



Company Profile and Patent Portfolio Analysis

afero

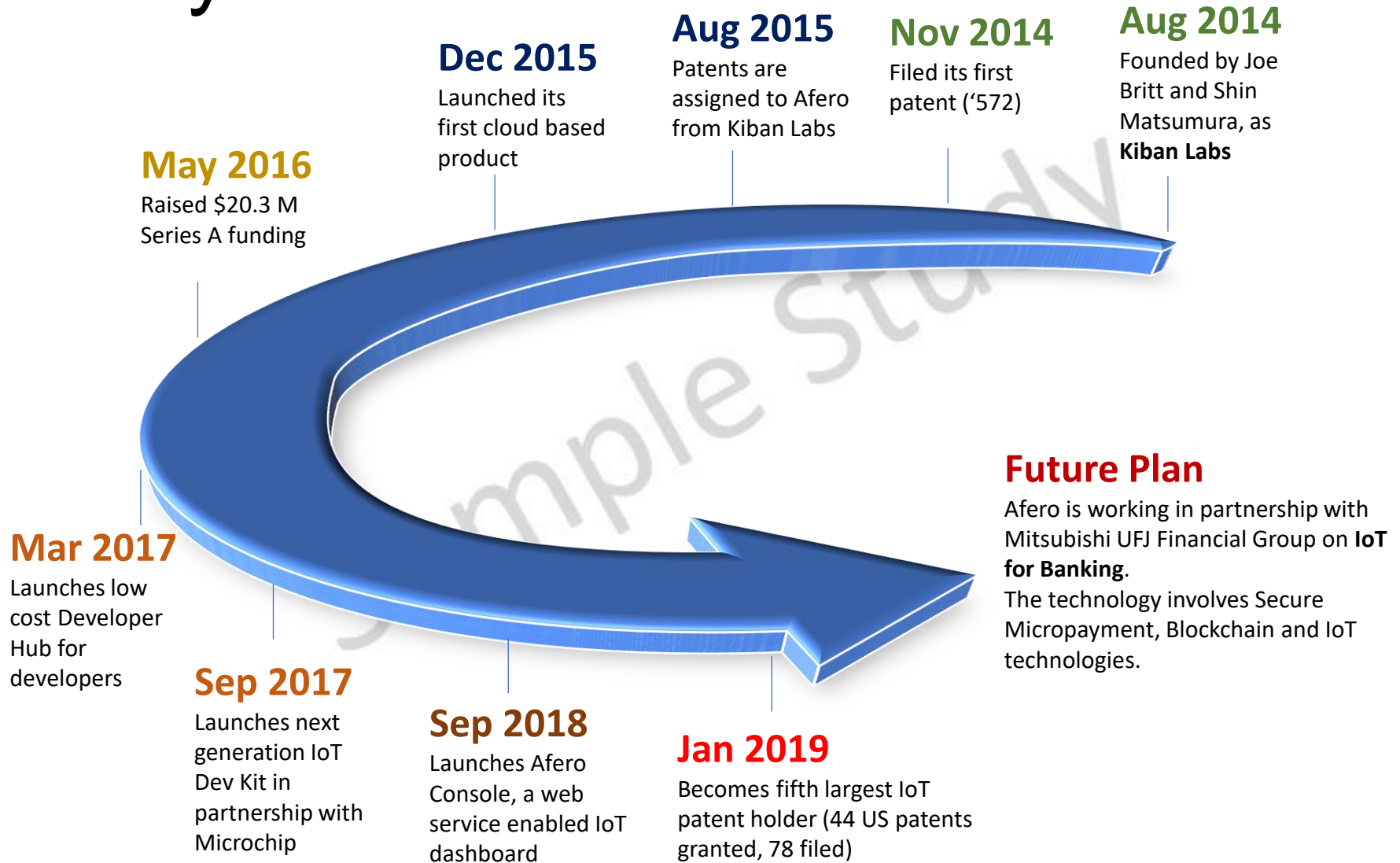


PG Technology Research

About Afero

- Afero is an Internet of Things (IoT) company based in California, USA
- Founded by Joe Britt and Shin Matsumura in 2014
- Has got about \$20 million Series A funding so far from Samsung, SoftBank and others
- Key products include Enterprise IoT platform, and an Analytics Visualization app
- Afero products are hardware and software agnostic, pure play platforms for IoT devices

