

A WHITE PAPER FOR DEVICE MANUFACTURERS

More Variety with Less Cost:

Using Software Features to Achieve Product Differentiation

Is it possible to increase product variety and lower production costs at the same time? Product differentiation based solely on software features makes this possible. What's more, these dedicated features don't need to be unlocked until the systems and machinery are installed on the customer's premises. This increases flexibility, reduces the number of hardware variants to be manufactured, and transfers the decoupling point in the manufacturing value chain to the customer.

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The Software Mindset

Software is becoming key to innovation and competitive differentiation. This goes hand in hand with trends towards high-speed Internet; the IoT, M2M and Industry 4.0 applications in industrial communications. Devices are connected to clouds, and can be accessed, monitored and controlled from almost anywhere using apps on mobile devices.

These trends contribute to the rising share of software in complex systems and machinery. This trend is seen primarily in suppliers of core logic software usually embedded in automation solutions. At the same time, industrial PCs and embedded systems hardware platforms are becoming commoditized – both in absolute prices, as well as when compared to the personnel costs OEMs and automation vendors incur for solution development.

According to Frost & Sullivan's Avni Rambhiaⁱ, "There is a seismic shift under way in how customers are choosing, using and paying for their devices and software, with a corresponding revolution in device design and monetization. This is driven by the paradigm of the Internet of Things; the power of analytics to leverage Big Data and decimate costs or multiply profits; and the push toward instant-on purchase and provisioning even in enterprise scenarios. This wave of disruption is giving rise to exhilarating growth forecasts for connected devices and products across a range of verticals.

There is a dark lining to this silver cloud: failure by any hardware company to modernize at a competitive pace puts it at risk of becoming obsolete. To capitalize on this revolution, hardware vendors must embrace a software mindset and transform their business and products accordingly. Industry leaders are already investing tens of billions of dollars in the strategic direction of connected, intelligent systems."

And other industry experts have made similar forecasts: In his letter to shareholders, GE CEO and Chairman, Jeff Immelt wroteⁱⁱ, "We believe that every industrial company will become a software company..."

Gartner Research Director, Laurie Wurster statedⁱⁱⁱ, "We expect that by 2020, a failure to put in place a licensing and software monetization system will result in a 20% drop in potential revenue generated from software for device manufacturers connecting to the IoT."

The Old Ways are No Longer Sustainable

To meet customer needs and remain competitive, equipment manufacturers have historically differentiated their products by either reducing or expanding hardware feature sets. A practice that not only allowed hardware manufacturers to offer a variety of product options, it also gave customers a choice in what they purchased. The downside for machinery manufacturers was that they often had to produce, manage, and maintain physical inventory for hundreds of different product variants with thousands of different hardware components in order to satisfy customer needs.

Each hardware variant incurs costs for development, manufacturing, warehousing, and support. With this model, product and hardware complexity increases, while the margin contribution decreases with each new variant – not a sustainable business model in today's fast-paced technology world.

The Options Today

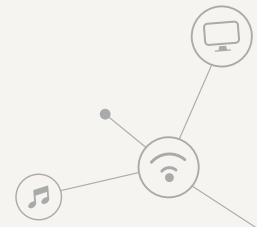
Today's manufacturer needs to be able to afford a broad product portfolio – either through high yields, or by finding a cost-effective way to manufacture the different product variants.

One option is to create modular hardware systems. This modularity makes it possible to delay customer-specific adaptations until it is clear what the exact customer needs are. However, limiting mass customization to hardware modules for systems and machinery is no longer sufficient because the proportion of software in these devices is constantly increasing.

A more viable option is to use software to customize the features and functionality of your hardware systems.

"Every industrial company will become a software company"

