

ESL-Easy System Description

Date: 12.05.2026

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General

This ESL -Easy description describes the technical operating process of the ESL-Easy software system.

Overview

ESL-Easy is a software system for controlling electronic shelf labels (*ESL labels*) in company processes for issuing and displaying information and primarily serves as a replacement for (*printed*) paper labels. Due to the technical possibilities of electronic shelf labels, there are new areas of application compared to paper labels. ESL-Easy was developed universally to cover as many areas of application as possible in order to display customer-specific information on the displays of the ESL labels. ESL-Easy is not limited to labeling goods in stores (*the original main area of application for ESL labels*) but can be used for any purpose to output information.

Electronic labels are internationally referred to as “**Electronic Shelf Labels**”, abbreviated ESL, due to their originally preferred area of application, the labeling of goods in wholesale and retail. In this System description we will only use this abbreviation (*ESL label*).

ESL labels include electronic displays based on electronic ink (*E-Paper or E-Ink*), which are also used in E-Book readers. There are two-color and multi-color display versions. The display is controlled via battery-operated electronics that enable wireless communications. Almost all major manufacturers currently use **Bluetooth Low Energy** (*Bluetooth BLE*) as the wireless standard. In this combination, an ESL label can be operated for several years (usually 5 years, there are also versions with 10 years and over) without changing the battery. Some ESL labels do not allow battery replacement.

The ESL labels are available in different sizes and formats. The housing colors are also standard black or white. Special housing colors can be ordered through the manufacturers against an uplift.

In the current version, ESL-Easy only supports ESL labels with graphic displays (dot matrix). Older labels sometimes only had controllable segments (LCD), but these are currently rarely offered. Therefore, this function has been removed from ESL-Easy.

All ESL labels can be mounted on shelves, for example. Extensive brackets are available for a variety of shelving systems and for mounting on tables, walls and stands.



(ESL label 2.6" with a resolution of 296 x 152 dots and three colors black, white and red)

In addition to the display for outputting information, the ESL models offer additional functionalities:

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- Multicolor: In addition to black and white as display colors, most displays have a third color integrated (red or yellow).
- Labels with 4 colors (*black, white, red and yellow*) and 7 colors (*black, white, red, yellow, blue, green and orange, referred to as multicolor*) are also available. ESL-Easy supports all available models.
- LED: Many ESL label models have an LED integrated into the housing. The LED can be controlled via ESL-Easy and flash in different colors over a certain period of time. An optical visualization is possible for customers or employees, for example to find a product more quickly.
- NFC: Most ESL labels have an integrated NFC chip (depending on the ESL manufacturer), which can be programmed via software. The NFC information can then be read contactless with a smartphone (hold the smartphone against the label), for example, in order to re-direct the user to a website with additional product information. Other functionalities are also possible, such as access authorization, internal information for employees, exchange of business cards information, etc.
- Low Temperature: There are special versions of the ESL labels for use in the freezer area, which can be used in environments down to -25° Celsius. For technical reasons, these models are currently only available as a black/white version (2 colors) and the batteries are not field-exchangeable.

The ESL labels communicate wirelessly via special Bluetooth access points. ESL labels can be addressed via multiple access points if the labels are within radio range of multiple access points (rooming).



(Bluetooth Access-Point for ESL-Labels)

ESL labels replace the classic printed paper label and also offer additional functionalities (see above).

From a software perspective, an ESL label is comparable to a printer on which the software can output (print) something. The access point replaces the printer cable or the print server and connects the devices (ESL labels and PC) to each other via a radio signal.

The ESL manufacturers provide a driver (software for physically controlling the ESL labels) as standard if external software systems (such as ESL-Easy) are used.

The ESL manufacturers also offer their own software (varies depending on the manufacturer), which is usually operated in the manufacturer's **CLOUD** environment. The functionalities are then limited to

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the options that the manufacturer has provided in its software. The operation for the customer usually takes place via a web interface.

When operating in a manufacturer's **CLOUD** environment, it should be noted that the manufacturer's servers are usually available to many customers and therefore the customer's data is uploaded to the same server and stored in the same database.

ESL-Easy at a glance

ESL-Easy was created as a comprehensive software system to cover all aspects of controlling ESL labels, regardless of the manufacturer. As a result of all processes, ESL-Easy always delivers an image that is output on an ESL label. This is comparable to printing labels on a printer, where the software is also responsible for creating the graphics to be printed and the output is then carried out via the printer (software driver and hardware). Each ESL label can be addressed independently of other ESL labels, so each ESL label is comparable to a printer at one location.

In terms of graphical output on the labels, ESL-Easy is completely independent of solutions that the manufacturers have provided for controlling their ESL labels (template system, import of data, output options, etc.). ESL-Easy maps all of these processes independently. ESL-Easy is constantly being expanded to include new functionalities (based on customer requirements and technical developments). ESL-Easy is therefore not dependent on extensions of the functionality of the ESL software from the manufacturer.

