



Smart Locks and Access Control Supply Chain: Scaling Innovation

IN PARTNERSHIP WITH **PassiveBolt**



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The simultaneous improvement of computing, sensing, and networking technologies is transforming products and services across industries. Manufacturers, including those in the smart door lock and smart access control markets, are undergoing organizational transformation to deliver on the promises—and requirements—of making and supporting connected solutions.

As connectivity becomes a de facto requirement to stay competitive, value creation moves to new sets of features and applications. Manufacturers must engage in constant innovation and explore new strategies to take products to market quickly.

At the same time, the smart door lock market is saturated with new players entering the market. These new players, as well as established market leaders, are all investing in the knowledge, staffing, and capabilities to keep up with the rapid pace of change. These efforts are costly and challenging.

The smart door lock market could benefit by re-evaluating its market structure and exploring ways to re-align industry relationships to drive the next wave of innovation at scale.

Rise of Smart Locks and Smart Access Control

The smart residence starts at the front door. Smart door locks, smart access control systems, networked cameras, video doorbells, smart garage door openers, parking access solutions, and other IoT devices represent a new generation of access control and monitoring solutions.

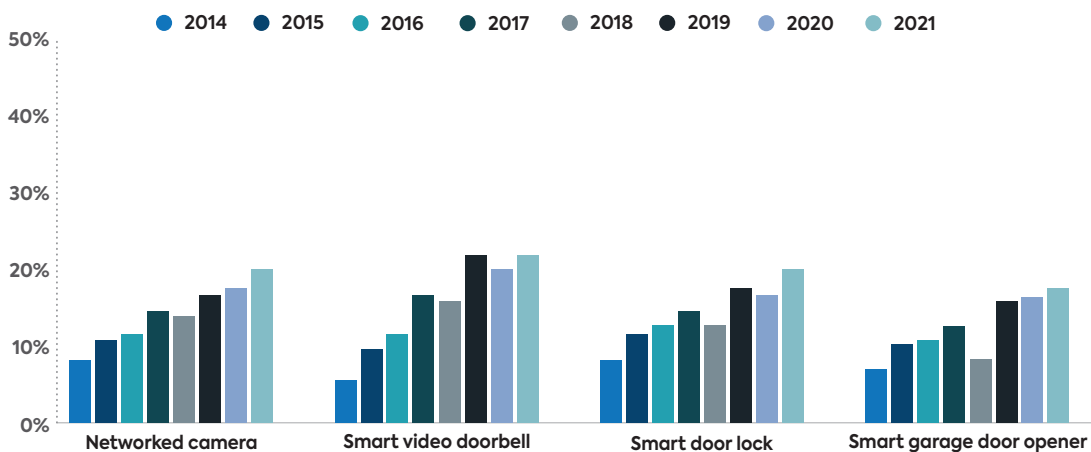
Smart door lock adoption continues to be driven by strong multichannel sales efforts and continual product innovation. The majority of residential door locks installed in the US are mechanical, but an increasing number of exterior locks in single-family homes are being replaced with smart door locks. Across single-family, multi-family, retail, and commercial spaces, builders and owners are adopting connected entry solutions to create more secure and functional spaces.



Smart door locks and associated whole-building access control systems have fueled the recent acceleration in smart apartment adoption while several major production builders now include them in standard specifications. Feature innovations, such as biometric verification, integrated video cameras, voice control via smart speakers, and integration with home delivery services, help to raise awareness and value perceptions of smart door locks. That increased awareness triggers sales in retail, security, home builder, and system integrator channels

- As of Q4 2021, 11% of US internet households, or over 12 million households, owned a smart door lock, nearly double the adoption rate five years prior.
- Purchase intentions are also on the rise. In Q4 2021, 29% of US broadband households reported an intention to purchase a smart door lock in the next six months, up from just 21% in 2018.
- 15% of MDU owner/operators report having a secure access system for property common areas that include IoT devices that they can access and control remotely; a similar percentage have connected access solutions for individual units as well.

