



# KEYnote 35

THE WIBU - MAGAZINE

## Automatic License Updates

### Highlights

- License Portal or Gateway? The Choice is Yours
- I<sup>2</sup>M<sup>2</sup> – The Future of Industrial Monetization
- How Secure do you want your Application to be?

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SYSTEMS

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## Dear Clients and Partners!



At Wibu-Systems, we are proud to play an active role in protecting the wealth and wellbeing of the national economies around the world. With you and many other partners at our side, we are promoting new technologies in the field of IT security, always with our mission in mind: To protect intellectual property and know-how, to enable new business models, and to ensure security everywhere. We want to create and maintain trust with transparent and user-friendly solutions. We are committed to mastering the challenges of digitalization and connected infrastructures beyond the standards required by law and beyond the simple commercial interests of our business. We are speaking of “digital sovereignty” for our society. In our work, we want to fulfill the security needs of all our stakeholders, be they our own employees, our customers, our partners, or our shareholders.

Our ambition is to take Wibu-Systems to the very top of the world’s market for digital product protection by offering genuine added value for makers, operators, and users alike, for applications in industrial automation, for PC software like CAD / CAM, for carmakers or the financial sector, for the manufacturing industry, for the medical world, and for any other field becoming more digital and more connected. With you and with our field offices in the United States, Europe, Africa, and Asia, we are doing this work as your reliable and technically competent partner. For almost 30 years, we have maintained our independence as a family company dedicated to values of fairness, honesty, and loyalty. I thank you for your continued trust and collaboration.

Read this issue of our KEYnote to find out more about monetization opportunities in the Internet of Things, the all-new WebDepot, gateways, our partnership with the SAP consultant Informatics, an exciting success story, and much more. Let yourself be inspired by these stories.

I would love to meet you in person at one of the many conferences and exhibitions coming up in this new year.

Best regards,

Oliver Winzenried

CEO



## Expanded License Access Rights

Software licenses are a valuable asset – and usually a limited resource. Their buyers will want to verify who actually uses them. This might not be an issue for a three-person start-up. At a large company or institution, however, it can, become essential that the licenses bought for a certain department or group of users are only used by those users. CodeMeter offers a granular and fully configurable rule set to allow just that.

By using the “Configuration – Server – License Access Permissions” menu on the WebAdmin interface, you can select one of two basic options. The simple mode lets you grant access rights to specified clients, who are defined by IP address or distinct names assigned to these hosts. The expanded mode offers far more granular options.

### Rules

There are four specific rule options for defining users or user groups:

- Computer: IP address or an identifiable name of the computer
- Subnet: A defined part of the network with a specified suffix, e.g. 192.168.2.0/24
- User: A specified user name as delivered by the client. In Active Directory networks with preceding domain name, e.g. Company\test\_user1
- Group: An Active Directory group, e.g. Company\test\_group3

When using the Active Directory group option, all groups from the Active Directory are listed to simplify the selection.

Establishing the rules is intuitively easy: You can define whether access is allowed or prohibited for the specified users for each rule. If none of the defined rules apply for the given license, the final default setting (allow or deny) will go into effect.

### Global Rules

The global rules define which rules will apply, if no specific rules are set to manage the license access.

### Specific Rules

The rules can be configured for individual Firm Codes (per developer) or individual Product Codes (per application). The system always uses the rule set that matches the query best:

1. Product Code
2. Firm Code
3. Global Rules

In some cases, different Product Items with the same Product Code are present, for instance when the same software was bought with different license options. In such instances, the Product Items can be identified using the

associated Product Item Text, and rules can be defined for each Product Item.

### User Limits

On the application level (Product Code), the number of available licenses can be set for each rule, and licenses can be reserved. This can set specific limits e.g. for some departments, while keeping one license reserved for exclusive use.

### Ease of Use

Once defined, any set of rules can be cloned with the push of a button, saving manual effort. Since the release of CodeMeter Runtime version 6.50, the rules for the expanded mode will apply immediately. CodeMeter does not have to be restarted. If a user already has access to a license, he or she will not be taken down, so there can be a temporary period of overlap. However, the most recent definitions will be applied the first time the relevant application is restarted. 



## License Portal or Gateway – The Choice is Yours

A license portal gives users a means to personally manage the licenses they have bought. This reduces the need for costly support services, enables users to solve most of their questions and problems around licenses immediately as they happen, and makes the entire process more enjoyable and satisfying for the client: A better service for less money.

CodeMeter License Central can provide a whole spectrum of license portals: from ready-to-use options like WebDepot or the more customizable UserPortal to the completely tailored solution, MyPortal. You can also access the license portal of your choice directly from within your software, making the portal a gateway on the server that implements your business logic with the frontend seamlessly integrated in your product in the form of a software activation wizard.

### How it Works

#### Login

In order to transfer licenses, the user needs to log into the portal, which can be done either with a ticket or a regular user account.

#### Show Licenses

The user has access to a list of all their licenses and the locations where they are currently kept.

#### Distribute Licenses

The original purpose of the license portal is to handle the distribution of licenses and to activate or deactivate them in the process. For

activation, the licenses are moved from the license portal into a CmContainer of some type; for deactivation, they are simply returned to the license portal. They can then be moved again into a new CmContainer, making it possible for licenses to be transferred. As the developer of the licensed software, it is up to you to decide whether licenses can be deactivated or moved around in this way.

The entire process can happen directly online if the chosen browser supports communication with the local CodeMeter Runtime. If it does not or if the user wants to move the license to another device, the activation needs to take the detour of a file transfer, which the license portal calls the offline mode. Key to this process is the interaction between the software activation wizard and the license portal.

#### Recover Licenses

In the case of CmActLicenses in particular, it is not unusual for the computer they were used on to be “retired” or rebuilt in some form over the course of the licenses’ life. The automatic recovery function enables the user to reactivate these licenses, while letting you decide how

often this can be done on one computer or on changing devices. The limitation can optionally even be defined for so many instances per time period.