ESL-Easy was developed from a practical point of view (*customers perspective*) over the last decades, based on customer requirements and use for EWS's own ERP system. The development is done exclusively in Germany. In addition to years of experience in programming, all members of the EWS development team also have extensive knowledge and expertise of retail and the use of ERP systems and logistics.

During the planning phase, in collaboration with many customers, the decision was made that ESL-Easy had to be developed primarily as a locally operable system. Use in a CLOUD environment is obviously also possible.

The following reasons led to this decision:

- Many larger customers are not allowed to transfer company data to external server systems (company policy).
- Certain data may not be transferred to CLOUD servers outside your own country. An ESL manufacturer must therefore ensure that the CLOUD server operation is available in accordance with legal requirements (*since all ESL manufacturers currently come from China, the servers are usually hosted in China. However, this varies depending on the manufacturer and is subject to constant change*).

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- The dependency on the CLOUD operator. If a manufacturer goes bankrupt or the CLOUD server cannot be reached, the ESL system fails (e.g. Yalatech in 2024, with around 12 million labels installed worldwide, completely useless after the server went down...)
- Changes and/or extensions to the ESL software in a CLOUD operated system environment usually affects all connected customers, as a uniform software version on the CLOUD server is used by all customers at the same time. Individual adjustments for customers are often difficult or impossible (this is particularly problematic for smaller customers, for whom large ESL operators often do not offer affordable adjustments).
- On the manufacturers' CLOUD servers, their customers' data is stored together on the same system (same database). This is often not compatible with the policy requirements of companies (data security).
- In the event of problems, the customer is dependent on the support and availability of the operator.
- If the Internet connection from the access points to the CLOUD servers fails, the labels can no longer be controlled (no local system).
- CLOUD servers can be accessed from the Internet and are therefore fundamentally more vulnerable than internally operated server systems (VPN).

For these reasons, ESL-Easy was developed in such a way that the system can be easily used in closed customer environments (VPN) and in CLOUD environments (external servers, accessible via the Internet).

ESL-Easy equally covers the requirements for small companies (one location or just a few branches/locations) and used in large corporate environments. ESL-Easy consists of several modules (system services), all of which run on a single system, but can also be distributed across several systems if the required performance is needed. In addition, the performance of ESL-Easy can be increased by load balancing when generating ESL label updates (integrated into the ESL-Easy standard).

ESL-Easy was developed under Microsoft Windows and requires the Microsoft DotNet (.NET) Framework from version 4.8 as the operating basis. On this basis, ESL-Easy can run on all Windows operating systems from Windows 7 upwards, the corresponding server systems without complicated installation (depending on the ESL hardware manufacturer, there may be another requirement if the manufacturer's driver software requires this).

ESL-Easy requires an SQL database to operate. Firebird and MS-SQL (Microsoft) are supported as standard. If necessary, it is very easy to create additional SQL connections to other SQL databases if they are supported by the DotNet system (which is currently the case for all common databases). In the basic installation, ESL-Easy relies on the Firebird SQL database. This is a professional SQL database system that is available free of charge for all purposes. This means that customers do not incur any costs for the database system when using Firebird. If necessary, an external SQL database system from the customer can be used.

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ESL-Easy communicates with each other and with the database exclusively via TCP/IP. This makes it very easy to operate in an existing infrastructure. A maximum of firewall settings must be made for communication via ports. In the standard installation, these settings for the local Windows firewall (Defender) are set automatically. In large environments, the requirements for the communication paths can be found in the appendix of this document and also in the \ESLEasy\Install directory in the file ESLEasy_Ports.txt.

In addition to the server PC system and the management software in the background (ESLEasy_Manager.exe), there is a mobile solution for the Android, Apple iOS and Windows CE operating systems. In practice, we only work with the mobile solution in daily use. The possibilities and the concept behind them are described in more detail in the corresponding paragraph in this document.

ESL-Easy does not require any administrative management for normal operation. ESL-Easy monitors itself, backs up data, carries out automatic backups and restores of the database, deletes database entries and log files that are no longer needed, etc. This means that ESL-Easy can also be used in small companies without their own IT department. It is only recommended to outsource the data backups provided by ESL-Easy to backup media.

If ESL-Easy has to be re-installed due to a total "failure", it can be restored from the automatic data backup within a few minutes.

ESL-Easy was basically developed independently of ESL hardware manufacturers. This means that ESL-Easy can easily be connected to other manufacturers who provide a communication interface to the labels or who can control the labels without the manufacturer's software (API).

HANSHOW

ESL-Easy fully supports the HANSHOW platform. The HANSHOW ESL-Working interface is used for communication, which runs as independent software in parallel to the ESL-Easy installation (on the same or an external system).

ZKong, Ontime and Century

ESL-Easy natively supports the hardware from ZKong, Ontime and Century. No additional software from the manufacturer is required for communication with these labels. The access points are set up using a web browser via the web server integrated into the access points. ESL-Easy supports the search for new access points in the network, so that the complete configuration of the system is carried out without any special software from the manufacturer.

