

IoT Market Overview

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The Internet of Things continues to evolve

IoT is a conceptual framework, not a market

IoT solutions are constantly developing to fit ever-growing business needs and technological capabilities—this combination drives the growth and excitement around IoT.



Connect

In IoT solutions, **connectivity** and **processing** capabilities are embedded into devices



Collect

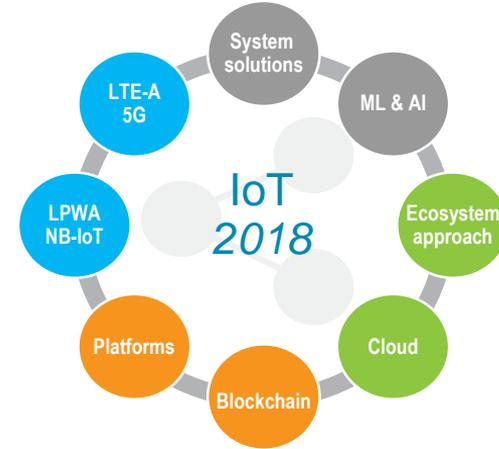
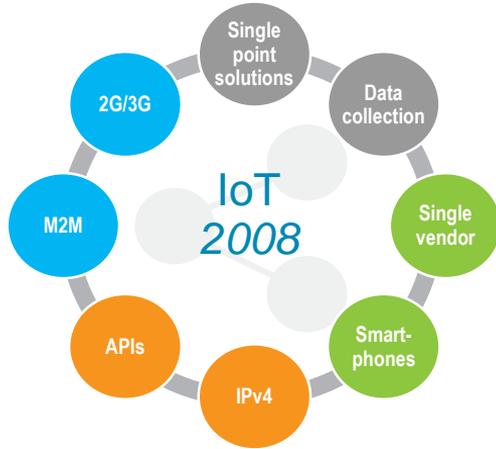
Once devices are connected, sensors and storage features are added. Devices then become aware of their environment, and can now collect and analyze data to provide critical insights



Compute

Collected data is identified: which data is processed at the edge; and which should be aggregated and stored as part of Big Data solution

IoT has been happening for years, solutions today are more sophisticated
Devices have been getting smarter and more connected for decades



