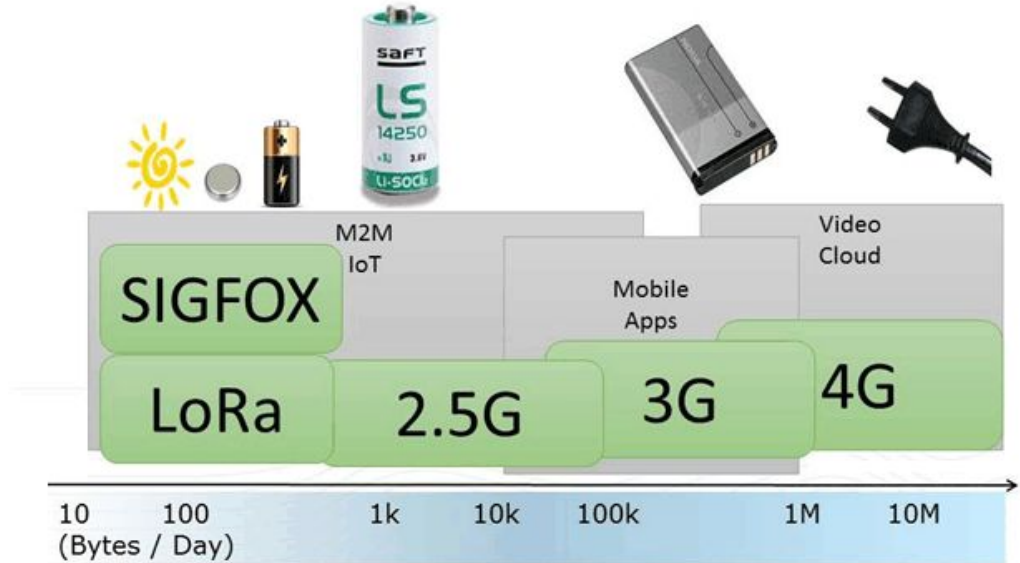
- High throughput, sending voice/video
- Real Time or near-RT

