Edge Computing and Data Management

AWS Community Connect

Chennai Aug 2019

DRAFT!

just Initiated the Layout....contents are not in place

Edge Computing & Data Management

- Edge Computing 10min
- Data Today 5 min
- Data and Data Management at Edge - Situation, Challenges Discuss 10min
- Edge Data Management Solutions Discuss 10min
- Wrap up 5min

- Edge Computing usually deals with compute, memory and latecy. However like any other new technology trends in the industry, edge computing is also data centric and data intrinsic.
- Heterogeneous storages, platforms , fragemented devices and huge data - enough reasons meet pitfalls and challenges in managing data at edge.
- This session goes from brief on edge and details on the data management challenges and potential solutions. Provides views on available open source solutions and interact on the inputs from audience.

- **Take away:** Understand Edge computing, Data Needs and challenges at edge, discuss on solutions.
- **Audience:** with basic cloud understanding. If they use WhatsApp, easy to discuss about data:)

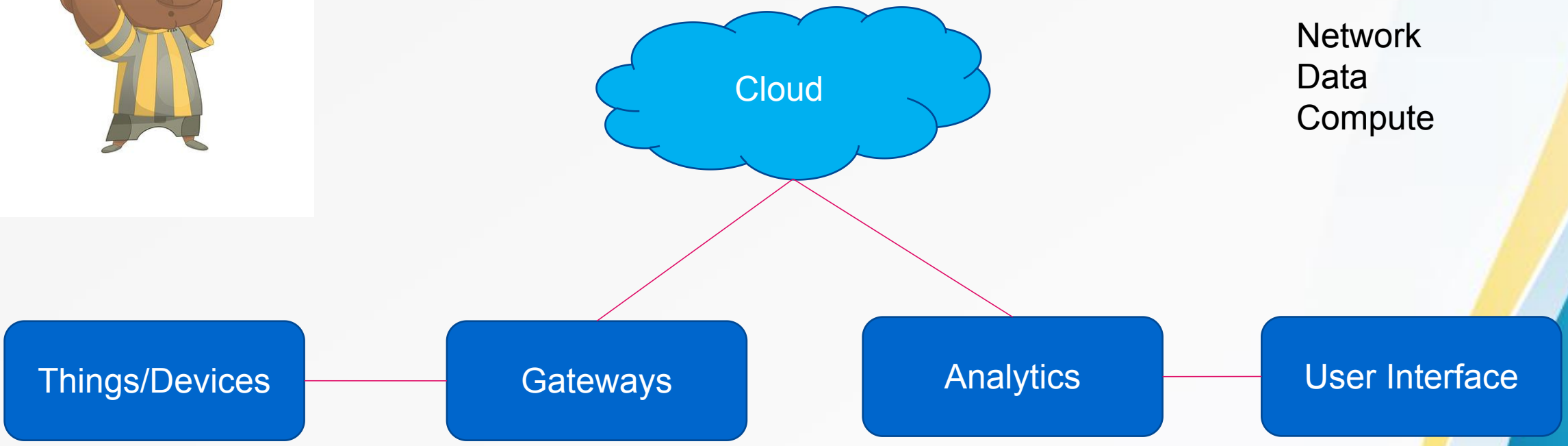
Edge Computing

THE INTERNET **OF EVERYTHING** IS HERE.

As the Internet evolves, so will we.