GE CEO Jeff Immelt

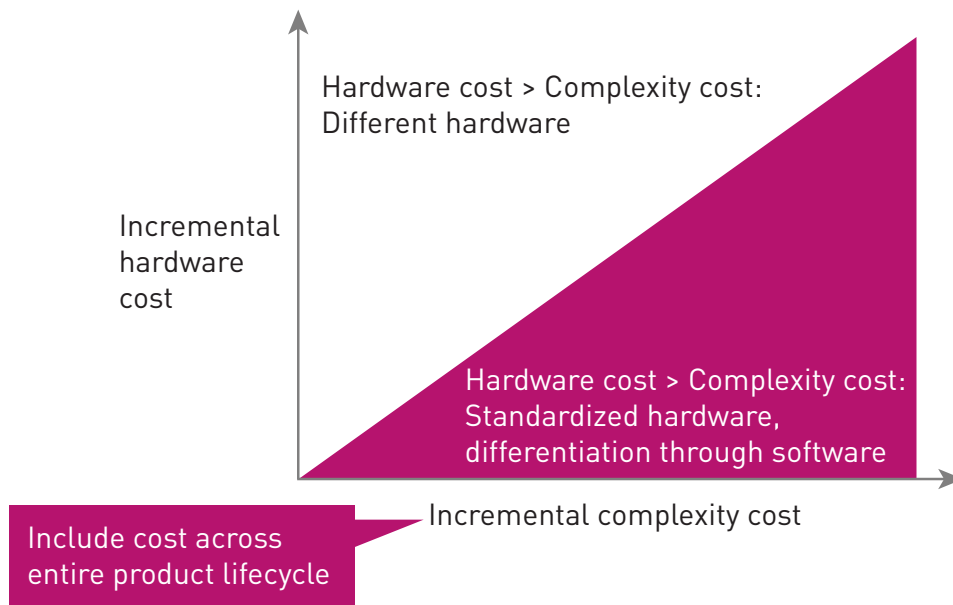


Differentiating Hardware Using Software

Over 70% of product developers in manufacturing companies are already involved in software development. In parallel, the increasingly widening gap between hardware and software costs indicates that competitive differentiation can only be achieved through software. Hardware is becoming a commodity, and its competitive advantage is short-lived due to constant integration of the "next performance generation."

Differentiation using hardware components should therefore only be implemented where absolutely necessary; using modular systems, if at all possible. Today, the only way to differentiate the hardware in a meaningful way is by adding company-specific branding to change the look and feel of the outer appearance. The rest – at least for automation platform providers – lies in the software.

Software differentiation where possible,
hardware differentiation where required



Using Software to Control Equipment Features

What applies to the hardware – keeping mass customization cost-effective by using modular systems, thereby getting a better handle on the cost of producing multiple variants – also applies to the software systems.

Variations should be created using modular licensing practices at the individual feature level. In addition, customization should occur as late as possible in the assembly process, or be determined by the customers themselves. It is at this point, that license management becomes crucial to creating new business strategies. The more powerful the license management, the greater the flexibility OEMs and automation vendors have to develop customized versions of their offering.

The customization of systems and machinery with software features does not have to take place during final assembly. It can happen much later, namely on the customer's premises. As a matter of fact, end users can make their individual design decision at any time – for example, enabled by optional in-app purchasing functions. With automated software updates in place, it is possible to implement continuous delivery models, allowing existing customers to benefit directly from agile development methods.

Powerful License Management

In order to provide this level of solution flexibility there is a need for a highly efficient license management system. At the core, a license management system should provide device-specific licensing to prevent piracy. If cloud licensing is used, processes and people will also require authentication. In addition, manufacturers need a powerful back-office solution to manage their product catalog and the licensing of specific customer applications efficiently.

“We expect that by 2020 a failure to put in place a licensing and software monetization system will result in a 20% drop in potential revenue generated from software for device manufacturers connecting to the IoT.”

Laurie Wurster, Research Director, Gartner

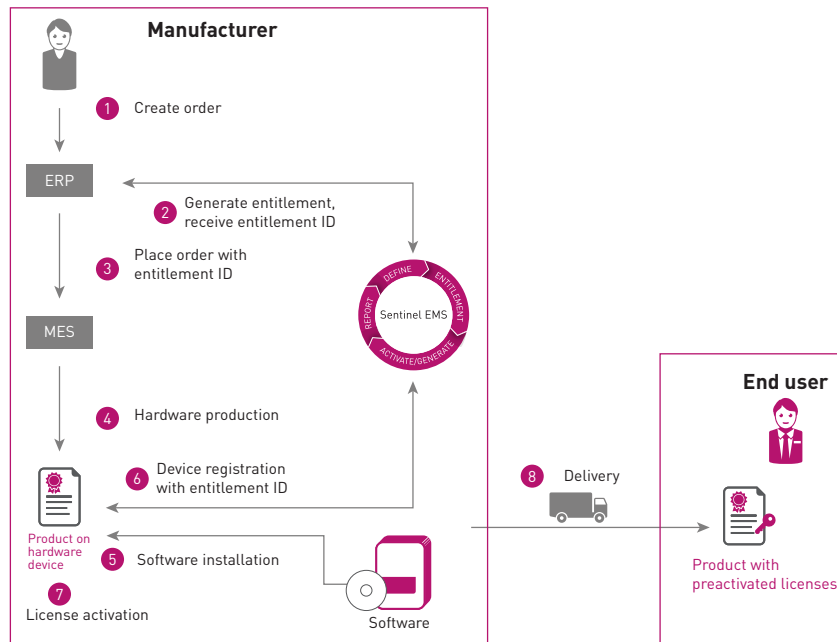
Interfaces to all leading ERP, CRM, and MES systems are also essential because the more flexible the licensing options, the greater the need for automated processes to reduce the costs of complexity. If the software setup is determined at the customer site, vendor portals are required for transparent license management. When regular software upgrades, updates, and patches are necessary, these portals also handle the electronic distribution of software.

