Introduction to IoT

Pavel Genevski & Vladimir Savchenko - SAP Labs Bulgaria
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Teachers

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Administrative Q&A

Кога?

Четвъртък от 17:15 до 21:00

Къде?

Зала 320

Как да минем?

Защита на групов проект + индивидуални впечатления

Let’s get started!

Over 20 billion connected devices

Consumer market: ~$546B

1.4B smartphones (flat*)

157M tablets (7% decline)

21M smartwatches (flat*)

Industrial market: ~$868B

Factories (Industry 4.0)

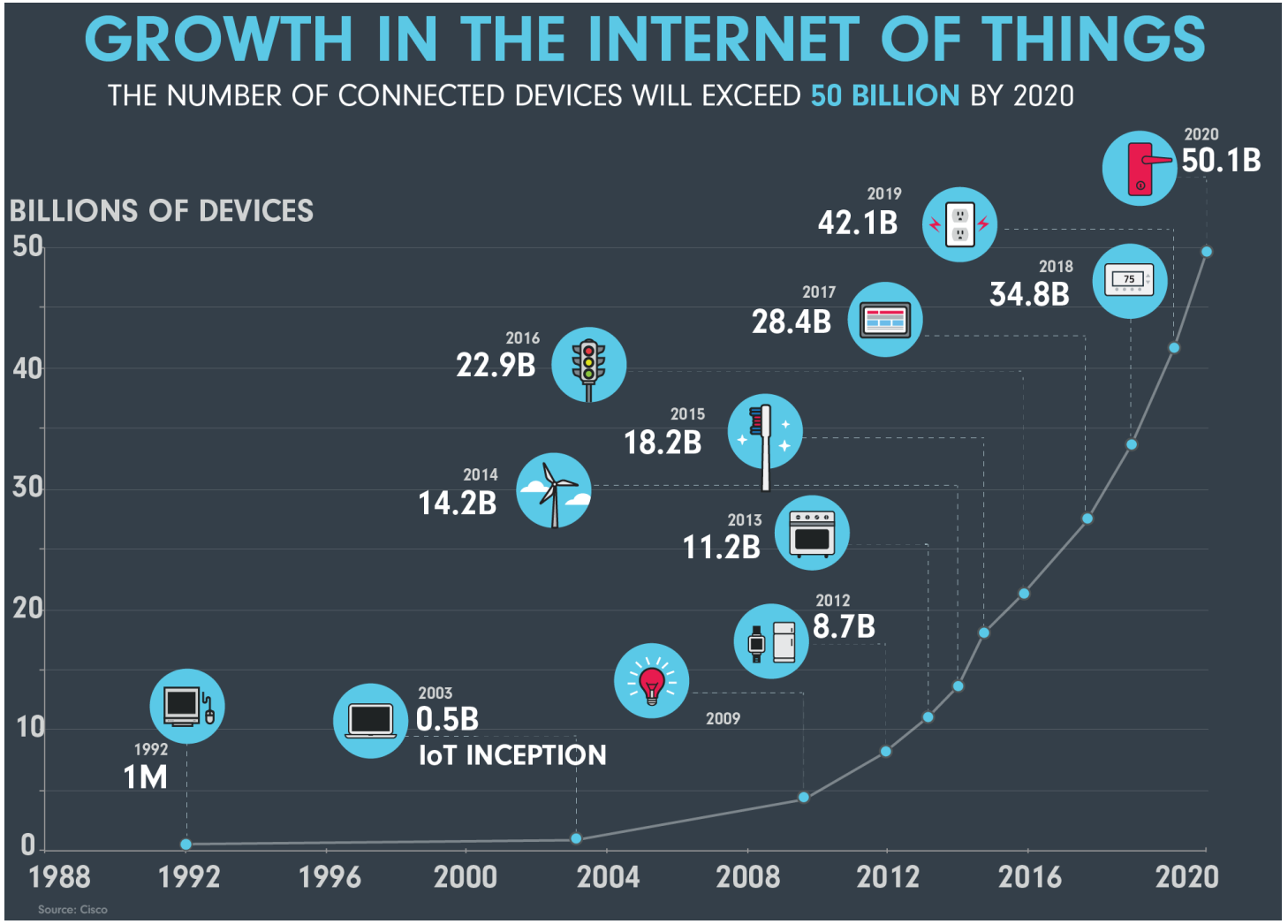
Logistics

Meters

Trains

Cities

….



Source: https://www.ncta.com/sites/prod/files/GROWTH_IOT-091516-IF-2000w.png

How did we get here?

