SOME THOUGHTS

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Some slides and ideas courtesy of Jason Hoffman, Head of the Ericsson Cloud System and Platforms

ERICSSON, WHO?

OPERATOR CLOUD SEGMENTS

Operator Public Cloud	Operator IT Private Cloud	Operator Telecom Private Cloud
Virtualized Compute + WAN resources sold as a service to Enterprises aka "Managed Cloud"	Virtualized IT functions (OSS, BSS, SDP, ERP, CRM etc)	Virtualized telecom functions (e.g. IMS)

openstack™
CLOUD SOFTWARE

NFV

Network
Functions
Virtualization

Classical Network Appliance Approach

Message Router

CDN

Session Border Controller

WAN Acceleration

DPI

Firewall

Carrier Grade NAT

Tester/QoE monitor

SGSN/GGSN

PE Router

BRAS

Radio Access Network Nodes

- Fragmented non-commodity hardware.
- Physical install per appliance per site.
- Hardware development large barrier to entry for new vendors, constraining innovation & competition.

Independent Software Vendors

Virtual Appliance Virtual Appliance Virtual Appliance Virtual Appliance
Virtual Appliance Virtual Appliance Virtual Appliance

Orchestrated, automatic & remote install.

Standard High Volume Servers

Standard High Volume Storage

Standard High Volume Ethernet Switches

Network Virtualisation Approach

Figure 1: Vision for Network Functions Virtualisation

500 BILLION DEVICES

500 BILLION DEVICES

Doing what?

500 BILLION DEVICES

Collecting data. Acting on data.

DATA.
Source. Observer. Student.

DATA FROM HUMANS
Photos. Videos. Text. Audio.

DATA FROM HUMANS

Google. FB. Enterprise File & Mail.

DATA FROM MACHINES
Servers, Phones, Wearables, Sensors, Cars.

DATA FROM NATURE
Is the highest resolution data available.

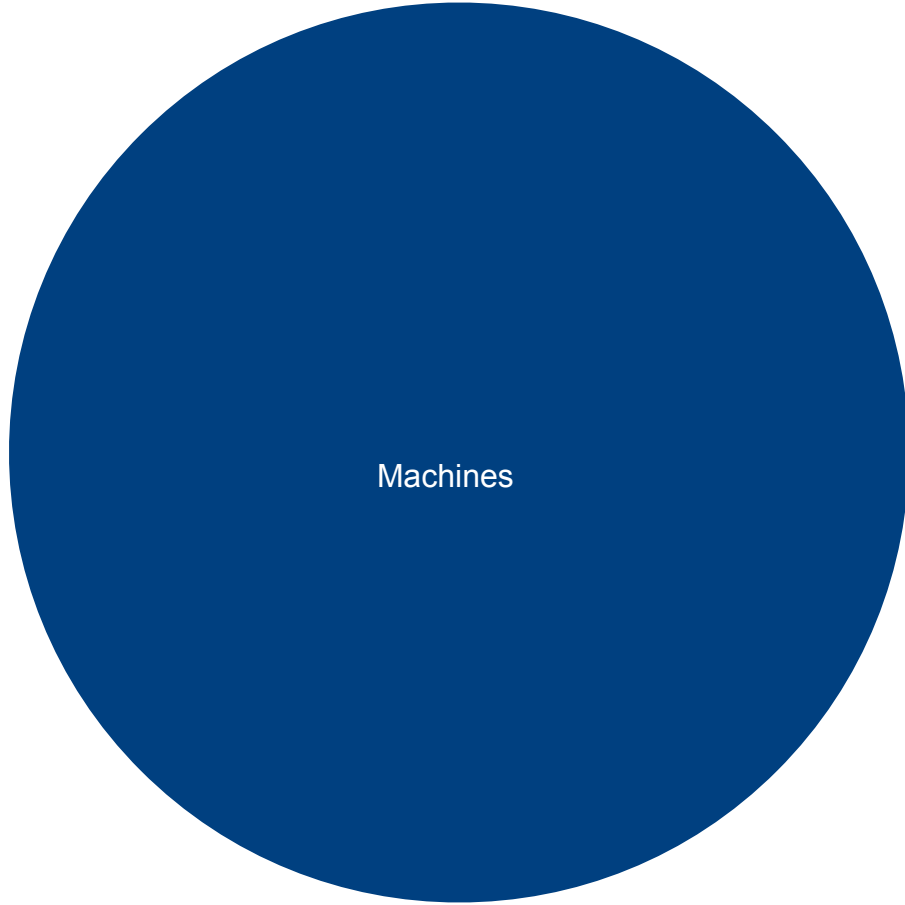# 10,000,000 GENOMES IS 20EB

Keep all the data

STORAGE INDUSTRY SHIPPED 16EB

In 2012 (according to IDC)

