

CS596 IoT

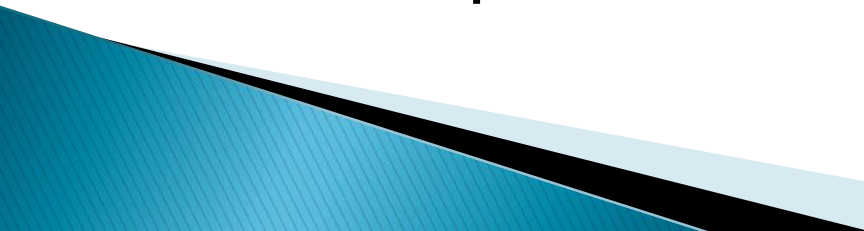
IoT Introduction

Vicky HSU
vickyhsu@picomo.com

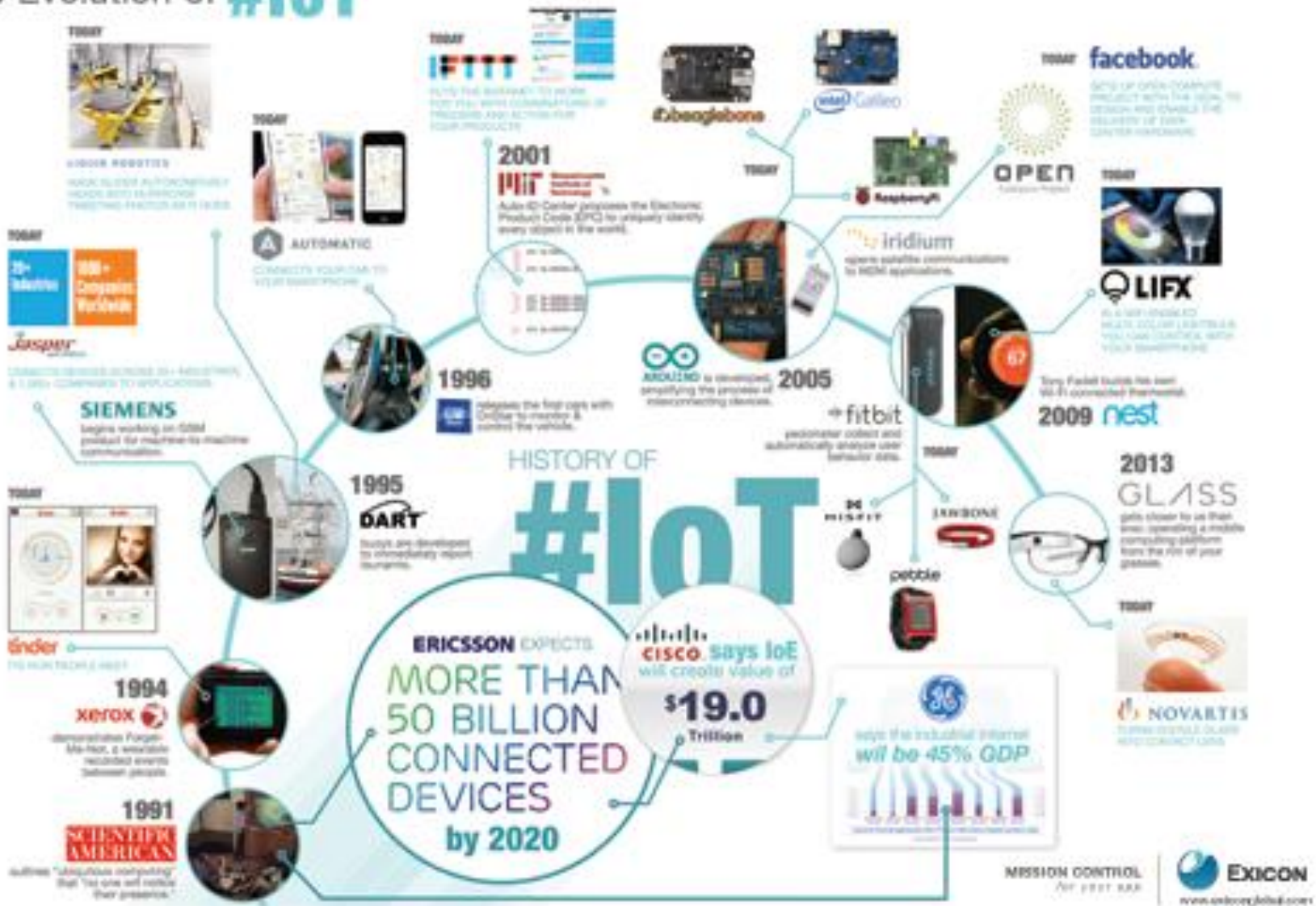
Class-1 Outline

- ▶ What is IoT
 - ▶ IoT Concepts
 - ▶ IoT Definitions
 - ▶ IoT Perspective
 - ▶ IoT Applications – Big Picture
 - ▶ IoT Adoption
 - ▶ IoT Examples
 - ▶ IoT Market
 - ▶ IoT EcoSystems
 - Who is the players
 - ▶ IoT Devices
 - ▶ IoT Platforms
- 

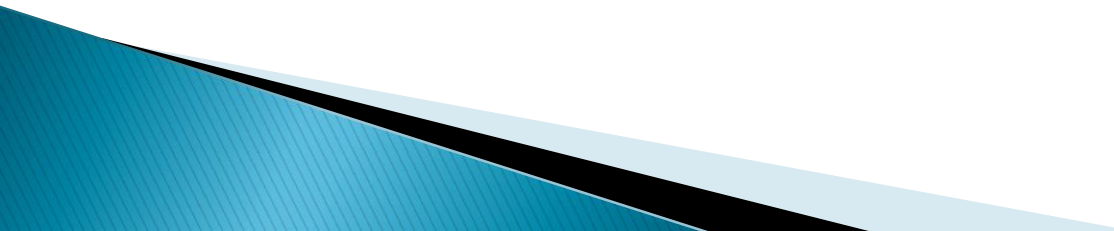
What is IoT

- ▶ 26 to 50 billion connected devices will live on our global networks by 2020
 - ▶ There will be three times as many Internet-connected things on Earth as there are humans within the next 10 years
 - ▶ For every Internet-connected PC or handset there will be 5–10 other types of devices sold with native Internet connectivity
 - ▶ The term was coined in 1999 by Kevin Ashton from MIT
 - ▶ ◉ Concept has been discussed since 1991
- 