Communication with the ZKong, Ontime and Century labels is secured by an individual key per label. Without this key, a label cannot be used. For each label delivered by EWS, this key is made available locally to the installation and is permanently available to the customer. If this key is lost (data loss without backup), it can be automatically re-trieved at any time via the EWS server systems. This makes it possible to operate the system without an internet connection (see further information under ESL security for customers)

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Yalatech

ESL-Easy natively supports the hardware from Yalatech. No additional software from the manufacturer is required for communication with the labels. The access points are set up directly from ESL-Easy without any special software from the manufacturer.

E-ink Smart (ETAG)

ESL-Easy natively supports the hardware from E-Ink Smart (ETAG). No additional software from the manufacturer is required for communication with the labels. The manufacturer's access points are delivered by EWS with an adapted operating system version, which enables the access points to be configured directly from ESL-Easy without requiring any special software from the manufacturer.

ESL security for customers

With the exception of HANSHOW hardware, the labels from the manufacturers ZKong, Ontime, Century, Yalatech and E-Ink Smart can only be used in an ESL-Easy installation if the label can be assigned to the customer (*for ZKong, Ontime and E- Ink Smart also via a security key, see above*). This offers additional security for our customers:

- The ESL labels purchased by the customer are registered to the customer when they are first used (this requires one-time Internet access to the EWS key server). The label can then only be used in an installation with the appropriate customer key.
- This ensures that installations located directly next to each other (e.g. two shops next to each other in a shopping center), where the access points of both installations also see labels from the other installation, cannot influence or address the external labels.
- Stolen ESL labels cannot be used in another installation with ESL-Easy.

It is possible to transfer ESL labels from one customer to another customer, for example when a hardware sale takes place between customers. For security reasons, this is only possible via the installation partner (or the company EWS).

Internet

ESL-Easy does not require an internet connection for regular operation. Depending on the hardware used, a connection to the Internet may be necessary from the ESL manufacturer:

HANSHOW

The HANSHOW system does not require an internet connection to operate.

ZKong, Ontime, Century, Yalatech and E- Ink Smart

In order to secure the control of the hardware for third-party installations, ESL-Easy requires an internet connection to the EWS key server (www.service-ews.de) once for each new (*unknown*) ESL label. If an ESL label is addressed to a customer for the first time, the ESL Easy system requests the ESL label data (for hardware from ZKong, Ontime and Century also the security key) from the EWS key server on the condition that this ESL label does not belong to any other customer. This data is stored locally in the ESL-Easy installation. At the same time, the ESL label is registered for the customer in the EWS key server. Once registered, only the customer can carry out further queries about the ESL label (e.g. after reinstalling the software).

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Every further communication with the ESL label does not require a new internet connection. If all ESL labels have been addressed once for a customer, no further internet connection is necessary (but it is recommended to leave the connection option available).

Queue

All tasks that ESL-Easy has to carry out are first placed in a queue (similar to the queue for print jobs) and then processed according to order and priority. This ensures that every task is retained even in the event of a system failure and that ESL-Easy knows the status of an order at all times. Depending on the configuration, completed orders (successful or unsuccessful) are retained for a period of time and can be queried in the system (e.g. via the history in the mobile app). If a location is temporarily unavailable (there is currently no access point available for an ESL label update), the update will be offered/presented again after a certain period of time (adjustable). If an update cannot be carried out for a long time, the queue job is set to incorrect and is not processed again (can be set) in order not to create endless loops if, for example, a label no longer exists.

If queue jobs that have not yet been sent to an ESL label overlap, then only the latest job will be executed and older tasks will be canceled. This ensures that if, for example, import data results in several updates for the same ESL label, only the latest job is executed. This may save significant battery power in the ESL labels.

Scheduler

There is another queue for tasks that does not directly update the ESL labels compared to the queue, but rather dates a task to a specific point in time. Once this point in time has been reached, the task is executed and, for example, in the case of an ESL label update, a specific update with the data valid at that point in time is placed in the queue.

External systems can, for example, enter article changes in the scheduler that will only be relevant for an ESL label update in the future (e.g. next Monday at 8:00 a.m.) (e.g. offer price). ESL-Easy then only carries out the update to this DataID (e.g. an article) at this point in time and updates all affected ESL labels.

As a special feature, an end date can be specified for each scheduler entry. In ESL-Easy this means that another scheduler entry is automatically generated by ESL-Easy with the same task at the end time. An example of an application would be a temporary price change for an item (offer) that is valid from Monday to Wednesday. An external system can now transfer the start time and the end time to ESL-Easy in one data record and then, in our example, does not have to send a price change to ESL-Easy again on Thursday, when the old price applies again (many ERP systems cannot do this). ESL-Easy then carries out the first update on Monday and puts another update for this article in the scheduler for Thursday (or a point in time after the end point). Accordingly, another update is then carried out, which again shows the normal price on the ESL label (the then valid price).

It is also possible to define automatically repeating tasks using the scheduler. For example, all labels in a branch can be automatically updated every Monday, even if ESL-Easy would not carry out an update based on the data transferred. With this functionality, extensive tasks can be implemented to update labels based on conditions in the template that would not be possible through normal data transfer (e.g. displaying an employee's birthday or vacation period on the door sign when this time is reached).