***37 billion** new things will be **connected by 2020**.*

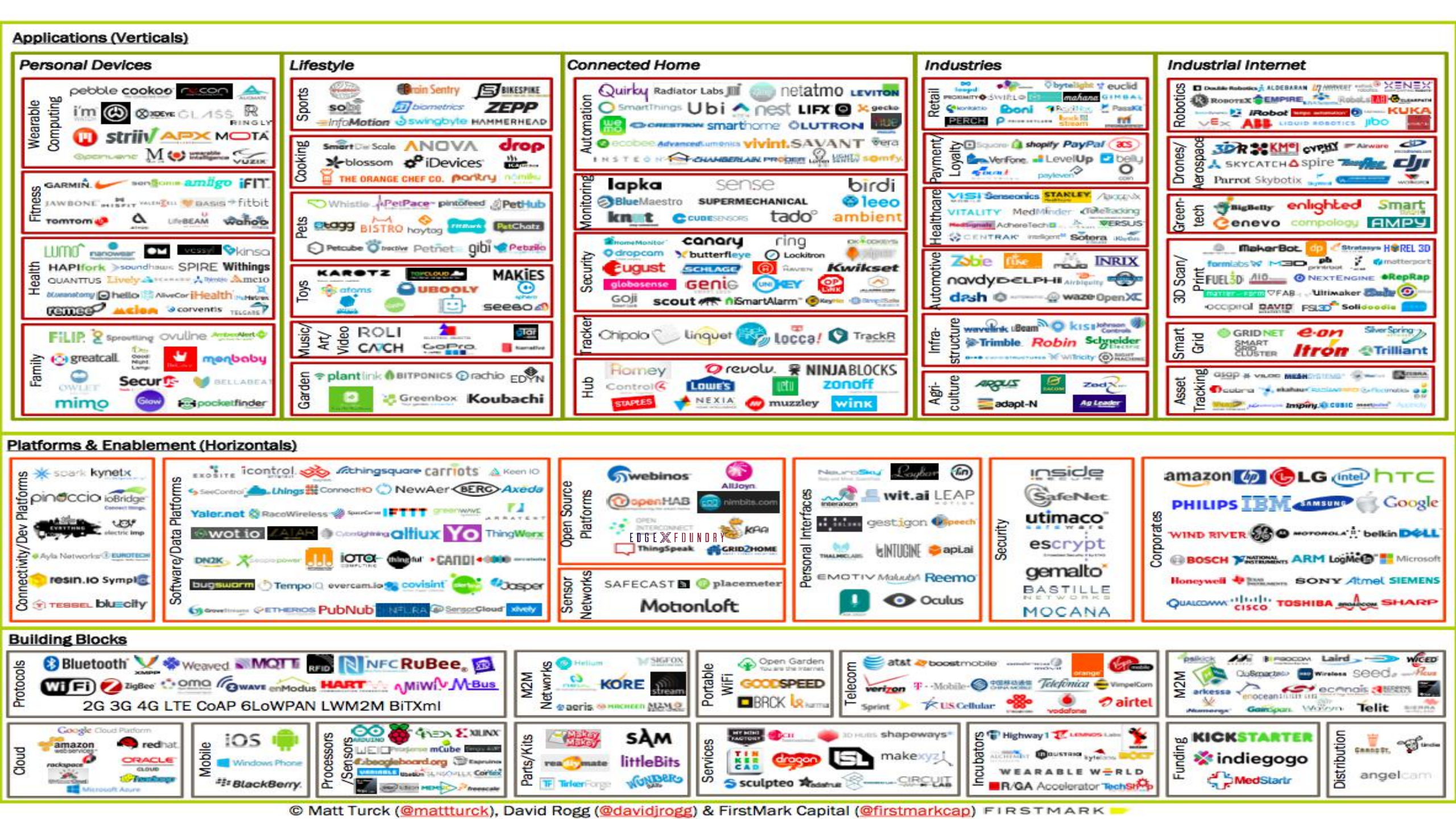
IoT



Network
Data
Compute

The Internet of things (IoT) is the network of devices such as vehicles, and home appliances that contain electronics, software, sensors, actuators, and connectivity which allows these things to connect, interact and exchange data

What’s happening to IoT….



