

IoT in the industry implications

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f Things (IoT) is the network of physical

Why companies are enthusiastic about IoT?

and exchange data [Wikipedia]

Smart life Smart things

Ubiquitous Universal access

Companies are enthusiastic about IoT

- For our life? Common welfare?

- Sensors-Control-Automation

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- Apache Corporation, an oil and gas exploration and production company, is using this approach to predict onshore and offshore oil pump failures to help minimize lost production. If the global oil industry improved pump performance by even 1 percent, it would increase oil production by half a million barrels a day and earn the industry an additional \$19 billion a year

- New markets

- New devices

- New services

- New technology



Industrial Automation



Smart Health

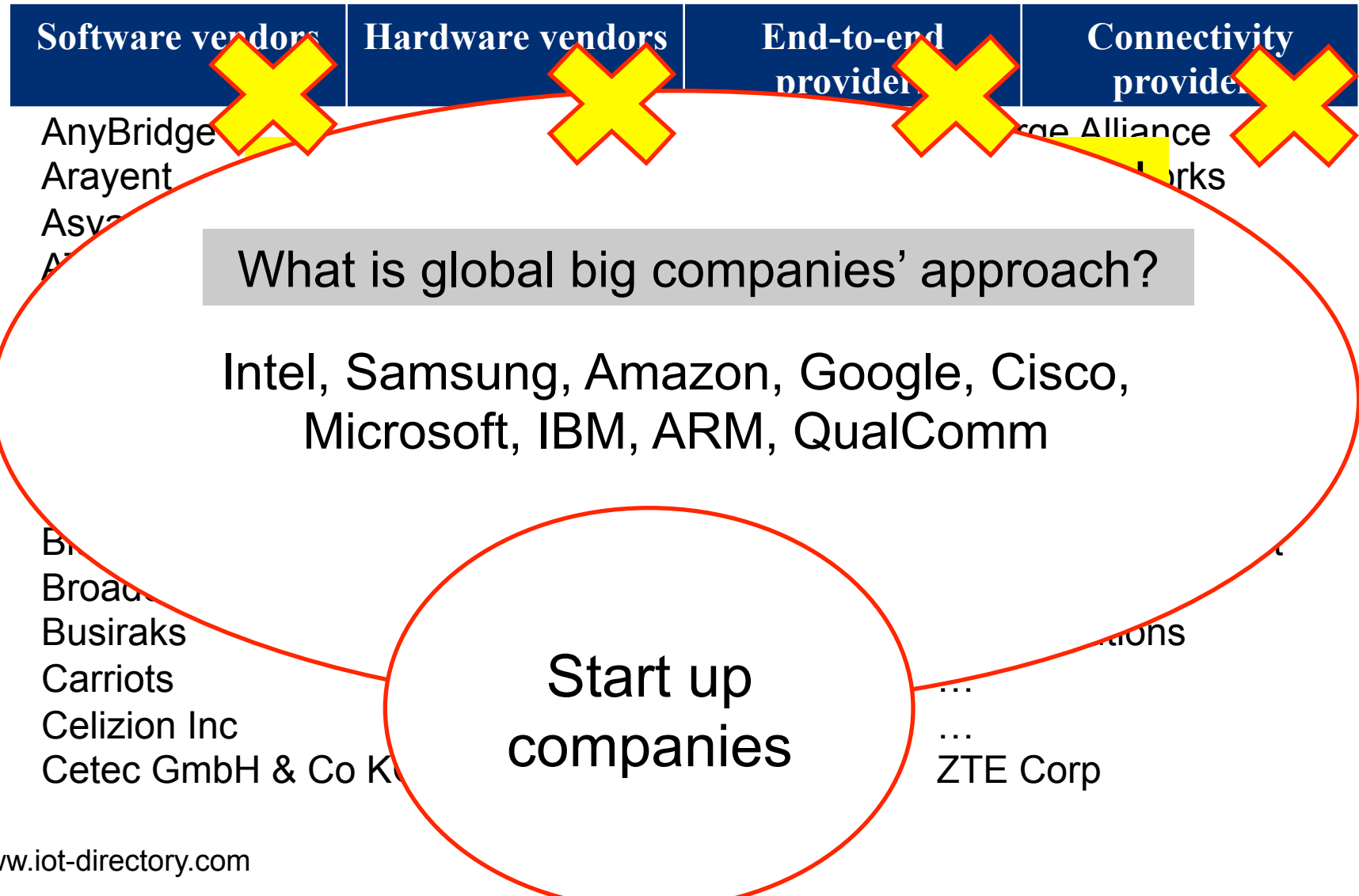


Smart Home



Smart City

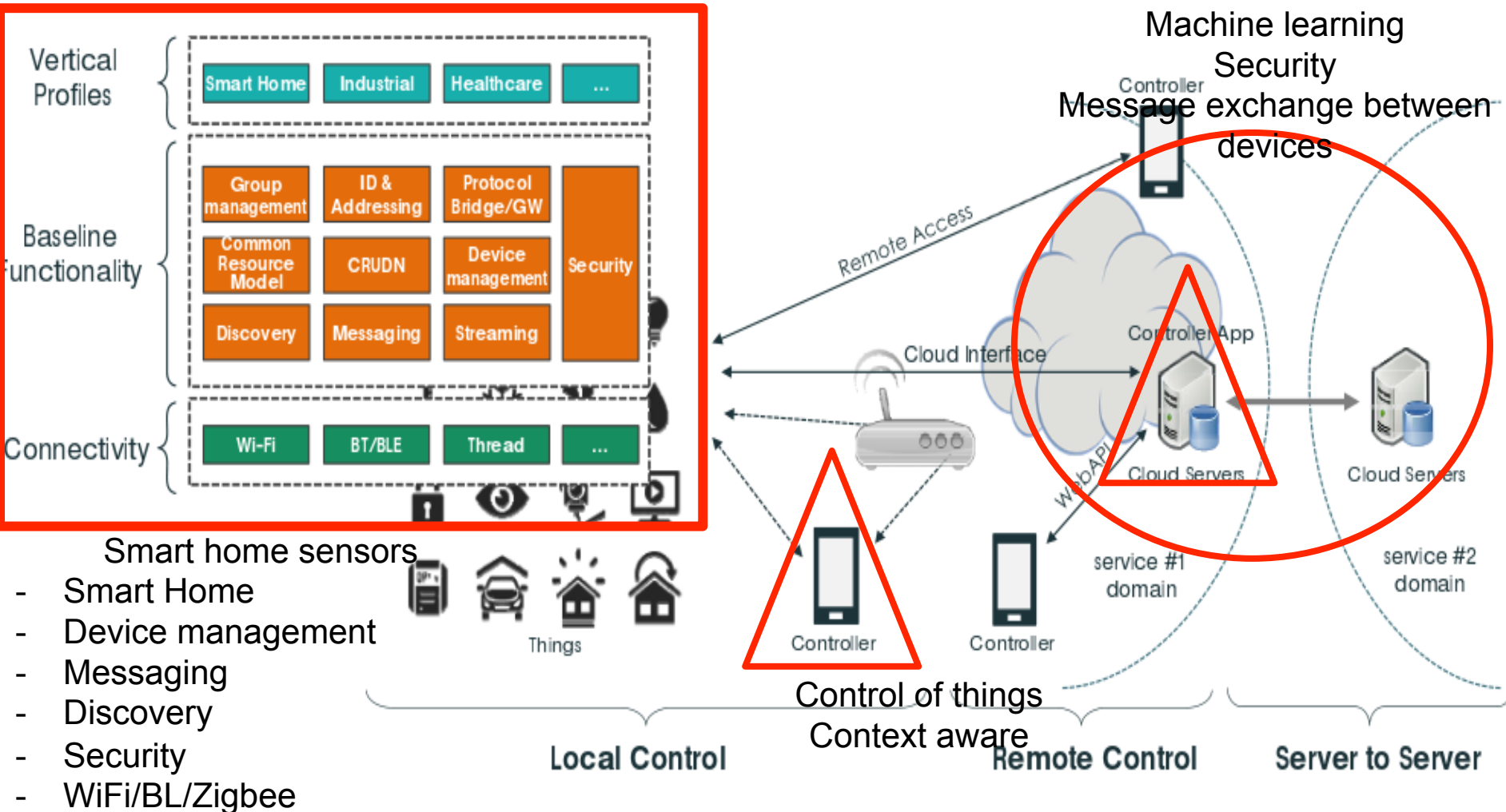
List of IoT companies



Big companies' approach

- IoT is big concepts → They realize that one company cannot cover whole IoT
 - Interoperability is essential in IoT
- Open Connectivity Foundation (OCF)
 - Intel, Samsung, Microsoft, Electronux, Qualcomm, Cisco
 - Unify IoT standard and specify protocols and open source projects
 - Seeks to scale the emerging IoT ecosystem by including a broader array of companies
 - Range of customer, enterprise and embedded devices and sensors from a variety of manufactures to securely and seamlessly interact with one another
 - +100 companies, 11 academic/nonprofit centers