Key Milestones



Product Portfolio



Afero IoT Platform™

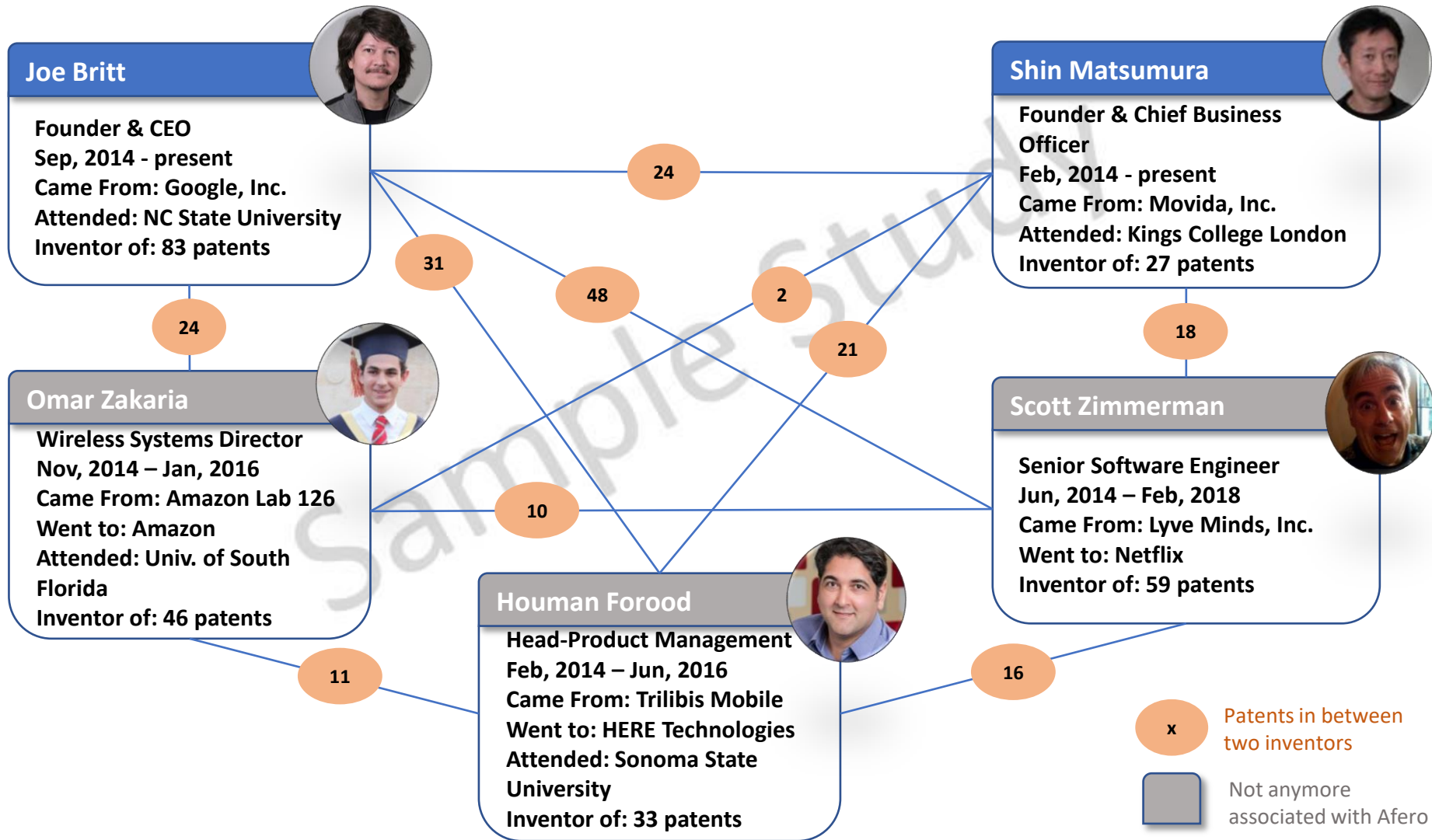
- an enterprise-level, edge-to-cloud turn key platform for developers
- allows to rapidly prototype and monetize IoT product
- uses Dynamic Hub technology to ensures secure and reliable communication between Afero Secure Radio (ASR) and the Afero Cloud



