Reducing Configuration Complexity with Next Gen IoT Networks

Orama Inc.

November, 2015

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Network Lighting Controls
Low Penetration - Why?

- Commissioning is very time-consuming & expensive
  - Network configuration
  - Commissioning of lighting control system
- Control electronics is proprietary & expensive
- Very limited smart IoT lighting capabilities
- Closed systems with 6 – 9 years payback

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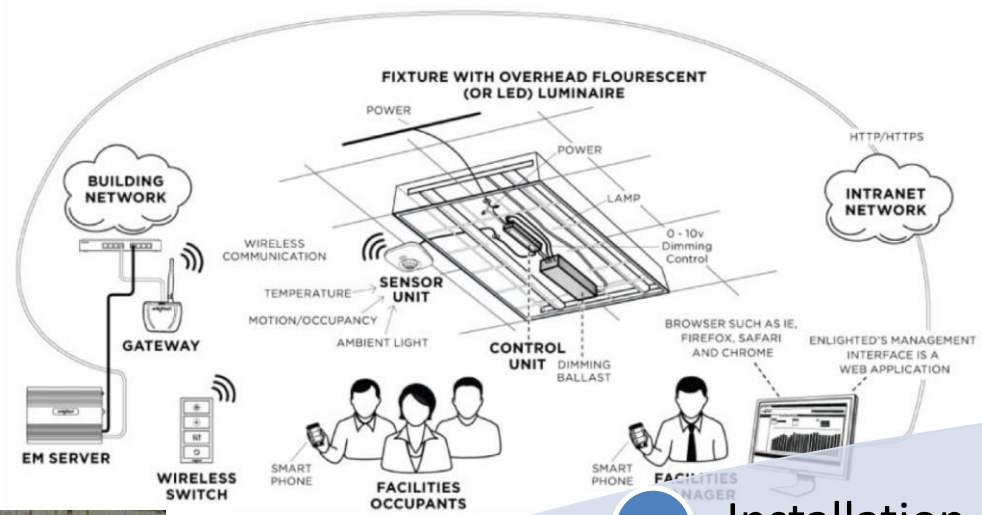
Commissioning of Lighting Control System - Difficult & Very Expensive



- Expert commissioned
- Time consuming & labor intensive
- Up to 60% of project cost

Planning

Installation

Commissioning

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Simplifying Commissioning

- Self commissioning software
  - Commission & configure several thousand fixtures in few hours
  - Easy to re-commission by end user
  - No need for manual data entry or stickers
  - Experts needed for only 10-20% of tasks
  - Energy saving ≥ expert-commissioned systems

Self Commissioning & Control Software

- Software & user interface to directly empower end users
  - Personalize & control ambiance
  - Instantly re-configure zones, scenes, download lighting profiles
  - Skill required: iPad

Intelligent IoT Software Simple User Interface

- How?
  - Software driven approach to automate >90% of tasks
  - Mass market IoT micros in each light fixture
  - Intelligent SW in each IoT node & server
  - Replace custom installation tools with mobile UI tools
  - Integrate control & power electronics, wherever possible
  - More sensors the better (within budget!)

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Robot for Auto Mapping?