OCF specification – IoT Scope

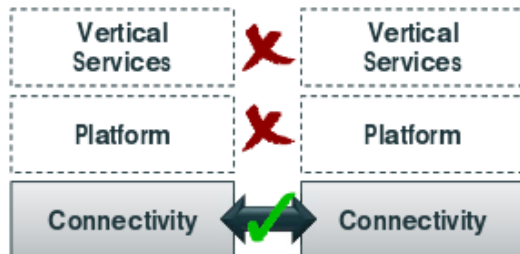


OCF specification - interoperability

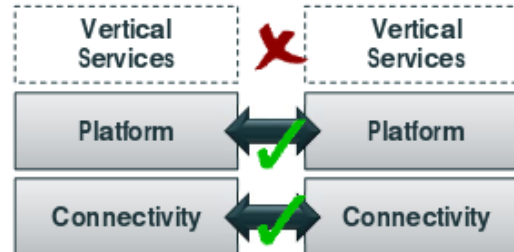
- Heterogeneous things

- Full interoperability from the connectivity layer up to the service layer

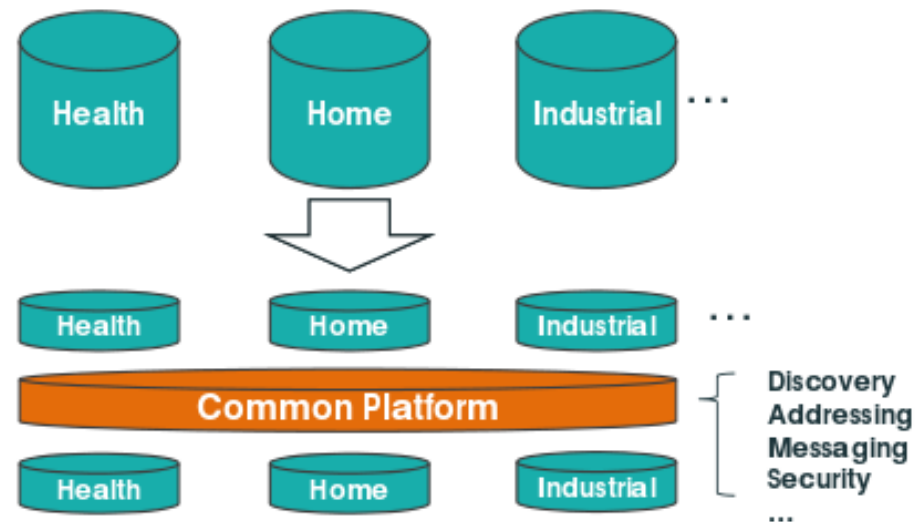
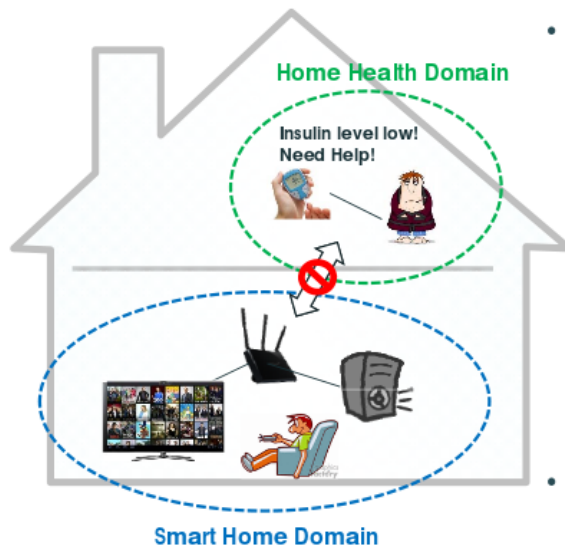
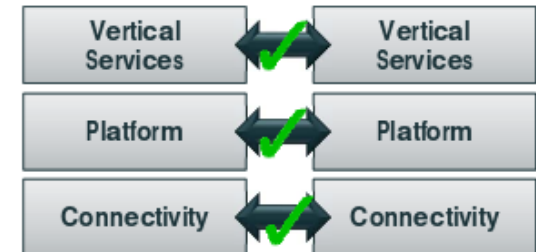
① Connectivity Level Interoperability