Inventory

By maintaining locations and assigning them to installed access points, ESL-Easy knows at all times which ESL label is located where. From this information, an inventory can be retrieved in ESL-Easy, which shows an overview of the hardware available in the company per location. In addition, information is provided about which ESL label types are involved (how many ESL labels of each size are available) and how many of them are already used (linked) or unused. This data can be used, for example, to control the subsequent delivery of new ESL labels.

ESL labels that have not reported via an access point for a long time (e.g. theft) can be shown in the inventory (and also in the statistics). The staff can react accordingly.

Storage locations

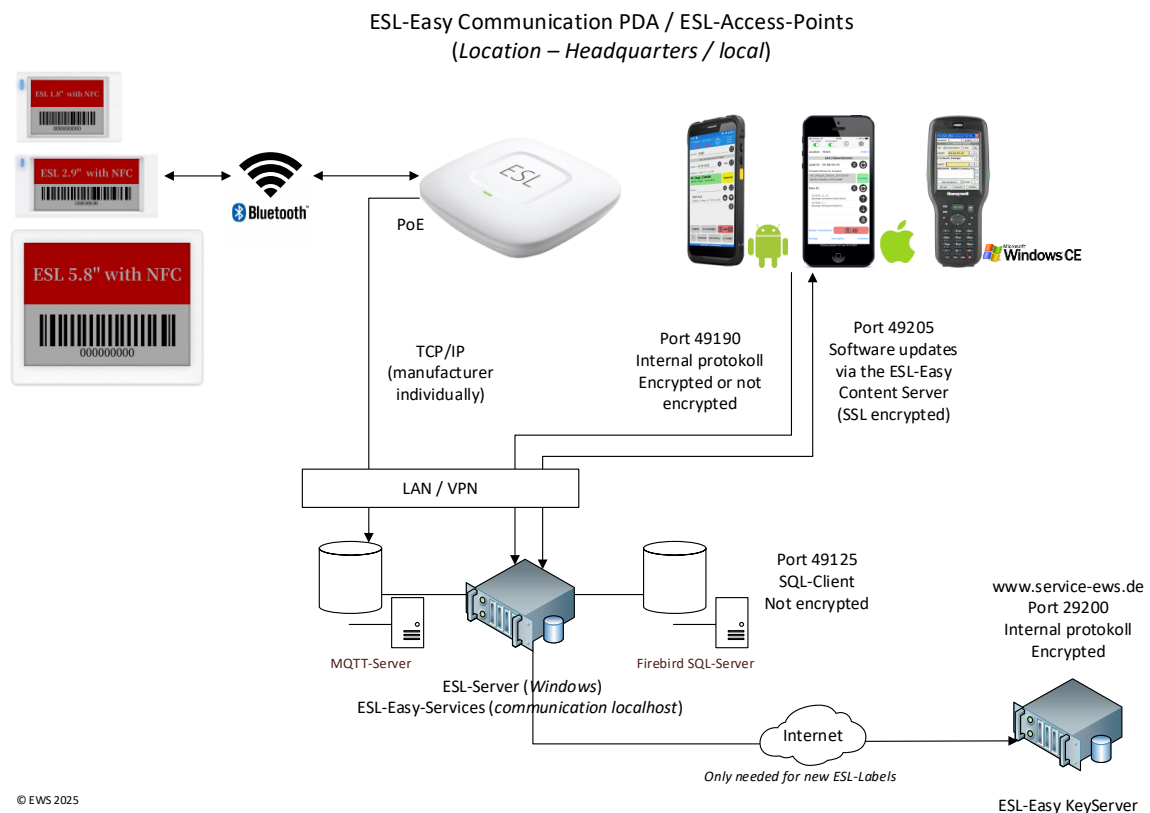
Each link between a label and a template and a product can also be assigned a storage location (optional). This information is then available to external systems, for example to show a customer where a product is in a store or to guide them there using appropriate applications. The storage locations are also displayed in the ESL-Easy mobile app. All storage locations of a product in a store can also be displayed here if several labels are linked to the same product because the product is offered in several places in the store (e.g. on the shelf and also at the checkout).

ESL Easy system diagram

Standard installation in a customer system with multiple locations and central server operation:

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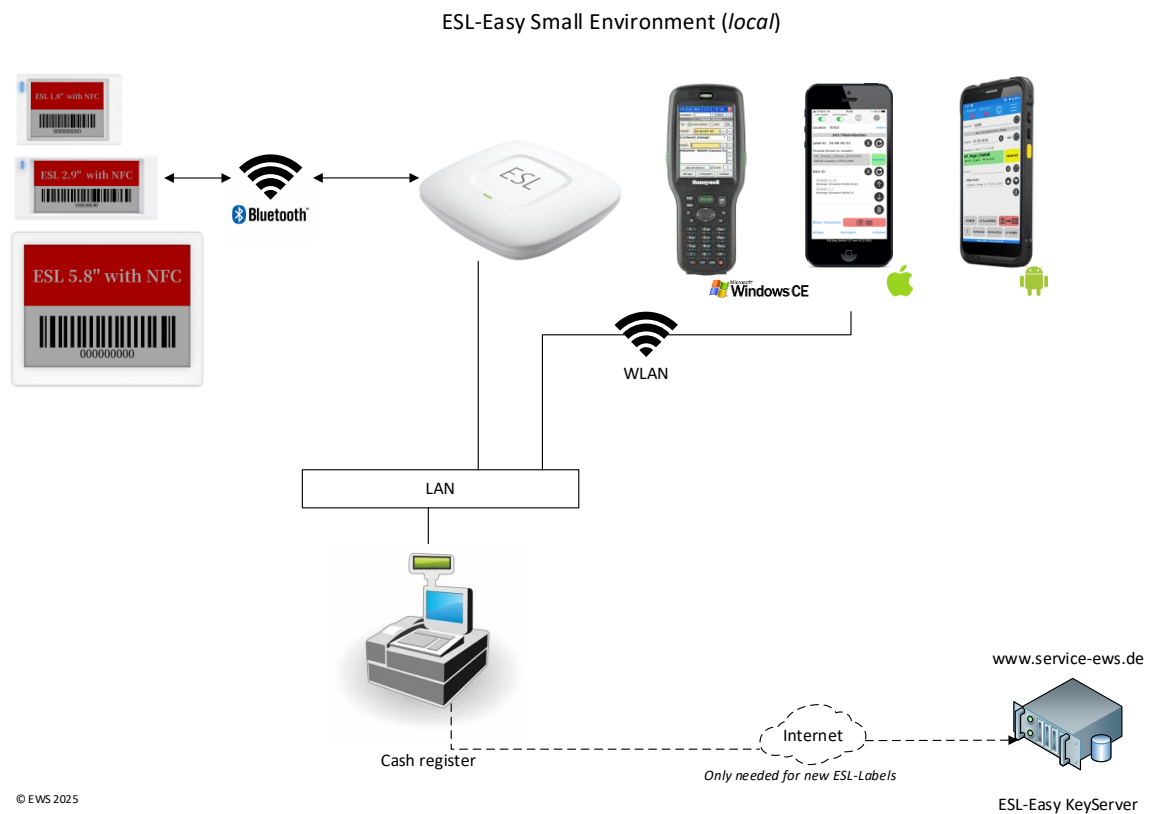
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**Use in a small environment (local)**

ESL-Easy requires only minimal resources to operate in small environments (e.g. directly in a branch). This makes it easy to run ESL-Easy, for example, in the background on a cash register (Windows system). A small desktop PC can also serve as the operating basis.

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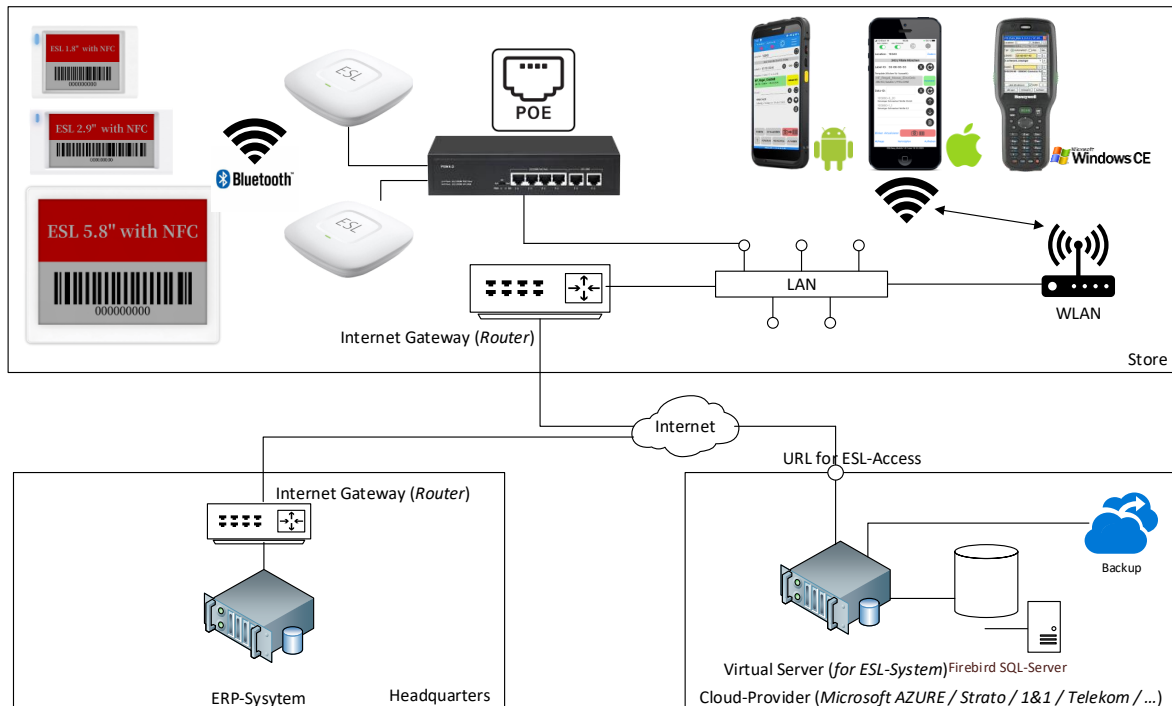
Use in a CLOUD environment

It is easily possible to operate ESL-Easy in a CLOUD environment. In this variant, the ESL-Easy server is operated on a server system that can be accessed from the Internet. The access points and mobile devices then communicate with the server via the Internet.