The Evolution of #IoT

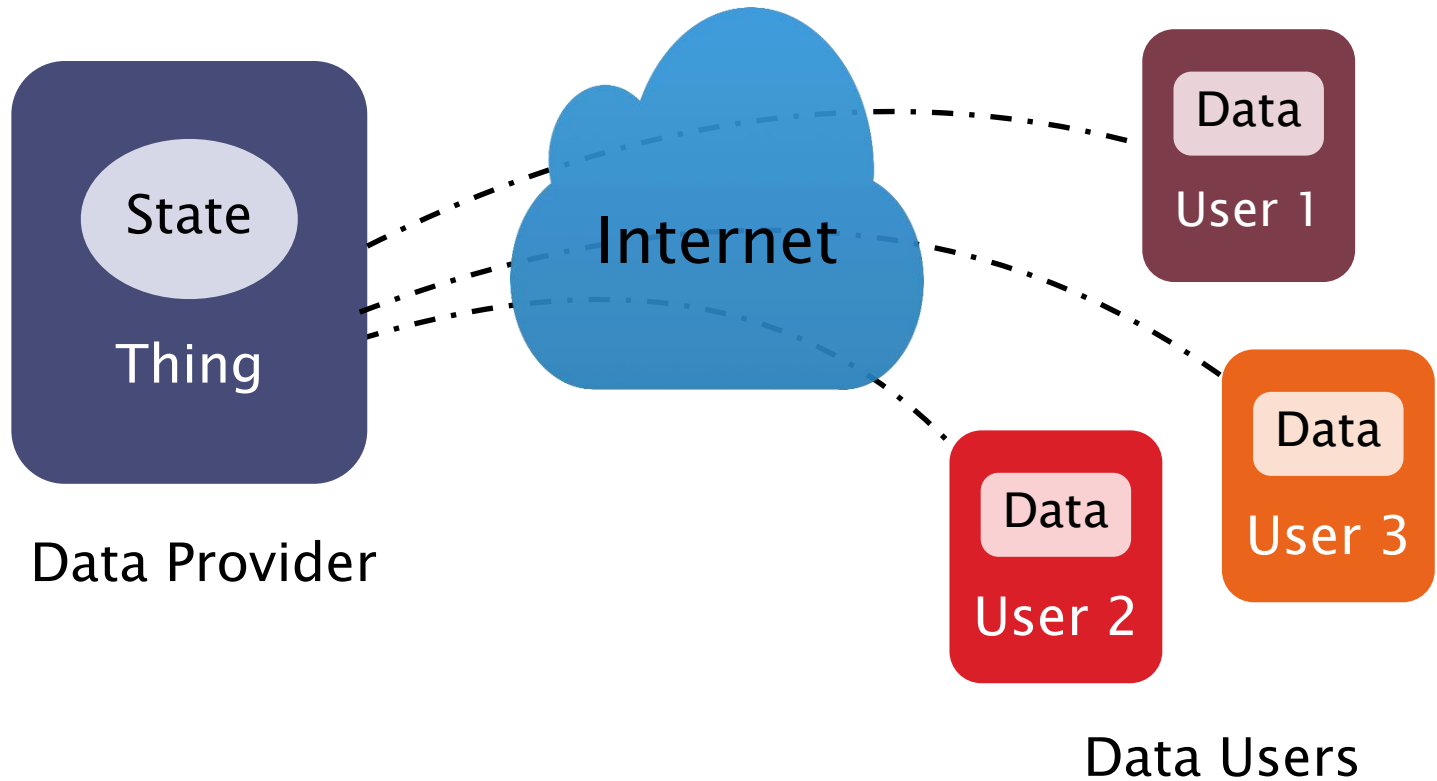


IoT Concepts

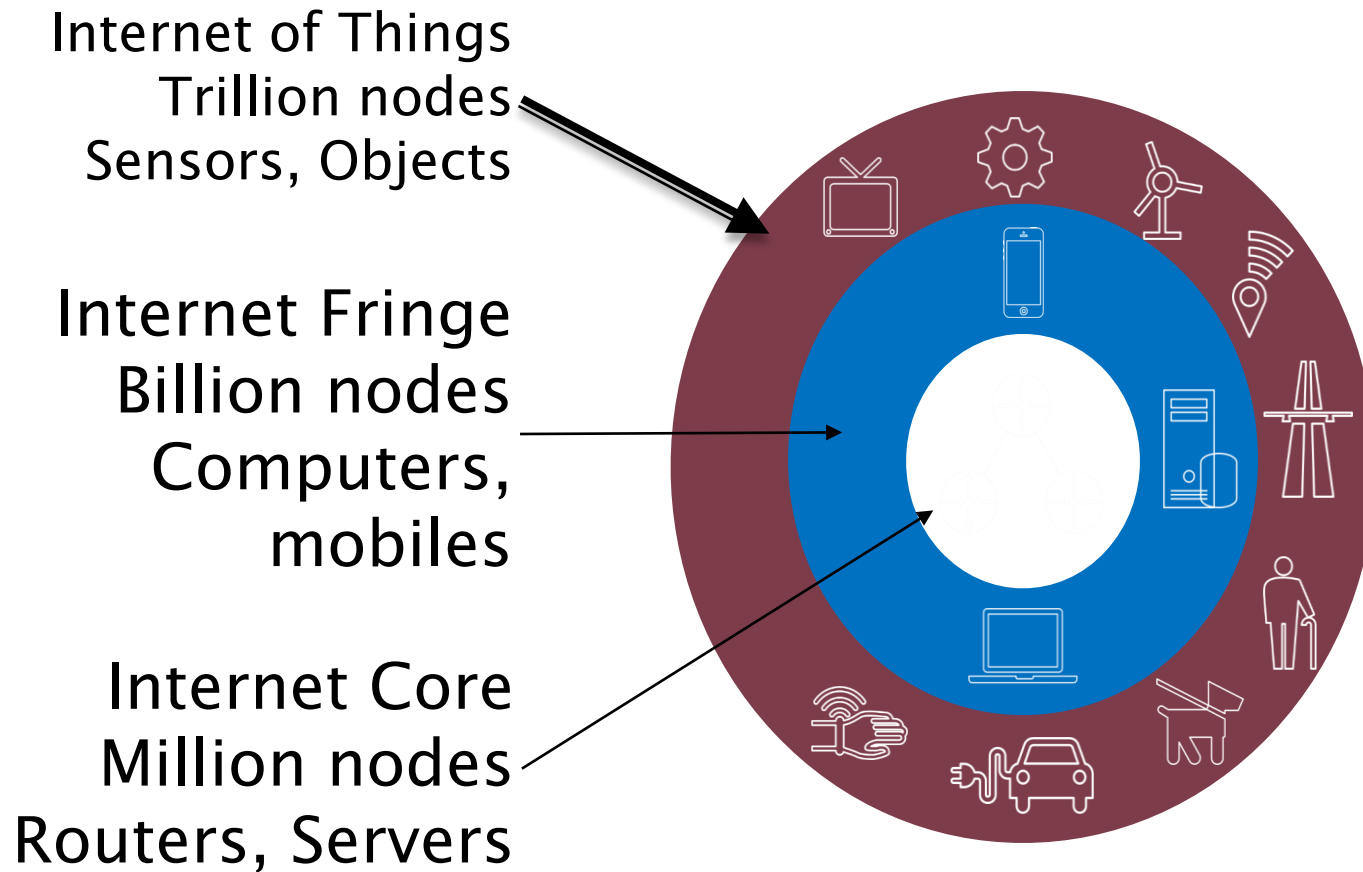
- ▶ M2M
 - ▶ IoT
 - ▶ IoE
 - ▶ Smart Objects
 - ▶ Web of Things
 - ▶ Cloud manufacturing
 - ▶ Network of Everthings
- 