A SINGLE IDEA CAN CONSUME AN ENTIRE INDUSTRY

Humans

Machines

Nature

WHAT WE'VE BEEN DOING

Humans Source, Humans Observe, Humans Learn

Nature Source, Nature Observe, Nature Learns

Nature Source, Humans Observe, Humans Learn

Nature Source, Machine Observes, Humans Learn

WHAT'S NEW

Humans Source, Machines Observe, Humans Learn
Humans Source, Machines Observe, Machines Learn
Machines Source, Machines Observe, Machines Learn
Nature Source, Machines Observe, Machines Learn
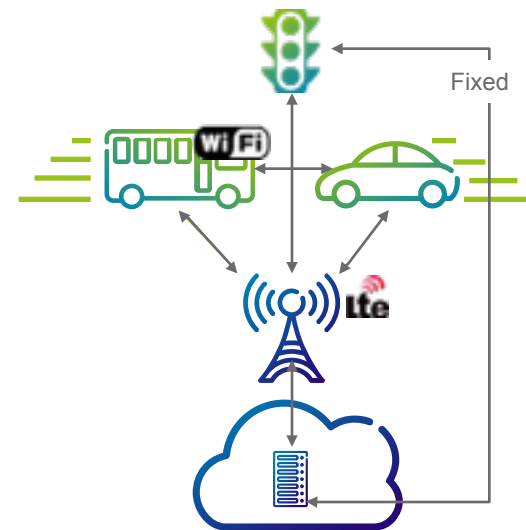
500 BILLION DEVICES

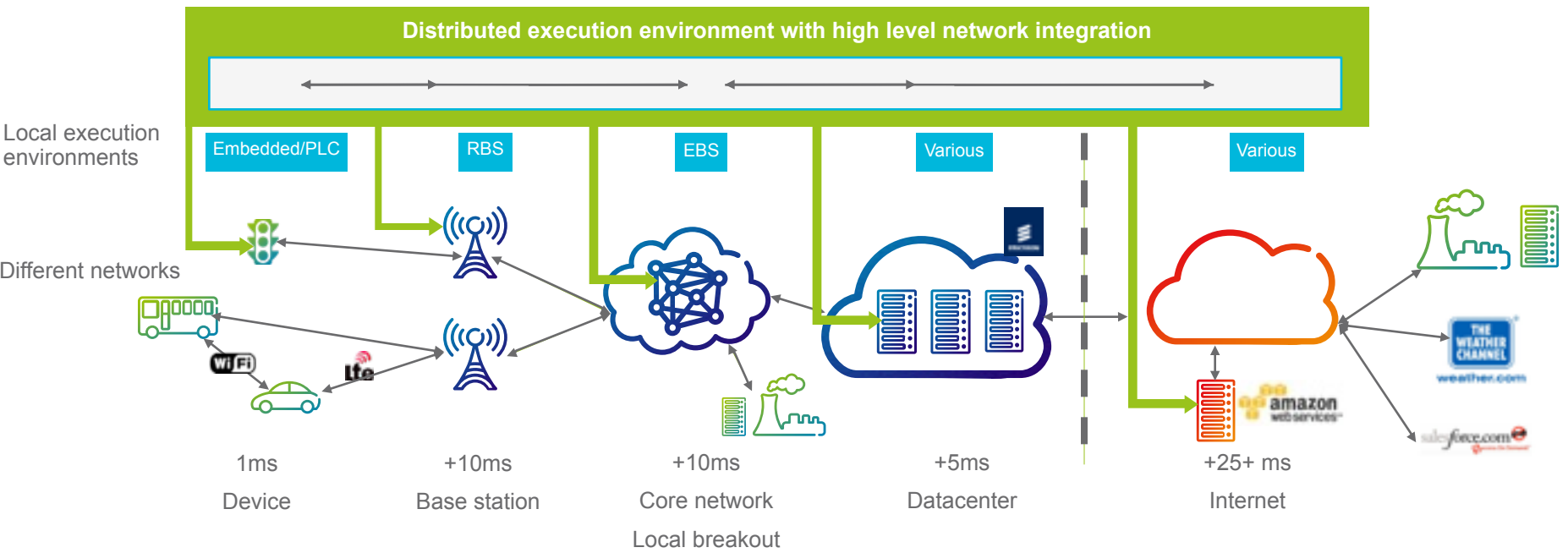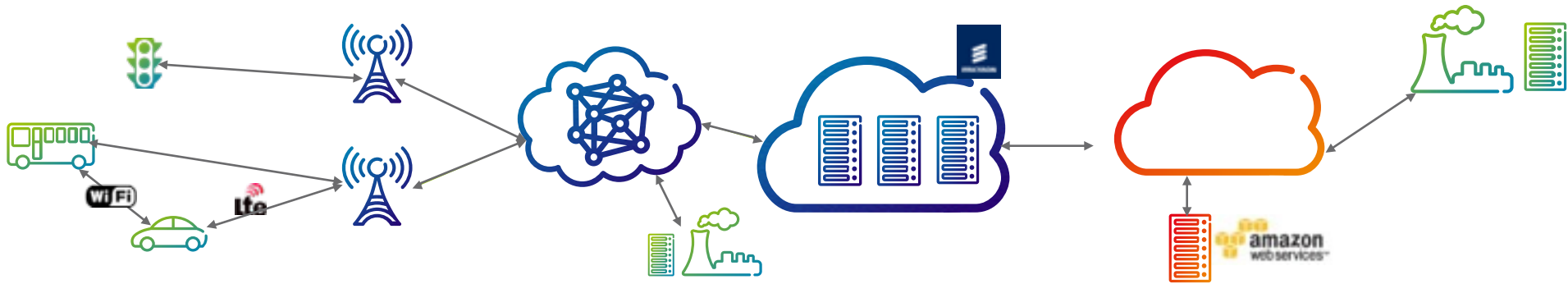Collecting Data.
Learning.
Acting.