② Platform Level Interoperability

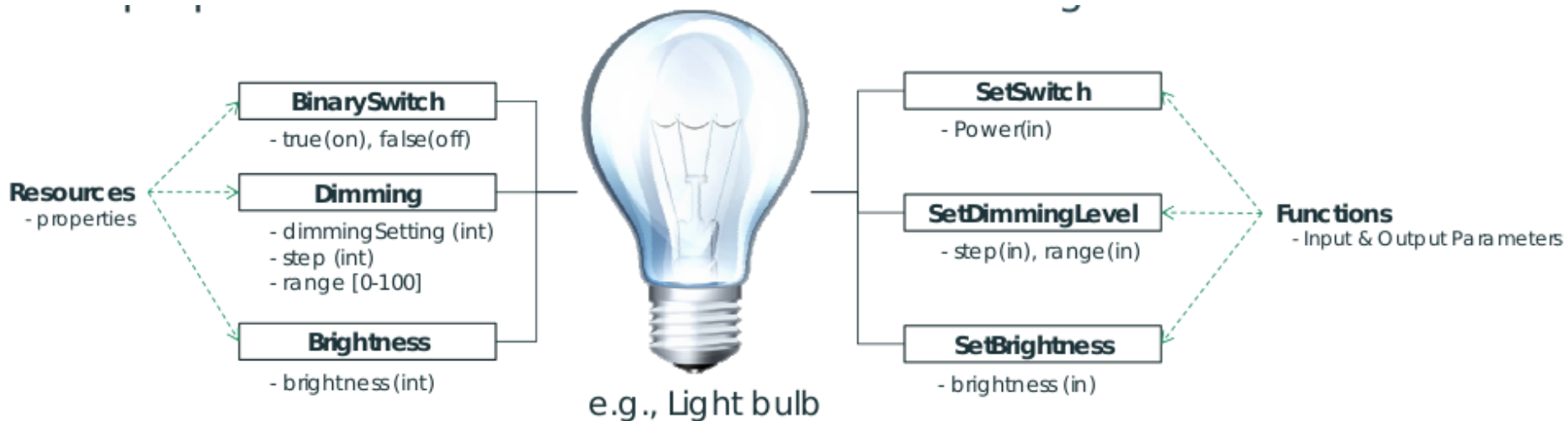


③ Service Level Interoperability



OCT specification - definition

- Defining resources of things and its property
- Defining functions/operations of things
- Characteristics
 - Simple resource model
 - Minimize CPU load, memory impacts, traffic and bandwidth



OCF specification - etc

- Free license which covers both code and standard
 - Standards and open source to allow flexibility creating solutions
- Certification and logo program
 - Guarantee all devices work together

IoT companies ranking

IoT Analytics – Quantifying the connected world

Q1/2015

Company	Category	Overall rank ¹	Scores			
			²	³	⁴	⁵
						
Ranking vs. Q4/14						
1 	Semiconductor	72%	1k	2.6k	4k	616
2 	Software	69%	480	1.6k	26k	545
3 	Hardware	66%	1k	1.4k	5k	719
4 	Several	59%	390	3.1k	21k	99
5 	Software	55%	720	1.5k	7k	504
6 	Consumer prod.	34%	590	1.6k	5k	29
7 	Consumer prod.	31%	170	1.3k	15k	37
8 	Software	26%	320	0.4k	5k	260
9 	Market research	24%	390	1.2k	3k	40
10 	Software	22%	170	0.3k	6k	277
11 	Semiconductor	20%	90	1.0k	9k	57
12 	Ind. equipment	19%	70	0.4k	3k	319
13 	Consulting	17%	170	0.4k	<1k	249
14 	Software	15%	110	0.4k	7k	67
15 	Software	15%	90	0.1k	7k	151
16 	Hardware	15%	390	0.5k	<1k	-
17 	Market research	15%	210	0.4k	5k	30
18 	Software	13%	210	0.3k	4k	25
19 	Software	12%	110	0.6k	<1k	123
20	M2M	11%	70	0.2k	6k	51

1. The highest ranking company in each aspect received a rating of 100%, with all other receiving a lower percentage in linear relation to the actual frequency. The overall result is the average of all four categories 2. Searches on Google in conjunction with IoT. 3. Tweets on Twitter in conjunction with IoT 4. Newspaper and blog mentions in conjunction with IoT 5. Number of employees that carry the tag "Internet of Things" on LinkedIn. All numbers valid for Dec 2014 to Feb 2015. Sources: Google, Twitter, LinkedIn, Company websites, IoT Analytics

Intel for IoT



Intel® IoT Platform

Secure, Scalable, Interoperable

The Intel® IoT Platform includes an end-to-end reference architecture and a portfolio of products from Intel and its ecosystem, that work with third-party solutions, to provide a foundation for seamlessly and securely connecting devices, delivering trusted data to the cloud, and delivering value through analytics.

SMART AND CONNECTED THINGS
Sense, filter, process, analyze, and actuate, while securing and managing machines and data.

THINGS

DEVELOPER KITS, TOOLS & SDKs
Rapidly move to prototyping, piloting, and productizing with developer kits, tools, and SDKs.

UNLOCKING THE VALUE OF DATA
Process, store, and analyze data globally, perform complex analytics on large datasets, secure and manage millions of endpoints, and manage policies, metadata, and networks.

VISUALIZE DATA AND MONETIZE INSIGHT
Provide actionable information and create new services, while automating operations.

CLOUD MANAGEMENT

DATA CENTER & STORAGE

APIs AND THIRD-PARTY CLOUD CONNECTIONS

GATEWAYS

CONNECTING THE UNCONNECTED
Capture, filter, process, and store data, connect securely to legacy infrastructure, and perform analytics at the edge.