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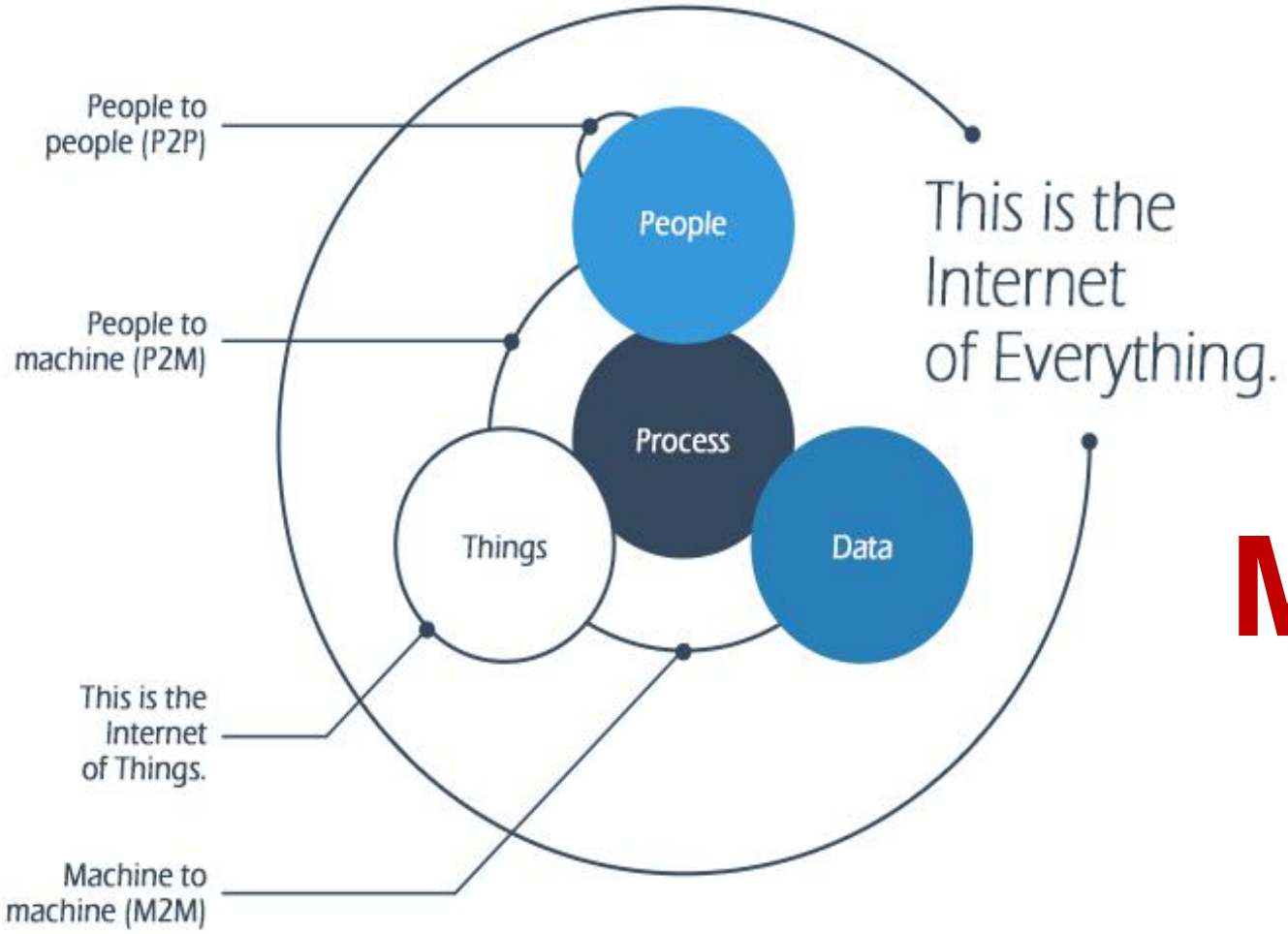
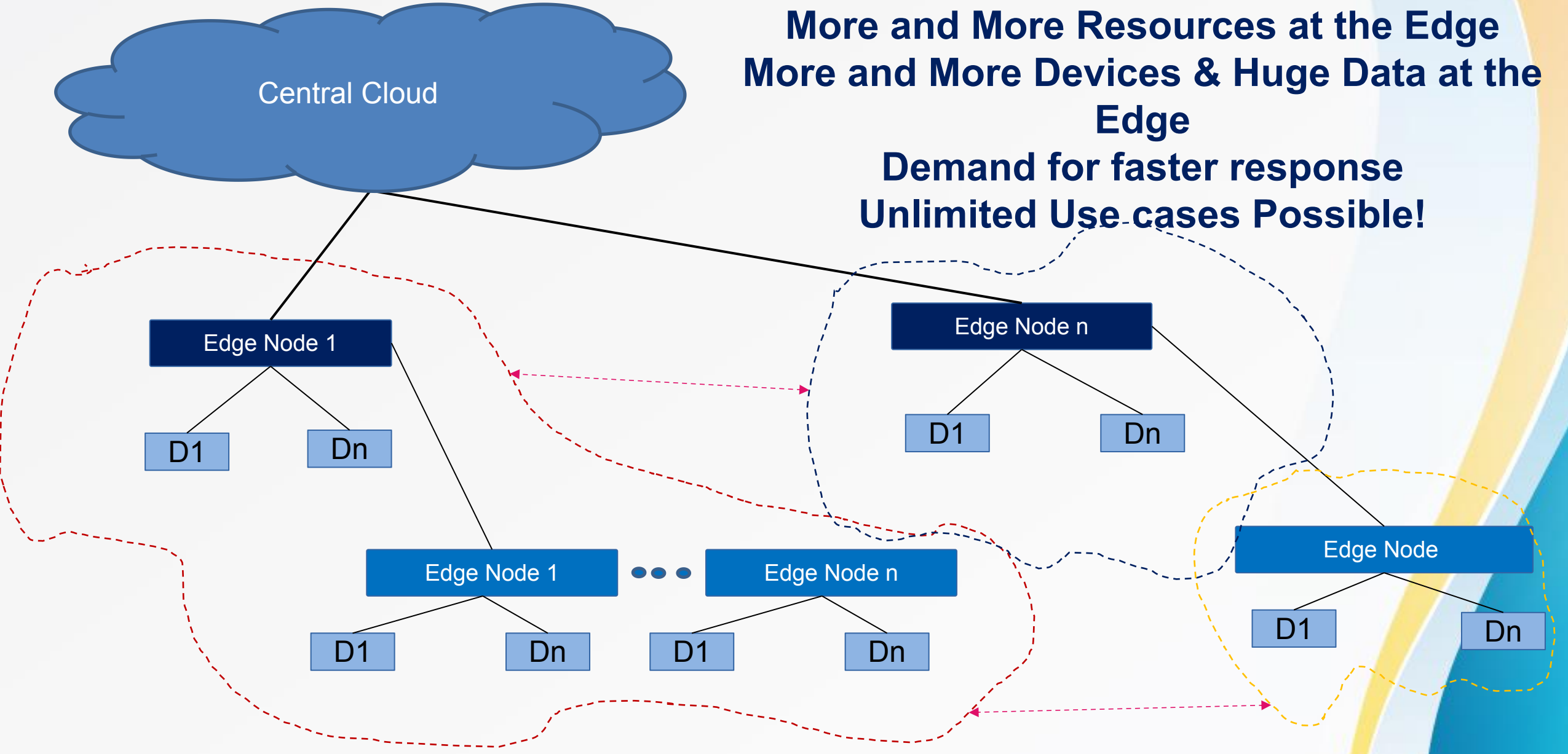


Moving to Edge!