Source: WiFiBOT, Google Image search

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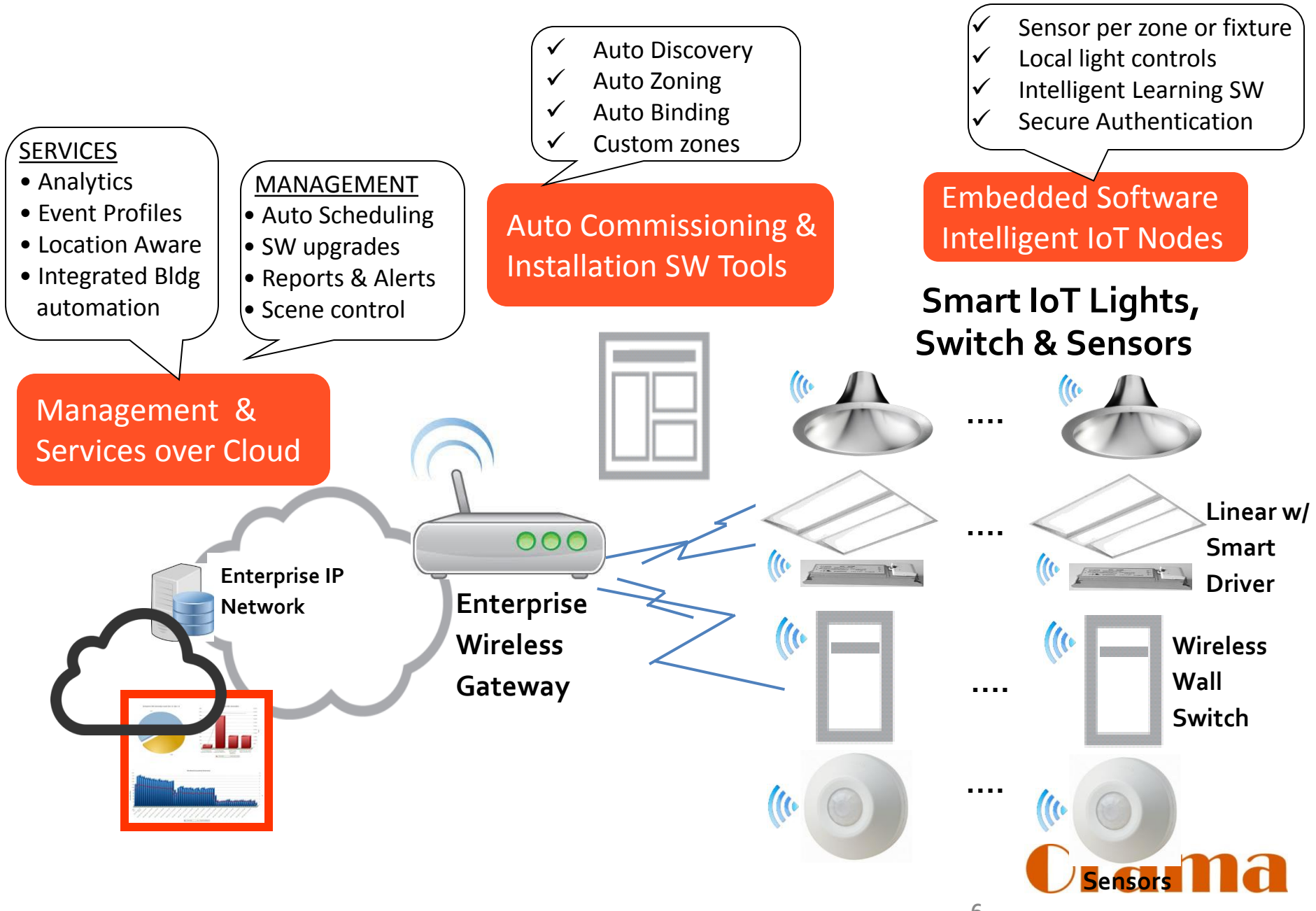
IoT Lighting Platform - Building Blocks



Where we are today & what's next?

- What is already affordable & available
  - Wireless (IoT) micro-controllers & sensor chips
  - IoT protocol stacks from multiple consortiums
  - IPv6 support & Enterprise grade security solutions
  - 3rd party cloud middleware for managing IoT devices
  - Smart LED driver reference design
  - Self commissioning software technology demonstrations

- What is missing for affordable, innovative & mass market deployments
  - Common radio/networking technology by various OEMs
  - Open APIs & data models for lighting (IoT) devices
  - Simple peripheral bus standard to connect & power 3rd party sensors & wireless modules
  - Industry organization(s) to drive interoperable solutions (competition) for continuous cost reduction & performance improvements
  - Total IP-platform approach towards Smart commercial buildings/lighting - similar to Apple HomeKit or Google Thread for smart homes
  - New startups or developer community with innovative solutions