The old CmContainer that had held the license at the time of its loss is automatically blacklisted. By regularly checking this blacklist, you can identify and, if need be, block these CmContainers, which would invalidate the licenses in question. You can even enforce this operation by way of an auto-update.

#### Auto-Update

Auto-updates are licenses that were assigned to a specific CmContainer upon their creation. They can be retrieved in two possible ways:

The license portal includes an auto-update function. The user picks a CmContainer to see all licenses that are available for that container. These licenses can be retrieved with one click of the mouse.

Alternatively, all auto-updates are executed in the background during any other regular license transaction. For the user, this appears as a single process, as the automatic updates

and the transactions the user actually requested seem to happen at the same time. Looking more closely, the automatic updates are given priority, which can be important when the individual licenses are dependent upon on each other in some way.

### Choose CmContainer Types

As software developer, it is your choice whether the user can move a license into a CmDongle or a CmActLicense. If you allow both options, the user can pick between the two CmContainer types.

If you are a maker of embedded devices, you can define other CmContainer types specifically for these devices, adjusting the available choice accordingly.

### Localization and Corporate Design

The license portal is part of your interface with the user. It can be customized to match your corporate design and to use any language you want to support. This flexibility is a key design parameter for the license portal architecture: the portal design can be adjusted with powerful style sheets, and all text is stored in separate resource files to allow you to change the wording or even translate the entire text as you need. Currently, WebDepot comes with a standard choice of 10 languages.

### Split Licenses / Units

Imagine a user buys a package of 10 licenses that you want him or her to be able to split and distribute to different CmContainers. This feature helps your user break down network licenses into however many packages and units for use in the field as are needed.

You can allow this feature if you want to give your users this added flexibility or block it if it is not consistent with your chosen pricing policy.

### Register Users

A special add-on module in the UserPortal allows your users to register, giving both you and your users special benefits: Registered users can, for instance, allocate tickets and the licenses they assign to their accounts. After having done this, they would only need their usual login data to manage their licenses instead of the full tickets. This makes the processes simpler, especially if the users in question are working with multiple tickets.

The registration process also gives you more information about the users working with your software, which can be particularly interesting

if your business model depends on selling premium versions or add-on features for originally free-to-use software. Even if the sales are handled by some other sales channel that gives you no direct contacts with your users, the optional registration is a great way to learn more about them.

### Allocate Licenses

The UserPortal recognizes two types of users: License administrators and license users. A license administrator can allocate licenses to different end users or take them away again if need be. This is intended in particular for commercial clients. The license administrators would be able to see all licenses owned by their employer and know exactly who is using them at the moment. License users only have access to the licenses given specifically to them.

### Trial Licenses

Another optional function of a license portal is to create and distribute trial licenses. These give the users 24/7 access to the licenses and allows them to create or activate them to the extent that you allow. The feature can be tailored to your specific needs in MyPortal.

## Available Versions

### Ready-to-Use Solutions

WebDepot offers you a complete turnkey solution that you can adjust to match your corporate design by tweaking the style sheet or replacing graphics. WebDepot can handle all basic functions like license transfers, recovery, auto-update, license splitting, choice of CmContainers, and additional localizations.

Users authenticate themselves with their tickets.

### Customized License Portal

UserPortal is an expanded version of WebDepot that includes additional modules, which can be activated to add more features, like user registration or allocated licenses.

You can choose between authentication by ticket, by user account, or even both.

### Custom Portal

You can fully customize your solution to add even more functions to User-

Portal and WebDepot. The resulting MyPortal will be a perfect fit for your needs, e.g. with the ability to create trial licenses.

Other typical adjustments are additional modules, a customized business logic, or a complete re-design that goes beyond adjustments to the existing style sheets. Both UserPortal and WebDepot have special interfaces in place to allow you to customize their business logic and appearance, while their standard core remains unchanged and can be updated without the risk of version conflicts.

### EduPortal

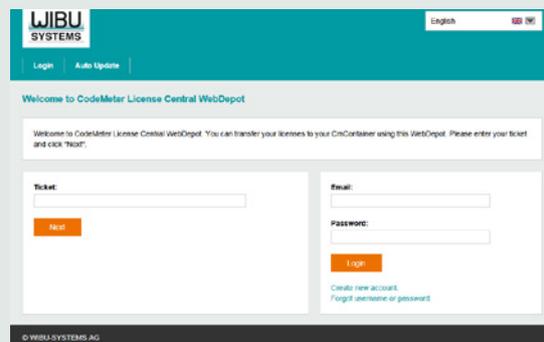
EduPortal is a specialized version of the license portal. Based on UserPortal, it tailors the process to the needs of higher education institutions. As software developer, you can sell universities and colleges a number of licenses; the EduPortal can then distinguish between faculty / teaching staff and students. Faculty members are given the licenses to distribute to their students. When the term ends, the licenses automatically become void and can be redistributed again for the next class. Students can, but do not have to, register using optional rules to limit this to specific mail addresses (same domain as their teachers).

You can manually authorize the teaching staff.

### Gateways for Software Activation Wizards

A gateway for your software activation wizard is essentially a license portal without its own user interface. It works with the same source code as WebDepot and includes the same functions, but relies on your local application for the interface with the user. This local implementation is the software activation wizard and is available as C#, Java, and C/C++ source code.

One great advantage of gateways and license portals is their ability to work together in offline



scenarios. A software activation wizard, for example, can create a request file if no online connection can be made to the gateway. The user then takes this file to WebDepot to receive the update he or she needs for the software activation wizard.

Another common choice is to combine EduPortal with Software Activation Wizard. The teacher then manages the available licenses in the EduPortal, while his or her students use a wizard for activating their software.