Centralized to De-centralized to Distributed!



More and More Resources at the Edge
More and More Devices & Huge Data at the Edge
Demand for faster response
Unlimited Use cases Possible!

Compute, Storage and Analytics Moving to Edge of the Cloud, closer to the source of the data. Edge Computing is becoming inevitable.

…and…why Edge?

Increasing costs of shipping the large volumes of data to the cloud for processing and storage.

Reduce the Cost

Trust & Security

Data governance and security – many organizations have sensitive data that they don't want to leave their premises under any circumstances.

Real-time decision making –the latencies involved in shipping the data to the cloud for analytics are unacceptable.

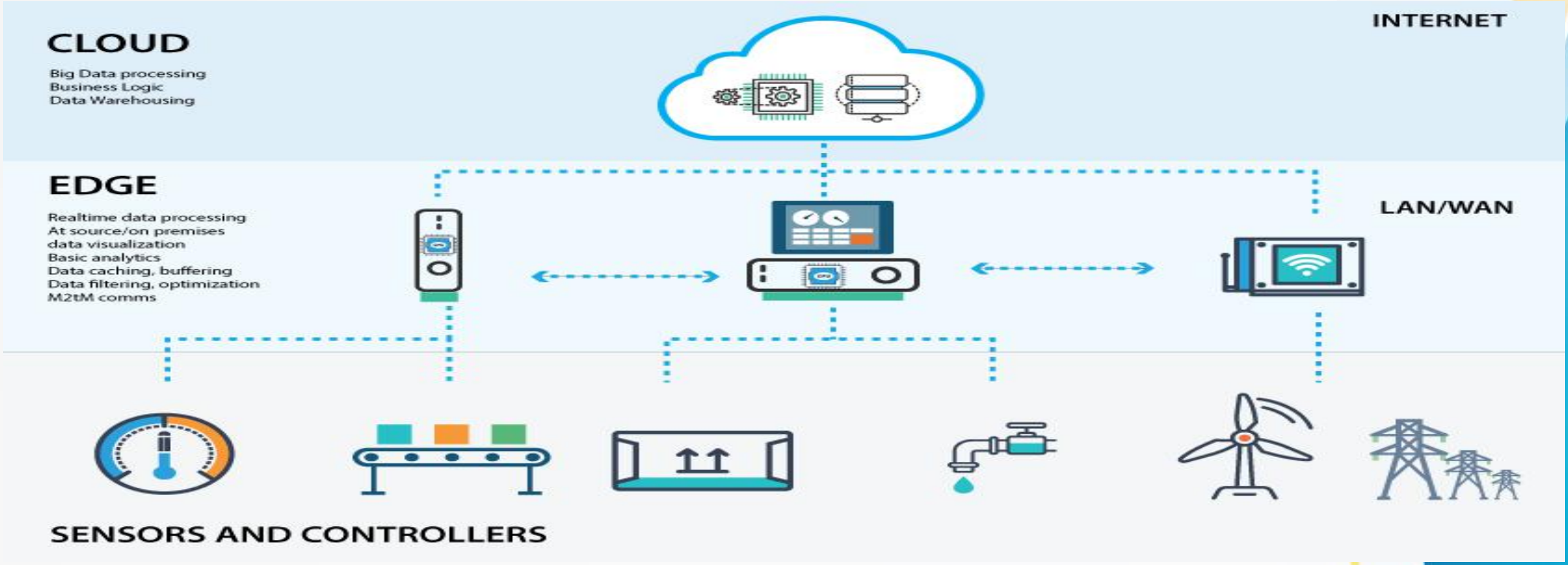
Real time, Ultra Low Latency

Offline, Independent

The possibility of intermittent cloud connectivity is a serious concern for mission-critical IoT applications such as a connected vehicle or other types of autonomous systems.

Edge ?