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ESL-Easy in a CLOUD-Environment



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If ESL-Easy is used in a CLOUD environment, a Windows server is required. This can be rented from any CLOUD provider. One virtual machine is sufficient for normal operation. Use in the CLOUD does not require that the system be operated by EWS. Customers can use their preferred CLOUD provider.

Access to the administration of ESL-Easy (ESL-Easy Manager) is then via a remote desktop connection (or the terminal server provided by the CLOUD provider). Accordingly, the customer can control access (users, user groups) via the Windows security system. Employees usually do not need access to the server, since normal work with the ESL-Easy system occurs through the mobile application.

Access points

The ESL labels communicate with the access points via Bluetooth. The access point itself communicates via LAN (local network) with the ESL-Easy server via TCP/IP (MQTT protocol). The access points are set up according to the manufacturer's specifications. ESL-Easy supports the configuration directly, eliminating the need for special software from the manufacturer.

In order to reach all ESL labels at one location, one or more access points must be installed in such a way that the entire area of application of the ESL labels is covered. In order to optimize radio coverage, ESL-Easy can temporarily display the radio quality on any label (except for HANSHOW hardware). This means that no special hardware/software is required from the manufacturer for the optimal positioning of the access points.

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Any number of access points can be installed per location. ESL labels can be accessed via all access points available within range. An ESL label can usually be reached via several access points. ESL-Easy takes care of the management of the access points in the background and independently selects the best access points for current communication with the ESL label (rooming).

Multiple access points automatically protect against the failure of one access point. If an access point fails, the ESL label is addressed via another access point (if available and or possible).

If the connection between the access point and the ESLEasy server is interrupted (e.g. line failure, power failure, server failure, ...), the access point automatically re-establishes the connection to the server as soon as communication is possible.

The location at which each access point is operated is stored on the ESL Easy server. All ESL labels that then communicate via this access point are automatically assigned their location in ESL-Easy. This makes it possible to obtain an overview of all locations and the hardware available there at any time (see inventory).

A connection between the access point and the ESL-Easy server is always established from the access point to the ESL-Easy server. There is no return connection. This means that an access point at a location that uses an Internet connection (not a VPN) to operate the ESL system (e.g. CLOUD variant) cannot be reached from the Internet. This means there is no point of attack on the branch's system from the Internet.

ESL labels

ESL labels provide different functionalities depending on the model. ESL-Easy currently supports all functions available from the manufacturers (paging, LED control, NFC, ...).

ESL Easy Communication

ESL-Easy uses the port-based TCP/IP standard for communication between the individual system services and the mobile application. Communication can be encrypted (AES Rijndael algorithm) or

occur unencrypted. Communication can be individually adjusted (e.g. block sizes and segmentation, timeouts, ...) if this is necessary due to network reasons (slow connections, dedicated lines, ...). No adjustment is necessary in current network environments.

If software from the ESL manufacturer is used in addition to the ESL-Easy system (e.g. at HANSHOW ESL-Working), a different communication and encryption may be used there. Reference is made here to the information provided by the manufacturer.

ESL-Easy uses its own protocol internally for data exchange, which is faster than common protocols and generates less overhead. The ESL-Easy server systems (the modules that actively accept connections, such as the ESL-Easy server) can also communicate via the REST API standard via JSON.