## Business Logic

The system's capabilities are not limited to customizing your license portal and Software Activation Wizard. It allows you to tailor the entire business logic for distributing your licenses to your needs.

### Keep Tickets Complete

One typical requirement is the ability to bundle licenses. You can use internal packages in CodeMeter License Central for that purpose, or a ticket

to act as a package. In that case, all licenses from that ticket would always be activated in one and the same CmContainer. Even licenses that are later added to the ticket in question could only be used with that CmContainer. Whenever licenses are activated or deactivated, the system would take all licenses on the ticket together.

### Declutter Tickets

If you are used to distributing large numbers of updates, e.g. for clients with maintenance contracts on place, the number of licenses on a ticket can grow and grow over the years. For key accounts or users who own licenses for many separate functions, that number can quickly rise into the hundreds of licenses on a single ticket.

The license portals and gateway now give you the opportunity to declutter tickets by removing licenses that are not used anymore. This makes the picture clearer for your user and improves performance during license distribution.

### Enter Data on Activation

CodeMeter License Central offers dynamic

entries that are filled in either when an order is created or upon delivery. One typical example would be the entry for the ticket in the license. The license portals and gateways automatically recognize the free entry and enter the relevant data when the license is activated.

The same system is used to register user names for named user licenses. You can then add rules that determine how much and how often those names can be changed.

### Custom Constraints

CodeMeter License Central gives you the opportunity to define product dependencies with special constraints. When several licenses are activated together, these are checked in the order of the licenses' creation. In some instances, it can be necessary for the check to be executed separately or to go beyond the limits imposed by the defined constraints. You can define your own constraints to be checked and set detailed custom error messages if the check fails. 

	WebDepot	UserPortal / EduPortal	MyPortal	Software Activation Wizard / Gateway
Technology	Server: PHP	Server: PHP	Server: PHP, Java, ASP.NET, ...	Server: PHP Client: C#, C++, Objective-C, Java, ...
Login	Ticket	Ticket, User/Password	Ticket, User/Password, Integration in third-party systems	Ticket
Show licenses	Yes	Yes	Yes	Yes
Distribute licenses	Online / Offline	Online / Offline	Online / Offline	Online / Offline
Recover licenses	CmContainer / individual licenses	CmContainer / individual licenses	CmContainer / individual licenses	CmContainer / individual licenses
Auto-updates	Yes	Yes	Yes	Yes
Choice of CmContainer type	Yes	Yes	Yes	Yes
Localization and Corporate Design	Yes	Yes	Yes	Yes
Split licenses / units	Yes	Yes	Yes	Yes
Register users		Yes	Yes	Optional
Allocate licenses to users / students		Yes	Yes	
Create trial licenses			Yes	
Keep tickets complete	Yes	Yes	Yes	Yes
Declutter tickets	Yes	Yes	Yes	Yes
Enter data on activation	Ticket	Ticket	Ticket, any data	Ticket, optional any data
Custom Constraints			Yes	Optional

# SAP, CodeMeter License Central, and Back Again



CodeMeter License Central is a great way to create, deliver, and manage licenses that can be operated as a cloud or on-premise solution or even in a stand-alone setup. However, CodeMeter License Central really comes into its own when it is integrated with existing processes, more often than not, in SAP. The benefits are many: Licenses can be created automatically, information about users' activities fed back reliably, and statistics can be aggregated from different systems.

## Lean solution

This is the thinking behind CodeMeter License Central: The design of CodeMeter License Central was produced with particular attention to avoid redundancy as much as possible, keep the amount of data that needs to be transferred as small as possible and avoid complex synchronization. This makes the integration with SAP and other such systems very easy indeed. CodeMeter License Central simply fits in perfectly in your process landscape without trying to force out any existing systems. CodeMeter License Central processes all the data that is needed for licensing purposes, from license properties (Product Item Options) to activations or the number of license transfers.

## Four Types of Integration

CodeMeter License Central has been integrated successfully with SAP by countless clients. As software vendor, you and your current SAP partner can benefit from our long-standing partnership with the certified SAP partner INFORMATICS Holding GmbH from Linz, Austria. Four options have emerged as best practices for these integrations:

1. As a software vendor, you or your SAP partner use the SOAP interfaces that are included in CodeMeter License Central.

2. The licensing experts of Wibu-Systems and the SAP specialists of INFORMATICS support you and your SAP partner with their expertise and know-how – and you or your SAP partner implement the functions yourself.
3. You or your SAP partner use an SAP framework of INFORMATICS that has the SOAP interfaces fully adjusted for SAP.
4. You let INFORMATICS take care of part of or the entire integration. Optionally, Wibu-Systems can take care of managing the entire project for you.

## Where to Keep the Ticket?

Whenever a license is created, CodeMeter License Central produces a ticket in response to an SAP request. This is typically stored in SAP's "Equipment" object, although some projects might use the object "Functional Location" for the same purpose. A more unusual, although still feasible choice is not to store the ticket at all, because it can be requested again from CodeMeter License Central, as it is assigned to a known order number.

## The Route Back to SAP

2018 has brought an innovative new feature, namely the add-on module "SAP Notification Service" made by Professional Services to

standardize the link back to SAP. This service can be adjusted to match your specific needs: You configure which activities are reported back and how often these are checked. There are two basic forms of operation:

1. The service reports all details. This needs a suitable web service on the SAP side to receive and process that data.
2. The service reports the type of the activity, and SAP requests the related details from the standard interface with CodeMeter License Central. This allows other extensions to be integrated on the SAP side without any adjustments to the Notification Service.

The right choice of operating mode for you depends on your needs and the nature of your IT landscape. The interface can be implemented by you, by your chosen SAP partner, or by INFORMATICS. 



## Automatic License Updates

CodeMeter License Central allows you to deliver and update licenses in many different ways. Two new features introduced in version 3.20 complete this picture: Licenses created or delivered by mistake can be withdrawn from the user immediately – safely and securely. Changes to licenses can also be enforced with a new function that replaces licenses permanently with new ones.