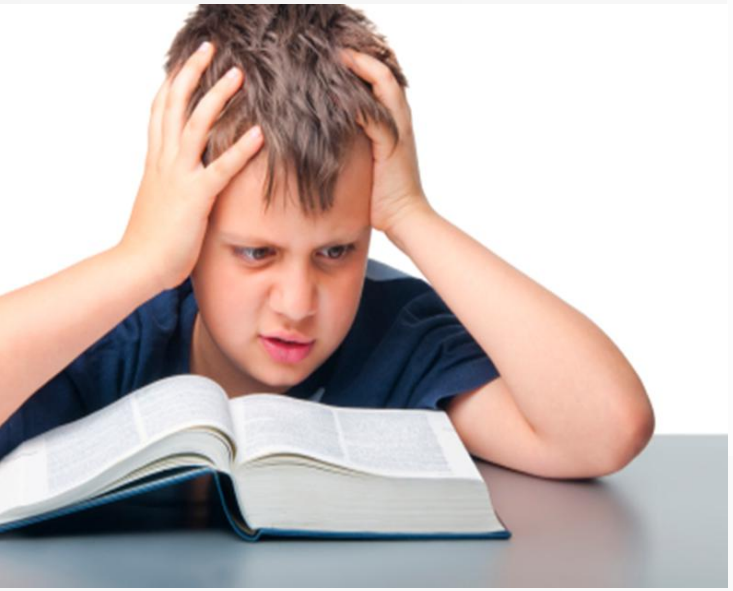
Edge computing is a method of **optimizing cloud** computing systems by **performing data processing at the edge of the network, near the source of the data.**