Afero intelligent applications

- include analytics and visualization
- allows smart products to easily connect and leverage a secure platform for IoT

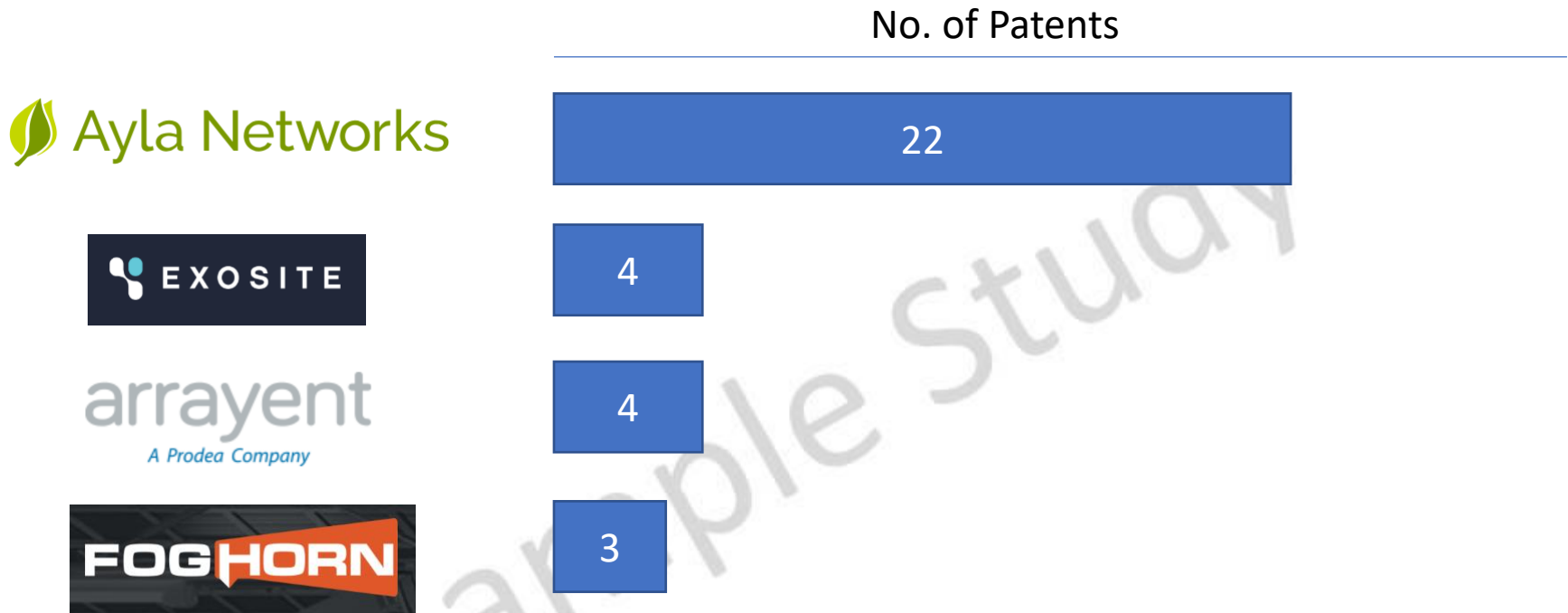
People (Top Inventors)