We have all been there: Stuck in the slowest checkout lane. A young mother in front with a toddler at her side, screaming for that candy bar. And the elderly lady at the counter forgot her purse. Everything grinds to a halt. “Supervisor to checkout 3”. If only we had picked lane 2...

This is a common situation not only at supermarket checkouts, but also in license management. One wrong click, and we picked the expensive network license instead of the cheaper single-user license in the heat of the moment. The incorrect transaction is confirmed without checking and then we realize what just happened. What now? The transaction can be cancelled, but that means entering all details again. We might also be unaware of the incident before the user activates the incorrect license.

Maybe the user ordered and received a version he wants to return within the standard allowable grace period. Or the sales team promised an update that does not actually exist. How can we get the license back?

### Withdraw

The new CodeMeter License Central 3.20 includes the “Withdraw” function that allows you to flag individual licenses for withdrawal.

If not activated yet, the licenses marked in this way will be withdrawn immediately, or at the next possible opportunity if they are already activated. After withdrawal, they will no longer be available.

How does this work? For CodeMeter License Central, a license can go through several specific states:

- Not yet collected
- Collected (without receipt)
- Confirmed collected
- Returned (without receipt)
- Confirmed returned

This is where the license has come full circle: A license that has been returned (with receipt) is the same as a license that has not yet been collected.

If the license is there in CodeMeter License Central (i.e. not collected or confirmed returned) it will immediately be removed from the ticket and will no longer show up in license queries. It will only be visible in the history logs of the order and the CmContainer.

In the other three cases, the license is still with the user. When a withdrawal is ordered, the

system first checks whether the license can be withdrawn without infringing the settings of other licenses. For instance, if a basic license is to be withdrawn, an add-on license should not have been activated in the first place – the update conditions require a valid basic license. In cases like these, the license withdrawal is not accepted, and the software vendor is sent an error message.

Upon passing this check, the license is earmarked for withdrawal and listed with the auto-updates.

Whatever happens, that license will be withdrawn as soon as the CmContainer is reprogrammed – irrespective of whether an auto-update is executed or another license is activated or deactivated. The technology under the hood has been streamlined to allow all actions to be completed in a single process, using this sequence:

- Withdrawn licenses
- Manually selected licenses for deactivation
- Assigned licenses
- Licenses to replace
- Manually selected licenses for activation

The manual actions are initiated by the users themselves; the rest are initiated by the soft-

ware vendor. The user has no way of preventing or skipping them. If there is a conflict in the sequence (e.g. other licenses not activating or deactivating after a license has been withdrawn), only the actions initiated by the vendor are executed. This differs somewhat from the current process which would have terminated completely and returned an error message in such instances.

No need to worry if you have made a mistake or if you have to cancel a transaction: You can simply withdraw the license, and you can rest assured that it will actually be taken away from the user at the next possible point.

### Replacing Licenses

Withdrawing licenses might not be enough. We may want to replace a license for many reasons, be there a typo in the licensing conditions, a revised order, or a change in the actual product that we want existing clients to benefit from as well. This could be done by "selling" an update or upgrade for free, but this comes at a price that we might only realize later on: When the licenses are transferred at some later point in time (i.e. moved from one CmContainer to another), all original licenses and all of their updates first need to be returned to CodeMeter License Central and then downloaded into the new CmContainer. This makes for unnecessarily complicated calculations, and the user needs to know all applicable ticket numbers. The data on the tickets will also become more complex every time and might cause utter confusion for everybody involved.

The basic idea is to replace the old license with a new one. As soon as the old license has been replaced, it will disappear from the ticket. It remains in the sales and activation history, but it is gone for good from the ticket.

This works by withdrawing the old license according to the same rules and the same processes used for regular license withdrawals. If the license in question is currently available in CodeMeter License Central, it is simply replaced with a new one on the same ticket. If it is currently with the user, it will be withdrawn and a new license activated at the next possible opportunity. The only difference concerns the return of the old license in this process: The new license is not activated directly, but rather made available again for activation on the ticket after the reprogramming.

As with license withdrawals, the user has no way of preventing the license replacement. He might not even notice it, if he only activated another license.

The ability to withdraw and replace licenses adds two more powerful tools to support software vendors' business processes even more accurately and effectively in CodeMeter License Central. 

Name	Activated On	CmContainer	Status
SampleNotePad - Basic Module - Single User	2018-01-24 11:47:40	130-3789318548	action pending
SampleNotePad - Change Font Module - Single User	2018-01-24 11:47:40	130-3789318548	action pending
SampleNotePad - Hex View Module - Single User	2018-01-24 11:47:40	130-3789318548	action pending



## How Secure Do You Want Your Application To Be?

“Anything executed on a computer can be monitored by hackers. They can understand and bypass security mechanisms just as easily as regular code.” This might be true, but what does it mean for software developers?

### Three options exist:

- You cannot see a point in all of this and do not use any copy protections or licensing.
- Hackers can understand how your software operates, but you are using CodeMeter to make hacking the software as labor-intensive as writing it from scratch.
- You move essential code into a CmDongle for execution far from the prying eyes of would-be hackers.

### The Ostrich Strategem

The first and certainly worst scenario is to forego any copy protection or licensing. The old story that “Microsoft became big because of piracy” is not only misleading – it is plainly false: Much of the success of Microsoft was due to the bundling of its operating system with IBM personal computers. The nature of the market at the time also played its part, as many of the operating systems had a reputation for being complex and hard to use. Market reach and popularity came first, piracy came second. Security mechanisms have been improving over the years. Activations with authentication and serial numbers stored in the BIOS are just one example of a whole gamut of techniques and approaches.