MISSION CRITICAL CLOUD

EVERYTHING IS PROGRAMMABLE

Distributed execution environment with high level network integration

Local execution environments

| Embedded/PLC | RBS | EBS | Various | Various |

Different networks

1ms	+10ms	+10ms	+5ms	+25+ ms
Device	Base station	Core network	Datacenter	Internet
		Local breakout		
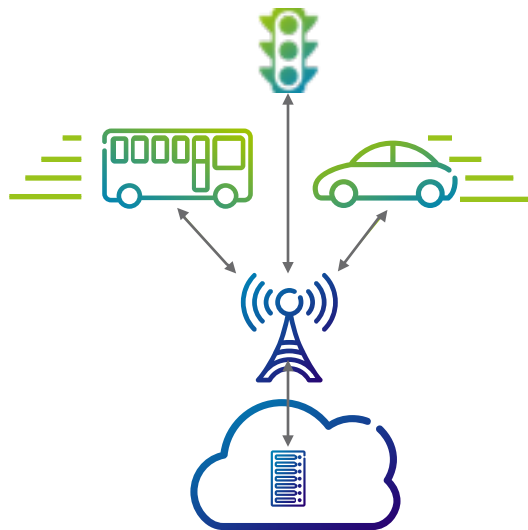
THIS IS THE HARDWARE

Distributed. Heterogenous. Dynamic.