Partnerships



Competitors

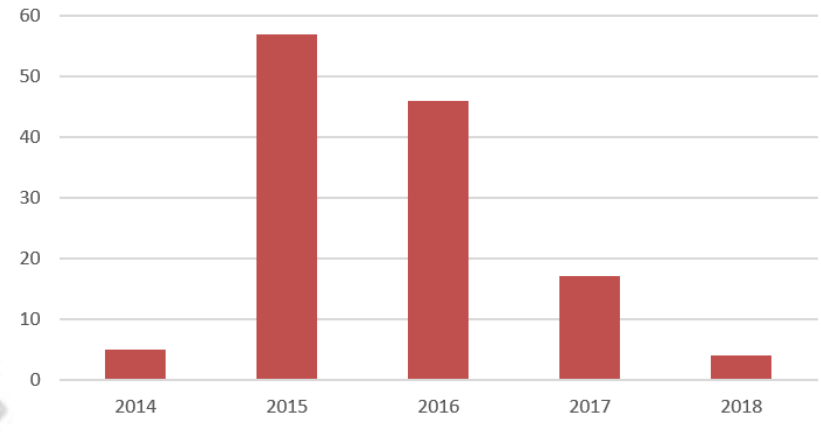


- Amazon Web Services (AWS), Microsoft Azure IoT, Google Cloud IoT, IBM, PTC – Thingworx are some of the other IoT development platforms popular among developers.
- Afero has partnered with AWS and Google Cloud

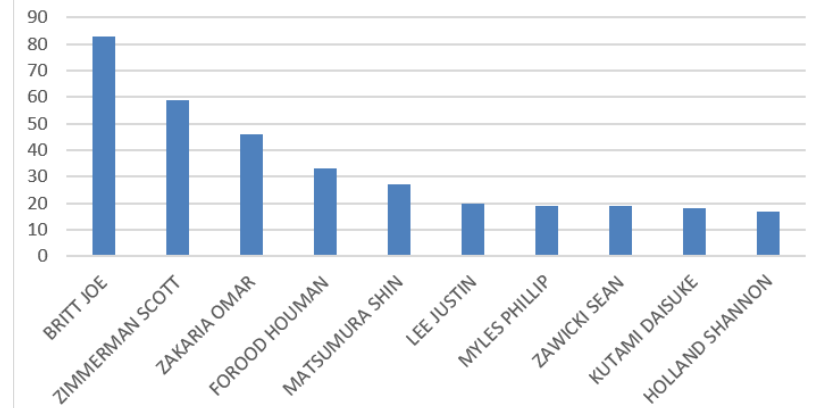
Afero Patents - Overview

- 44 US granted patents
- 129 published patents worldwide (45 patent families)
- Filing activities in four countries (US, Japan, Korea and China)
- Joe Britt (Founder) is inventor of maximum number of patent applications
- Our proprietary patent mining tools fetch patents from multiple sources, which ensures exhaustiveness of data

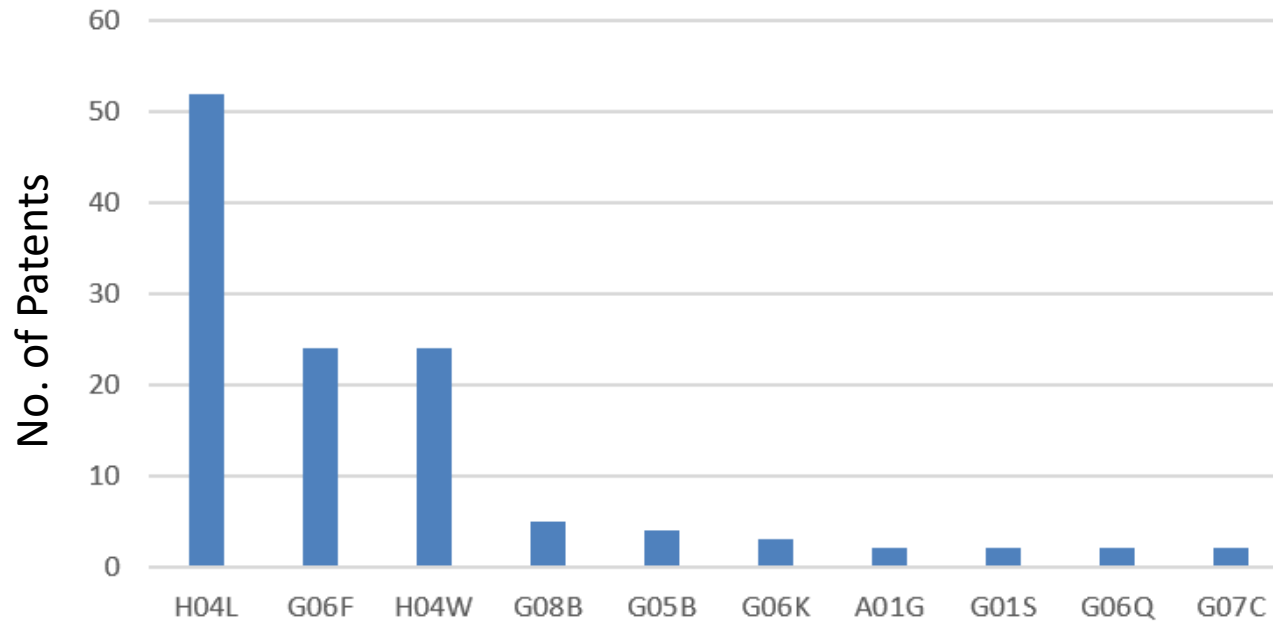
Filing Trend (Patents Worldwide)



