

Introduction to Fog Computing

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Digital Society of Tomorrow

Avalanche of **Traffic Volume**

Expansion of mobile broadband

Communicating machines



Massive growth in **Connected Devices (IoT)**

50+ Billion devices in 2020



Large **diversity** of use cases



Data will be **Collected**
(sensors, terminals, things)

Exchanged
(fixed & mobile)

Elaborated
(cloud, edge, fog)



Tremendous stress on networks

Bandwidth

Reaction Time (Latency)



Sky-rocketing Data

**180 ExaBytes
2016 - 2021**



**15 ExaBytes
2010 - 2015**

By the end of 2021...

6.4 billion



smartphone
subscriptions

10X



mobile data traffic

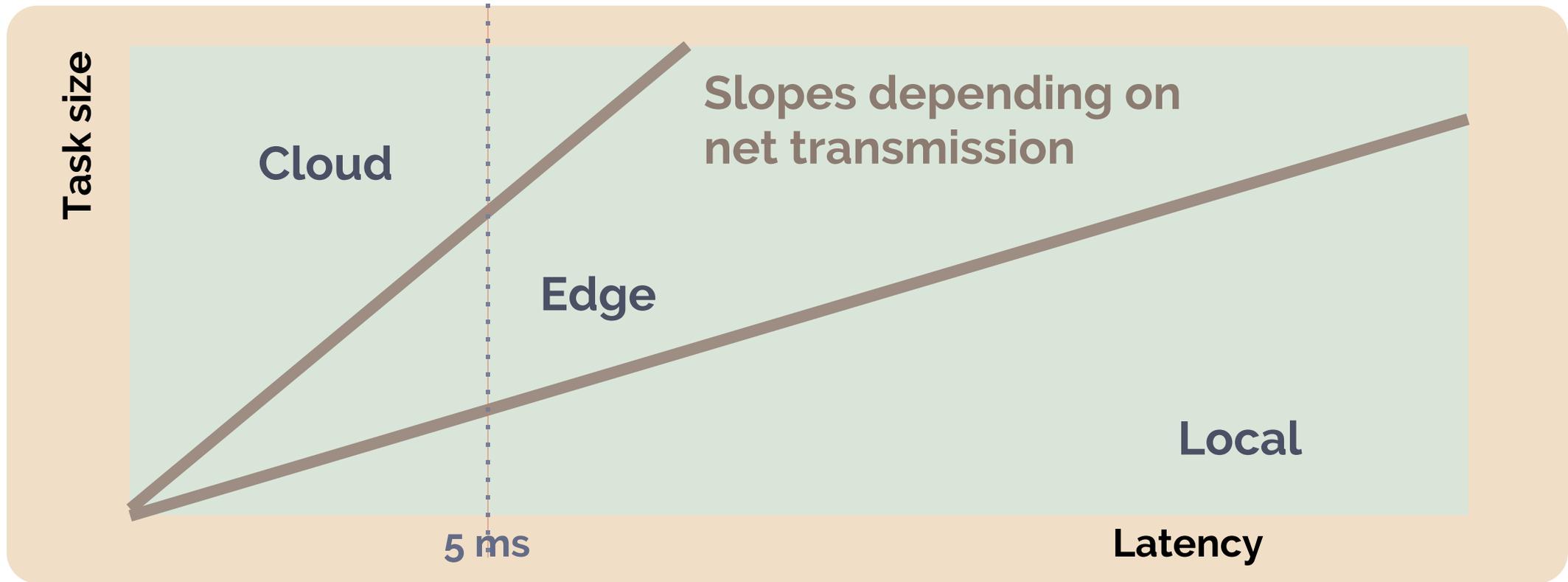
22 GB /month



per smartphone in North
America

Source: Ericsson Mobility Report, February 2016

Reaction time (Latency)



Source: Manzalini, Telecom Italia

Solve the problem locally when you can!

Fog, Distributed Cloud & Edge Computing

Distributed and local computing

- Network of intelligent nano / microsystems
- Data Management
- Processing and applications

Fog

- **Reduce dependence** on complex long-distance networks
- **Multiplicity** of Data Points, Variety & Velocity, Security, Resiliency, Latency
- **Real time** analytics and response needs
- **Control** / actuation

Cloud vs Fog

Fog can be distinguished from Cloud by its **proximity to end-users**, dense geographical distribution and support for mobility

Provides low latency, location awareness, and **improves quality-of- services** (QoS) and real time applications

Data, processing concentration **at the edge**; data can be processed locally in smart devices instead of being sent to the cloud

Fog computing is one approach to **dealing with the demands** of the ever-increasing number of Internet-connected devices

Advantages



Fast processing of **localized** service requests using local resources and connections