Hardware is now …

Cheaper

Smaller

More connected

Less power hungry

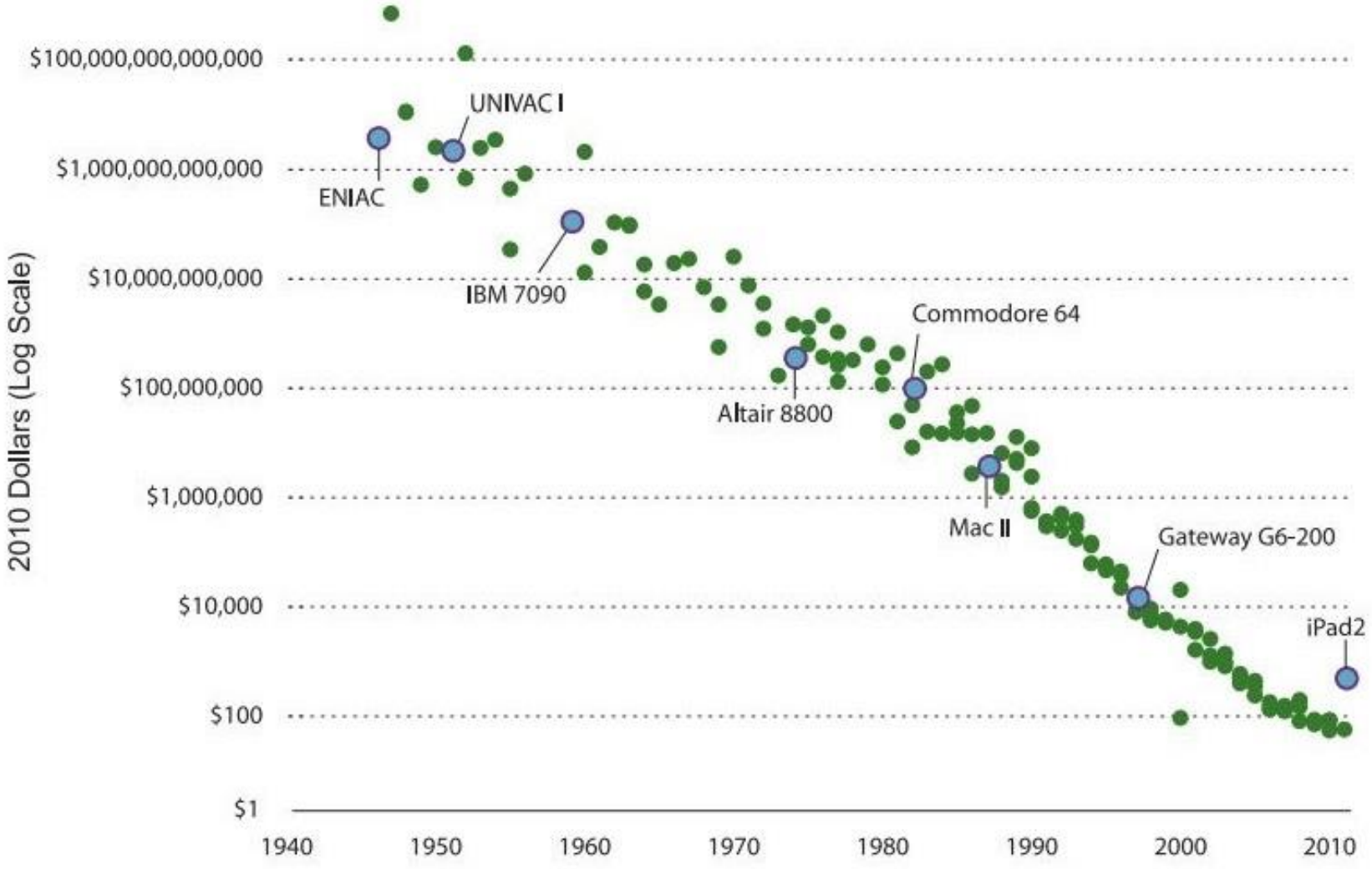
Easier to develop

Ecosystem

More tools & knowledge

More opportunities

More investment



Source: http://www.hamiltonproject.org/ee-ce-image/made/assets/img/uploads/charts/cost_of_computing_power_equal_to_an_ipad2_1017_685_80.jpg

What is IoT?

Physical

Sensors, Actuators

Connected

WiFi, Bluetooth, Cellular, LPWAN …

Programmable

Arduino, C/C++, Python, Java, Assembly ..