Top Inventors



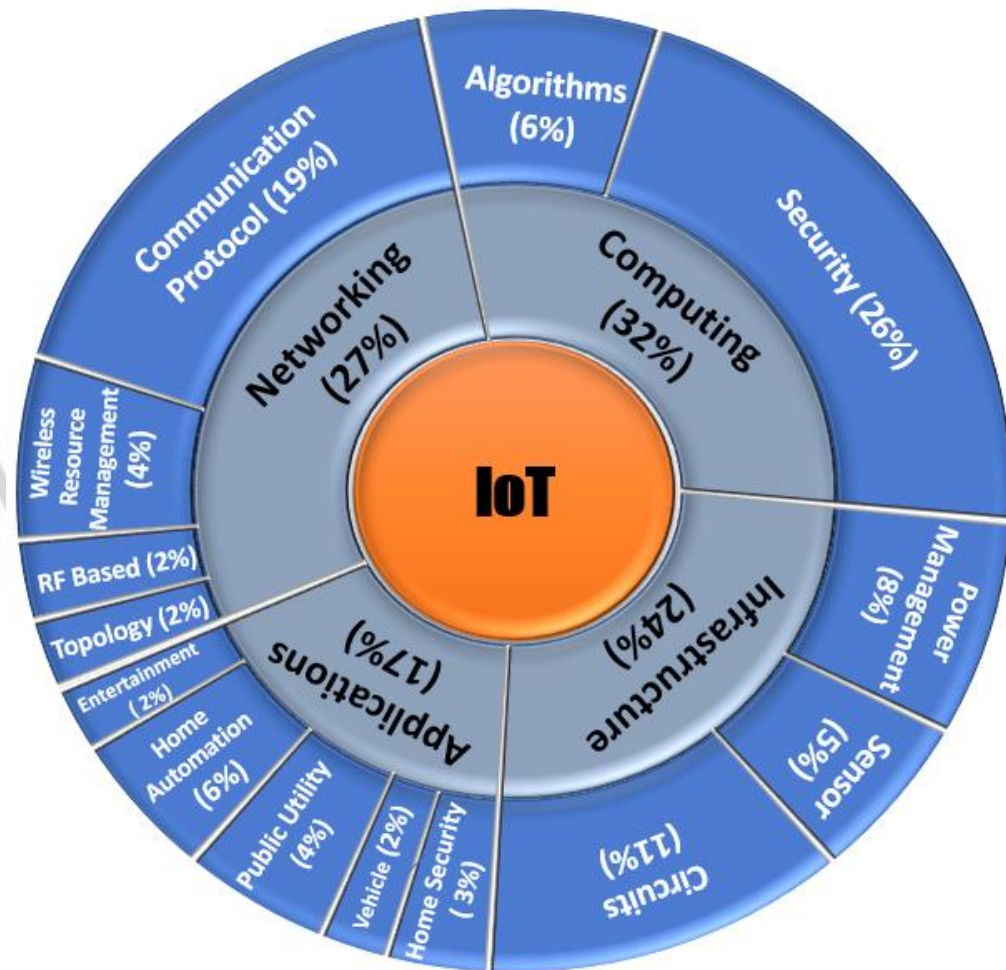
IPC Classification Distribution



- ❑ IPC Classification distribution suggests that maximum number of patents belong to H04L which refers to 'Transmission of Digital Information' category.
- ❑ Next prominent category is G06F 'Electric Digital Data Processing' category.
- ❑ This is in consistence with the company's business model and product portfolio.