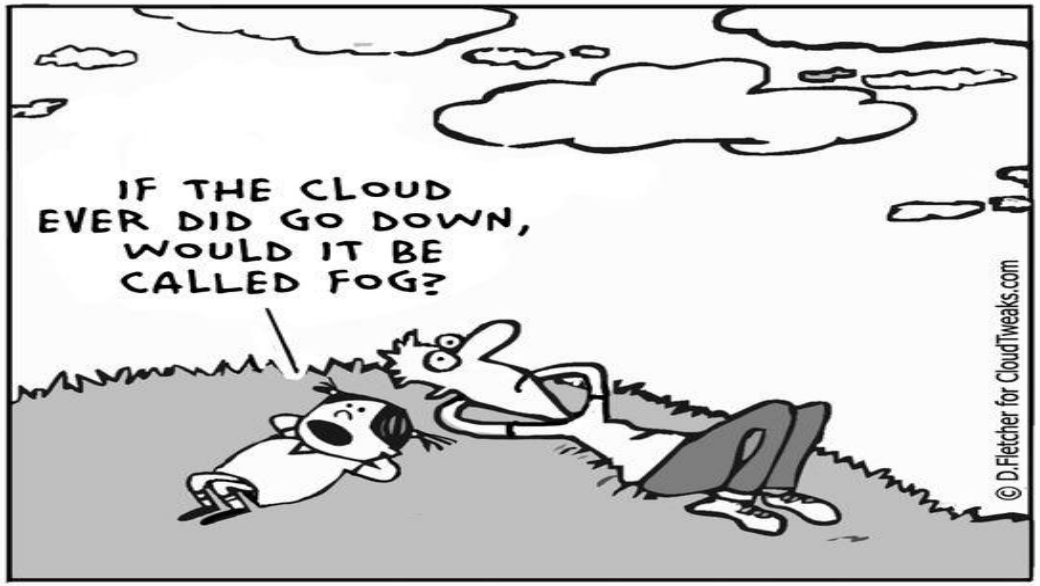


Roof Computing？

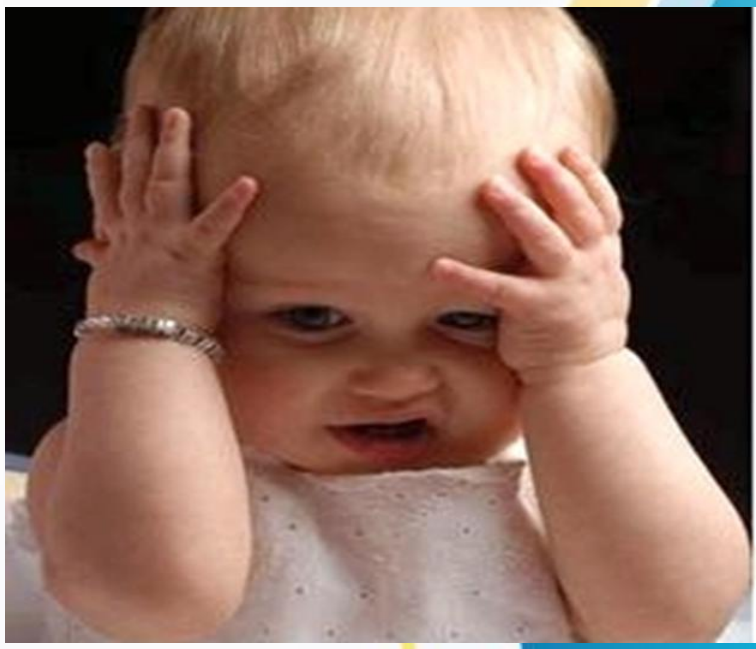
MEC ？

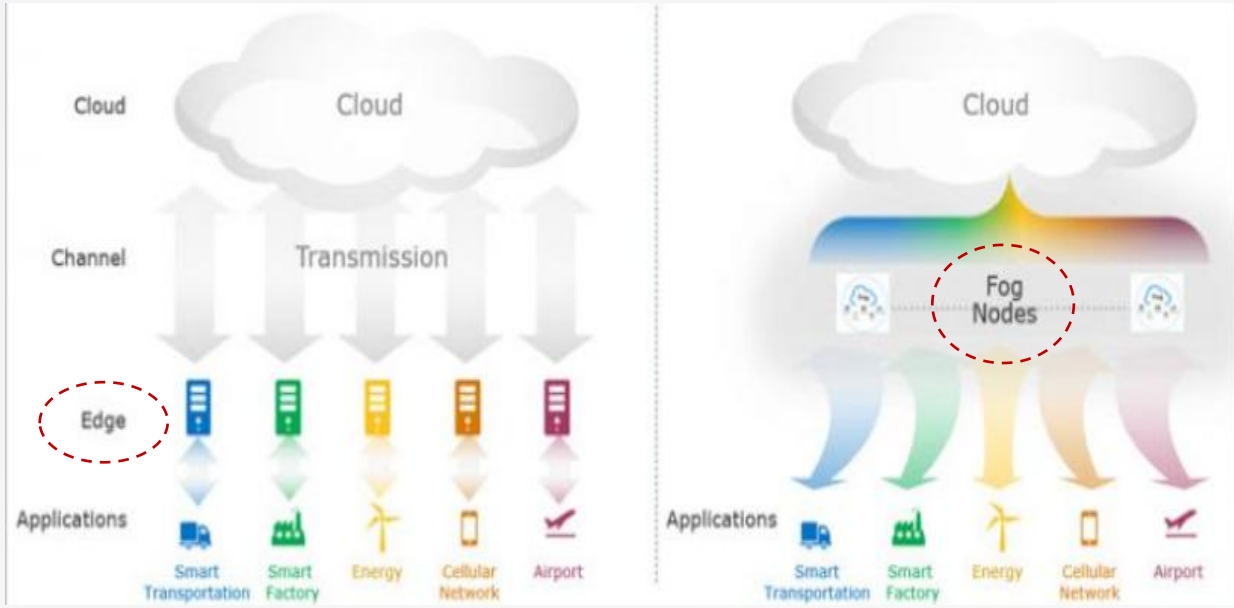
Fog Computing？

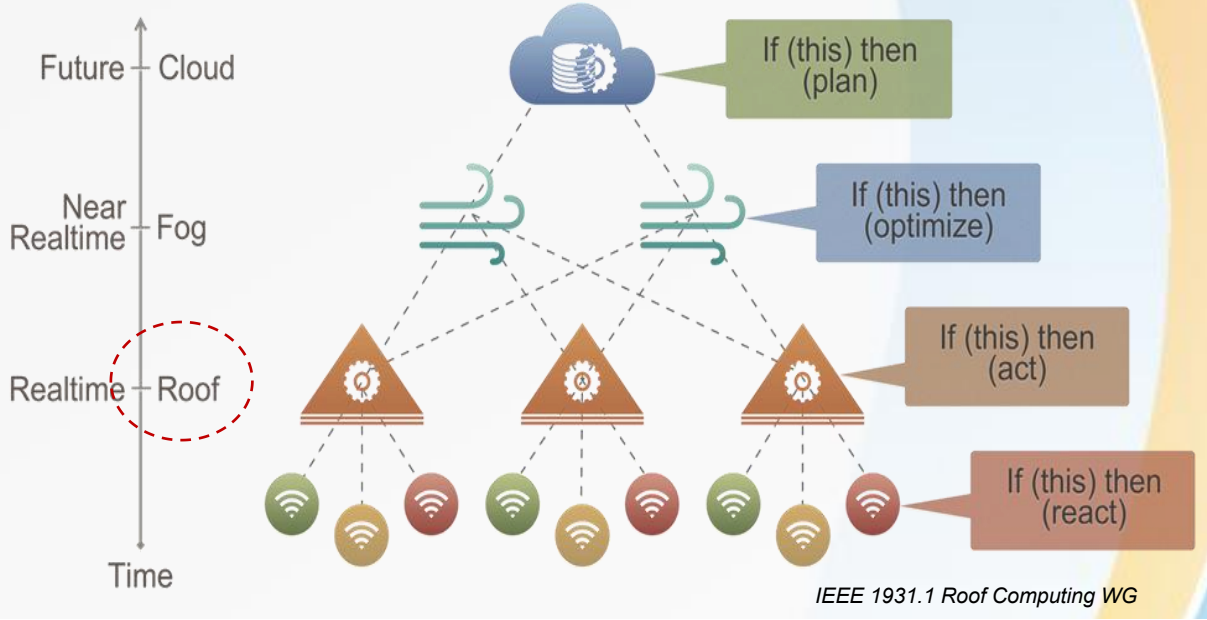




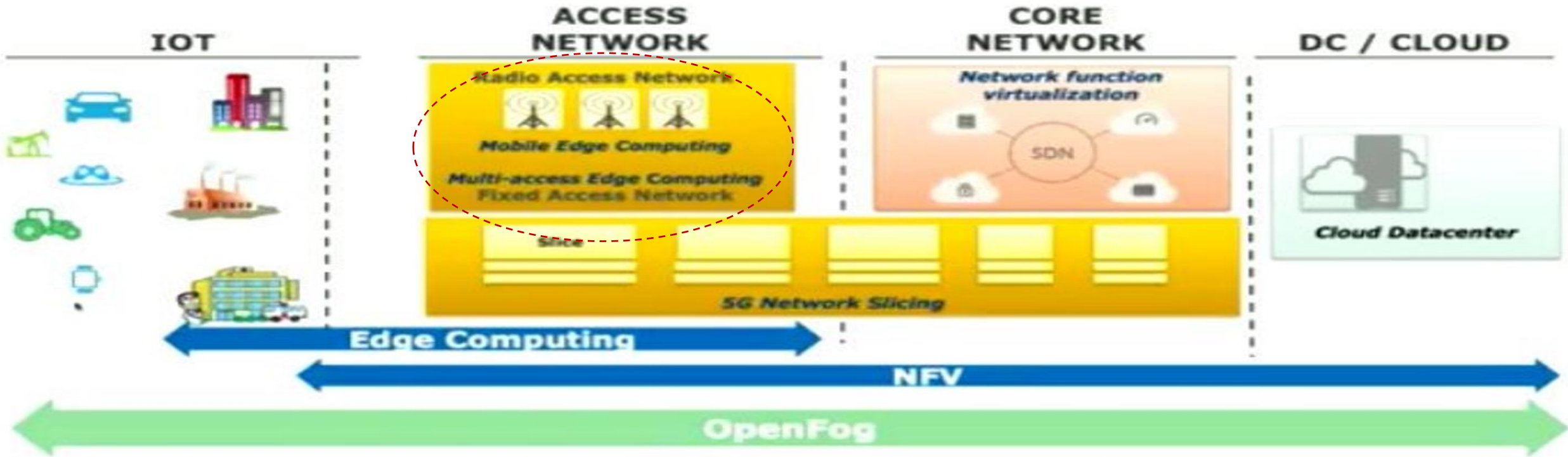
Edge Computing？





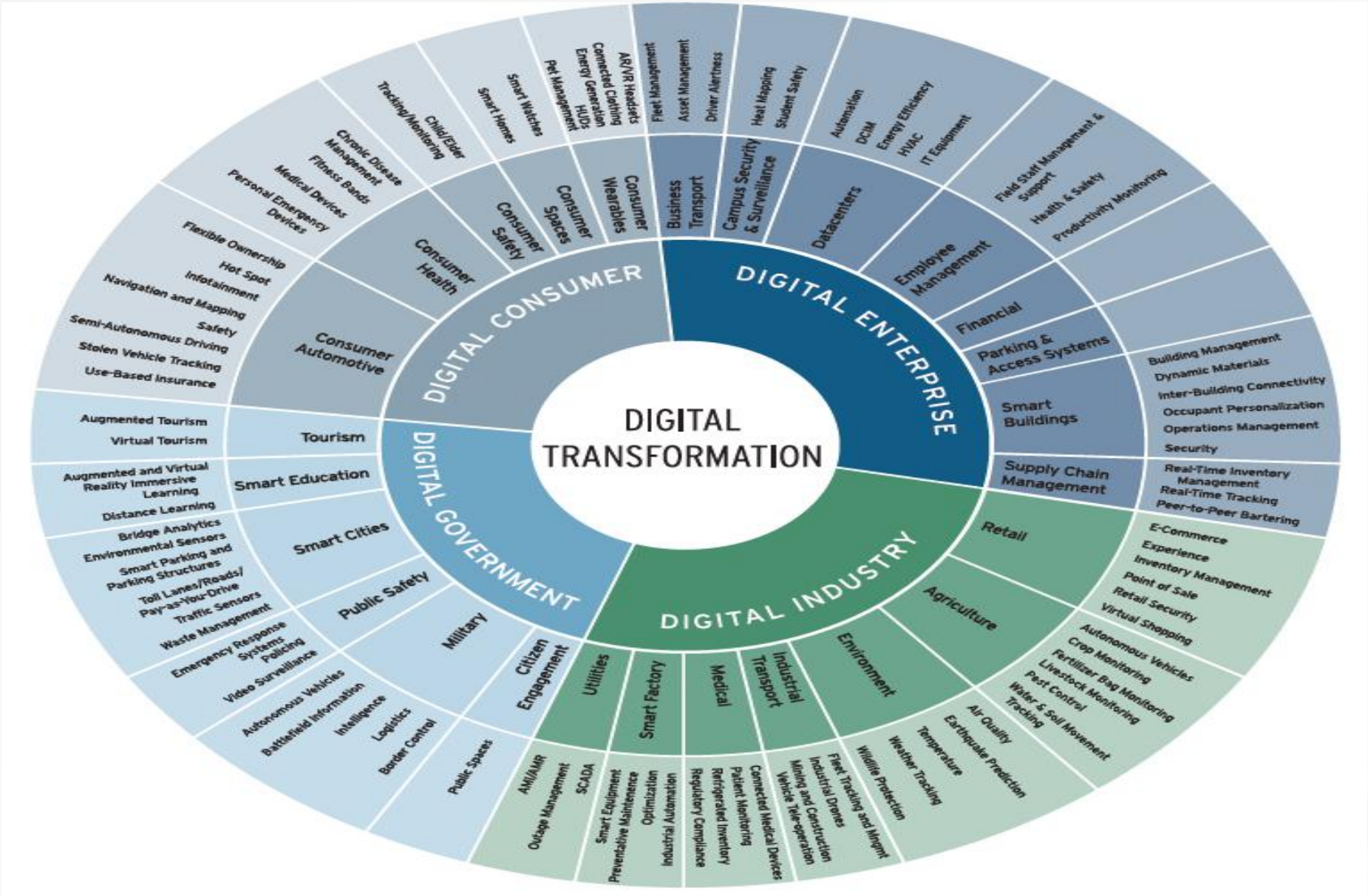


IEEE 1931.1 Roof Computing WG



https://www.openfogconsortium.org

The Markets and Usecases…



Edge Computing Key Requirements

1. **Maximize the computing at Edge**
   - Realtime Scheduling
   - Distributed Application Execution for Resource Optimization and Compute Efficiency
   - Efficient Orchestration, Monitoring
   - Resource utilization across the cluster
   - Efficient Runtime Support (Container, LWC, Serverless)
   - Low Latency

1. **Offline Scenarios and Communication**
   - Edge Node/Cluster Offline Working
   - Vendor Agnostic Cloud Interface
   - East – West Communication
   - Reverse Proxy, Address Resolution, Routing
   - Workload-Workload, Device to Workload Commn

1. **Security & Privacy**
   - Workload to Workload Secure Communication
   - Device Identity and Authorization
   - Node level identity
   - Private Data Isolation