(Atmel, **Espressif**, TI, Microchip, MIPS, ARM …)

```
/**
 * Test led: Arduino uno
 */

#include "Arduino.h"

int redPin = 9;
int greenPin = 10;
int bluePin = 11;

void setColor(int red, int green, int blue)
{
    red = 255 - red;
    green = 255 - green;
    blue = 255 - blue;
}

void setup() {
  Serial.begin(9600);
  Serial.println("Setup");
  pinMode(redPin, OUTPUT);
  pinMode(greenPin, OUTPUT);
  pinMode(bluePin, OUTPUT);
}
```

Industrial vs Consumer IoT

Industrial IoT

***Drivers**:* cost and risk reduction, business agility, informed decision making

***Challenges**:* security, compliance, compatibility, reliability, connectivity, support …

Consumer IoT

Drivers: coolness, convenience, health, some cost reduction

Challenges: UX, hype vs value, time to market, some privacy and security

Source:http://www.clipartpanda.com/clipart_images/stacks-of-money-clipart-1-57831954

Industrial IoT examples

Remote maintenance & management

Energy: Solar & wind power

Construction: Pipelines, bridges, buildings

Agriculture: Soil properties, crop health …

Smart vehicles

Remote and continuous metering of cargo temperature, truck position and health …

Source:http://inmolecular.com/index.php/cold-chain-monitoring-solution/

Consumer IoT examples

Personal productivity & fashion

Smart phones & watches

Fitness & sleep trackers

Professional sports gadgets

Home Automation

Smart locks, Bulbs, TVs

Baby monitors

Appliances health monitors

Source: https://42xaiz2iny9m45jqzf36ofk2-wpengine.netdna-ssl.com/wp-content/uploads/2014/08/Front.jpg
https://c.slashgear.com/wp-content/uploads/2011/12/NO-4.jpg

What?

Course assignment

Objective

Try to make something useful

No idea is too brave!

Learn new things

Examples

Smart beehive, waste bin

Smart plant pot

You name it …☺

Made in FMI ☺

Source: https://www.smartbin.com/markets/level-sensor-general-waste-recyclables/

How?

IoT development platforms

Bare metal

SDK: Espressif, NXP, TI, Atmel, Microchip …

Arduino: Atmel, **ESP8266 (we will use this one)**

Linux

Raspberry PI, Beaglebone …

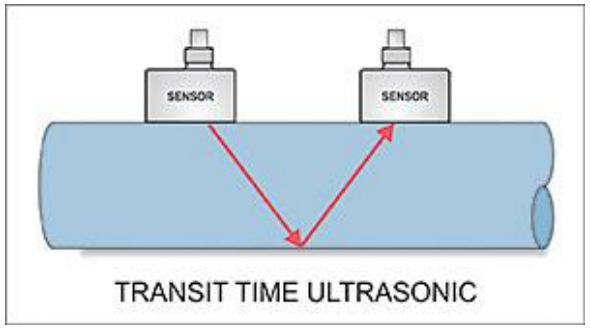
Android & iOS

Phones, Wearables, TVs …

Sensors

So many sensors …

- Touch, movement, compass, acceleration, video, sound
- Temperature, humidity/moisture, light / infrared
- Pressure, gas detection
- Force (tenso), proximity, motion
- Liquid level, flow, magnetic field (hall), radiation
- Fingerpring, heart rate …



Source: http://www.imagesco.com/geiger/buying-a-geiger-counter-pg3.html, http://www.greyline.com/twotechnologies.htm, http://www.noshok.com/force_2351_series.shtml