Patent Tech Clusters

- Afero's patent trend indicate more than a quarter of all its patents are related to Security Solutions in IoT
- Next important category is Communication Protocol with 19% patents
- The trend shows that the company is working heavily towards **designing new protocols for IoT communication** along with setting **security standards**.
- These innovative technologies seems to be implemented in Afero products, like Afero Platform™, which include innovative IoT-specific security measures.



*The patent categorization is done manually by our experts

Exemplary Use of Afero Patents in Afero Products (1/4)

Patent Information

Patent Number: US9942328B2

Patent Title: System and method for latched attributes in an internet of things (IOT) system

Filing Date: 27 May 2016

Grant Date: 10 April 2018

Inventors: Shannon Holland | Robey Pointer | Stephen Sewerynek | Nickolas Heckman | Chris Aiuto | Lucas Finkelstein | Scott Zimmerman

Product Information

Product: Afero IoT Platform

Reference Links Used:

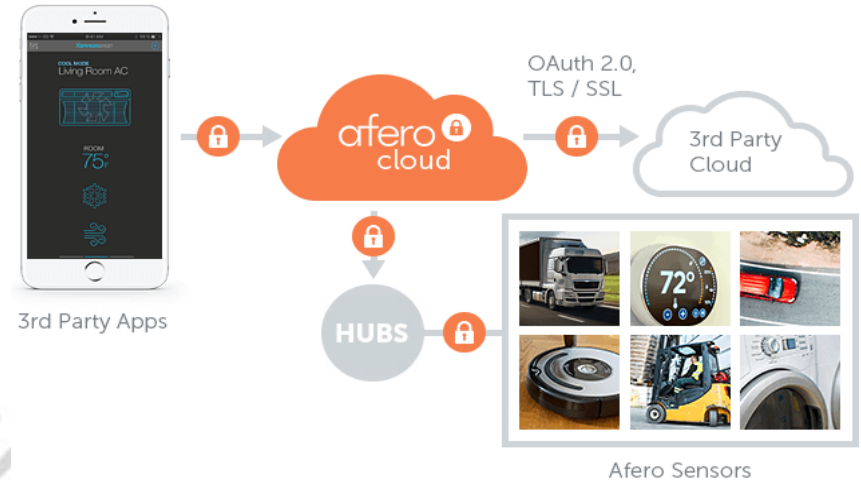
<https://www.afero.io/platform/>

<https://developer.afero.io/Projects>

<https://developer.afero.io/AttrDef>

Exemplary Use of Afero Patents in Afero Products (2/4)

Afero IoT Platform



Secure from day one, the Afero Platform™ is an enterprise-level, edge-to-cloud foundation that allows you to rapidly prototype and monetize your intelligent IoT product. Whether you are building or connecting consumer devices or enterprise assets, you can focus on your core expertise.

You don't need to hire experts in hardware, firmware, networking, mobile, cloud, and IoT. Just leverage the Afero Platform, which includes Afero edge, cloud, core/cross-platform services, and developer tools that allow you to build, provision, monitor, and manage your IoT deployment. With one-click onboarding, over-the-air (OTA) updates, and world-class security, you can be agile and innovative.

PROFILE EDITOR USER GUIDE

Once you are set up for development, you are ready to begin working on your project. Each project developed to run within the Afero ecosystem is unique. You might rely solely on Afero Secure Radio (ASR) for processing and control, you might require hardware and software development for an in-product MCU that works with ASR, or you might be developing an Afero Secure Hub prototype.