Automated Licensing Processes

Regardless of when customization happens, either during manufacturing or on the customer's premises, the licensing technology should be as comprehensive as possible to ensure efficient automated processes. From ERP order initiation to product activation on the target system, the license management system should connect to the back-office management systems to ensure synchronization between authorizations and entitlements.

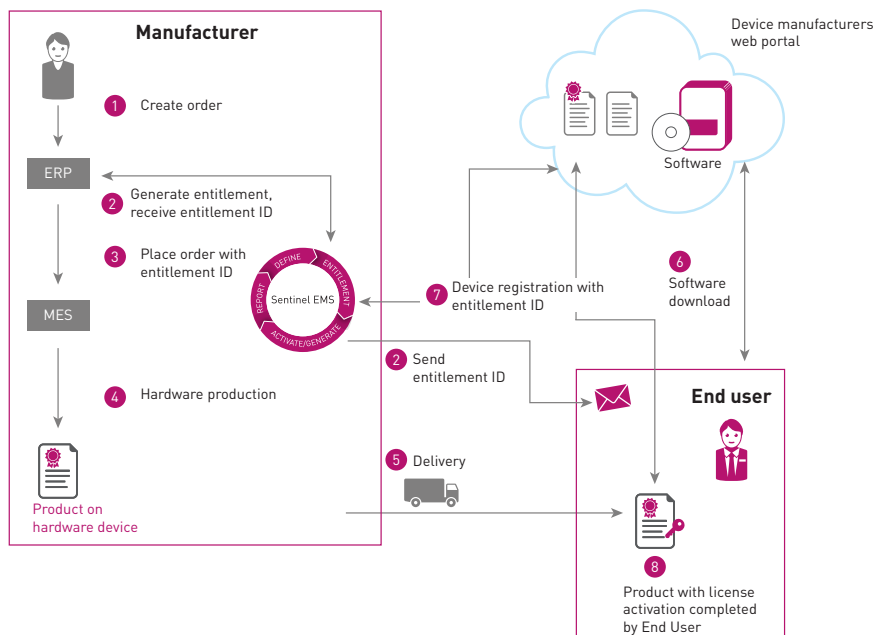
As an example, the ERP system should be able to automatically request an authorization ID. If this ID is then used during production on the target system, it should be automatically synchronized with the license management system, to protect against counterfeiting and unauthorized use.

Fully automated activation during manufacturing



If the software activation will occur on the customer's premises, the processes are similar.

Activation on end-user premises (initial or updates)



Flexible Licensing Options

In addition to license activation, a comprehensive license management system should support not only the initial activation but also test licenses and license renewal as well as capacity or expansion of functionality. It must further be able to handle upgrades, updates, and patches, (electronic) software distribution, and manage the license revocation and re-hosting processes.

System connectivity also plays an important role. The more flexible a license management system is the more manufacturers will benefit from a range of internet connectivity options. From totally disconnected to always connected, from intermittent connection to usability only in the proximity of a connection – maximum support for various internet connectivity scenarios is paramount. When different, customer-specific product variants are developed based on one set of source code and individual features are enabled or disabled through licensing, it is possible to work completely offline while still creating highly flexible product variants at the customer site.