Key IoT Drivers



**INNOVATION AND
COMPETITIVENESS**



BUSINESS MODELS

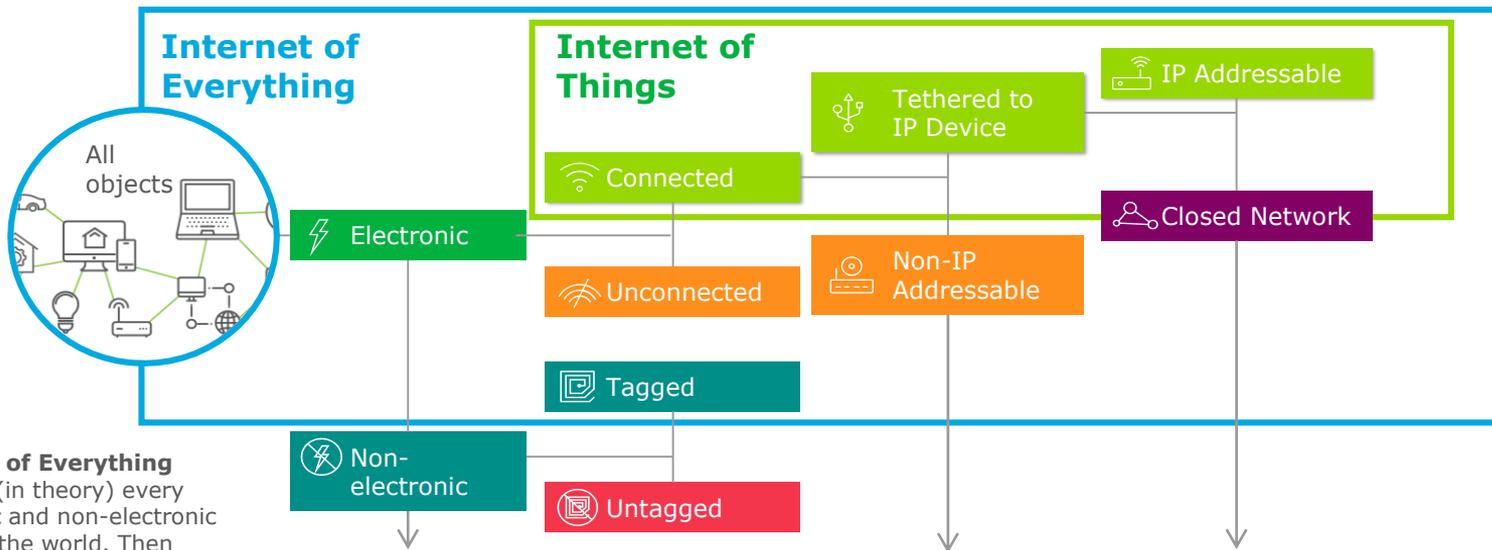


**STANDARDIZATION
AND SECURITY**



**WIRELESS TECHNOLOGY
INNOVATION**

Measuring progress through connected devices



Internet of Everything
Includes (in theory) every electronic and non-electronic object in the world. Then branches into increasingly smaller divisions, differentiated by connectivity type and device function.

Non-electronic vs. electronic:
1st major divide. Is object powered—
by electricity, batteries or solar?

- Non-electronic: Tagged objects are identified by RFID labels or QR codes
- Electronic: splits into more specific subsets and categories

Connected vs. Unconnected:
2nd big divide

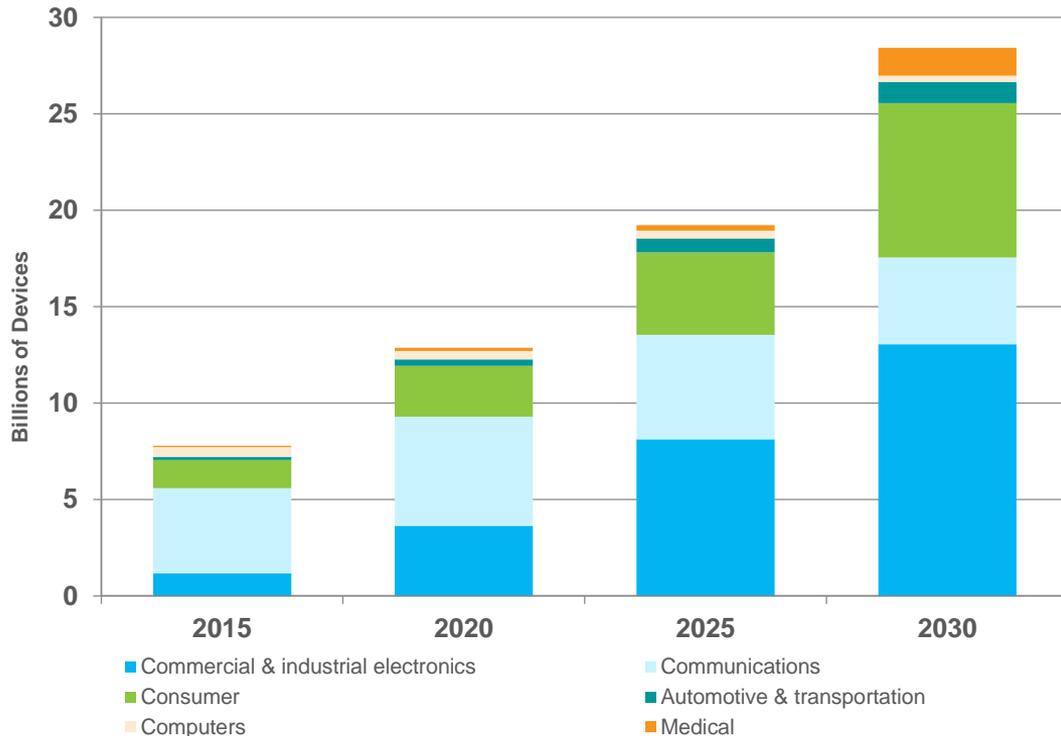
- Non-IP-addressable: DVD players with no internet connectivity
- Tethered: wearables that don't link up directly to the internet but connect instead to smartphones to share data