High Intention to Purchase Smart Access Device



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Expanding Value beyond Secure Entry to Services

Safety and security remain the leading purchase drivers of smart home devices. Smart door locks and smart access control systems provide a foundation of security by helping consumers and building owners/operators monitor and secure the primary access points.



A Future of Services

In addition to these secure entry capabilities, smart door locks and smart access control systems also double as points of access for a future world of services. Companies are vying for control of access points into homes and buildings that enable service opportunities such as in-home, in-unit, and in-garage delivery, health and wellness solutions, cleaning and pet care services, home and unit rental solutions, and much more. Alignments and partnerships are also helping expand the market beyond safety and security use cases.

- Door lock manufacturers have established integrations with Airbnb and HomeAway reservation systems to enable home hosts to grant access to guests.
- OEMs are working with real estate developers (single family and multifamily) to include smart access solutions as a standard part of smart home packages and home control platforms.
- Parcel delivery services are integrating smart door locks and cameras to offer secure package delivery.

Multi-Dwelling Units

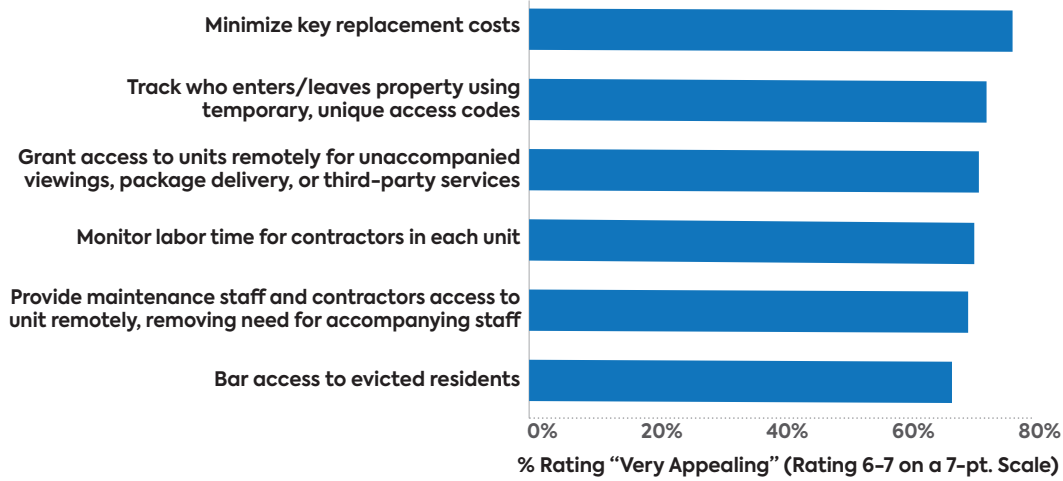
MDU (multi-dwelling unit) owners/operators value smart access control for security, convenience, and OPEX savings. Properties want to grant access to units remotely for unaccompanied viewing, assist with package delivery, control who had access to units, and make key replacement more efficient.

- 73% of MDU properties with smart door locks use the devices to grant access to units remotely for unaccompanied viewings, package delivery, or third-party services.
- 65% use the locks to track who enters and leaves the property using temporary, unique access codes.
- About three out of four MDU property managers find the ability of smart door locks to minimize key replacement costs “very appealing.”
- One-third of MDU property managers report that their residents are demanding the ability to enable remote access to apartment units.

Typical use cases for smart door lock and access control systems:

- Grant entrance access remotely
- Receive electronic notifications of who is entering and leaving in real-time
- Assign permanent and temporary virtual key with access schedules for specific days and times
- Change or revoke access privileges at any time
- Trigger tamper and forced entry alarms that warn of a possible break-in

Highly Appealing Functions of Smart Door Locks for MDUs Among US MDU Property Managers and Owners



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Product Capabilities: Where's The Bleeding Edge?

Many smart door lock and smart access control systems are several generations into their development, and features that once defined premium tiers are now integrated into basic models. Remote access, unique guest codes, personalized alerts, and integration with prevalent smart home and property management platforms are commonplace.