If a customer-specific configuration is highly granular and is licensed as pay-per-use, usage frequency can be tracked. Such data is also useful outside of software monetization. For instance, licensing of individual features enables manufacturers to see on how often each feature is used. Usage data can provide valuable insights that can be used to fuel business decisions and future product development.

The Solution: Sentinel Software Monetization for Manufacturers of Hardware Equipment

Gemalto Sentinel Software Monetization Solutions are tailored specifically to protect and manage software embedded within any piece of hardware – from networking appliances and medical devices to mobile devices and industrial automation equipment. Sentinel provides device and equipment manufacturers with all the tools they need to effectively protect their products from tampering and reverse engineering while also opening up an entirely new world of packaging and opportunities to maximize profitability.

Sentinel Embedded Software Monetization Solutions feature:

- > Award-winning license enforcement and IP protection technology for ensuring device and brand integrity, mitigating reverse engineering, and safeguarding revenue.
- > The industry's widest variety of flexible licensing models and enforcement mechanisms for enabling device and equipment manufacturers to meet the packaging demands of every customer every time.
- > A reduced footprint paired with efficient use of memory allowing our solutions to conform to the strictest of embedded environment constraints without compromising device performance.

- > Out-of-the-box support for a broad variety of platforms and operating systems and a design that supports quick and easy custom porting.
- > Web-based entitlement management enables equipment manufacturers to centralize and automate product activation, usage tracking, and ongoing end-user entitlement management.

In Summary

Equipment manufacturers that embrace the transition from a hardware- to a software-based business model using the licensing tools and methodologies discussed in this paper, will be able to vigorously pursue greater market share and reduce manufacturing and inventory costs with the confidence that they are protected against competitive threats to their intellectual property. They will also be able to more cost-effectively expand their product lines and bring innovative new devices to market. In short, hardware manufacturers that adopt a software-based business model enabled by Gemalto Sentinel will be more nimble and better positioned for the future.

Take Sentinel Embedded Software Monetization Solutions for a Test Drive

Sentinel Embedded Solutions are flexible software licensing toolkits that give you the freedom to design and implement the right licensing experience for embedded devices. Fully integrated with Sentinel EMS, the company's web-based entitlement management system, Sentinel Embedded Solutions comprehensively solve your embedded software protection and licensing challenges. Request a Free Trial of Sentinel Embedded Solutions: www5.gemalto.com/sentinel-embedded-trial-en

More Information and Resources

www.gemalto.com/software-monetization/embedded-protection-and-licensing

About Sentinel Software Monetization Solutions

Gemalto's Sentinel software monetization portfolio provides software companies and intelligent device vendors with software licensing, protection, and entitlement management solutions that help them monetize their software and drive business growth. Gemalto also offers a full suite of Sentinel Professional Services – ranging from system discovery & design to technology implementation & integration and ongoing system assessment & optimization.

Whether in the cloud, embedded in hardware, or installed on premises, Gemalto's Sentinel portfolio helps customers extract the most value from their software. For more information, visit www.gemalto.com/software-monetization

About Gemalto

Gemalto (Euronext NL0000400653 GTO) is the global leader in digital security, with 2015 annual revenues of €3.1 billion and customers in over 180 countries. We bring trust to an increasingly connected world.

Our technologies and services enable businesses and governments to authenticate identities and protect data so that they stay safe and enable services in personal devices, connected objects, and cloud and in between.

Gemalto's solutions are at the heart of modern life, from payment to enterprise security and the internet of things. We authenticate people, transactions and objects, encrypt data and create value for software – enabling our clients to deliver secure digital services for billions of individuals and things.

Our 14, 000+ employees operate out of 118 offices, 45 personalization and data centers, and 27 research and software development centers located in 49 countries. For more information, visit www.gemalto.com or follow [@gemalto](https://twitter.com/gemalto) on Twitter.

ⁱ Get Connected to Profit: Embracing Software Propels Growth in IoT Era Device Vendors Must Transform into Software Companies – or Become Obsolete, Avni Rambhia, Industry Principal, Digital Transformation, Frost & Sullivan

ⁱⁱ GE Press Release, 2013 Annual Report Highlights the Industrial Internet and Predictivity, <http://www.ge.com/digital/press-releases/annual-report-highlights-industrial-internet-and-ge-predictivity-0>

ⁱⁱⁱ LLI 2016 Presentation: Using the IoT to Create Opportunities for Software Monetization, Laurie Wurster, research director, Gartner

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