CodeMeter SmartBind®
– the revolutionary Activation Scheme

- **Easy and secure binding of licenses to a computer**
- **Flexible feature generation**
- **High system reliability**
- **Top security preventing manipulation**
- **Dynamic weighting of binding features**

CodeMeter SmartBind®

SmartBind® describes the new concept to bind licenses, i.e. digital rights, to a computer or other specific device. SmartBind® has been developed by Wibu-System and is patent pending. Binding stands for activation. The challenge is to choose binding features which uniquely identify the computer while, at the same time, tolerating minor changes to the computer, thus ensuring high license reliability for the user.

How does it work?
Imagine you are to identify a person. Imagine further that you cannot use fingerprints since the person wears gloves or you have no fingerprint scanner at hand. In this case, you would fall back on visible features: facial form, size, weight, gender, hair color, hair length, nose width and length, shape and strength of eye-glasses, beard color and shape, etc.. If you recognize enough features then you conclude: "Yes, that's him."

When there is only a short interval between the first and the next time you meet the person, most of the features will be unchanged. However, if this interval is longer, then some features may have changed more or less. And the features are of different quality. It is rather unlikely that the gender changes although possible thanks to modern surgery. Some change their hair color like they change shirts while others keep the original color throughout their lives. For adults, size is a good first exclusion criterion, while with children

and teens this naturally changes.
Until meeting again with the statement "Gee, isn't that John Doe", numerous complex processes take place in the human brain. Features are compared and carefully considered before the final "yes" or "no" decision is made.

Carrying the Passport Photo
What does this has to do with CodeMeter Smart-Bind®? Nature itself has been the model case for CodeMeter SmartBind®. CodeMeter SmartBind® mathematically maps the complex recognition processes. When a license is bound to a computer, CodeMeter SmartBind® creates the fingerprint of the computer, the so-called a cryptographic key, and a list of all features found. This list is – analog to a photo in the passport – stored on the computer. That is, the license always carries its own passport photo.

The passport photo is used to identify the license. All current features are matched to those on the photo. New features, glasses in the human example, a UMTS card in the case of the computer, are negligible and do not become part of the algorithm. In contrast, in the case of classical binding, a new network card would falsify the value of the MAC address/es. Not so with CodeMeter SmartBind®. New features are not a source of error.

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Dynamic Feature Selection

How would it be if you did actually have the fingerprint, retina scan or DNA sample of a person? Then you would of course use them. The same applies to CodeMeter SmartBind®. CodeMeter SmartBind® has no rigid scheme concerning the features it uses. The selection of features is dynamically adapted to the availability and recognition of features. CodeMeter SmartBind® is able to access a large pool of potential features. If, for example, the CPU ID and/or TPM chip is available, it will use these too.

Dynamic Weighting

You definitely remember the size of a person. Children and teenagers are still growing, but size is a good and stable criterion for adults. Features are dynamically weighted by CodeMeter SmartBind® according to the available characteristics and the environment. If the CPU ID and/or TPM chip can be read, they will be given a high weighting in the binding. The components of a virtual machine differ to those of a "real" computer.

Tolerance

CodeMeter SmartBind® is tolerant of changing features. You set the tolerance level. If you select the "Tight" setting, the tolerance level is low; if you select the "Loose" setting, the tolerance level is high. A high tolerance level means only a few features need to be retrieved to identify the computer; a low tolerance level means many original features must be retrieved. It is not necessarily the number of features which is important, but the "overall weighting".

Security

Doesn't a passport photo then present a security risk? A particularly fine example here is provided by the advertising poster of a security services company which showed the bit of a key belonging to the company. The picture was enough to allow the key to be copied. This couldn't happen with SmartBind® as features are not stored in plain text in the passport photo. The information in the passport photo only says this feature existed when the license was activated but does not allow the feature itself to be reconstructed.

Conclusion

CODEMETER SMARTBIND® PROVIDES AN EASY AND SECURE WAY TO BIND A LICENSE TO A COMPUTER. USING A VARIETY OF DYNAMICALLY SELECTED FEATURES, CODEMETER SMARTBIND® PROVIDES BOTH RELIABILITY AND SECURITY PREVENTING MANIPULATION. LET US GO BACK TO OUR COMPARISON WITH RECOGNIZING A PERSON. IF I TAKE OFF MY GLASSES I WILL STILL BE RECOGNIZED. A COLLEAGUE WHO PUTS ON MY GLASSES THOUGH WILL NOT SUCCEED IN PRETENDING TO BE ME. THE LICENSE DOES NOT BECOME INVALID AND REQUIRE REACTIVATION UNTIL SEVERAL OF MY FEATURES HAVE CHANGED.