1. **Scalability – Platform and Clusters**
   - Edge Cloud - Clusters
   - Microservice based core platform
   - Platform extensions and plugins

5. Device Life Cycle & Management
- Device, Node, Application Provisioning
- Repositories and Registry (Device, Mapper, Node, Workload)
- Discovery (Device, Node, Application/Service)

6. Data & Data Analytics
- Data Storage, Sharing, Distributed
- Distributed and customizable Data Analytics
- AI/ML, Big Data, Streaming Data processing…

7. Remote Management & Visualization
- Consolidated and Efficient Dashboard which can handle huge number of edge entities (nodes, devices, workloads, resources so on)
- Dashboard at North and South
- Upgrade, Rollback, Reset, Enable/Disable

8. Efficient Energy Management
- Energy aware workload scheduler
- Energy optimized Devices/Nodes
- Energy Monitoring

EDGE X FOUNDRY™

Platform Architecture

REQUIRED INTEROPERABILITY FOUNDATION

REPLACEABLE REFERENCE SERVICES

"NORTHBOUND" INFRASTRUCTURE AND APPLICATIONS

LOOSELY-COUPLED MICROSERVICES FRAMEWORK

CHOICE OF PROTOCOL

CONTAINER DEPLOYMENT

REMOTE/LOCAL GUI

REVERSE PROXY

APPLICATION/EXPORT SERVICES

CLIENT REGISTRATION

DISTRIBUTION

ADDITIONAL SERVICES