Whatever your goal, you will start by creating a project using the Afero Profile Editor. This user guide steps you through everything you need to know to get started:

- [Open a Project](#)
- [Define the Device Type](#)
- [Define the Device Attributes](#)
- [Define the Mobile App UI](#)
- [Publish Your Profile](#)

Activate Windows

Exemplary Use of Afero Patents in Afero Products (3/4)

A method comprising:
specifying an attribute for each of a plurality of items of data managed in an Internet of Things (IoT) device and/or an IoT service, at least one of the attributes comprising a latched attribute having a current value and an indication of state changes to the latched attribute over a period of time;

What Is an Attribute?

Think of an attribute as a variable shared between your IoT device and the end-user's Afero mobile app. Your device sets that variable/attribute in ASR to a value reflecting device state. That value is communicated to the Afero Cloud (for ASR-1 via either a standalone hub or "softhub" built into the Afero mobile app), and from there to the end-user's mobile app. This causes the app UI to update, reflecting the current value of the attribute. Conversely, the end-user can manipulate the mobile app UI to cause a change in the value of an attribute: the new value is communicated to ASR in your device via the Afero Cloud then hub, and a device action is triggered by that attribute value.

Devices without an MCU - A relatively simple device may not have a microcontroller, but still have sensors or controls. For this type of application, ASR exposes four GPIO pins that can be connected to a device that does not need to perform any processing beyond communicating attribute state with Afero. These four attributes are referred to as **GPIO ATTRIBUTES**.

GPIO attributes are, of course, tied directly to GPIO pin state, and therefore are defined by characteristics you would expect from pin interfaces: they can be Input or Output, you can activate internal pull-up or pull-down resistors, etc.

- LATCH - Latching is currently only available for Input attributes. Latching causes a change in an attribute value to be held until it can be successfully transmitted to the Afero Cloud. This is useful for applications like door or leak sensors where you want to make sure the user is notified of a change even if the state goes back to normal. In these cases the value starts at 0. If an event occurs, the value goes to 1 and that value will be held until a hub can connect. Once the connection is made, the peripheral will send the latched value followed by the current value. If you have a rule to notify the user when an event occurs, that rule will fire when the latched value is received even if the current value is 0.

Exemplary Use of Afero Patents in Afero Products (4/4)

when an IoT device is unable to connect with an IoT service for the period of time, maintaining the indication of state changes occurring to the latched attribute over the period of time;

upon establishing a successful connection between the IoT device and the IoT service after the period of time, transmitting the indication of state changes of the latched attribute from the IoT device to the IoT service;
and

analyzing the indication of state changes to determine whether to generate an alert on the IoT service.

- LATCH - Latching is currently only available for Input attributes. Latching causes a change in an attribute value to be held until it can be successfully transmitted to the Afero Cloud. This is useful for applications like door or leak sensors where you want to make sure the user is notified of a change even if the state goes back to normal. In these cases the value starts at 0. If an event occurs, the value goes to 1 and that value will be held until a hub can connect. Once the connection is made, the peripheral will send the latched value followed by the current value. If you have a rule to notify the user when an event occurs, that rule will fire when the latched value is received even if the current value is 0.