Connectivity

Long range

LoRaWAN, Sigfox, 6LoWPAN (868MHz), 3G/GPRS

Medium range

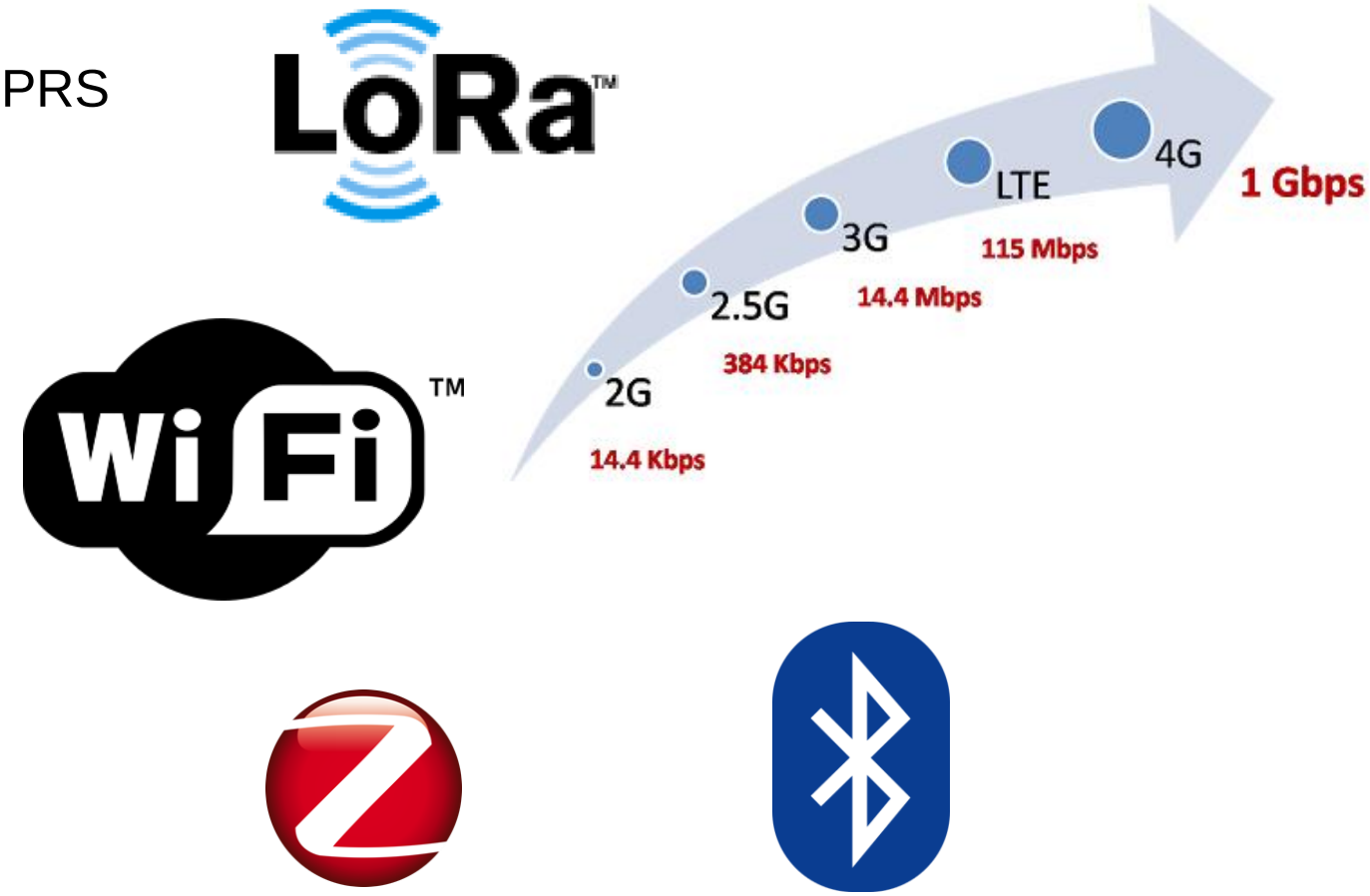
ZigBee, WiFi

Short range

Bluetooth, NFC/RFiD

Wired

Ethernet, RS-485, 4-20 mA …



Source: http://hitlistsofts.blogspot.bg/2015/05/difference-between-gsm-gprs-edge-3g.html

What else?

Power management

Batteries, sleep modes …

Security & Device management

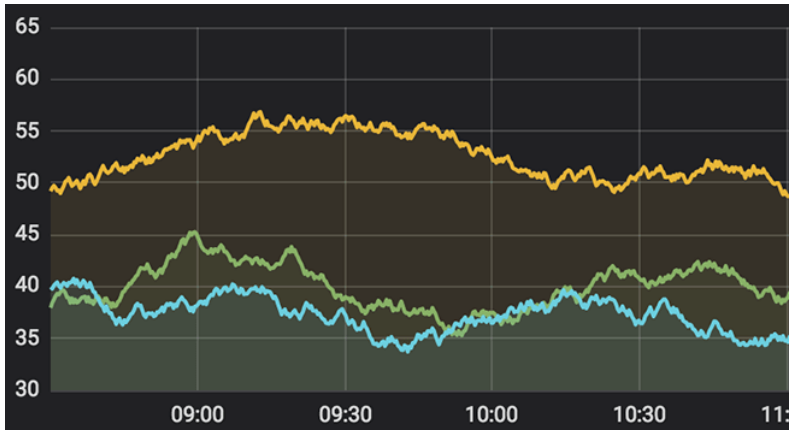
Authentication, Onboarding …

Monitoring

Data management

Data transport & storage

Processing and visualization



Source: http://djdamageonline.com/img/od-login-password-svg-icon-free-download-for-free-powerpoint-symbols-and-icons.jpg

Thank you

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