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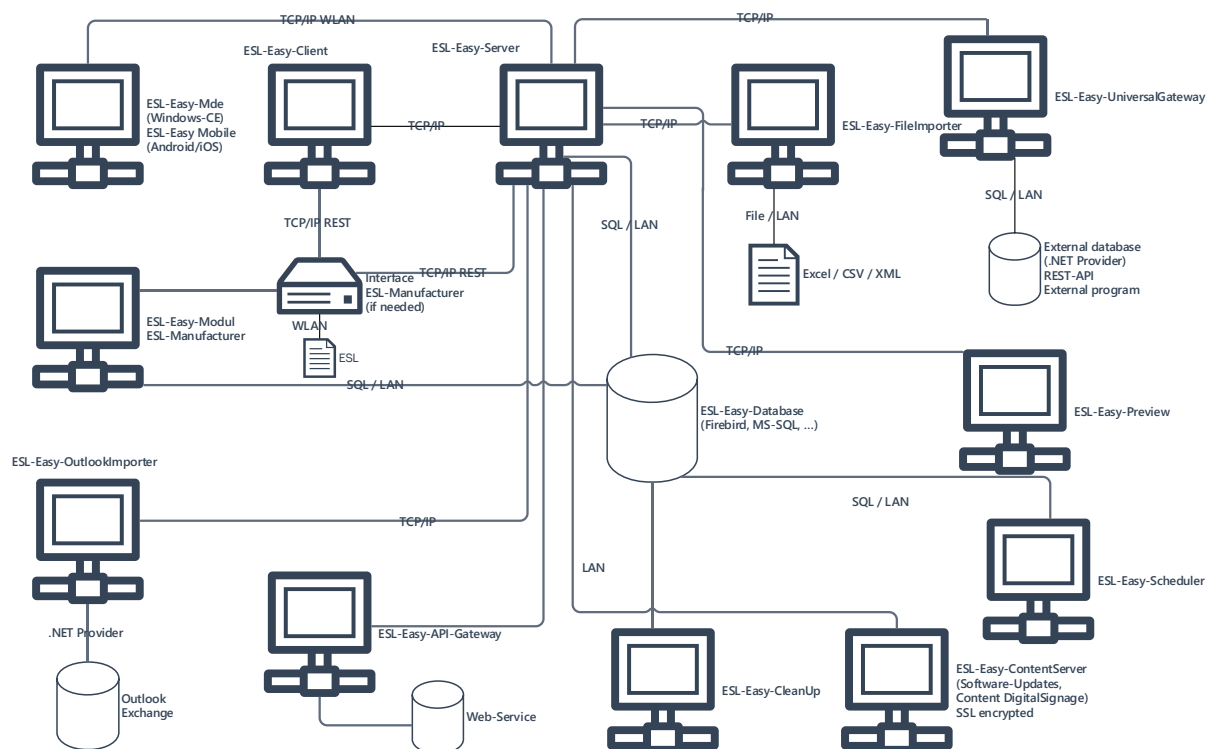
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This enables direct communication with external systems (e.g. customers' own software) with ESL-Easy, if desired (see e.g. *ESLEasy-UniversalGateway*).

Communication is additionally secured every time a connection is established via a user/password that is stored on the communication partner (no input by the operator).

If ESL-Easy's encryption is switched on, external systems can no longer communicate directly with ESL-Easy's REST API, as this interface also requires an encrypted connection. Since the encryption within ESL-Easy works with an internal key from EWS, access for external systems is not possible (only for EWS modules). If encrypted access to the ESL-Easy REST API is still required, an external module (EWS-ApiGateway) can be purchased, which enables an interface via its own certificate and an API key. This allows, for example, direct access to ESL-Easy functions from a website or other external systems that are assigned their own API key.

ESL-Easy consists of several system services that make it possible to split the system across multiple systems if necessary to achieve load balancing. For example, the database server can be outsourced to an external system to improve performance. All system services and communication with the database take place via TCP/IP.



ESL-Easy Communication Overview

MQTT

ESL-Easy offers native integration for hardware from ZKong, Ontime, Century, Yalatech and E-Ink Smart. Accordingly, ESL-Easy provides a server service (*MQTT*) for communication with the access

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points for each hardware type (manufacturer), to which all access points from all of the manufacturer's locations log on.

MQTT client security

Since MQTT is an open protocol, ESL-Easy can be used to specify which access points are permitted for communication as additional security. Connections from unknown systems are immediately interrupted without any feedback (thus without any information for a possible attacker).

When operating in a local network (*or VPN*), this security may not apply. In this case, new access points can be used immediately without administrative intervention.

The MQTT communication between the ESL Easy system and the access points corresponds to the manufacturer's options. If additional encryption based on MQTT is supported by the manufacturer, this is also available in ESL-Easy (depending on the manufacturer's options in the complete MQTT communication or in the payload area).

Locations

ESL-Easy was developed for use across multiple locations. An ESL-Easy installation on a server at a company's headquarters can manage any number of locations and take the location-related data into account for output on the ESL labels.

The required number of access points are installed at the locations, which establish and keep open a TCP/IP connection to the ESLEasy server (*MQTT protocol, in the case of HANSHOW via the manufacturer's EsIWorking*).

Furthermore, the desired number of mobile devices are registered on the location's WLAN so that the ESL-Easy Mobile App can establish a TCP/IP connection to the ESL-Easy server.

No additional hardware/software is required at the locations for operation.

Any amount of additional data about a location can be stored in ESL-Easy, which is available when processing a template (generating the image to be displayed) in addition to the imported data, for example from an ERP system. This makes it possible to create an individual display on the labels in the different locations (e.g. a different language) without having to create a separate template for each location.