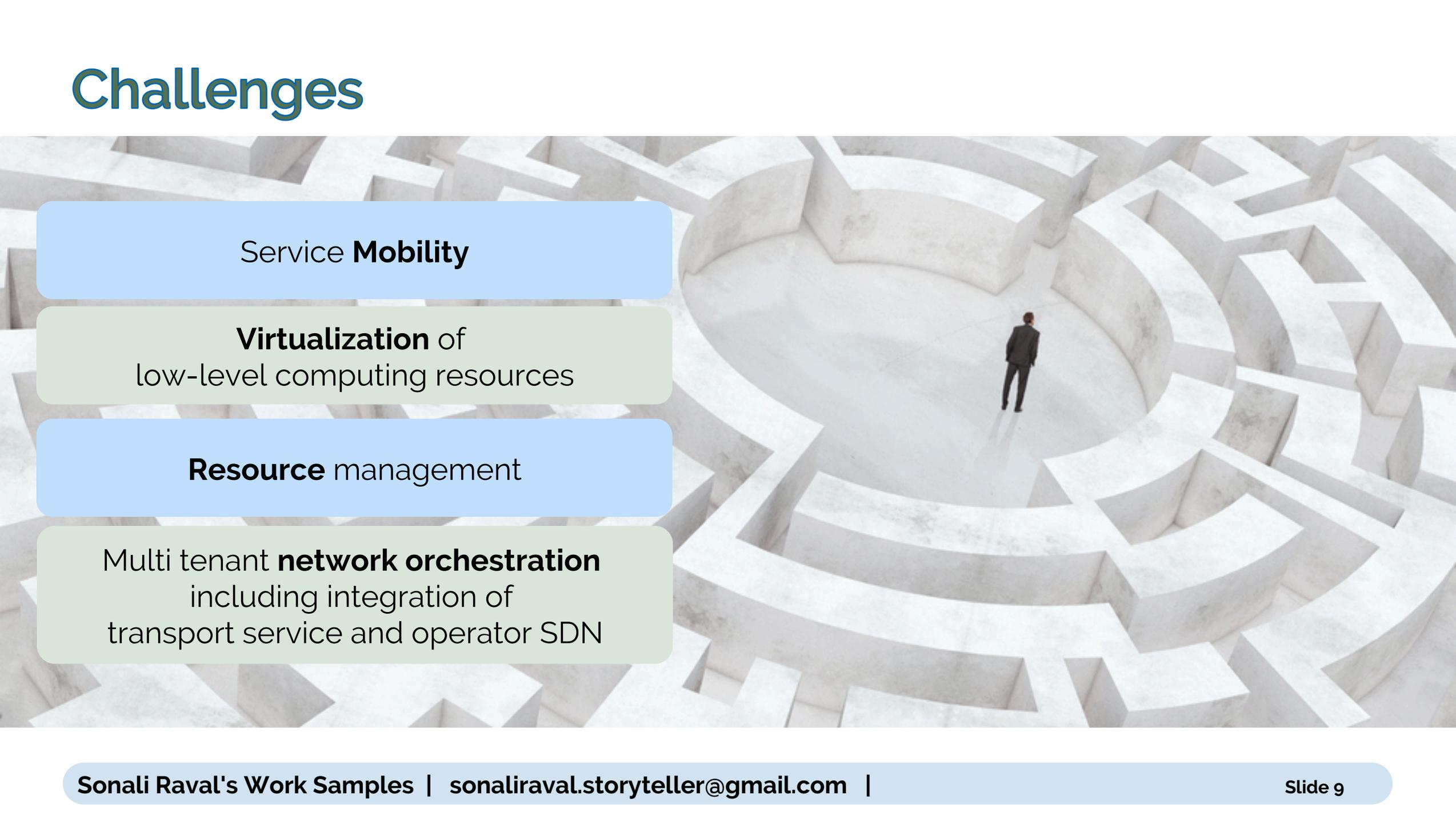
Enhanced service quality as compared to cloud, increased data handling and reduced service latency, response time



Enhanced efficiency

- Fog computing **avoids/strongly limits hauling traffic** between cloud and mobile users
- Higher energy efficiency

Challenges

A high-angle photograph of a large, intricate maze made of light-colored stone or concrete. A single person in a dark suit stands in the center of the maze, looking out at the complex paths. The maze is composed of many interconnected paths and dead ends, creating a sense of complexity and challenge.

Service **Mobility**

Virtualization of
low-level computing resources

Resource management

Multi tenant **network orchestration**
including integration of
transport service and operator SDN

Fog Computing in Action ...



Improve passenger safety,
Increase rider satisfaction

Thwart cyber-security
attacks

Alert drivers to treacherous
conditions ahead

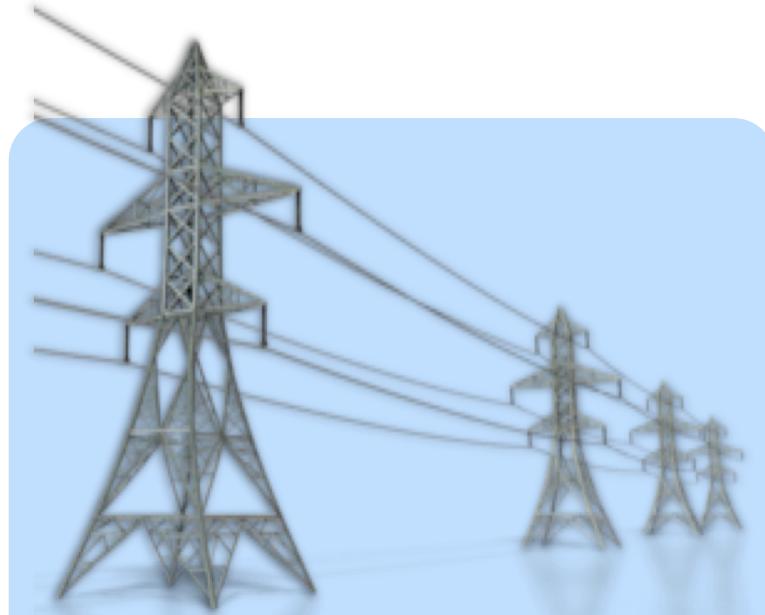


Increase agility

Reduce downtime

Secure machines and data

Confirm Safety systems are
intact



Restore power faster

Detect physical and cyber
security breach

Reduce maintenance costs