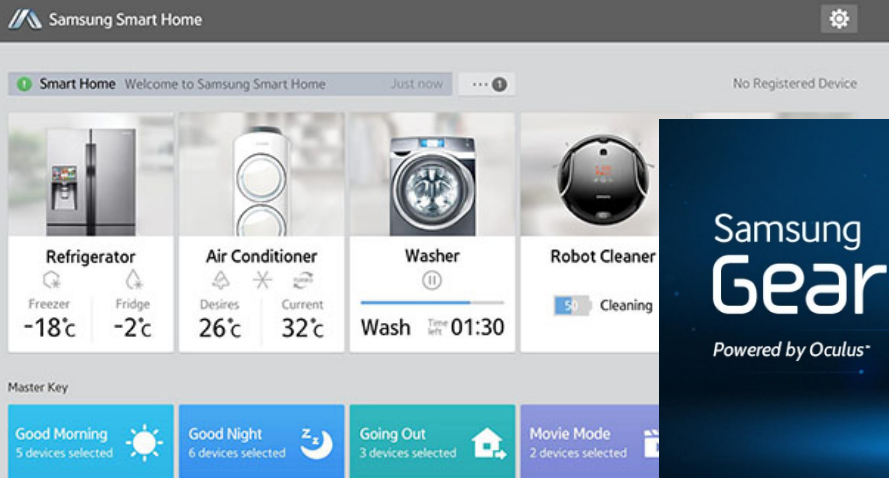
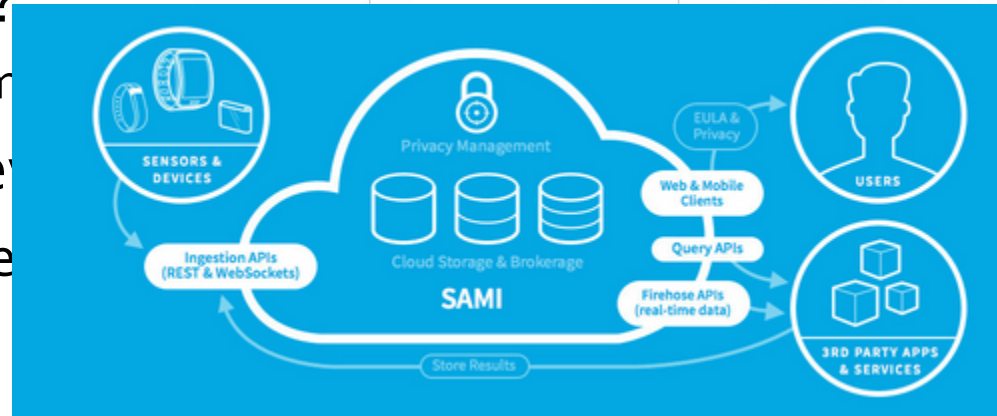
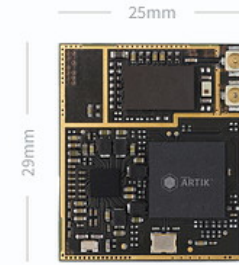
DATA AND DEVICE MANAGEMENT
Supports onboarding, monitoring, diagnostics, and remote control of devices.

END-TO-END SECURITY
Secure hardware, software, and data, as well as device and policy management. Detect threats and safeguard scalable compute.

Interact with INTEL architecture

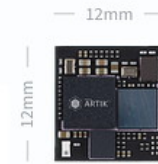
Samsung for IoT

- What is Samsung products?
 - Smartphone, appliances, home
- Connect 100% Samsung devices
 - Interoperability to other devices
- Spread power to things
 - Artik: programmable platform
 - Samsung open source tools for IoT (SAMI)

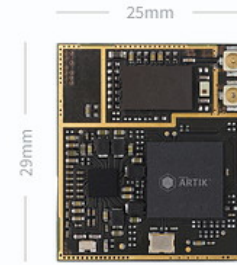


Google for IoT

- What is power of google?
 - Machine learning, infrastructure, cloud-computing, operating system (Android)
- Brillo OS for IoT
 - The connected OS could be used on everything from major smart home appliances such as refrigerators, TV to smaller tech such as garden monitor, light bulb, door locks and sensors