About Wibu-Systems:

Wibu-Systems was founded in 1989 by Oliver Winzenried and Marcellus Buchheit with a mission to provide state-of-the-art solutions for protecting and licensing software and digital media. Products from Wibu-Systems support virtually all operating systems and come in a broad variety, with many form factors, including USB, PC Card, Express Card|34, Compact Flash Card, SD Card, MicroSD-Card and ASIC. Applications include software for desktop PCs, servers, embedded systems, mobile, smart phones and cloud computing.

Corporate efforts stress achieving world-class quality in the areas of security, reliability, durability, support, and customer service. More than 6,000 independent software vendors (ISV) rely on CodeMeter, CodeMeterActLicense and WibuKey to sell more products by reducing piracy and increasing the customer target group due to flexibility of their licensing models.

Products include:
- CodeMeter, Wibu's latest architecture, allows for multiple ISVs to share a single dongle, easy online license transfers and optional integrated flash memory
- CodeMeterActLicense is a software-based solution that protects software by binding to the characteristics of an individual PC
- CodeMeter License Central creates, managers, and delivers licenses with integration into sales and ERP systems
- SmartShelter allows for secure encryption of PDF documents
- CodeMeter SDL (Secure Data Layer) protects data files including audio, video, and database
- Authentication Solutions allow for easy and safe access to websites and hosted software applications (SaaS + cloud applications).

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CodeMeter SmartBind® Concept from a technical viewpoint

When a device is licensed, as many recognition features as possible are collected for it. The individual features are weighted and stored in a feature vector. Only a few bits are used for the not so good features as their information content is low; whereas a relatively large number of bits are used for the good features such as a TPM chip in the PC.