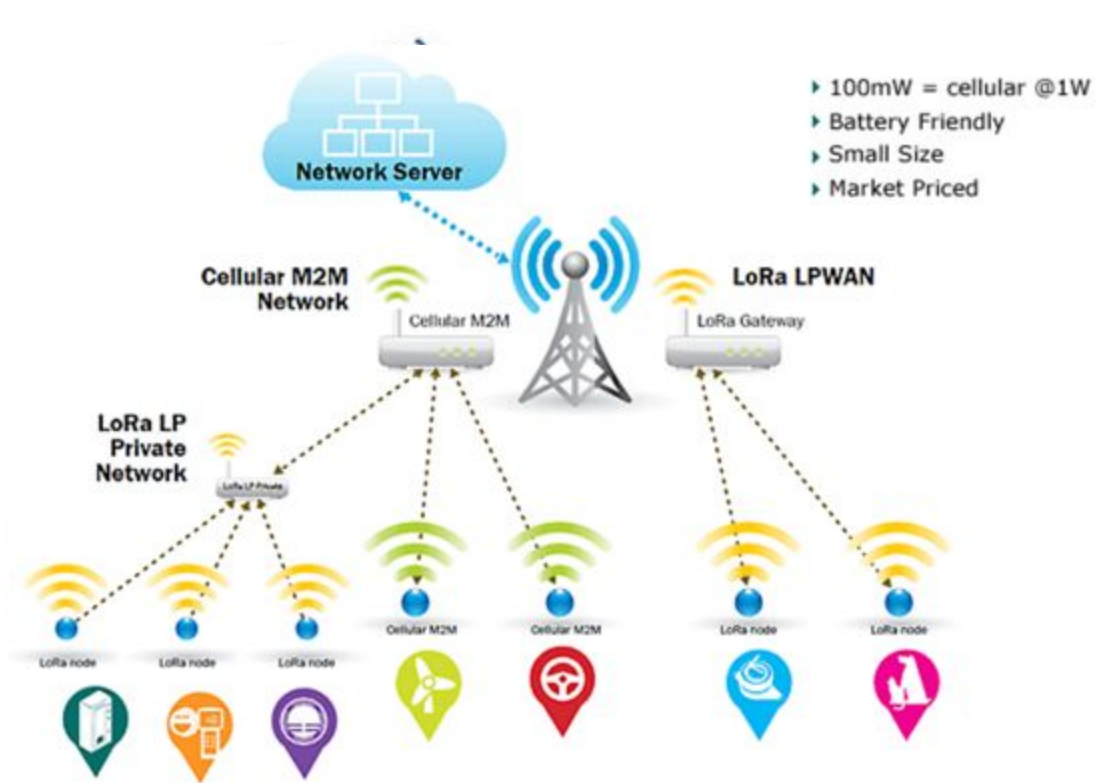


## Transmitting the M2M chatter



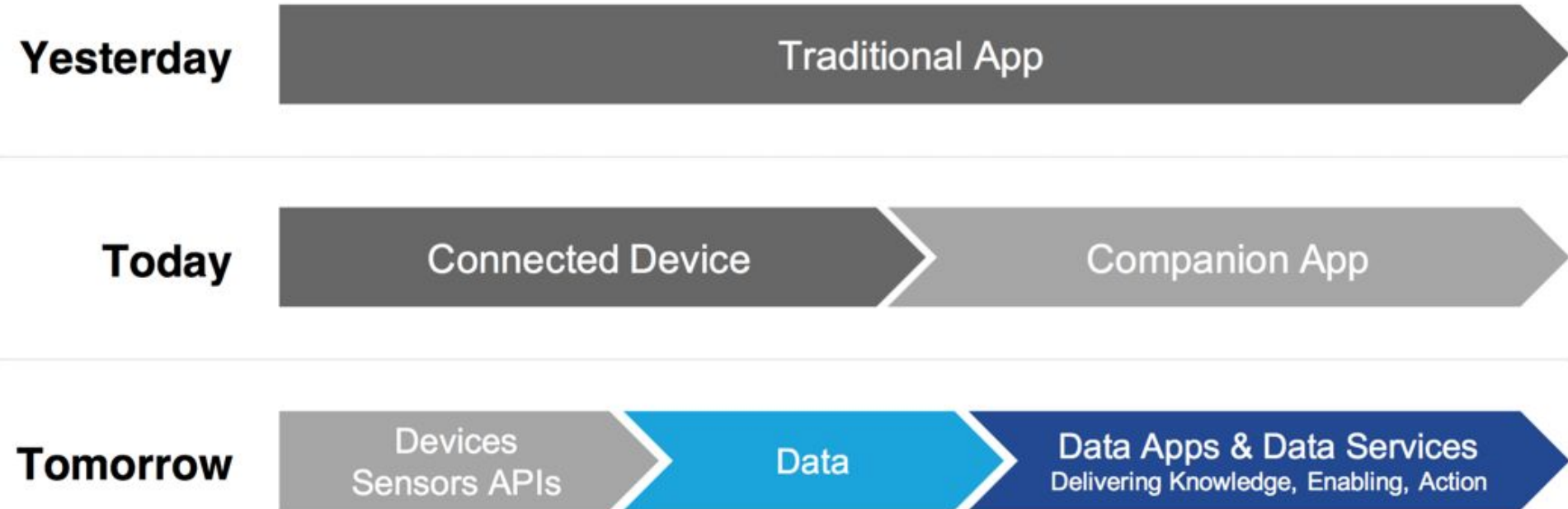
Technology  
decision factor





# Evolutions of Apps

Making Sense of Data



## The three layered approach



### IoT Data Svcs and Apps

Manufacturing

Utility

Oil/Gas

Transportation

Cities

Retail

Energy Mgt

Remote Expert

Smart Space

Collab/Video Apps

Analytics

Locations



### IoT Data Platform (IoT Cloud)



### IoT Fabric

Devices

Sensors

Actuators

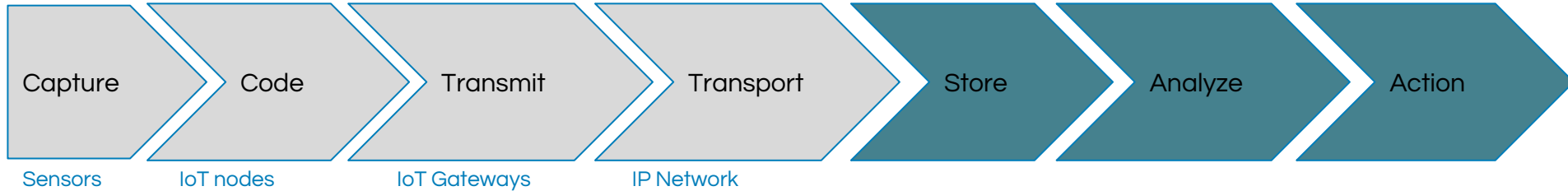
Silicon

Device Security

RTOS/Agent



## Gathering, structuring and processing the data






- Input from IOT Gateways (MQTT)
- Any other input
- Data modeling and data set definitions
- Machine Learning, Analytics

**Data Science for IOT:** making sense of massive data and give the machines the ability to take intelligent decisions.

Top courses on coursera about data science and machine learning.

