

27 April 2016

Internet of Things

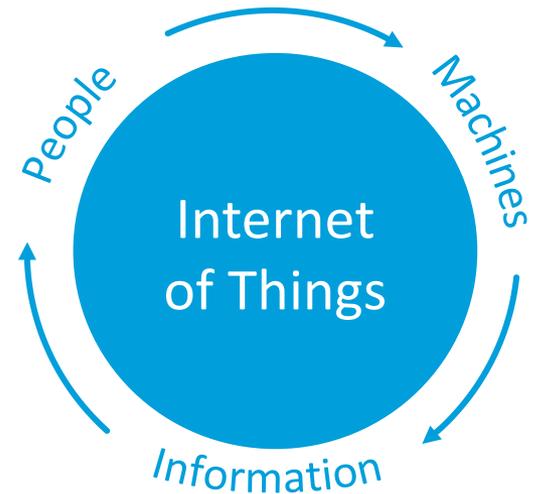
Transforming How We Live and Work

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Internet of Things

IoT is real, and will significantly improve production and administrative efficiencies.

Public policy frameworks will matter in its deployment and growth.



IoT – By the Numbers



By some estimates, by 2020, up to **50 billion devices** will be connected with a potential economic value in the **trillions of US dollars***.



By some estimates, billions of devices are already connected using WiFi, Bluetooth, RFID, satellite, commercial wireless, and fixed networks.



AT&T has certified more than **2,600 device types** for connection to its commercial mobile network and connects **more than 26 million devices**.

*Frost & Sullivan, The Internet of Things (IoT): How Real is It Today?, Dec. 2015

AT&T investing in the Internet of Things

The AT&T network has more than **26+ million** cellular connected devices

More than **2,600 device types** certified

The AT&T Single Global M2M SIM, delivers access in over **200 countries and territories** with over **500 carriers** networks

A leader in Gartner's 2015 Magic Quadrant for Managed Machine-to-Machine Services, Worldwide



IoT Use Cases – AT&T Illustrations



Homes

- alarms, cameras, locks, thermostats, lights, water controls, etc.
 - 83 US markets
-



Vehicles

- telematics, productivity, back-seat entertainment
 - > 7 million cars in the US & Europe, growing to > 10 million by year-end 2017
 - Red Bull Formula One Race Car
 - 1.9 million commercial fleet management systems
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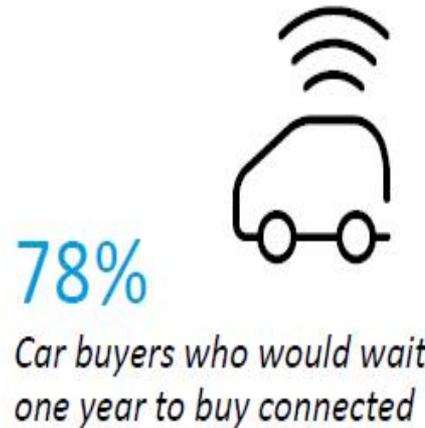


Containers

- across road, rail, sea, and air, monitor for temperature, humidity, pressure, shock and vibration, and breach
- From agricultural products to fine art
- > 280,000 refrigerated intermodal freight containers

Use Case: Connected Car

- Connected Car will account for **52% of all cellular M2M connections in 2024** (Source: Machina Research)
- AT&T has relationships with **9 automotive OEMs** to provide embedded connectivity solutions
- AT&T has approximately **7M connected cars**, has been adding **around 1M** per quarter, **10M+** by end 2017



Source:
Ericsson & AT&T Global Connected Car Market Research, July 2015



AT&T AND VODAFONE INTRODUCE ONSTAR CONNECTED CAR SERVICE FOR OPEL AND VAUXHALL ONSTAR IN EUROPE

DALLAS, FEB. 22, 2016 — AT&T* and Vodafone have recently introduced OnStar's connected service for Opel and Vauxhall OnStar in select European countries. In Europe, the OnStar's Wi-Fi 4G LTE service, enabled by Vodafone, is available in all new Opel and Vauxhall passenger vehicles.

OnStar's 4G LTE Wi-Fi connection is already available in Spain, Germany, the Netherlands and the United Kingdom. The car becomes a powerful, mobile hotspot giving easier access to apps and services that require a high-speed cellular connection. The hotspot will support up to 7 mobile devices.

Opel and Vauxhall OnStar features also include emergency services, such as roadside assistance and automatic crash response, stolen vehicle assistance, vehicle diagnostics and destination download. There's a dedicated OnStar smartphone app for services such as remote door unlock.