Voice Control becomes Standard

Even voice control is now a standard feature, as a growing number of use voice control for connected devices in the home. Consumers ranked lights, thermostats, door locks, smart TVs, and video cameras as the top five devices they would most like to control via voice assistant. Although some users express concern about using voice assistants to allow access to their properties, most integrations do not allow for voice-controlled unlock. Instead, voice assistants' capabilities are limited to restricting access, locking doors, and arming systems.

It is now common for companies to integrate their devices with Amazon Alexa or Google Assistant. Although integrations with Apple HomeKit lag behind the other two big voice assistants, most of the dominant players have already added Siri voice assistance to their door locks.

Top Five Devices to Control via Voice Assistant

- Lights
- Thermostats
- Door locks
- Smart TVs
- Video cameras

To remain competitive, device manufacturers need to include voice control.

Eye on Power Solutions

Power consumption is also an ever-present issue, with many connected home products—like smart door locks, smart smoke and CO detectors, Wi-Fi weight scales—relying on battery power. Battery power limits these products’ ability to support more robust networking protocols, and frequent battery replacement makes for a poor user experience. It also limits products’ ability to add new features or interfaces. For instance, smart door locks often include a traditional physical key option—homeowners will not tolerate coming home to a door they cannot unlock because the battery has run down.

Advanced Features driving the Next Wave of Premium Products

New sets of features are emerging that will define the premium tier of smart door lock and access control platforms going forward, including advancements in sensing, mechatronic functions, authentication technologies and communication protocols.

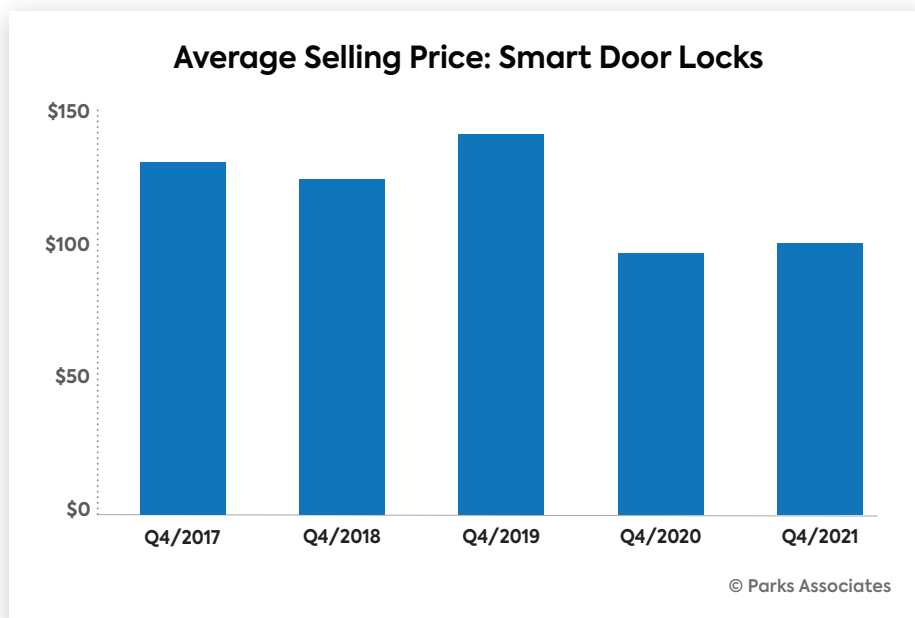
	Development Trends	Feature Innovation Areas
Sensing	Today’s smart door locks are packed with sensors that enable an ever-broadening array of use cases. Sensors help the lock determine its status (locked/unlocked). Location sensors trigger auto-unlock and lock when authenticated users are in/out of range. Presence sensors light up the lock face to help the user inset a in the dark key. Sensors can detect a break-in or alert the user of attempted tampering.	<ul style="list-style-type: none"> • BLE-based location • UWB-based micro location • Integrated Door Status (IDS) • Obstacle detection • Capacitive touch • Tampering detection • Molded electronics • Smart door interface • Welcome lighting
Mechatronic	OEMs are continuously advancing the physical and electronic functioning of the lock mechanism. Powering locks is a particular area of focus, with some companies likes Masonite focusing on a powered doorframe and others like Alfred and Yale developing wireless charging techniques.	<ul style="list-style-type: none"> • Direct actuation • Auto calibration • Deadbolt tracking • Back drive • Powered door • Wireless charging
Authentication	Major innovations include increasing use of biometrics, including fingerprint, facial recognition, voice authentication and even iris scanning, to grant access with heightened security. Additionally, Apple introduced its Home Key feature for iOS 15 that allows users to unlock an NFC-enabled locks with a secure, encrypted passcode stored in the user’s Apple Wallet.	<ul style="list-style-type: none"> • Passive authentication • Digital keys • Facial recognition • Secured storage (HSE) • NFC reader module • LF-RFID reader module
Communication	Communication standards abound in the lock and access control market, like in other smart home categories. Each standard has strengths and weaknesses related to range, power consumption, security protocols, cost, and interoperability. IP-based Matter aims to aid in interoperability and leading lock OEMs have committed to supporting the standard.	<ul style="list-style-type: none"> • Zigbee • Z-Wave • Wi-Fi • BLE • NFC • LF-RFID • Matter • CAN • RS-485 • TCP/IP • Wiegand