ARTIK 1



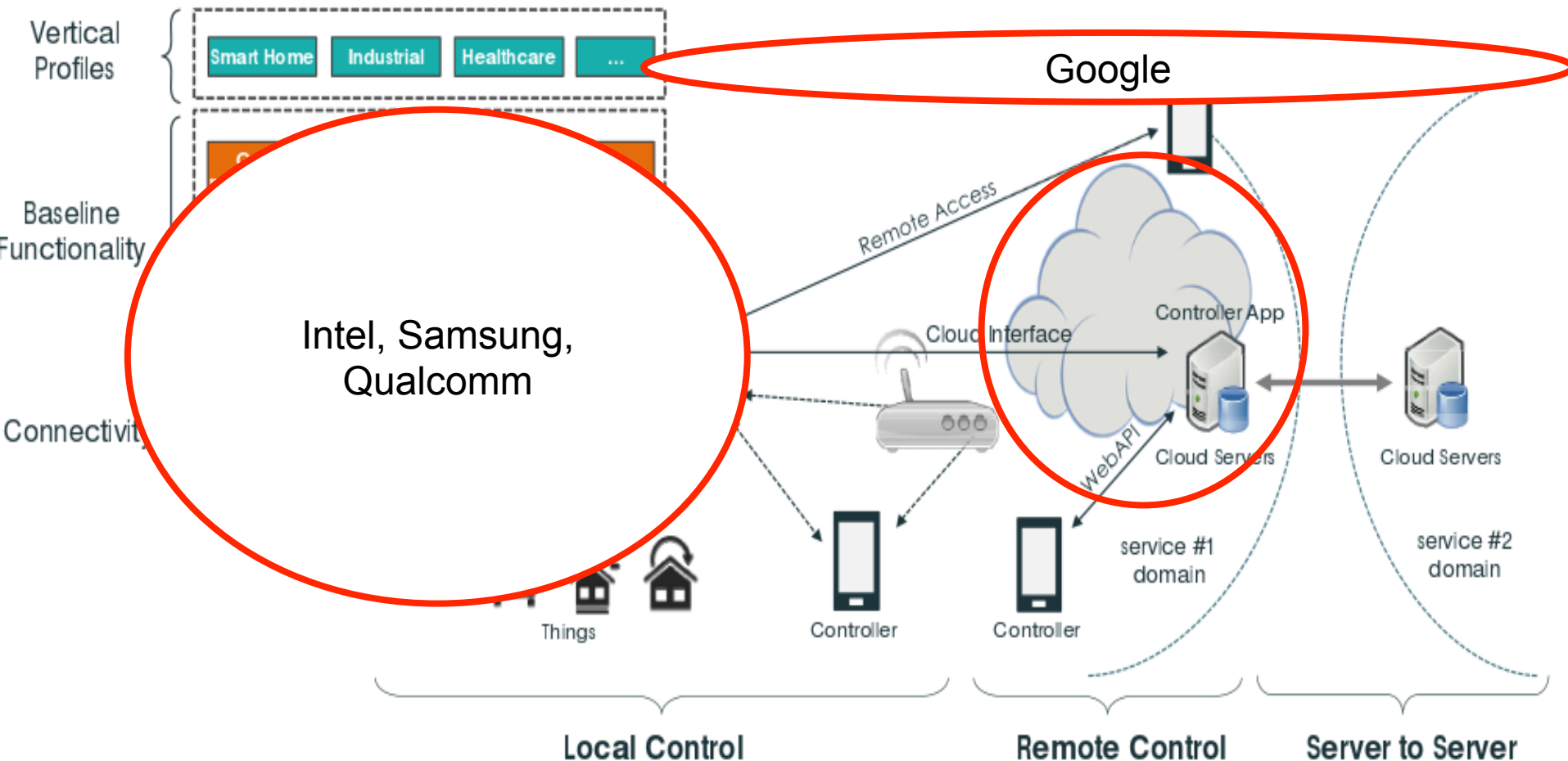
ARTIK 5



ARTIK 10



OCF specification – IoT Scope



IBM for IoT

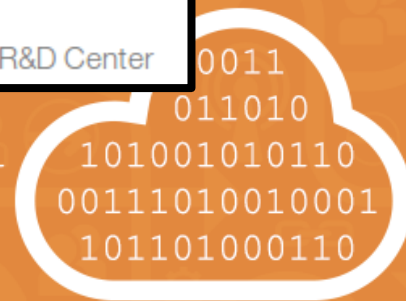
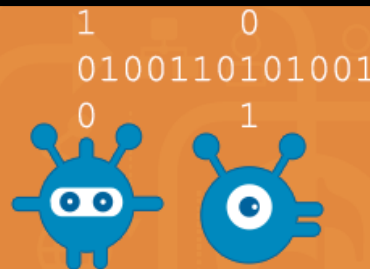
- Data analysis
 - Billions of devices, but 90% of generated data will go unused
- BlueMix
 - Provide API for App developments
 - Apps upload data to IBM cloud and analyze the data
 - Provide monitoring API