For small and medium enterprises, a “head in

the sand” strategy could potentially threaten their very survival. Studies and surveys have shown that the greatest losses are caused by ignorance of licensing terms or unintentional license violations. This goes primarily for business software in commercial use in Europe and North America. With the countless licensing models in the market, it is hardly surprising that administrators get confused and believe they have more licenses than they actually paid for. Simple technical countermeasures are enough in these instances to protect the legitimate monetization of the software.

### The Hacker Pyramid

The hacking scene seems to be made up of four types: script kiddies, leisure-time hackers, professional hackers, and the all-stars. The first lot might know how to google and find either hacking instructions or ready-made hacks, but the professionals and the stars of the scene are the ones doing the damage and earning an illicit living by selling their hacks. They are motivated by simple profit: Which hacks can I sell most often, at the highest price, and with the least effort? It seems like the story of the two hikers and the bear. Both are caught off guard by the bear and take off running. As one hiker stops to put his running shoes on, the other scoffs: “They won’t make you faster than

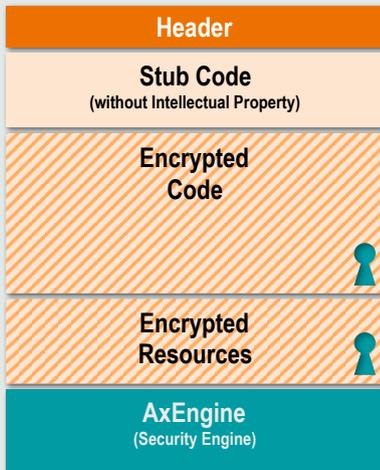
the bear.” Says the other: “They don’t have to. They just have to make me faster than you.”

The same applies to software protection. It does not have to be perfect and unassailable. It has to be appropriate for the value and appeal of the software, and it has to be – only just – better than the standard protection. With CodeMeter, this is already guaranteed by using AxProtector.

### Better Safe than Sorry

The second strategy relies around making the hackers’ job as hard as possible. It should be impossible for them to automate their shady work, and knowing one crack should not help them with finding another crack.

As software developers, you can now benefit from the complexity of your software. Hackers might be able to analyze anything executed on a CPU, but first they need to be able to execute. With typical business applications, users will only ever use between 10 and 20% of the functions. Only a fraction of the code is actually executed. This makes it harder for hackers to monitor the code in action. They need to find a strategy to execute the entire code completely. Whoever manages to complete that task would become the king of



## Protected Application

testing suites and would not have to continue to earn a meager living by hacking software.

Copy protection and licensing must get to work where they are needed in the code. One typical strategy would be to create a license wrapper class, but calling on that class repeatedly would be counterproductive: Hackers would only have to analyze, understand, and replace the code of that license wrapper class. Encrypting the class with AxProtector does not really solve this problem, and only offers a deceptive feeling of security. The better option would be to encrypt as many functions as possible in the code with AxProtector .NET and IxProtector. Now, hackers indeed need to execute the entire software. Traps can be added so that, if hackers fall into them, the CmDongle

or CmActLicense is locked to prevent automated code analysis. KEYnote issue 34 included much more information on this type of integration.

### CodeMoving

The optimum in protection is achieved by moving the code into the CmDongle and executing it in that safe environment. This makes it completely impossible for hackers to know what is going on.

The ability to move code into the CmDongle is available for CmDongles with serial numbers 3-xxxxxx and firmware version 4.03. This is currently limited to code written in C, but will be expanded to Java and .NET code. One important consideration is the right choice of code: If it is too trivial, its inner workings can be guessed at by looking at its output. If it is too complex, the operation becomes too cumbersome, or it exceeds the size limit of 3 kB. CodeMoving should also only be used for single-user dongles.

The best thing about CodeMoving is that it allows you to create as many code fragments as you want for execution in the CmDongle. To move the code, the application is encrypted with AxProtector; all functions to be moved are compiled by AxProtector and encrypted within the application. During runtime, the block in question is moved into the CmDongle, decrypted, and executed with the right input parameters. The output parameters are then returned back to the application.

CmDongles come with several assistance features installed. Cryptographic functions like

```
// simple.h
// Definition of the Input and Output structure
// between Software and CmDongle
#ifndef simple_h
#define simple_h

struct I {
    int a;
    int b;
};

struct O {
    int result;
};

#endif
```

```
// simple.c
// implementation of a sample a + b = c function
#include "code_moving_api.h"
#include "simple.h"

// entry function which is executed in the CmDongle
void entry(const struct I* const i, struct O* o)
{
    o->result = i->a + i->b;
}
```

```
// SimpleCodeMovingSample.cpp
// calculates 1 + 2 in a CmDongle
#include "stdafx.h"
#include "wibuixap.h"
#include "simple.h"

int _tmain(int argc, _TCHAR* argv[])
{
    I input;
    O output;
    input.a = 1;
    input.b = 2;

    // execute moved function now
    if (WupiExecuteMovedCodeId(
        1, 1, &input, &output) == 1) {
        // print the result (3)
        printf("%d\n", output.result);
    }
    return 0;
}
```

AES and SHA can be used directly. Data can be saved temporarily and used again when the next function is called up. Hidden data can also be accessed, although security dictates that this can only be done within the product item that the code fragment is encrypted with.

### Security that Scales

With CodeMeter, you can decide on the level of security for your application, be it a simple license check to prevent the intentional or inadvertent misuse of licenses or the secure execution of code in the CmDongle: CodeMeter will match your needs. 



