Internet of Things at Home

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Near future

- Scale and production economics leading to significant cost reduction of connected devices (things)
- Emergence of Management System turning around acceptance hurdles to it head, instead increasing consumer adoption due to same
- Each IoT device individually connecting to smart-phone and individual app for each impractical and not scalable model
- Large amounts of data generated due to abundance of devices, helps tapping consumer behavior
MARKET AND GROWTH TRENDS

Global Connected-Home Device Annual Shipments

Internet Of Things Annual Device Shipments

~ 27% IoT market connected homes

Source: ABI Research, TechNavio, Pike Research, BI Intelligence Estimates
Huge divergence in Home Device categories

- **Security**
  - Home Alarm & Motion sensors
  - Video Camera
  - Locks

- **Power**
  - Smart Meters
  - HVAC Controllers
  - Lighting

- **Media & Internet**
  - Router
  - Set Top Boxes
  - Streaming

- **Other automation devices**
  - Kitchen devices
  - Medical devices
• Not A Single Player Market
  – Security Surveillance companies
  – Utility companies
  – Internet and TV providers
  – Streaming device companies
  – Other device manufactures

• How to Manage these Devices
  – Centralized vs Device based
  – Single vs One per category
  – Service providers vs Device Providers
  – Subscription vs Ad-revenue based
Communication
- Wired
- Wireless
  - Wi-Fi (high bandwidth)
  - Cellular
  - Bluetooth (low power)
  - ZigBee, Thread (low power)

Management
- Managing Communications
- Data Management
- Analysis
- Event/Action Management
IOT ANALOGY WITH PC REVOLUTION

Home Management Hardware Manufacturers

- CPU
- Communication
- Sensors

PC Manufacturers

- CPU
- Communication
- Storage

Hardware Platform

Home Management Operating System

- Security
- Climate Control
- Lights
- Health Sensor

Operating System

- Text Editor
- Web Browser
- Media Players
- Mail

Enabling Software

Applications

OEM Manufacturers

- CPU
- Communication

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How did we get here?

With key obstacles gone, the cost of connectivity has declined at the same time that new ways to analyze mountains of data have developed.

<table>
<thead>
<tr>
<th>Cost of Sensors</th>
<th>Cost of Bandwidth</th>
<th>Cost of Processing</th>
</tr>
</thead>
<tbody>
<tr>
<td>$1.30 → $0.60</td>
<td>↓40x</td>
<td>↓60x</td>
</tr>
<tr>
<td>Avg. cost over the past 10 years.</td>
<td>over the past 10 years.</td>
<td>over the past 10 years.</td>
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**Smartphones**

Smartphones are now becoming the personal gateway to the IoT.

**Wi-Fi**

With Wi-Fi coverage now ubiquitous, wireless connectivity is available for free or at a very low cost.

**Big Data**

As the IoT will by definition generate voluminous amounts of unstructured data, the availability of big data analytics is a key enabler.

**Scalability of IPv6**

IPv6 = \(3.4 \times 10^{38}\) IP addresses

Internet Protocol (IP) addresses are the identification and location system for every computer on a network. IPv4, the fourth version of this protocol, allows for 4.3 billion addresses. IPv6, the newest version, allows for an almost limitless amount.
• Platform and standards will expedite Home IoT Ecosystem
• Significant growth in next 3-5 years
• Common Management hits nail of complexity and security concerns on its head as
  • seamlessly interconnects diverse devices securely
  • development of intelligent apps, leveraging humongous data to provide real value proposition
• Apple and Google leveraging the opportunity and becoming key direct beneficiaries