IP-addressable vs. Closed:
3rd and final divide

- IP devices: PCs, smartphones, tablets connecting directly to the internet
- Closed network: nuclear launch systems, military drones and other devices never to be connected to the open internet

IoT Market Growth: Connectable Device Shipments

IoT devices: Shipments, global market



Commercial & Industrial Electronics

- Shipments will see strong growth: 2013–2030 CAGR = 20%
- Will contribute the largest margin of installed devices in the next decade (2021–2030)
- Devices in the market will surpass the communications segment in 2025, which includes mobile handsets

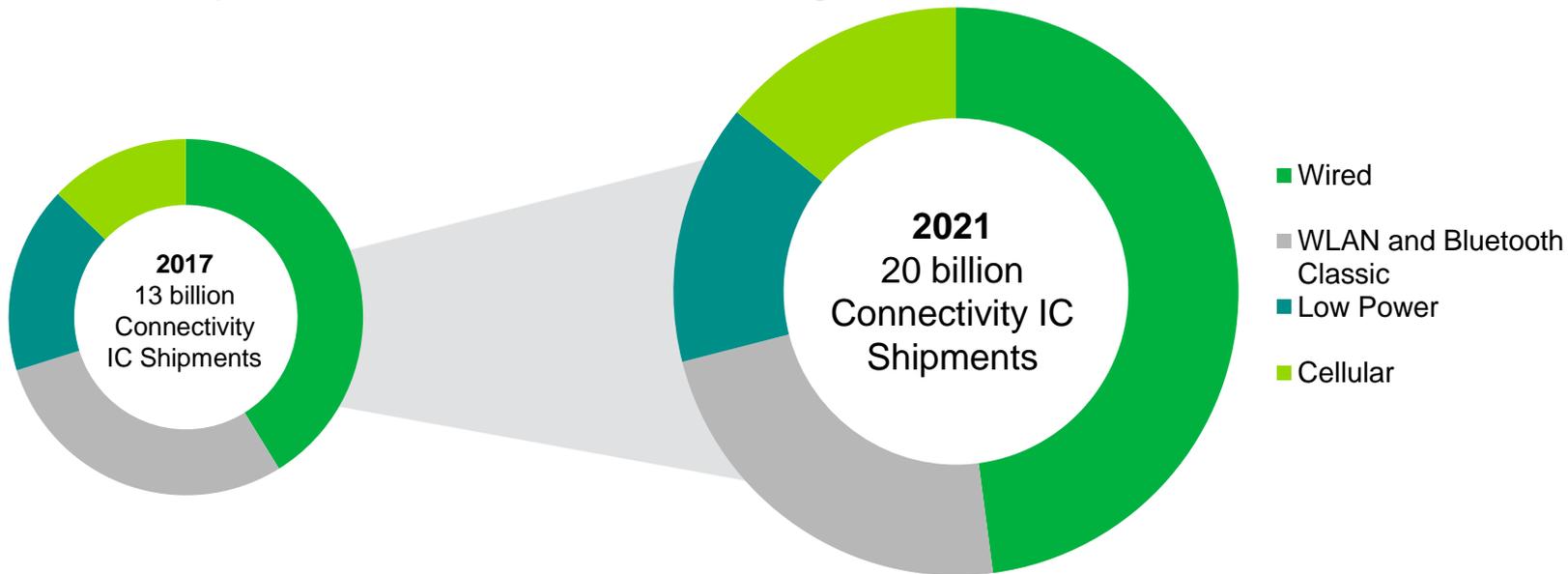


Consumer

- Shipments will see moderate growth over the long-term forecast: 2013–2030: 13.8% (CAGR)
- Connectable device installed base will double from 2015 to 2020
- Total new connectable shipments increases 12.5% from 2013–2030

Devices included in both shipments and installed base are “connectable” and may not end up connected.