ADDITIONAL SERVICES

SECURITY

ADDITIONAL SECURITY SERVICES

SUPPORTING SERVICES

RULES ENGINE

SCHEDULING

ALERTS & NOTIFICATIONS

LOGGING

ADDITIONAL SERVICES

MANAGEMENT

MGMT SERVICE AGENT

ALL MICROSERVICES INTERCOMMUNICATE VIA APIs

CORE SERVICES

CORE DATA

COMMAND

METADATA

REGISTRY & CONFIG

DEVICE SERVICES (ANY COMBINATION OF STANDARD OR PROPRIETARY PROTOCOLS VIA SDK)

REST

OPC-UA

MODBUS

BACNET

ULE

BLE

MQTT

ENOCEAN

VIRTUAL

ADD'L DEVICE SERVICES

SECRET STORE

"SOUTHBOUND" DEVICES, SENSORS AND ACTUATORS

Data Today

- How much data we created in this world last 3-4 years?
- How much is useful day?
- Why?
- Possibilities with Data and Business Value!!

- We are here because of all of us!! :)

Data and Data Management at Edge - Situation, Challenges Discuss

- Edge & Data
  - What are the sources
  - Types
  - Amount
  - Rate
- What do we need to do with the data at Edge
- Then .....challenges...

Edge Data Management Solutions Discuss

So...what can we do?

- Solution view
- Interactive discussion
- Derive specific new points -- added to this slide realtime!

Wrap up

- Summary take away - collective notes
- Next possibilities...- a view

Thank You!