Cloud-connect your Things in minutes

from real physical devices

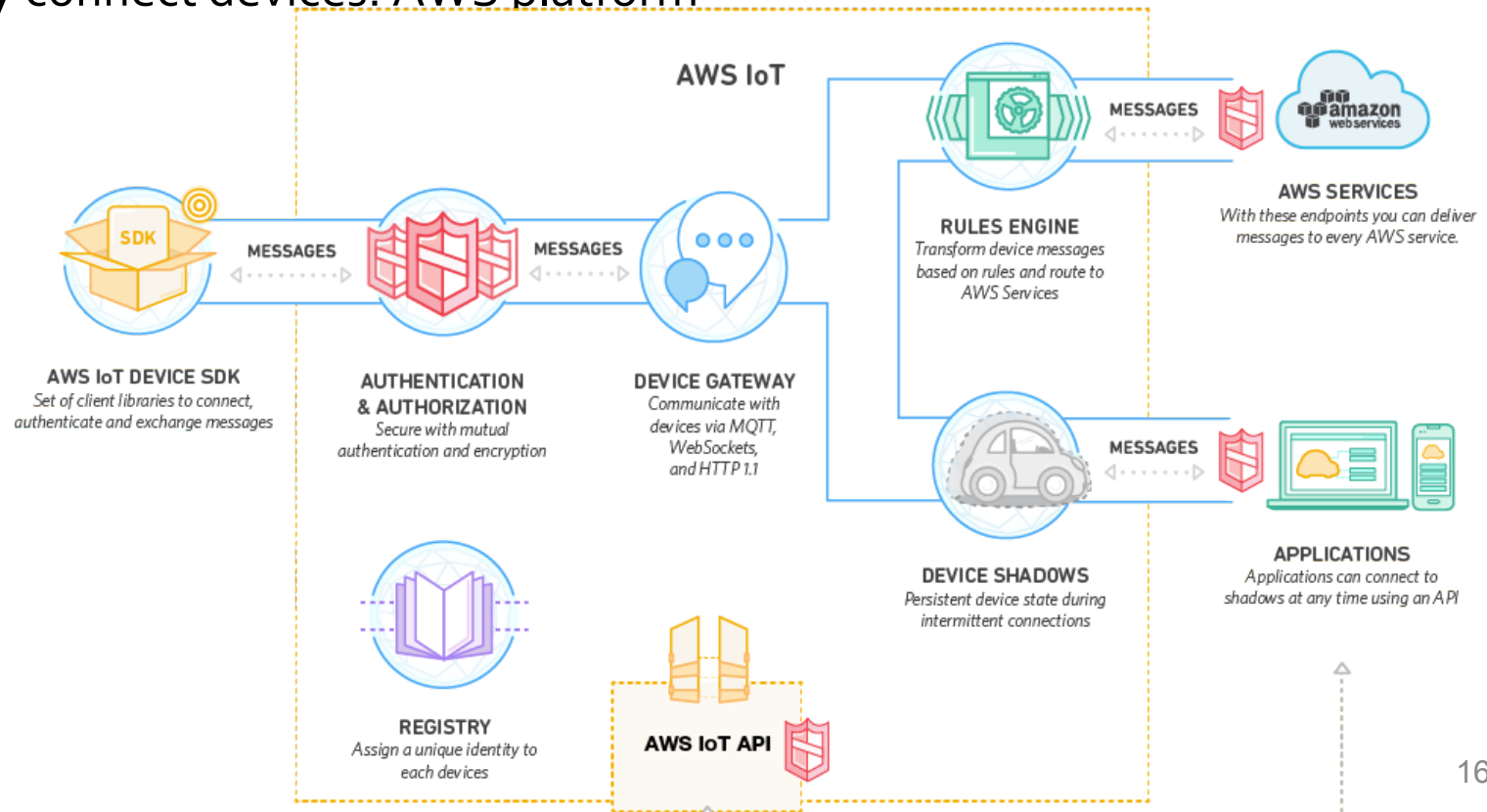
“With IBM Analytics we can now identify within our own research and development where we should be going from the data analysis we capture”

Kyoka Nakagawa, Research & Development, Honda R&D Co. LTD Automobile R&D Center



Amazon for IoT

- Cloud computing: Amazon prime, music and shopping
- Shoppers: amazon prime members
 - Create Smart things: Echo, Fire TV, Dash
- Securely connect devices: AWS platform



Top 10 companies (2015 March)