The Pressure is On: Manufacturers Must Keep Innovating

Whether established market leaders or start-ups, smart access control product and system manufacturers are under constant pressure to keep innovating. Not only have formerly innovative features become standard, but in some access control categories, prices are falling. The average selling price of a smart door lock in the US was \$101 in Q4 2021, down from \$133 just two years prior. Video doorbells, smart thermostats, and other smart home products are witnessing similar pricing trends.



Manufacturers seek features that demand premium pricing and services that can create recurring revenue streams. Maintaining an edge with innovative technology and ability to integrate with future solutions are important differentiators in a highly competitive market.



Pace of Innovation

For traditional manufacturers, keeping up with the pace of smart product innovation is a challenge. Product lifecycles for smart products—which demand software updates, new connectivity standards, sensor integration, and cybersecurity patches—are dramatically shorter than traditional, unconnected or locally networked solutions. Manufacturers must be more agile, respond faster to changing market conditions, and get new features to consumers faster than the organization may be able to move.

The constant push to develop the next generation of products leads companies down two paths: acquiring innovation or building it in-house.

Access control powerhouse ASSA ABLOY has led the acquisition drive, first acquiring August in December 2017. In September 2021, it announced its intentions to acquire Spectrum Brands' Hardware and Home Improvement division, including lock brands Kwikset, Baldwin, and Weiser.

Brands lacking the capital or desire to make major acquisitions are investing in internal product development, looking for incremental innovation that improves each product generation.

Ability to Scale

However, the smart lock and smart access control market has shown substantive growth and transformational change over the past five years, expanding well beyond early capabilities. More than 10 new brands have entered the space in just the past two years. This means that each individual brand has to build competency in-house on all aspects of lock performance—mechatronic functions, sensors, authentication, communication, privacy and security controls, and integration with other connected products and platforms, among others. While the

acquisition path of buying product innovation is quite expensive, the alternative approach of independently developing knowledge and investing in R&D in-house carries its own inefficiencies and leads to a fragmented market landscape.

It is possible that these traditional and dominant approaches to product development for smart door locks—and the smart home market generally—are holding back the industry’s ability to scale.

Smart Door Lock and Access Control Market Leaders



Dozens of Smart Door Lock and Access Control OEMs



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Innovation without Fragmentation: Benefits of Tier-1 Suppliers

The exact structure of industry supply chains naturally vary by industry, based on market needs, strategies of market leaders, and the legacy of a market’s historical development. The smart door lock and smart access control product industries have developed such that both established and start-up OEMs do the vast majority of R&D, product iteration, manufacturing, and assemblage of distinct components themselves. Other industries have developed a supply chain tier between components suppliers and the OEM that offloads much of this work – commonly referred to as Tier-1 suppliers.