The Internet of Things

Internet to Bridge Data Providers and Users



The Internet Evolution



IoT Applications Requires Lots of Devices



Smart Cities



Smart Water



Industrial
Control



Smart Grid



Smart
Farming



Smart Homes



Smart
Environment



Smart Retail



eHealthcare



Safety and
Security



Smart
Logistics

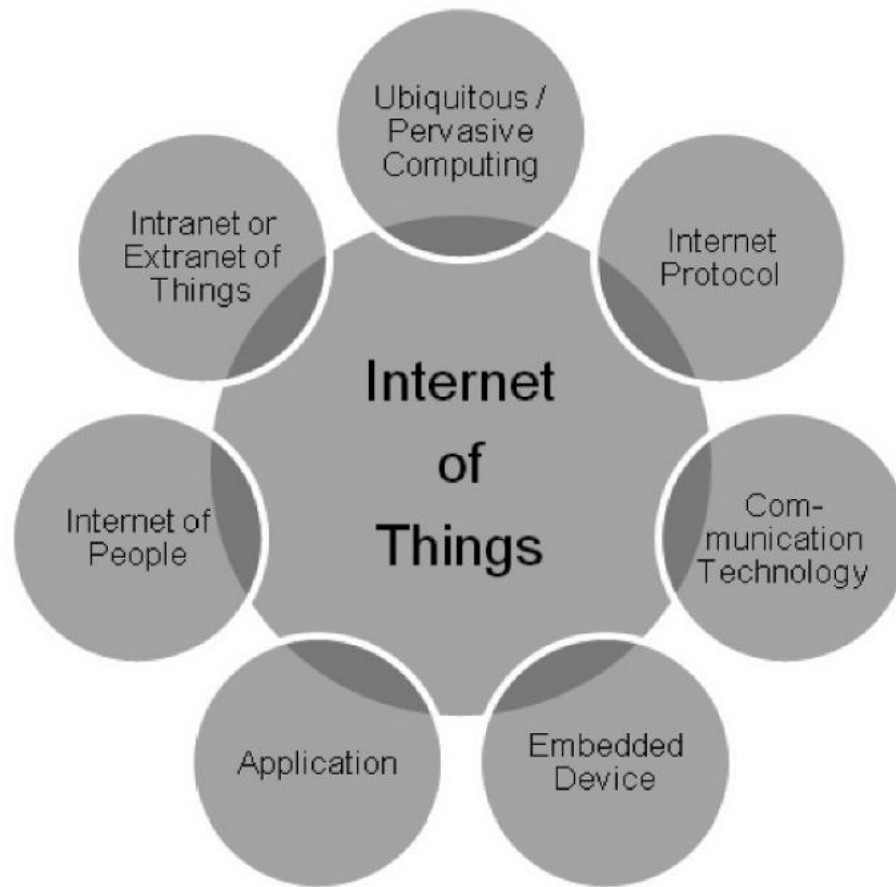


Customer
Service

IoT Definitions

- ▶ The Internet of Things (IoT)^[1] is the network of physical objects or "things" embedded with electronics, software, sensors, and connectivity to enable objects to collect and exchange data.^[2]
- ▶ The Internet of Things allows objects to be sensed and controlled remotely across existing network infrastructure,^[3] creating opportunities for more direct integration between the physical world and computer-based systems, and resulting in improved efficiency, accuracy and economic benefit.^{[4][5][6][7][8]}
- ▶ Each thing is uniquely identifiable through its embedded computing system but is able to interoperate within the existing Internet infrastructure.
- ▶ Experts estimate that the IoT will consist of almost 50 billion objects by 2020