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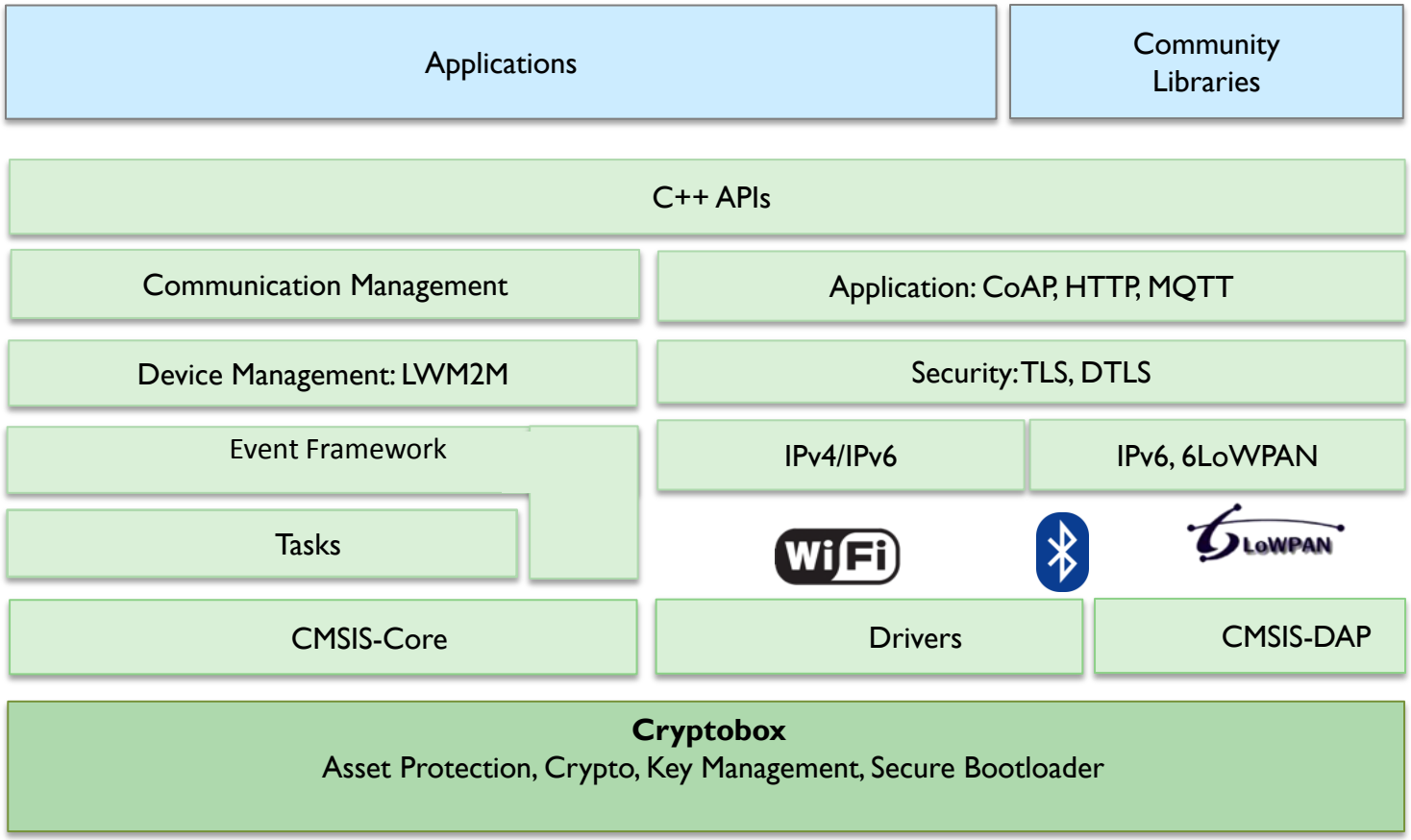
Example IoT Stack



Source: ARM

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Existing Wireless Networks for Lighting Controls
Difficult to Configure & Limited IoT Capabilities

- Designed, installed & managed by lighting OEMs, not by Networking OEMs
  - Network & Application (lighting control) functions are not truly separable
- Non-IP, proprietary & not interoperable
  - RF, MAC layer, networking protocols, APIs to higher layers, network management tools
- Difficult to configure & maintain
  - Discovery, provisioning, secure authentication
  - Latency issues for various current & new lighting applications
  - Very slow software upgrade for end-points
- Not scalable for higher IoT data traffic
  - Static network topology, RF interference, IPv6?
  - Bandwidth constraints for new sensors & use cases
  - Limited self healing & optimization mechanisms

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Solution - Next Gen IoT Network

- A dedicated Enterprise IoT Network
  - Designed, installed & managed by IoT networking OEM
  - To fill major gaps with existing IT wireless networks in large scale deployments
- IoT Aware Network Controller
  - Policy-based Intelligent algorithms for automatic network formation & optimization
  - Deterministic network formation with low latency as against Ad-Hoc formation
  - Application-level control over the network architecture
- Based on open standards & IPv6 connectivity
  - Truly Interoperable – multi vendor IoT devices on same network
  - Well established security mechanisms (Enterprise grade)
- Scalable bandwidth for both low & high data traffic sensors

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Simplifying Network Configuration & Operation

- **Auto Provisioning**
  - Device network provisioning guided from IoT Controller
- **Auto Setup & Formation**
  - Auto Discovery, Auto Formation of entire network topology
  - Policy-based network formation – latency, bandwidth, no single point of failure, RF margin, power consumption, application behavior
- **Auto Extend Range**
  - Automatically form & extend range of network as new IoT devices are added over time
- **Auto Heal IoT Connectivity**
  - Provides Auto Healing if link to IoT nodes is broken, w/ local or IoT Controller intelligence
- **Auto Boost Performance**
  - Auto boost and optimize latency, bandwidth, power, etc w/ self learning algorithms

Thank You

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