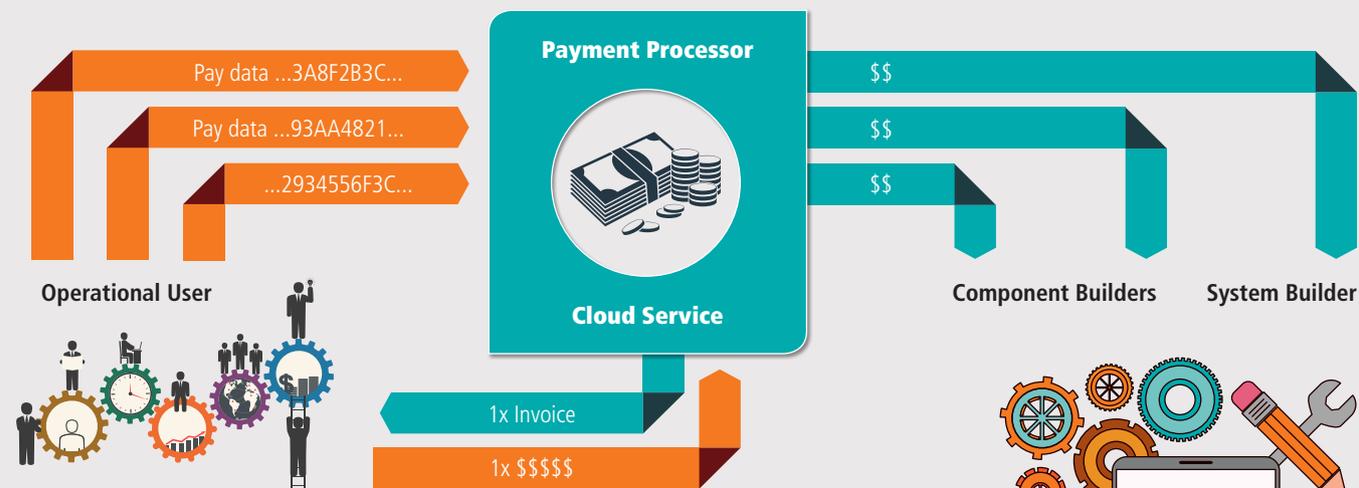


Figure 1

# I<sup>2</sup>M<sup>2</sup> – the Future of Industrial Device Monetization

Software on desktop, server and cloud systems today represents a major part of business assets. Software in embedded devices, however, is typically sold as a “free” part of the device hardware. One reason for this approach is that such devices are not Internet-connected – licensing and modern software payment methods like subscription, feature-on-demand or pay-per-use are difficult to realize. This will change with the IoT wave – when all embedded devices are finally connected to the Internet.

### Embedded Devices are Different

The challenge ahead is that in a typical industrial system many thousands of such embedded devices will be installed from many different manufacturers. Using an individual payment method for the software on each device (e.g. based on credit card and serial numbers (tickets) as with today’s desktop software) would be extremely cumbersome.

Instead, a technical standard, which automatically manages the payment of all used devices at the Operational User site by a centralized cloud-based Payment Processor (as shown in figure 1), would be useful. Much like a credit card clearance service, this Processor collects the money one time per payment cycle (e.g. one month) from the Operational User and distributes it in accordance with the agreed upon price to all the manufacturers of the devices (generalized as Component Builders) and the System Builder (as its share for planning and deploying the complete system).

Wibu-Systems discussed this idea last year with other companies involved with the inter-

national Industrial Internet Consortium (IIC, [www.iiconsortium.org](http://www.iiconsortium.org)). They liked the idea, but quickly viewed the monetization aspect in a much broader spectrum, as there are many more monetization methods possible than this one example.

### A Universal Monetization Model

To describe such methods site by site, the Industrial Internet Monetization Model (I<sup>2</sup>M<sup>2</sup>) was created. Figure 2 illustrates all of the parameters of the model.

For any specific Monetization Method, it is important to know which Business Models can be used. Nearly all such models are described by the St. Gallen Business Model Navigator ([www.bmilab.com](http://www.bmilab.com)). Another parameter are the items which are monetized:

- **Systems and Components** have already been described in figure 1.
- **Aggregates** are components of components (of any depth) which can lead to complex monetization scenarios.
- **Platform** describes industrial location

parameters – monetization in the cloud is probably different from at the „edge“, where permanent Internet connections are not always possible or not even desired.

- **Conditions** influence Monetization Methods as well – a safety component for example must also work even if its subscription was not paid.
- **Participants** are the different actors in an industrial system.

Figure 3 explains their relationship: An Operational User wants a new industrial system (e.g. an oil rig). The System Builder converts the requirements into a real system, adding many components together. The system is finally deployed and the Operational User operates it. Figure 3 shows two traditional payment arrows: The Operational User pays the System Builder upfront one time and the latter pays the Component Builders one time.

### Dynamic Monetization Method

Referring back to the beginning of this article: Components contain more and more software, which can be used in additional sophisticated

payment methods during usage. This will reduce the upfront cost. the Operational User has to pay to start the system, but it is more economical to pay this later as part of the revenue of the operating system. This is Dynamic Monetization and one possible method of I<sup>2</sup>M<sup>2</sup>. It structures the cost of a component into the following parts:

- **Physical Costs:** Required to build the component from raw material or other components.
- **Intellectual Costs:** Software development, patents, cloud services and intellectual properties like pictures.
- **Setup Costs:** Required to install, test and validate the system.
- **Profit:** The component builder's reward for business success.

The Dynamic Monetization Method defines Physical and Setup Costs as Upfront Costs and Intellectual Costs and Profit as Usage Costs. Upfront Costs are traditionally paid before the system is deployed while the Usage Costs are paid when the system is operated and creates revenue for the Operational User.