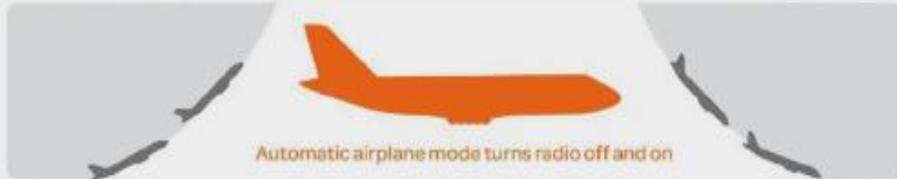
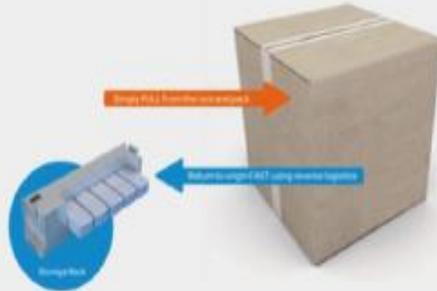
http://about.att.com/story/att_vodafone_support_onstar_connected_car_technology.html

Use Case: Asset Management

AT&T Cargo View with FlightSafe®

Uses Sensors to Detect

- Location
- Pressure
- Light or Dark
- Temperature
- Shock



- Global near Real-Time Tracking & Monitoring Service
- AT&T Cloud-hosted & secured Cargo View application
- Automatic Airplane Mode with FAA Compliance
- Exclusive to AT&T – certified by 45 Airlines
- Tracking on land or air

Maersk Line

Maersk's Bottom Line Results



619 Container Vessels

Maersk Line is the world's largest container shipping company



+280,000

Refrigerated containers monitored via wireless



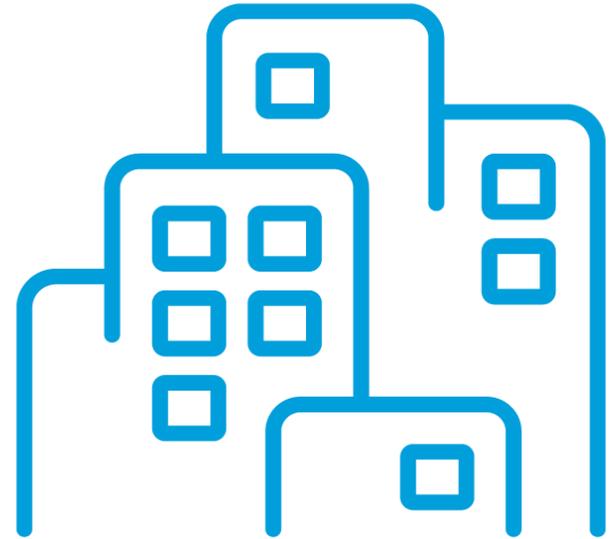
Smart Cities

AT&T has announced five pilot cities in the US – Atlanta, Chicago, Dallas, Chapel Hill (NC), and Montgomery County (MD).

Goal: to **identify** opportunities and solutions to improve municipal operations, **integrate** capabilities into packages that we can replicate from city to city, and **demonstrate** that value exceeds costs.

Initial **focus areas**: energy, transportation, infrastructure, and public safety with devices that control street and traffic lights, measure water quality, detect water leaks, and locate gunshots.

Working with **device manufacturers** and **opening APIs** for independent developers to create apps.



IoT Platforms

Industry: an **open** and **interoperable** platform, **agnostic** to device and network, that is **reliable, private, secure, and scalable**.

Policymakers:

frameworks that

- Promote investment and adoption
- Appropriate and proportional to use;
- Do not unnecessarily restrict data flows;
- Free from regulations not designed for IoT; and
- Avoid duplicate, inconsistent regulation by agencies from every sector of the economy

Policymakers can also encourage IoT in **public works** and **enable access to public data** through APIs and IoT platforms



IoT – Why Now?

Mobile Broadband is the Foundation

Ubiquitous, high speed, low latency, wireless networks enable people and devices to connect to almost any place at almost any time.

Though not yet universal, we are past the tipping point in terms of availability, scale and performance of these networks.

Investment

The investment needed to expand, maintain, upgrade, and protect these networks is extraordinary.

There is nothing inevitable about these investments.

Public Policy

Tax, spectrum, and regulatory – should be considered with an eye toward fostering and not burdening investments in these enabling networks, and toward driving universal availability

BEREC Findings

- No special treatment of IoT services and/or M2M communication appears necessary or appropriate.
- Use of numbering resources
- The following aspects appear to be key for IoT services to be economically viable:
 - Permissibility of extra-territorial use of national E. 164 and E.212 numbers (an internationally harmonised approach is desirable).
 - Global ITU numbers

BEREC Findings

- **Roaming:**
 - Many M2M services, which use mobile connectivity, are currently based on permanent roaming.
 - Permanent roaming appears to be a key factor for the success of certain IoT models being used.

Applicability to APAC

IoT is dynamic and has a significant cross-border dimension. IoT can play a central role in stimulating economic growth in APAC.

Regulatory Modernization is key:

- Encourage investment
 - Limiting Licensing Requirements
- Promote competition
- Light touch approach
 - Meet Consumer Needs
 - Assure Consumer Protection (Data Privacy and data protection)
 - Global Norms
 - Cross Border Data Flows

Global Norms – Trans Pacific Partnership Digital Economy

Enabling Cross Border Data flows

Prohibits Localization

- Data Centers
- Local Content
- Deployment of Computing Facilities

Prohibiting Forced Technology Transfers

Protecting Source Code

Ensuring Technology Choice

Promoting Inter-operable Data Privacy

- APEC Cross Border Privacy Regime

Open Internet



AT&T