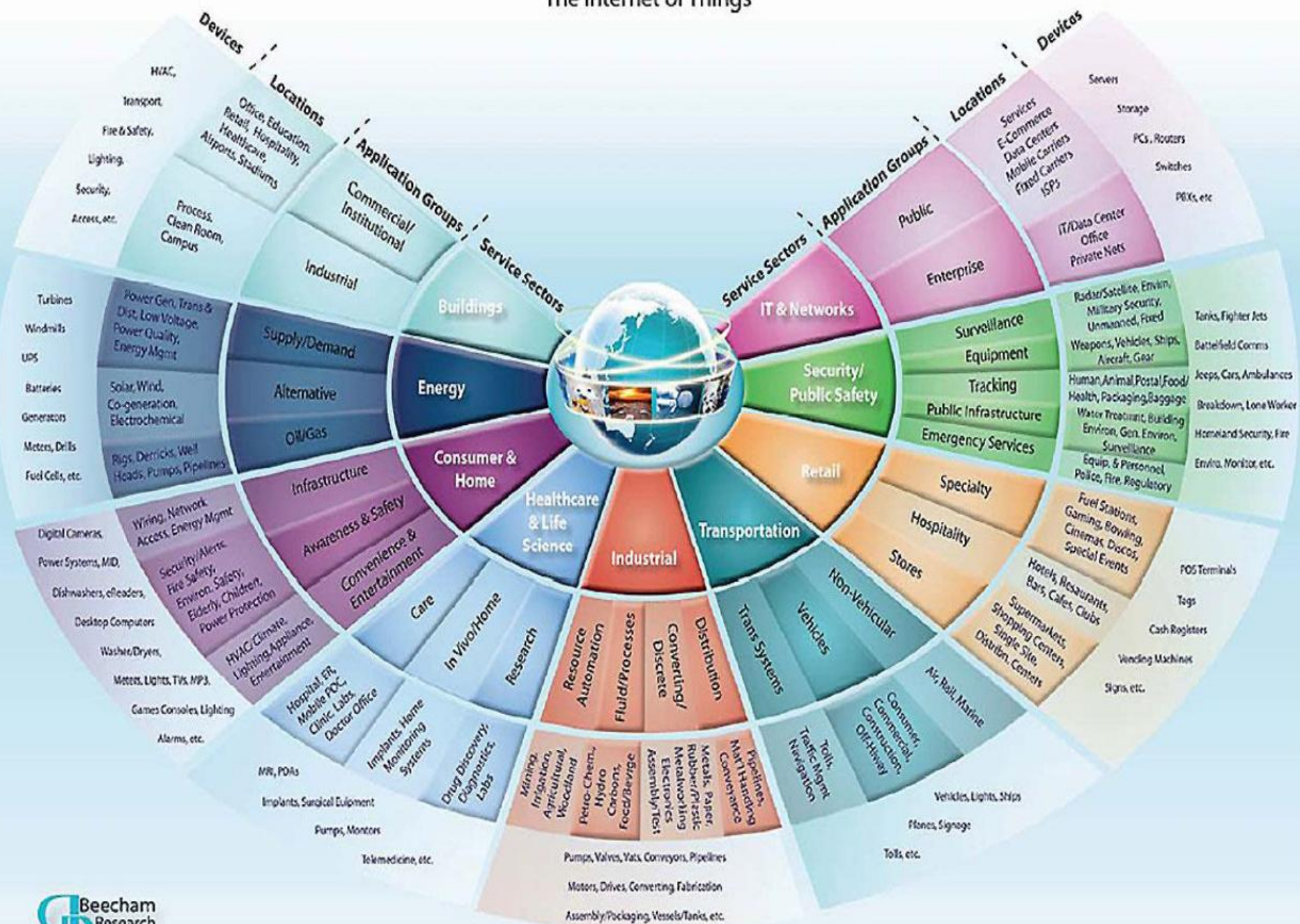
IoT Perspective



IoT Applications

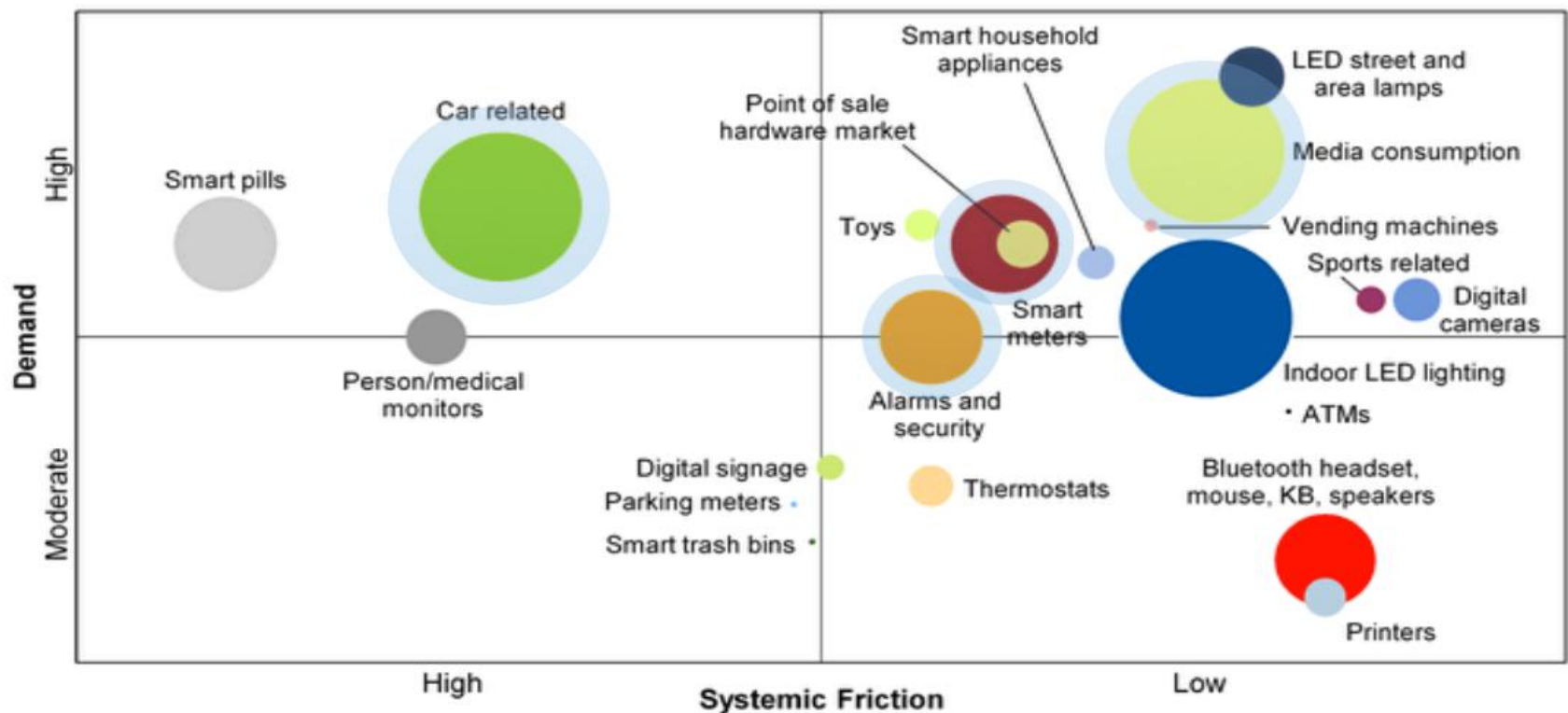
- ▶ Home Automation
 - ▶ Smart Building
 - ▶ Environmental Monitoring
 - ▶ **Infrastructure management**
 - ▶ **Manufacturing**
 - ▶ **Energy management**
 - ▶ **Medical and healthcare systems**
 - ▶ **Building and home automation**
 - ▶ **Transportation**
 - ▶
- 