A cryptographic key is derived from the feature vector and is subsequently used to identify the device. During identification, voids may occur if some of the features are not recognized. Moreover, the vector may contain errors if some of the features have changed causing a different value to be calculated.
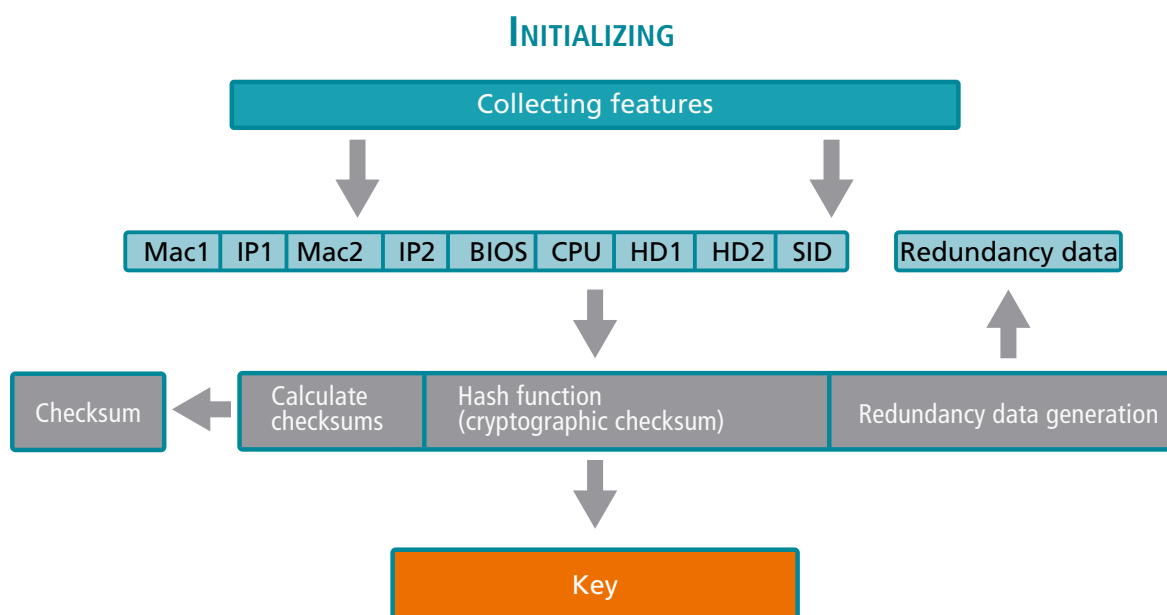
When the feature vector is generated for the first time, the evaluated features are stored together with the checksums of the results. The existence of this information means newly added features such as an additional network adapter in a laptop docking station can be ignored. Only the originally collected features are checked. These mechanisms ensure the original features are correctly detected. Use of mathematical error correction techniques, so-called erasure codes,
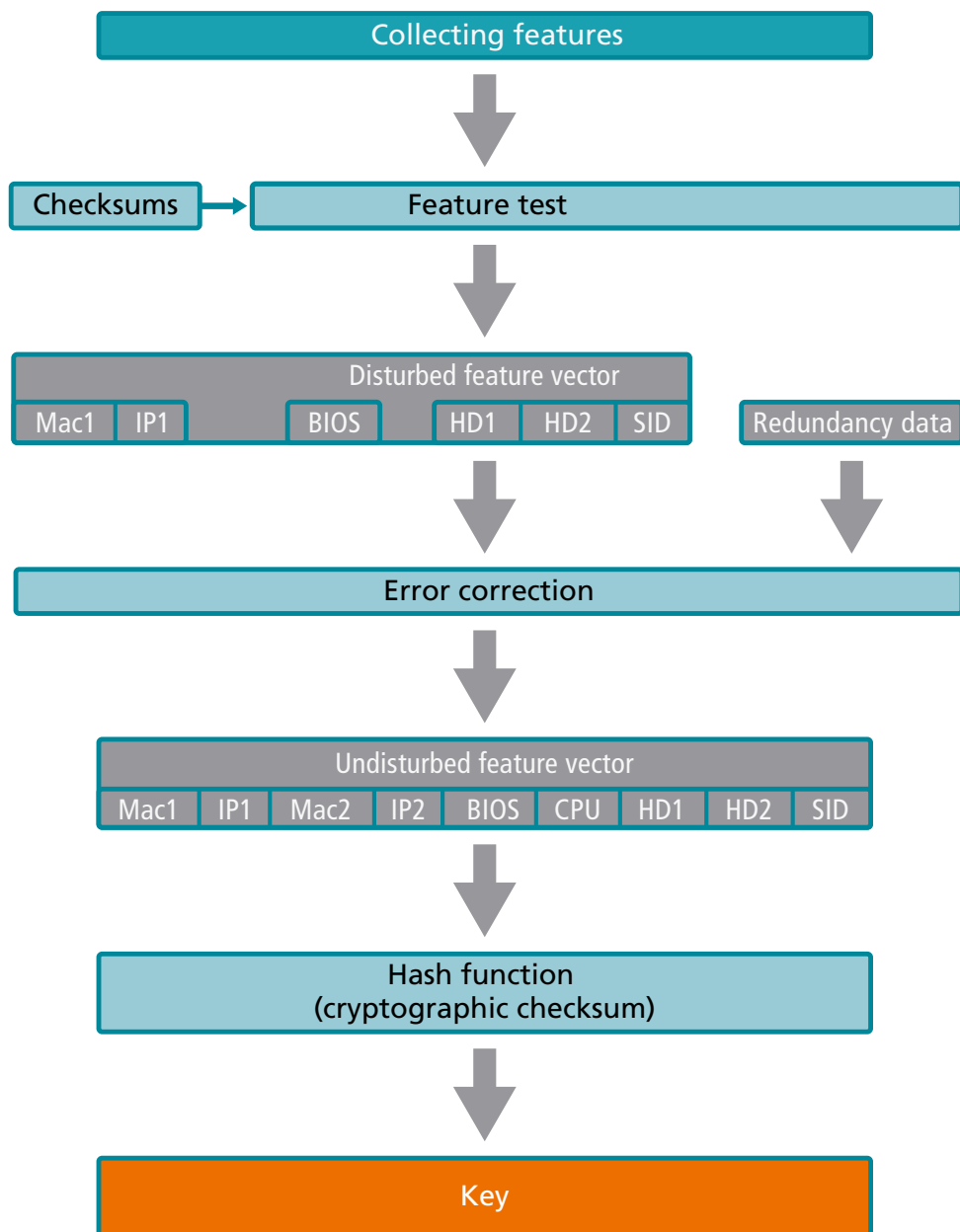
ensures changes to the device are also tolerated. Before feature values, the list of collected features and error correction data are stored, they are encrypted to protect them. The licensor defines the overall system's tolerance of changes via the error correction data. If only a small amount of correction data is specified, only a small number of deviations can be corrected in the feature vector.

By specifying a large amount of correction data, authentic recognition of the device is still possible even if the deviations are large. It is up to the manufacturer to choose the tolerance and the correct balance between security and robustness of the binding. A large number of "minor" features increases reliability as not all features need to exist.

Schematic diagram of the components and functions in CodeMeter SmartBind®

INITIALIZING

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NORMAL OPERATION

```
Collecting features
        ↓
Checksums →  Feature test
        ↓
Disturbed feature vector
Mac1 | IP1 |        | BIOS |      | HD1 | HD2 | SID        Redundancy data
        ↓                                                      ↓
Error correction
        ↓
Undisturbed feature vector
Mac1 | IP1 | Mac2 | IP2 | BIOS | CPU | HD1 | HD2 | SID
        ↓
Hash function
(cryptographic checksum)
        ↓
Key
```

Advantages over existing systems

Up till now only a small number of features were collected. These features weren't weighted or evaluated using error correction techniques. A minor change to the device invalidated the license. CodeMeter SmartBind® binds the license to a device and is reliable in daily use. It can tolerate changes to the device while guaranteeing a high level of security.

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