The auto industry is among the most recognized Tier-1 supply chain structure. Companies like Continental, Bosch, Denso, Panasonic Automotive, and Magna, among others, design and develop whole systems or modules for a vehicle, while sourcing individual components for the system from farther up the supply chain. The auto OEM focuses on the overall design of their vehicles, assembly of various vehicle systems, balance of their product portfolios, product marketing, developing sales strategies, and other mission-critical tasks.

Tier-1 Supply Chain Structure

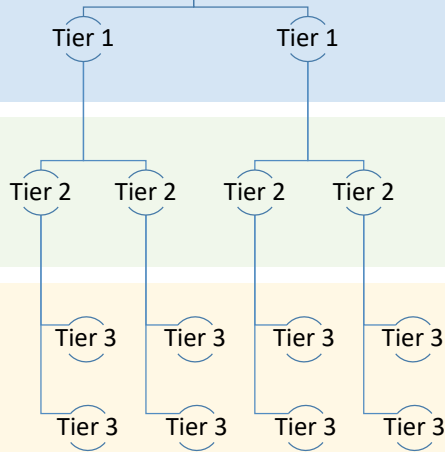
Designs, promotes, and may assemble product

OEM: Brand to End User

Supplies systems and modules Directly to OEM

Supplies components to Tier-1 suppliers

Provides materials and parts to Tier-2 suppliers



Auto Industry



Door Lock Industry



Opportunity for Tier-1 suppliers

Providers of components like brake parts, chipsets, electronics components, steering structures, interior pieces, etc.



Suppliers of metals, plastics, glass, rubber, leather, etc.

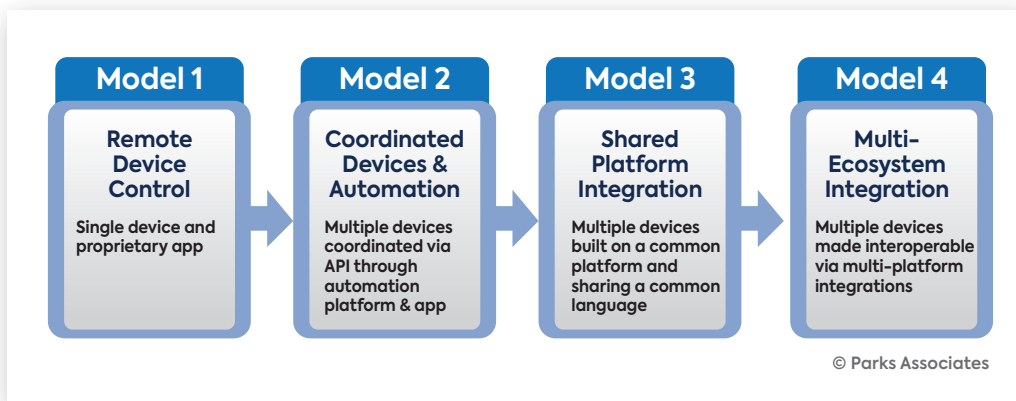
Suppliers of metals, plastics, silicon, etc.

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More mature industries that leverage a Tier-1 supply structure aim to realize a variety of benefits:

- **More cost-effective R&D:** Most companies are limited in how many projects they can do at once; they can focus on mission-critical things, and everything else is a nice-to-have or just goes to the wayside. A Tier 1 structure allows companies to outsource research and development time and costs to specialists, which can extend and broaden projects/deployments.
- **Rapid pivots:** The smart door lock and smart access control market – like the smart home market generally – innovates at an extremely rapid pace compared to the traditional manufacturing lifecycle. Tier 1 suppliers help OEMs operate on a more agile timeframe and respond to changing market conditions more quickly.
- **Circulate knowledge** – Tier 1s develop competency on leading-edge technologies and approaches by serving OEMs with varying product specifications and visions. They then serve as a clearinghouse of knowledge, advancing the whole industry, and saving OEMs from having to individually build redundant competencies in-house.
- **Take the pain out of interoperability** – Devices typically evolve in common stages of IoT development, and as IoT development advances from single device/apps in multiple ecosystems, companies need to make business decisions about investing in interoperability. In an industry where multiple leading protocols have attracted and developed a sizable, sustainable ecosystem, the best hope for broader interoperability rests in bridging technologies that can enable ecosystems of ecosystems. Those technologies include voice control and their requisite API integrations, open platforms that provide a common language, and application layer initiatives. As the market matures, business models will have to account for these multi-ecosystem integrations and the cost of creating and maintaining them. A Tier 1 structure allows suppliers to handle integrations and build on new standards like Matter or directly as needed and removing the stress of these developments from the OEM.