### Summary

This article is only an introduction in the complex but also exciting world of Industrial Internet Monetization. Using I<sup>2</sup>M<sup>2</sup> as a model for different Monetization Methods helps to establish such methods in the future. The different scenarios can illustrate how they might

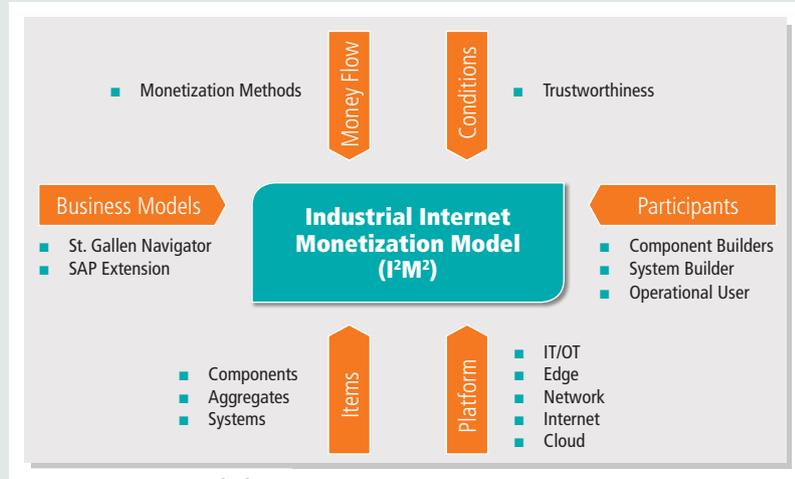


Figure 2: Parameters of I<sup>2</sup>M<sup>2</sup>

fit within a world of varying business models, components and systems and the relationships with different participants like Operational User, Component and System Builders.

One of the promising Monetization Methods is Dynamic Monetization. It moves significantly the payment of Industrial Systems from upfront to the time of usage. This method faces challenges from markets and participants, but they all can be solved with a sophisticated standard and the advantages of Dynamic Monetization will redefine how industrial systems will be paid in future.

### Next Steps

At IIC only the Business Viewpoint of I<sup>2</sup>M<sup>2</sup> has been described to date. After all of the business requirements have been discussed, IIC will move into an Implementation Viewpoint, which describes all communication standards necessary to implement the model shown in figure 1. Once all this information is collected, it will be possible to define a plug-and-play standard, which will finally automate the Dynamic Monetization as much as possible, so that picture will become reality. 

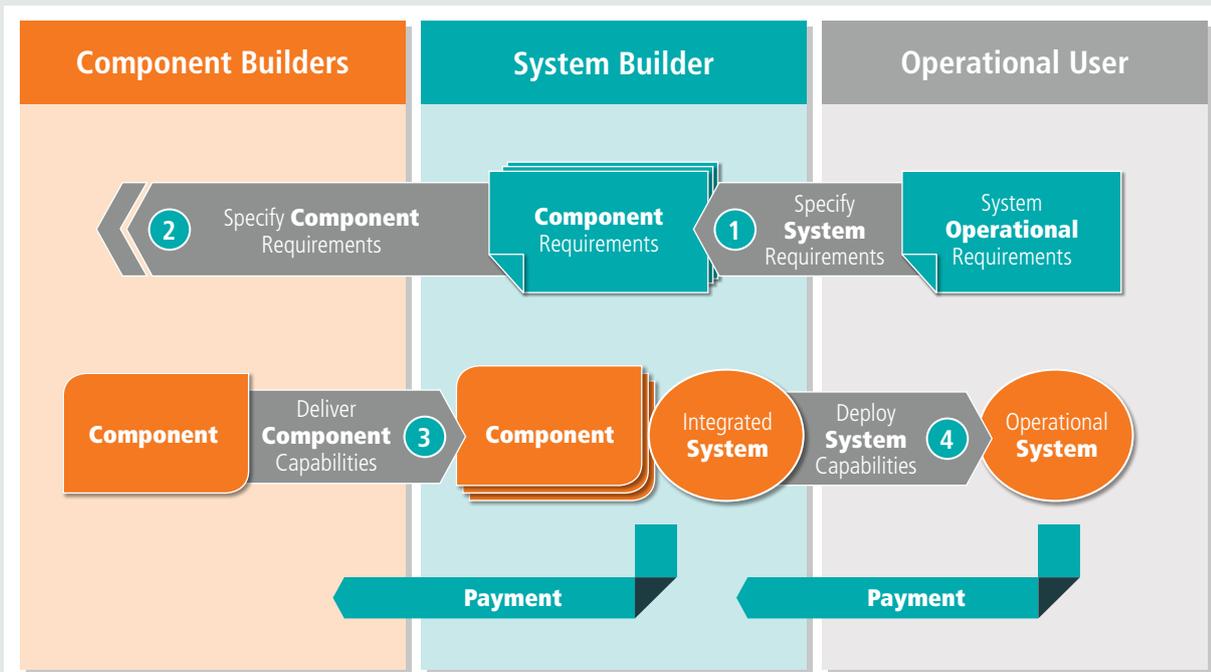


Figure 3: Actors Relationship in I<sup>2</sup>M<sup>2</sup>

# News in Brief

## CmStick/B

We are so excited about CmStick/BMC with 16GB memory that we decided to offer another version of the compact and elegant full-metal dongle without additional memory - introducing the all-new CmStick/B (available immediately).



## CmDongles with Flash

The unique combination of industrial grade flash memory and a CodeMeter smart card chip is the ideal choice for use in medical devices, PLCs, or IoT gateways that demand uncompromising reliability.



## CodeMeter Runtime 6.60

The major innovation among the many tweaks and improvements is the ability to access CodeMeter WebAdmin via https, optionally with self-signed or SSL certificates.

## AxProtector 10.10

Applications created in Java 9 can now be encrypted automatically with AxProtector Java and protected effectively against reverse engineering and piracy.

AxProtector / AxProtector .NET enable the definition of computer names for license tracking. AxProtector is now available for Linux ARM and uses the CodeMeter Runtime, which supports Linux ARM since release 6.50. This means that protecting applications and libraries on Linux ARM is now possible with CmDongles without the need for additional adjustments. CodeMeter Embedded is still available for software-based CmActLicenses.

## CmEmbedded 2.1 Released

Universal Firm Code licenses contained in CmDongles or CmActLicenses can be created, updated, or deleted remotely via CodeMeter License Central, CmBoxPgm, and High-Level Programming API (HIP).