The Internet of Things




IoT Adoption

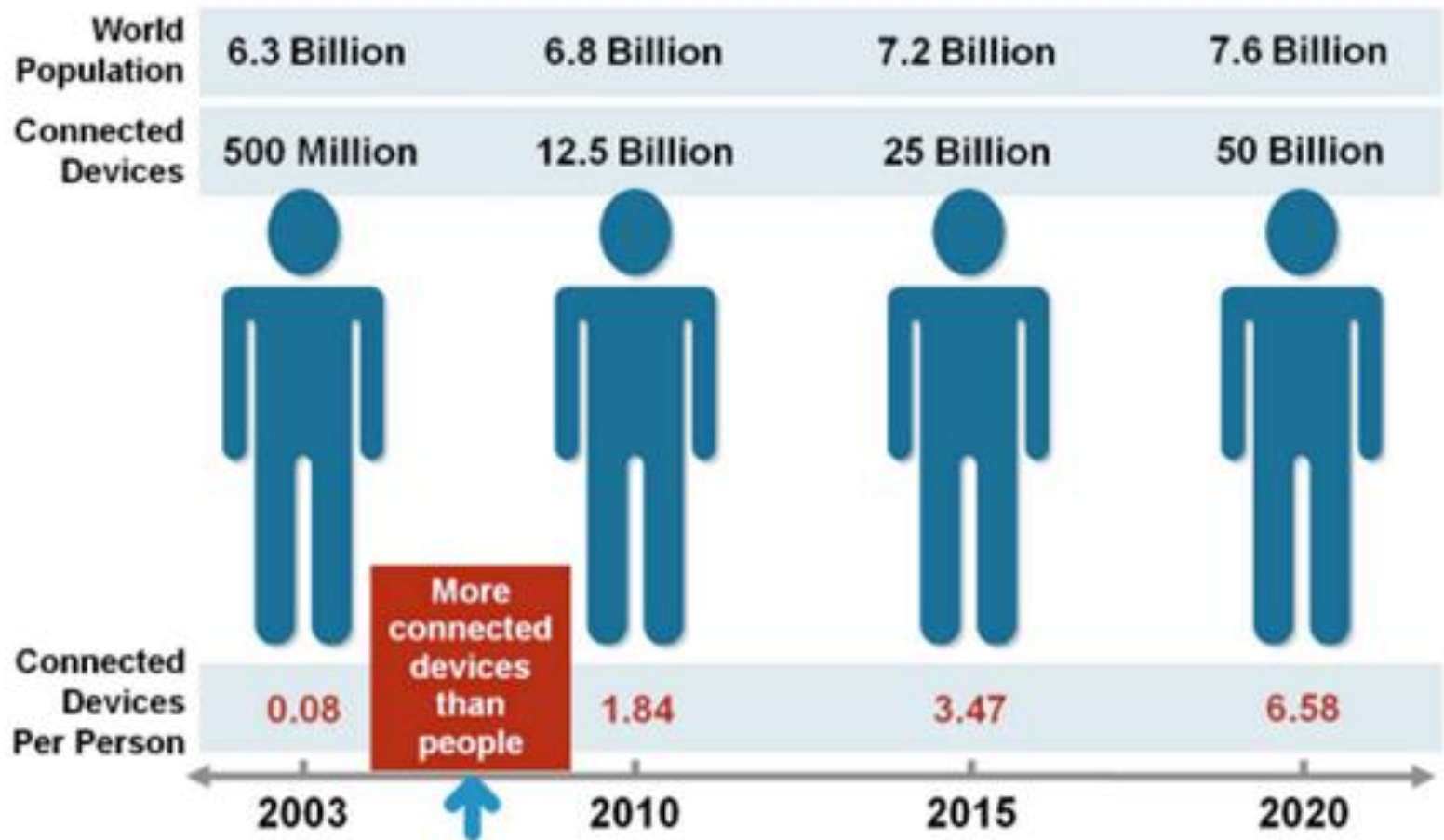
- ▶ IoT adoption will occur at different rates. Adoption of car related, smart meters and
- ▶ security IoT solutions are some of the largest opportunities on the IoT landscape.



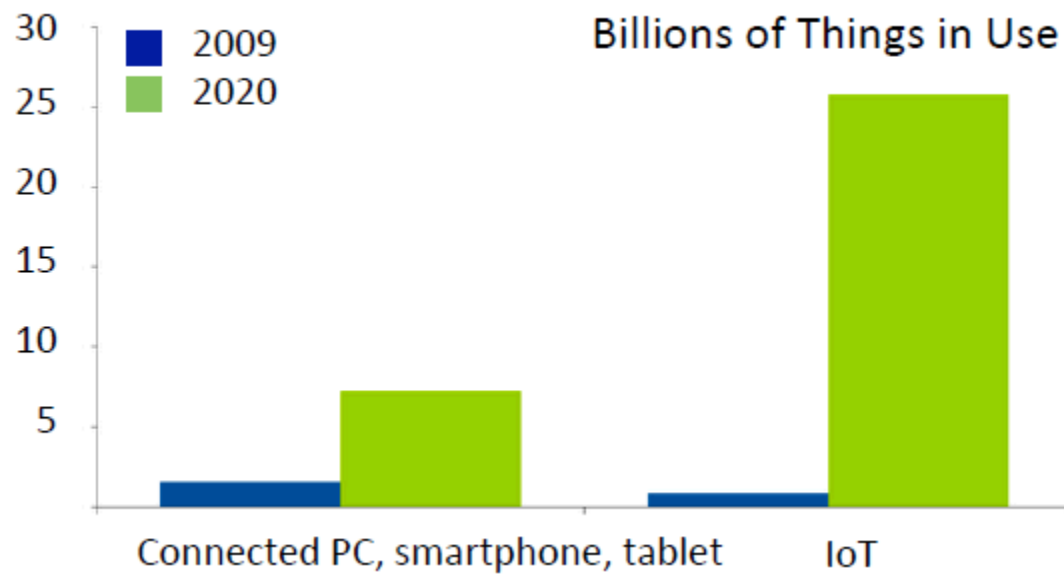
IoT Examples

- ▶ Wireless Sensor Networks
 - ▶ Internet-connected wearables
 - ▶ Low power embedded systems
 - ▶ RFID enabled tracking
 - ▶ Use of mobile phones to interact with the real world
 - ▶ Devices that connect via Bluetooth enabled mobile phones to the
 - ▶ Internet
 - ▶ Smart Homes
 - ▶ Connected Cars
 - ▶ etc.
- 