For the smart access industry to leverage the same benefits of a Tier-1 supply structure, several critical factors would be necessary for success. First, a Tier-1 supplier class must demonstrate the competency needed to gain the trust and confidence of established brands to outsource work previously done in house. Suppliers also must demonstrate a high level of responsiveness to deliver on the rapid product lifecycle timelines that smart product development demands. Finally, OEMs and their Tier-1 suppliers must practice tight collaboration to ensure critical objectives are met.

Scaling Innovation

Smart door lock solutions have seen steady growth in the past few years, but barriers impede wider and faster adoption. Among them is the current fragmented nature of the space and a supply chain that may not be conducive to future scale. Smart access companies are constantly looking for incremental innovation, progress, and technology development that make products better year over year. A new market structure, relying on third-party suppliers, can help realize this progress without these companies have to heavily invest their own resources or take on the risks.



Companies are capturing new value through innovative technology creating new applications with a clear and quantifiable ROI. Adequate funding for investment in technology often requires companies to think more broadly about their value than for one particular segment of the business. The demands of new tech on processing, power, memory, security, and latency for real-time applications are driving companies to look to new ways to build products. Suppliers have an opportunity to better serve manufacturers by operating on a Tier-1 structure, which could provide a more systematic and cost-efficient approach for the development and release of the next generation of products.

About Parks Associates

Parks Associates, a woman-founded and certified business, is an internationally recognized market research and consulting company specializing in emerging consumer technology products and services. Founded in 1986, Parks Associates creates research capital for companies ranging from Fortune 500 to small start-ups through market reports, primary studies, consumer research, custom research, workshops, executive conferences, and annual service subscriptions.

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About PassiveBolt

PassiveBolt

PassiveBolt, a spin-off of Continental Automotive, has established itself as the first Tier-1 company in the smart lock and smart access control space (modeled after the auto industry). The company designs, produces, and supplies door lock manufacturers and access control platforms with underlying electronics, firmware, and cloud technologies. PassiveBolt serves as a force multiplier by supplying access control technologies that natively integrate OEMs ecosystem.

The smart lock and smart access control hardware market is rapidly commoditizing with very little opportunity for major innovations. However, OEMs require solutions with incremental improvements and/or customization that unlock key features and enhance user experience. As a Tier-1 partner, PassiveBolt takes on hardware and software design and production needs. PassiveBolt can thus support OEMs to transition out of advanced R&D and fully focus on integrations, user experience, and increasing market share. For more information visit www.passivebolt.com.

About the Author



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Jennifer manages the research department and Parks Associates' process for producing high-quality, relevant, and meaningful research. Jennifer also leads and advises on syndicated and custom research projects across all connected consumer verticals and guides questionnaire development for Parks Associates' extensive consumer analytics survey program. Jennifer is a certified focus group moderator, with training from the Burke Institute.

Jennifer earned her PhD in religion, politics, and society and an MA in church-state studies from Baylor University. She earned her BA in politics from the Catholic University of America in Washington, DC.

ATTRIBUTION

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RESEARCH & ANALYSIS

for Emerging Consumer Technologies

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Smart Home Devices and Platforms



Digital Media and Platforms



Home Networks



Digital Health



Support Services



Entertainment & Video Services



Consumer Electronics



Energy Management



Home Control Systems



Home Security