Encrypted communication between CmDongles and CodeMeter Embedded is now available and activated by default.

The manual was completely revised and the support of CmStick/BMC was added.

The package structure of CodeMeter Embedded has been streamlined. The new standard is one static library with the complete functionality for each combination of supported operating system and architecture. The source code is still available on request.

## Digital Transformation Award

The editors of Markt & Technik identified thirteen pioneering product or business model 4.0 projects. CodeMeter won the consensus of the magazine's readers and was picked as one of three winners with its integration in OPC UA stacks for secure communication, with certificates stored in industry-grade CmDongles and secure cloud-based delivery via License Central.



## CmStick/BMC wins an Automation Award

At SPS IPC Drives, our CmStick/BMC made it into the top three of the "Components" category.



## Embedded World 2018

In addition to our own exhibit at booth 360, hall 4, we are out in force with Infineon, the Trusted Computing Group, and the OSADL team.

## Electronic Product of the Year 2017

And the winner is: our innovative software protection technology Blurry Box, integrated in our CmDongles and tools.



## ISO 9001:2015 Certificate

The transition to the new standard with its special approach to risk management in processes has been successfully completed.



## Sharing Our Fortunes: nph Germany

We are supporting the children's charity "Pasos Pequenitos" in Honduras alongside Goethe kidz4kidz and nph deutschland e.V. with their.





## Success Story | ABB Marine & Ports



### The Challenge

The world's premier shipping companies work with the software solutions of ABB Marine & Ports to get their vessels safely and efficiently to their destinations. A loyal customer of Wibu-Systems for over a decade, ABB has been relying on CodeMeter dongles to store the license keys for their ABB Ability™ Marine Advisory System – OCTOPUS. The current version of the system is using Wibu-Systems' robust metal-case CmStick ME, a perfect choice for the rugged conditions at sea. As satellite communications has made fast Internet connections at sea a common reality for maritime operators, the company is looking to move from physical to software solutions to streamline its logistics processes.

### The Solution

The next release of the ABB Marine & Ports' marine advisory system, the OCTOPUS suite, will rely exclusively on the all-software CmActLicenses, which can be distributed through the cloud. While CmDongles offer unparalleled security, the opportunity to migrate to a software-based solution makes the system more convenient to use in the hustle and bustle of naval operations.

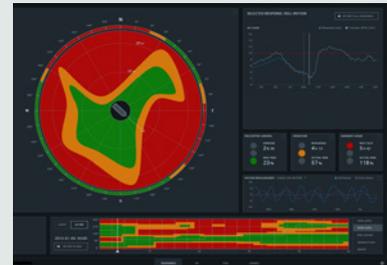
### The Result

The decision in favor of Wibu-Systems' CmActLicenses not only simplifies the allocation of

licenses but also of updates and new modules via the cloud with around-the-clock availability. As an added bonus, the capabilities of CodeMeter License Central gives the company flexible control over access to the data in the hydrodynamic databases and the use of real-time signal data.

### The Company

ABB is a pioneering technology leader that works closely with utility, industry, transport and infrastructure customers in roughly 100 countries. With more than four decades at the forefront of digital technologies, ABB is a leader in digitally connected and enabled industrial equipment and systems with an installed base of more than 70,000 control systems connecting 70 million devices. With a heritage spanning more than 130 years, ABB employs around 136,000 people.



### Hendrik Middag

#### Global Product Manager, Digital Services ABB Marine & Ports

"With our relatively small team of software builders, software-only license management is a great way of keeping stock of our licenses in a maritime business that is moving more and more to virtual solutions. With CodeMeter, we can prevent the inappropriate use of the system by incorporating a fingerprint of the devices and computers used by our customers in the software code of the OCTOPUS modules. Whenever a certain new module or an upgrade is launched, we upload the licenses together with that fingerprint of the licensed computer aboard a particular vessel to the cloud, which the user can then download. The security level stays high, but all in a simple software process."

### Wibu-Systems Workshops

Wibu-Systems offers you the opportunity to participate in one of the special seminars about:

- Software Monetization, Back office integration
- Licensing of software, with hardware or software-based keys (SmartBind)
- Code protection against illegal use & reverse engineering
- Solutions for embedded software in systems or cloud applications



Access the latest training schedule by scanning the QR Code or visit [www.wibu.com/tr](http://www.wibu.com/tr).

Training location	Date	Time
Soest (NL)	27 Februar	10 am - 3 pm
Basingstoke (UK)	14 March	10 am - 3 pm
Brussels (BE)	22 March	10 am - 3 pm

Contact your local sales representative for details about the workshops and/or upgrading your test kit or current solution to Universal Firm Code with secure offline license transfer and borrowing.

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Belgium / Luxembourg	+32 (0)38080381	sales@wibu.be
France	+33 (0)186266129	sales@wibu.fr

### Join Wibu-Systems and its subsidiaries at the following events:

 **Embedded World**  
27 February - 1 March 2018  
Nuremberg, Germany

 **Hannover Messe**  
23 - 27 April 2018  
Hanover, Germany

 **IAMD**  
9 - 11 May 2018  
Beijing, China

 **NI Week**  
21 - 24 May 2018  
Texas, USA

 **SPS IPC Drives Italy**  
22 - 24 May 2018  
Parma, Italy

 **Smart Industry Forum**  
7 - 8 June 2018  
Copenhagen, Denmark

 **IOT Solutions World Congress**  
16 - 18 October 2018  
Barcelona, Spain

 **ECS**  
6 - 7 November 2018  
Stockholm, Sweden

### Imprint

KEYnote 35  
Edition, Spring 2018

### Publisher:

WIBU-SYSTEMS AG  
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### Design

Markus Quintus

### Print

Kraft Premium GmbH, Ettlingen, Germany,  
ISO 14001 certified

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