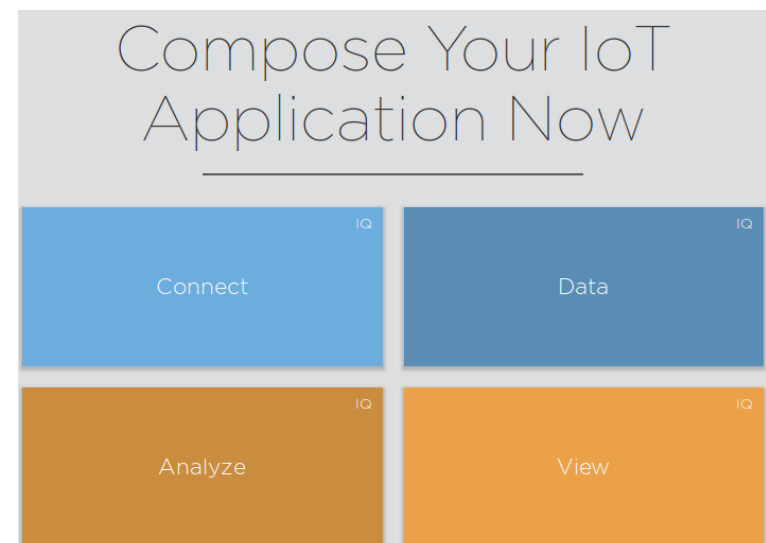
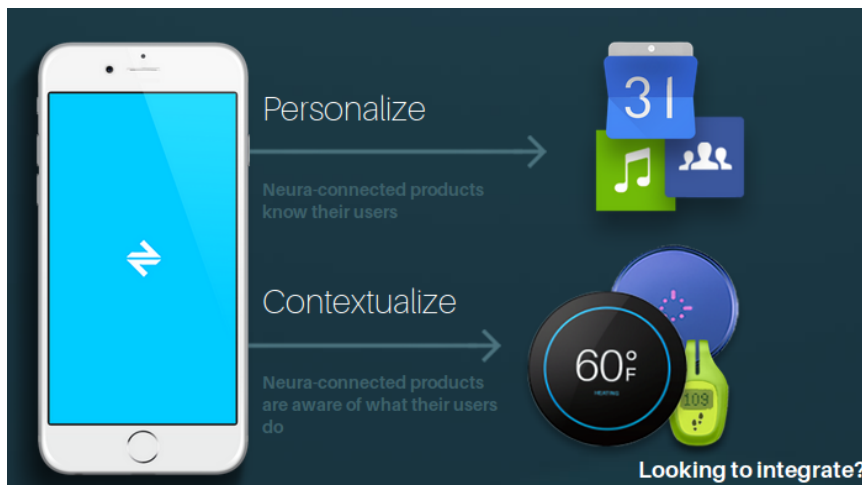
Company	Specialty	Moto	Achievements
Intel	Chips	The IoT Engines	Intel IoT platform that helps companies to test, deploy and secure connected devices
Samsung	Chips/ Appliances	Internet Of Things is Internet of Everything	90% devices IoT ready by 2017 and 100% by 2020
Google	Software	IoT from A to Z	Creating a complete network of interoperable IoT devices and ensure security: Google cloud platform, Brillo IoT OS, Nest
IBM	Cloud	Big data analytics in IoT	Data analytics and cognitive computing
Amazon	Product	IoT starts with SmartHomes	Fire sticks, TV, Dash, Echo / real time data streaming analyzer Kinesis

Top 10 companies (2015 March)

Company	Specialty	Moto	Achievements
Microsoft	Software	Windows 10 for IoT,	Convince retail, healthcare, manufacturing and automotive to embed Windows in their devices
ARM	Chips	All devices need to use ARM processors	ARM Cordio, ARM Cortex-M
CISCO	Network	There is No IoT without security	Nothing new here just that given Cisco's specific: exceptional reliability and security
Qualcomm	Chips	Connecting Internet of Everything	Qualcomm reaches \$1 billion revenue in 2014 on IoT chipsets: SmartCities, Smarthones, wearable tech etc.

Summary

- Two different directions
 - Collaboration for interoperability
 - Concentrate their effort to lead IoT market
- Any chance that Startups for IoT?
 - Yes, IoT still needs creative service and devices
 - OCF's framework is tools for development not for users



Startups for IoT

Company	What are they doing?
Adhere	Provide a connected pill bottle that ensures patients take their medications
Chui	Combine facial recognition with advanced computer vision and machine learning techniques to turn faces into “universal keys”. The world’s most intelligent doorbell
Enlighted	Provide smart lighting system on building, house and restaurants. Worker comfort and productivity
Heapsylon	Touch clothes into computers. Their socks are infused with textile pressure sensors and paired with proprietary electronics. Not only detect problems, but go well beyond that to track cadence, foot landing technique etc.
Humavox	Create technologies to wirelessly power IoT by using radio frequencies, thus eliminating the need for wired.

Startups for IoT

Company	What are they doing?
Neura	Their goal is to become the glue connecting the IoT by developing an open platform that bridges objects, locations, people and the Web.
Revolv	Unified control of your smart home via a Smartphone or tablet app
TempoIQ	Provide a cloud-based sensor data analytics backend for IoT and M2M
Theatro	Provide small Wi-Fi based wearable devices intended for indoor communications within the enterprise
PubNub	Provide a global real-time network that solves the problems of large-scale IoT connectivity in the wild, enabling IoT providers to focus on their core business

Conclusions

- Big money market
- Interoperability, standardization, specification is really necessary
- Machine learning, sensors, communications, services are essential in IoT
- Startups develop brilliant products, but their interoperability is not yet solved