**coursera** Catalog Search catalog Institutions Log In Sign Up

1,260 matches

<input type="checkbox"/> Now 560	 <b>Big Data</b> 6-course Specialization · University of California, San Diego
<input type="checkbox"/> Within 1 month 30	 <b>Python for Everybody</b> 5-course Specialization · University of Michigan
<input type="checkbox"/> 2 to 3 months 22	 <b>Data Science</b> 10-course Specialization · Johns Hopkins University

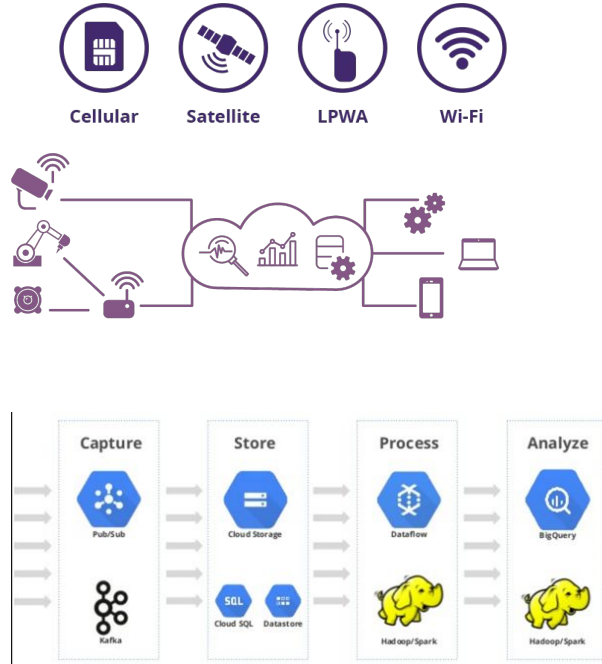
Availability

All Topics

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<input type="checkbox"/> Computer Science 205

Languages

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**Connectivity Management**

**Device Management**

**Data Management**

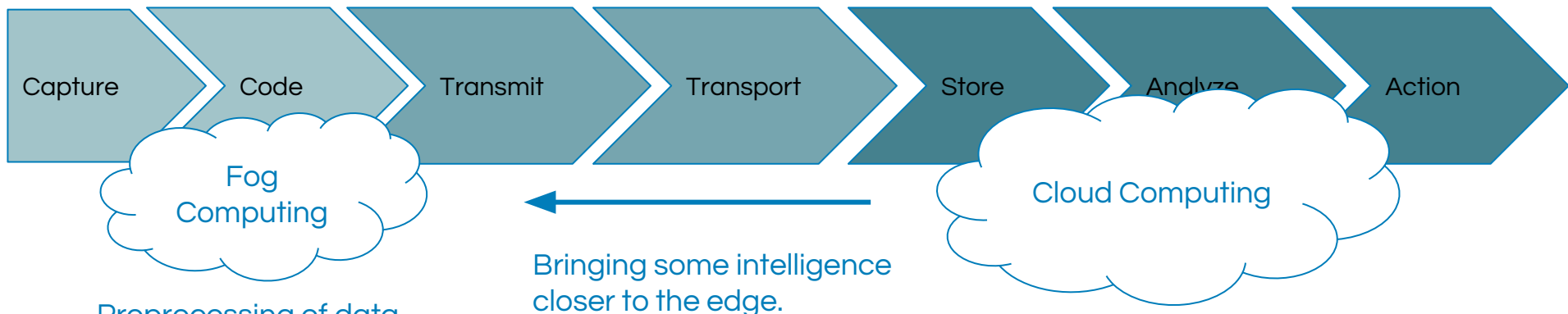
**S  
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**Application**