Internet Usage and Population Statistics



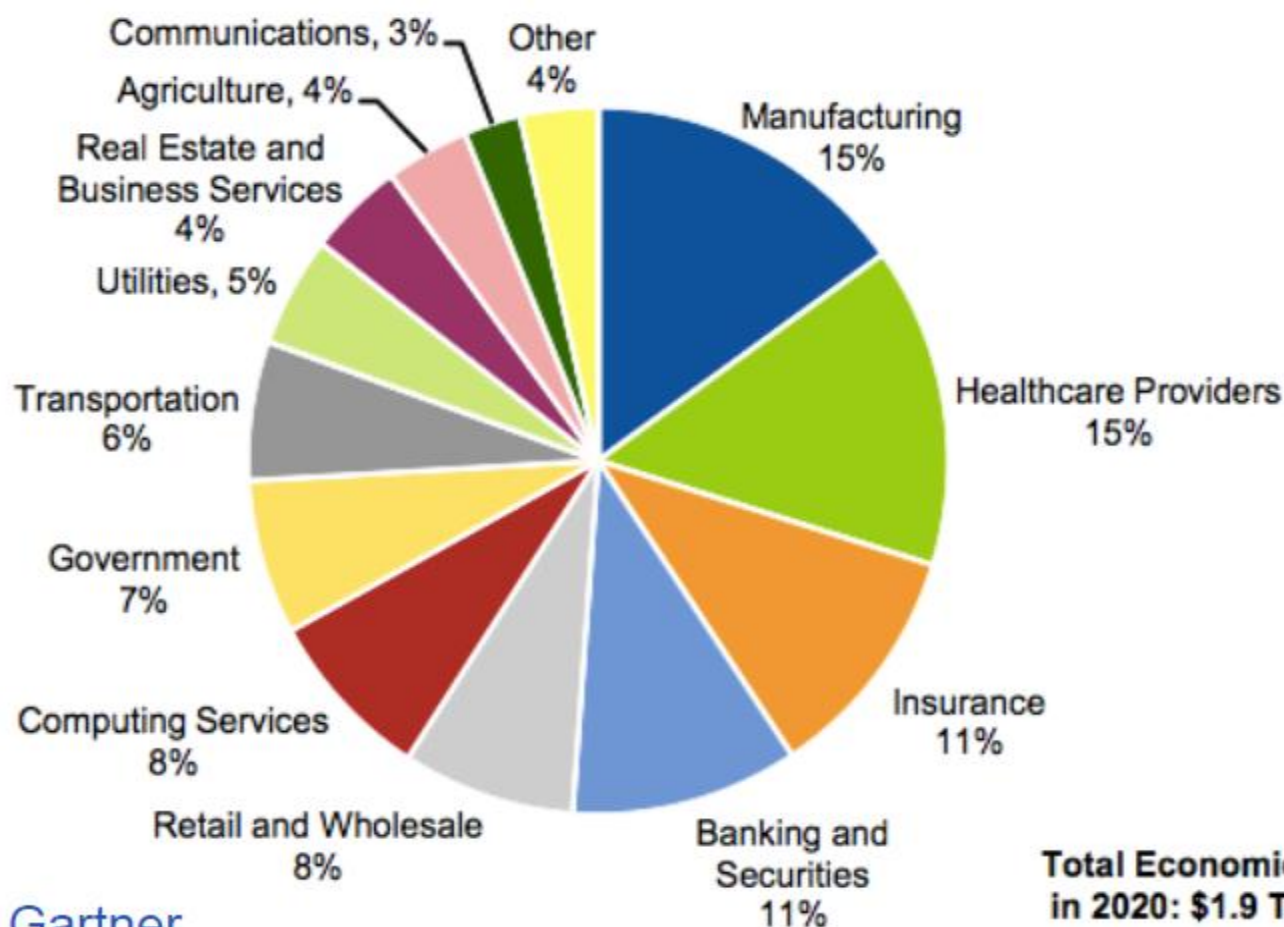
Source: Cisco IBSG, April 2011



26bn devices connected to the Internet by 2020

Gartner estimates the global economic value add of IoT as a result of increasing sales and decreasing inputs and costs to be \$1.9 trillion by 2020.

	2014	2015	2016	2017	2018	2019	2020
Value Add (\$T)	0.4	0.5	06	0.8	1.0	1.4	1.9
Growth (%)	25	26	27	29	31	34	39



Source: Gartner

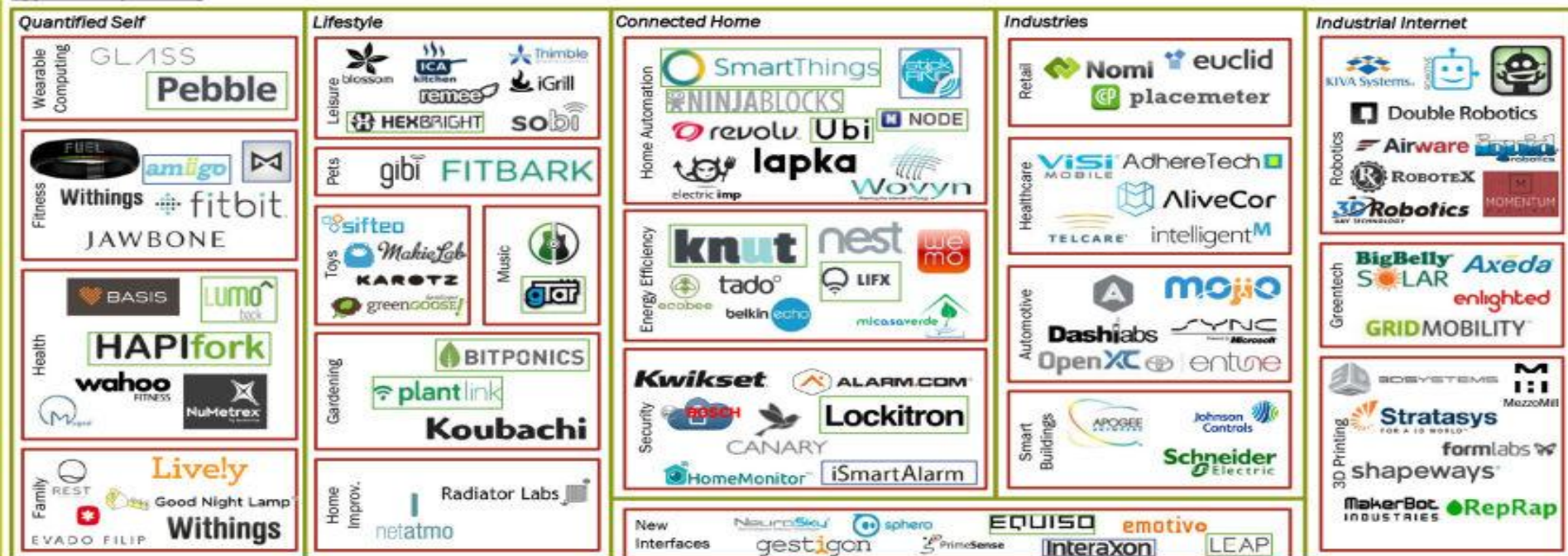
IoT Ecosystem

INTERNET OF THINGS LANDSCAPE

Platforms & Enablement (Horizontals)