IoT connectivity: Diverse mix of technologies



Wired Connectivity

IHS Markit forecasts that wired will remain the largest single connectivity type, followed by WLAN and cellular. Wired v Wireless Connectivity: Share of wired connectivity to grow from 41% in 2016 to 48% in 2021.



Wireless Connectivity

Wireless connectivity has a strong presence in IoT Connectivity ICs accounting for 59% of all IC shipments in 2017. Low Power Wireless is set to gain the most traction through 2021 with the share of these technologies growing from 13% in 2017 to 15% in 2021.

1.2 billion devices in 2018

20.7% CAGR 2017–2022

Amazon, Apple and Google ecosystems addressing the interoperability challenge. Shift from device to solution sale

472.6 million devices in 2018

12.4% CAGR 2017–2022

Sports, fitness and personal care central to the personal IoT.

473.6 million devices in 2018

17.8% CAGR 2017–2022

Funding, pilots, scalability, result. Moving beyond silos to create the true smart city.

56.9 million devices in 2018

12.7% CAGR 2017–2022

Driver assistance and infotainment safer, informed personal driving.

385.2 million devices in 2018

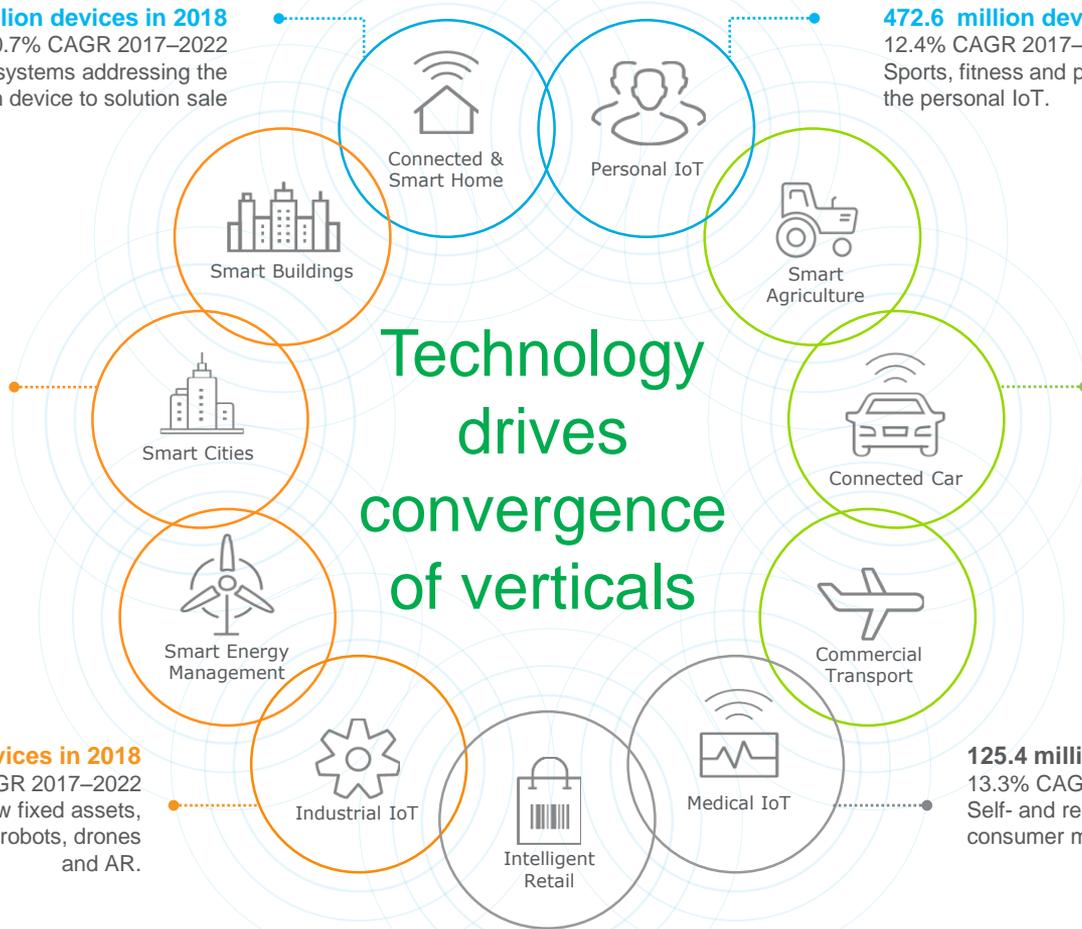
23.1% CAGR 2017–2022

Connectivity coming to new fixed assets, mobile/wireless devices such as robots, drones and AR.

125.4 million devices in 2018

13.3% CAGR 2017–2022

Self- and remote-monitoring lifting consumer medical device adoption.



IoT roadmap defined by technology innovation & business process changes

Process changes

Embracing IoT in response to shifting demands

- Telcos expanding beyond saturated traditional telco services
- Industrials react to fluctuating prices and external demand
- Auto face declining pool of drivers

Enhancing Operational Efficiencies

- Increasing productivity
- Reducing energy cost
- Reducing loss of perishable goods
- Improving asset utilization through asset tracking