**Enterprise  
Integration**

**Cloud 2 Cloud**

Eliminating the unnecessary chatter on the radio



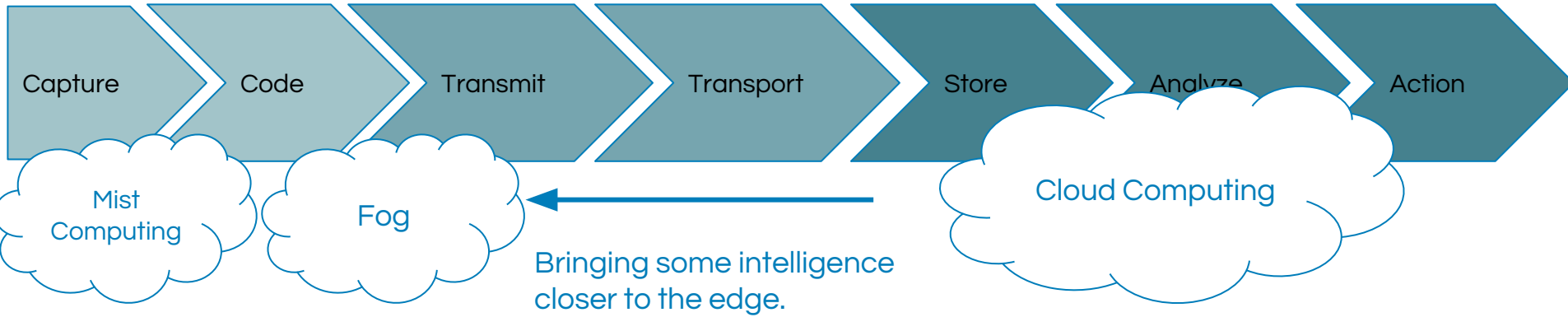
Preprocessing of data from sensors saves on transmissions costs.

Bringing some intelligence closer to the edge.

- Decreased network chatter and cloud storage.
- Linux IoT nodes, complex computing done local.

**Computing on the IOT gateway (managing different nodes)**

Eliminating the unnecessary chatter on the radio



**Computing on the IOT node (sensor or actuator)**

- Decreased latency
- More autonomy

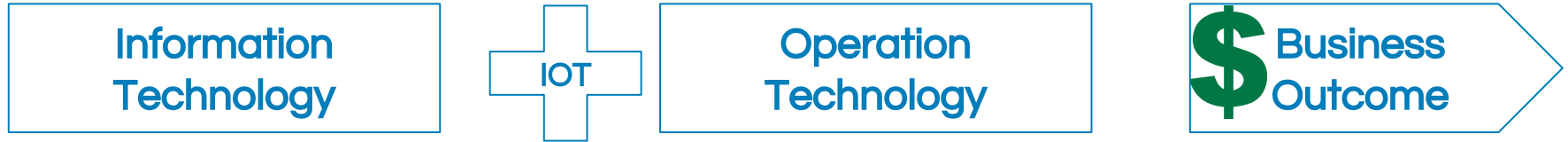
# Back to our IoT application

It's all about the business case



-40% Savings

Finally



## System Integration

- Operation technology & Low Current
- Radio Access
- Networking
- Data Integration, software
- Data science

Thank you!

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