Applications (Verticals)



Building Blocks



Applications (Verticals)

Personal Devices

Wearable Computing

pebble cookoo rufcon

strivi APX MOT

Fitness

GARMIN

tomtom

Health

WIM

remee

Family

FILIP

mimo

Lifestyle

Sports

SO

InfoMotion

Cooking

Smart Die Scale

blossom

Pets

Whistle

etagg

Toys

KAROTZ

atoms

Music/Art/Video

ROLI

CATCH

Garden

plantlink

BITPONICS

Connected Home

Automation

Quirky

SmartThings

Monitoring

lapka

BlueMaestro

Security

canary

dropcam

Tracker

Chipolo

linquet

Hub

Homey

Control

Industries

Retail

bytelights

euclid

Payment/Loyalty

Square

shopify

Healthcare

VISI

Senseonics

Automotive

Zobe

libe

Infrastructure

waveLink

Trimble

Agri-culture

ARQUS

adap-N

Industrial Internet

Robotics

Double Robotics

ALDEBARAN

Drones/Aerospace

3DR

KML

Green-tech

BigBelly

enlighted

3D Scan/Print

MakerBot

dp

Smart Grid

GRIDNET

SMART

Asset Tracking

gsp

VIDEO

Platforms & Enablement (Horizontal)

Connectivity/Dev Platforms

spark kynetx

pinoccio

resin.io

Software/Data Platforms

EXOSITE

Yaler.net

Wot.io

Open Source

webinos

openHAB

SAFECAST

Sensor Networks

motionloft

place-meter

Motionloft

Personal Interfaces

NeuroSky

wit.ai

Leap

gestigon

Security

inside

SafeNet

utimaco

Corporates

amazon

hp

LG

Building Blocks

Protocols

Bluetooth

WiFi

2G 3G 4G LTE

M2M Networks

Helium

KORE

aeris

Portable WiFi

GOODSPEED

BACK

at&t

Telecom

boostmobile

Verizon

Sprint

Cloud

Google Cloud Platform

amazon

redhat

Mobile

iOS

Android

Windows Phone

Processors/Sensors

ARM

Intel

TI

Parts/Kits

Makey Makey

SAM

littleBits

Services

tinycad

dragon

sculpteo

Incubators

Highway 1

LEARNOS

WEARABLE WORLD

Funding

KICKSTARTER

indiegogo

MedStartr

Distribution

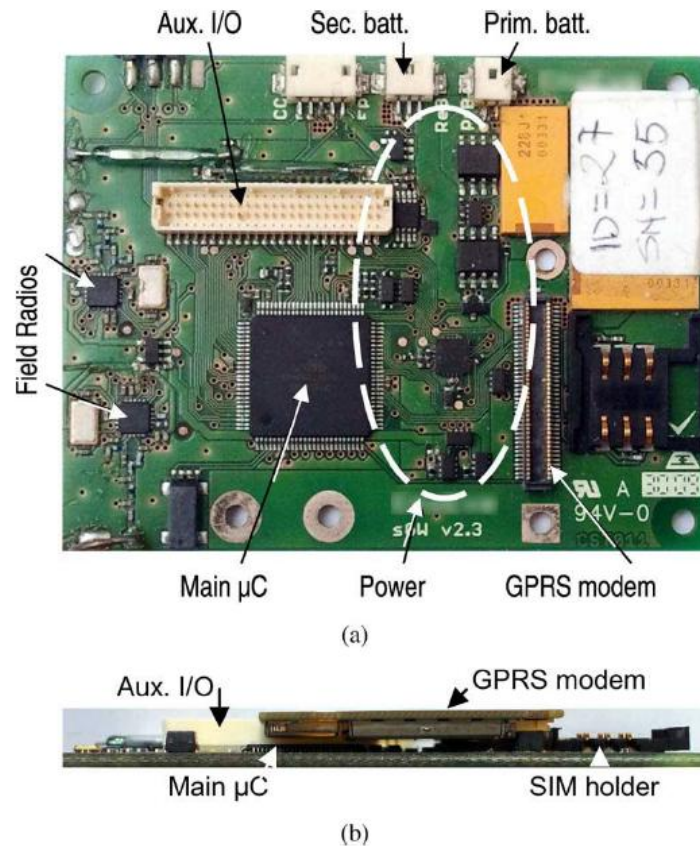
angelcam

angelcam

angelcam

IoT Sample Device

PCB of the gateway node for environmental monitoring: (a) top view and (b) side view with the GPRS modem mounted on top (scale 1:1 aprox.).