Monetizing the IoT

- Developing new sources of revenue
- Changing business models
- “Data markets”



2012–2014

2015–2017

2018–2020

2021–2025

2025 & Beyond

Innovation

Growing availability of public LPWAN

- Low cost of ownership
- Long-range
- Deep coverage
- Extended battery life

Richer data and analytical techniques

- Revising or optimizing tasks based on real data
- Improve legacy decision-making processes
- Transition to holistic IoT system solutions, moving away from traditional IoT point services

5G

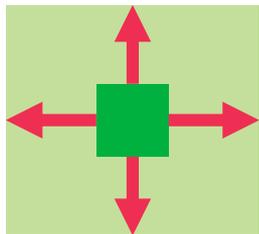
- Continues transition to true ubiquitous connectivity
- Transformative changes for many industries (ex. transportation & logistics)

Challenges for enterprises planning IoT

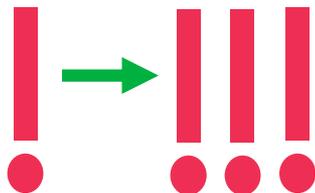
Interoperability and standardisation
Fragmented ecosystem
Customer outcomes
Internal business silos Low power requirements
Complexity Privacy concerns
Unstructured data
Undefined business objectives
Security risks
Multiple connectivity technologies

Growing cybersecurity threat for IoT applications

More things to attack – greater potential harm



Growing Attack Surface



Increased risk to health and safety

Necessity for a “defense in depth” – not perimeter-based



Remote Device

Network

Cloud/application

IoT cybersecurity threat examples

- **DDoS** - The Mirai botnet showed that a vast number of consumer-grade IoT devices lack adequate security and can be used as part of attack botnets.
- **Virus/worm** – Stuxnet demonstrated that viruses can be installed deep inside even the most secure industrial facilities to disrupt and destroy operations.
- **Hacking** - The Daimler Chrysler Jeep Cherokee white hat exploit painted a frightening picture of how vehicles in motion could be compromised remotely to disastrous effect for occupants.



Thank You

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