HOW TO PROGRAM?
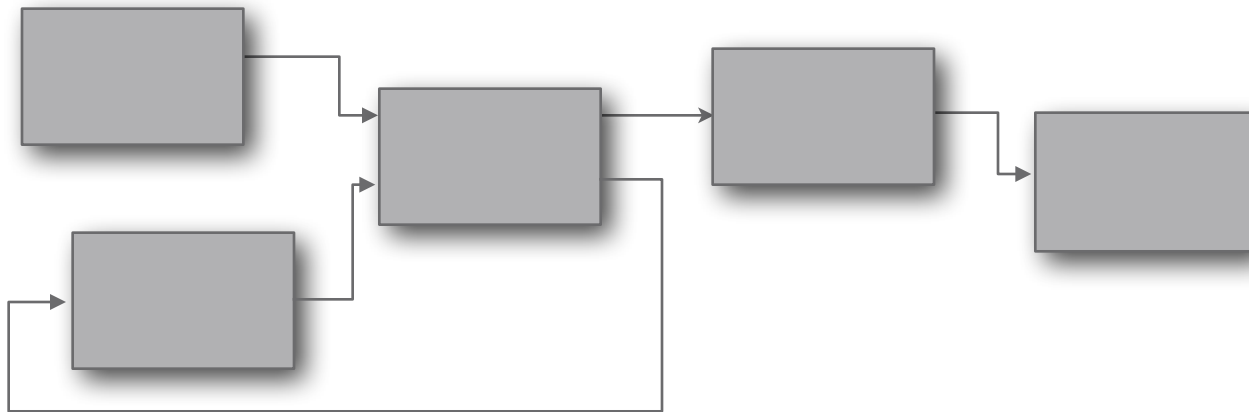
HOW TO PROGRAM?
Ease of use. Resource. Timing. Resilient.
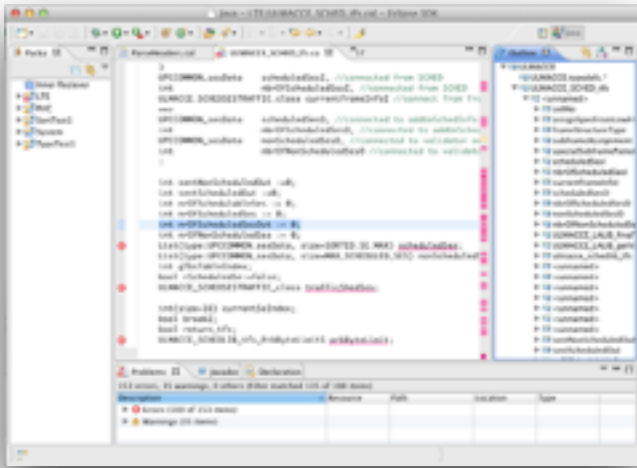
HOW TO MANAGE?

Distributed. Network, Computed & Data integration
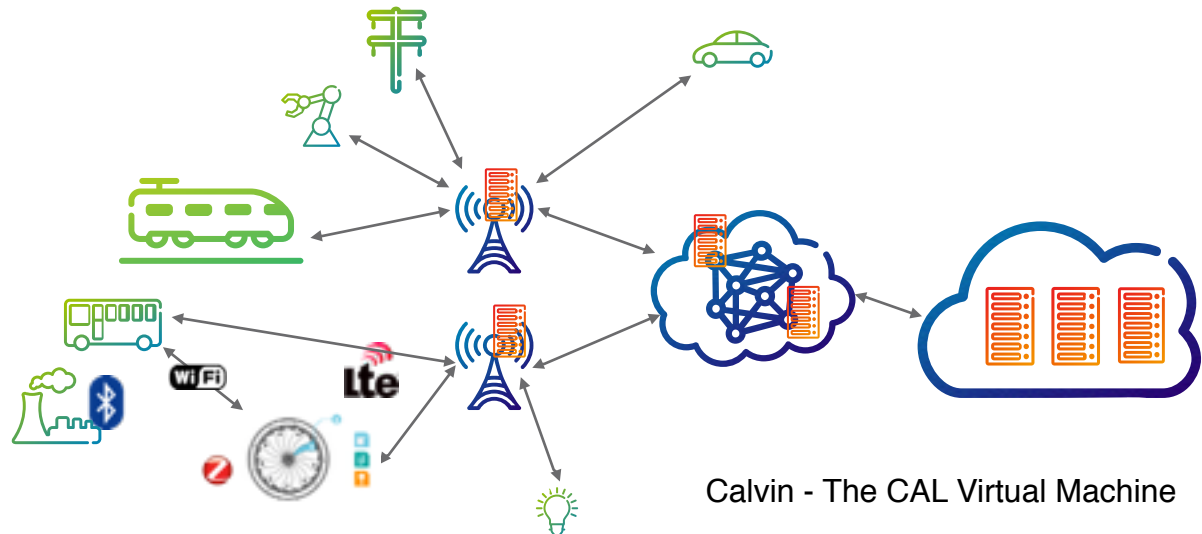
AN APPLICATION AS A GRAPH

- Nodes called actors

- Message passing

  - Actors only interact via ports & FIFO connections

- Scheduling decoupled from algorithm

- Programming in CAL, Erlang or X

CALTOOPIA.ORG

The CAL Actor Language

Available at GitHub

Calvin - The CAL Virtual Machine

THE END

Everything is programmable

The data collected is used to control things

The cloud is integrated with devices & network