Home & Building Automation

- Bringing intelligence, convenience and lifestyle



Smart Energy

- Adding power awareness to products and helping to save energy



Multimedia

- Wireless audio streaming and advanced remote controls



Security and Safety

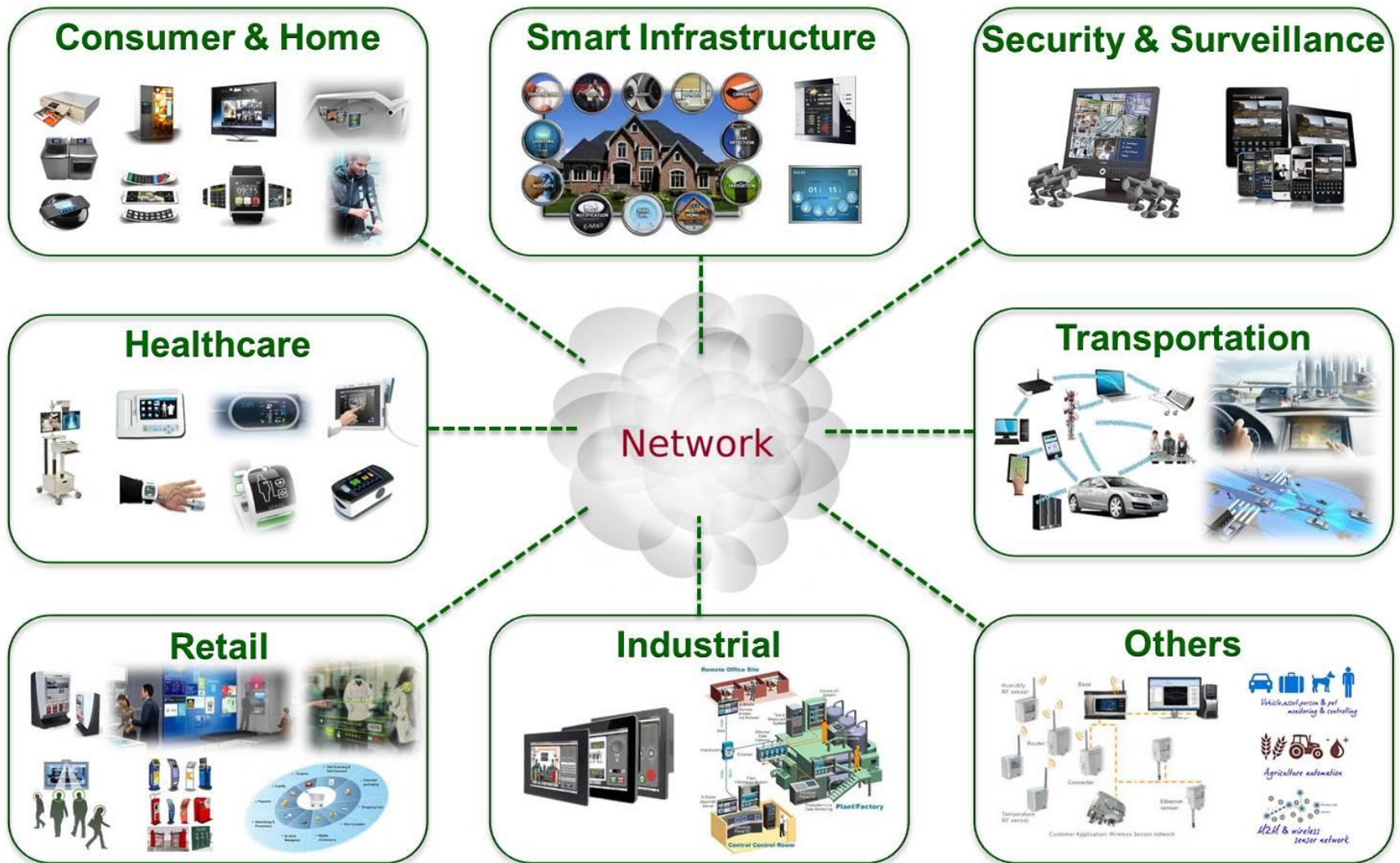
- Improving remote control and home monitoring



Industrial M2M Communication

- Internet enhanced M2M communication using existing Wi-Fi infrastructure





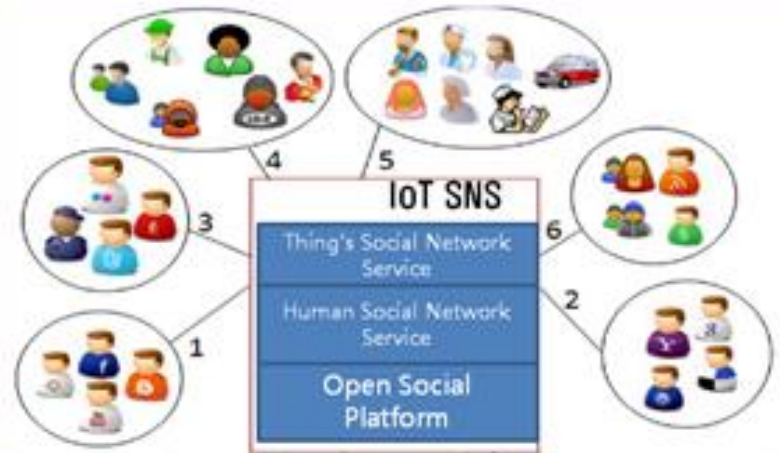
Vivante and the Vivante logo are trademarks of Vivante Corporation. All other product, image or service names in this presentation are the property of their respective owners. © 2013 Vivante Corporation

IoT Solutions Platform / Solutions

- ▶ Realtime Data Logging
 - Jasper Technologies, Inc.
 - Xively
- ▶ Software development environments
 - Tibbo Systems
 - AggreGate Platform
 - Arrayent
 - B-Scada
 - Carriots
 - EVERYTHING
 - Exosite
 - IoT-Ticket.com
 - nPhase
 - Raco Wireless
 - ThingWorx



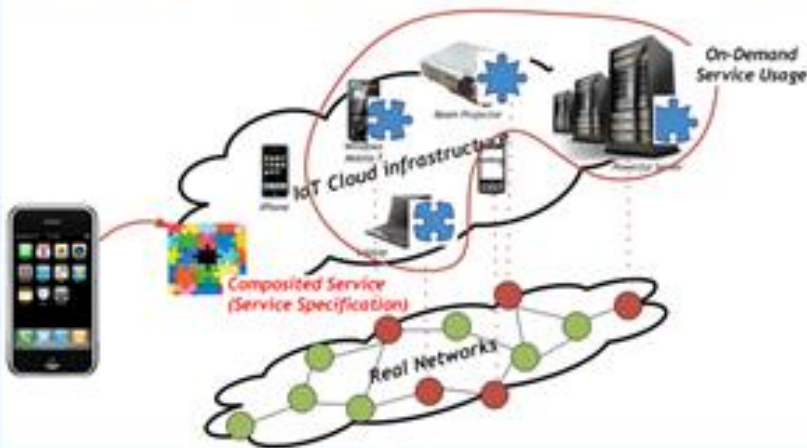
Crawling things' Information over the world



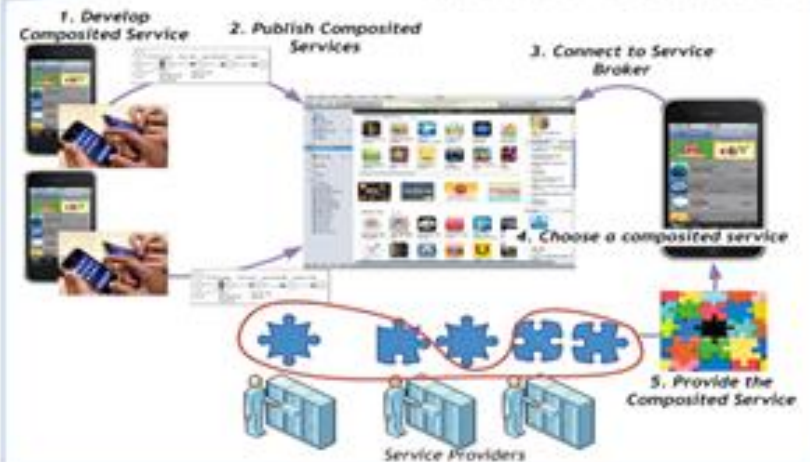
Connecting things through social network

Internet of Things

Service Provisioning through IoT Cloud



Interactive Programming for IoT Services



IoT Architecture Overview