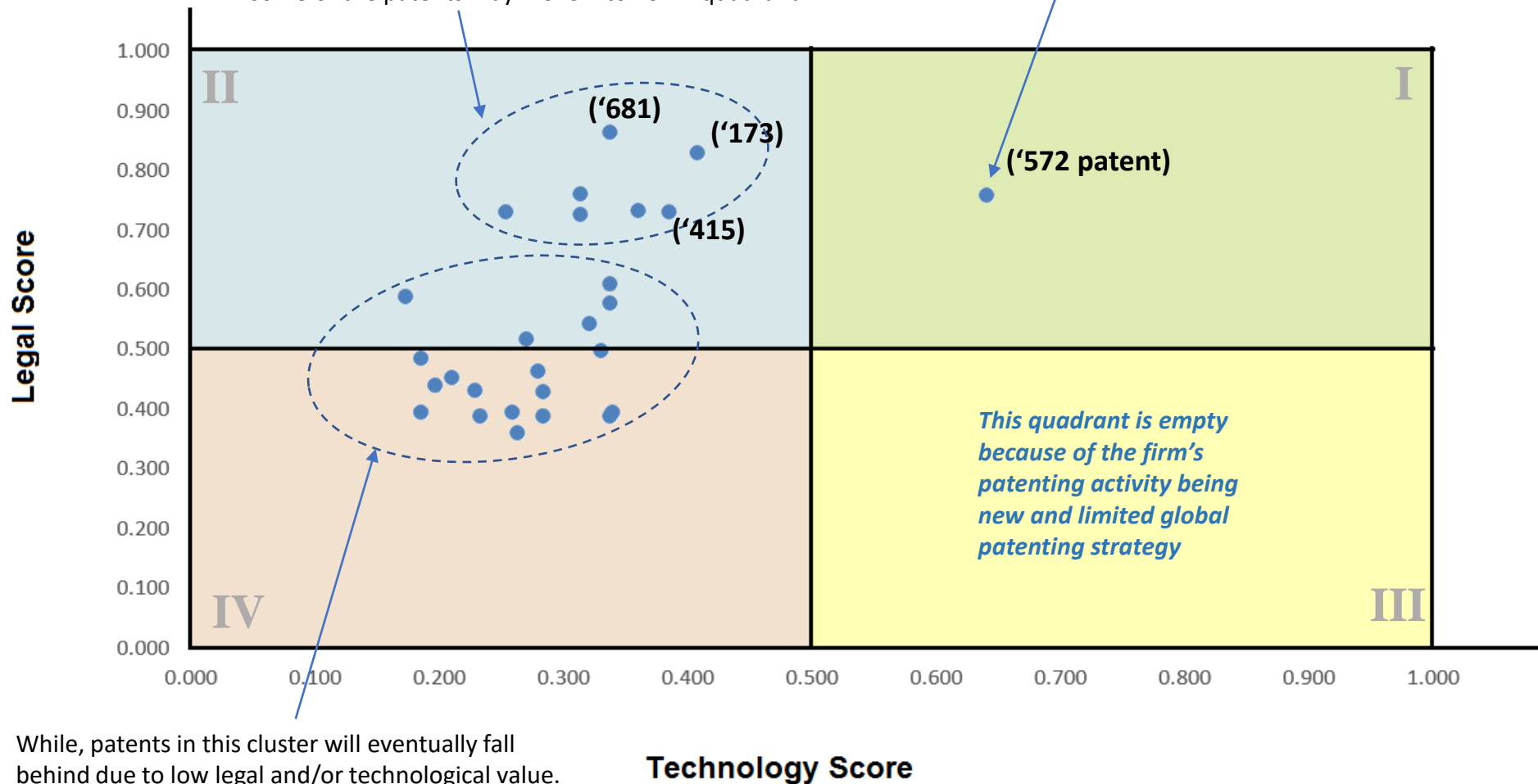
Patent Strength Analysis (1/3)

- Afero's US patent portfolio was analysed using our proprietary *Patent Strength Framework* to obtain a Technical Score and a Legal Score for each granted patent
- Some of the factors used in calculating the Patent strength are: *Independent Claim's broadness, No. of Citations, Technology Category Strength, Remaining Life of the Patent, Geographical Coverage, and No. of Active Family Members.*
- Based on the Legal and Technical Score, a scattered plot was charted to create a Portfolio Matrix (*see next slide*)

Patent Strength Analysis (2/3)

Patents in this cluster have potential to become valuable, as the technology will mature. Over time, some of the patents may move into I or III quadrant

This is the top patent, stands out in the entire portfolio



Patent Strength Analysis (3/3)

- Afero's patent portfolio matrix clearly indicates that the company is investing in core technology of Low Power IoT for WAN, Virtual IoT platform, and IoT Security
- It is also clear that less effort is being spent on developing application-based technologies for IoT (use of IoT in Home Automation, Vehicles, etc.)
- Above findings are consistent with firm's overall vision – “Setting the Standard for IoT Companies”

Key Points and Disclaimer

Data Sources: Afero website (<https://www.afero.io/>), Questel Orbit, USPTO Patent Database, Escapenet Patent Database, Google Web

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Any questions?

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or

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