Mobile PDA devices

In day-to-day business, employees usually only work with the mobile application ESL-Easy-Mobile. With this app all necessary actions that are necessary for regular operation can be carried out:

- ESL labels can be linked to data (e.g. products in a store) so that these are then displayed on the ESL label. After a link, the label is automatically updated if data changes (e.g. price change).
- An ESL label can be unlinked if the ESL label is not currently intended to be used.
- Query the current status of an ESL label (*current link, current view, status information such as battery level and radio quality, history of changes, ...*)

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- Query the location of a product (*if specified when linking*)
- Show the location of a product via the linked label by flashing the LED

The mobile application offers further options that can be used depending on the area of application. For example, it is possible to record additional data (e.g. displaying arrows that indicate where the product shown is located as seen from the label) and to be combined with the master data from the ERP system. It is also fundamentally possible to change the imported master data directly in the app, if this is permitted (the master data can only be changed within ESL-Easy; there is no feedback to an ERP system!). The options the user has (and is allowed to) are determined centrally via the app's templates and authorizations.

ESL-Easy has integrated a management system for mobile devices. All mobile devices that communicate with the ESL-Easy server are checked against the management system.

It is possible to specify all of the app's settings via the management system, so that the app user does not have the opportunity to change these specifications on their own.

Groups can be created in the management system into which a mobile device can then be assigned. Groups can each have their own settings for the group's devices, which a mobile device then receives.

Mobile devices can be blocked centrally. It is then no longer possible to work with this device in the ESL-Easy system. It can be specified that unknown devices are automatically blocked first and must be unlocked manually.

Due to the management options for mobile devices described, there is no separate registration required for app users. The app can be used as desired on mobile devices in accordance with the guidelines described by the headquarters. This makes it possible to work effectively and quickly, especially in large installations (e.g. a supermarket).

Automatic location detection

Practical experience has shown that mobile devices are often used by customers at different locations (e.g. when area managers work with their mobile device in different branches). When using ESL-Easy with multiple locations, ESL labels are not only linked to the data, but also to the location so that, for example, the correct price for the location (branch) is displayed. So that the employee doesn't always have to think about it in one

In order to provide the app with the correct branch number, automatic location detection was integrated into ESL-Easy.

All locations (branches) of a company can be maintained in ESL-Easy. In addition to the location description, it is possible to specify the subnet used at the location (the IP range of the location). In a company's VPN environment, all locations have their own subnet so that all locations can communicate with each other or with headquarters (firewall settings).

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When communicating with the ESL-Easy server, the ESL-Easy Mobile App always transmits the current subnet of the WLAN used at the location. The ESL-Easy server uses this information to identify which location the subnet belongs to. This location information is then transmitted to the app. If the app is configured for automatic location detection, the app uses this information for further communication (the location is then automatically changed and displayed in the app).

All information about the mobile devices in use is available on the ESL-Easy Manager. All specifications can be adjusted.

Operating systems for the app

The mobile application ESL-Easy-Mobile is available for Android, iOS and Windows CE. For technical reasons, the version for Windows CE does not offer all the options compared to the app for Android and iOS. However, all functionalities fundamentally necessary for operation are available.

Windows CE

This app is intended for use on older PDA devices (*e.g. Honeywell 6000 series, DataLogic Skorpion series*), which are often still found with customers. The pre-requisite for use is that these devices can communicate via WLAN. Installation is possible simply by copying the application to the device.

Android

In most cases, the Android version is used on PDA devices with Android as the operating system. These devices are specially designed for professional use and have a professional barcode scanner built in compared to a smartphone. With these devices you can work very efficient. On these devices, the app is not installed via the Google Play Store, but rather via sideload. To do this, the app (APK) is copied to the device via USB and installed locally. Therefore, these devices do not require an internet connection. The current APK installation file is always available on our download server. It can also be found in the \ESLEasy\ESLEasy_Mobile directory in every installation.

An app version is also available in the Google Play Store, which can be used on a smartphone, for example (but local installation is also possible here).

For sideloaded apps on Android devices, software updates are delivered locally via the ESL-Easy server. These are then installed with the consent of the user (Android security concept). The devices do not have to be updated manually.

When installing via the Google Play Store, updates are carried out via the store (same as other apps on the device).

iOS

Software can only be installed on Apple devices via the Apple Store after approval by Apple. There are currently no PDA devices on the market that use iOS as the operating system. Therefore, the iOS version is limited to use on iPhone or iPad devices.

Companies can operate their own app store for the use of internal apps. The app can be hosted here accordingly.

Updates to the app are carried out exclusively via the Apple App Store.

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Communication

The ESL-Easy-Mobile mobile application communicates via Wi-Fi (TCP/IP) with the ESL-Easy server using ESL-Easy's internal protocol (exchange of text messages). Depending on the configuration, data exchange takes place unencrypted or encrypted. The app does not establish any connections other than to the ESL-Easy server.

The ESL-Easy Mobile App does not transmit any data to external servers (e.g. to EWS).

The app does not maintain a permanent connection to the ESL-Easy server. If data is required, a connection is established to the ESL-Easy server, the data is transferred and the connection is closed again. Therefore, the app does not communicate in the background.

If the connection to the ESL-Easy server is interrupted (e.g. line failure, power failure, server failure, ...), the operator is shown a corresponding error message and can repeat the request. The app does not need to be restarted.

Updates

Updates of the software for Android (*only apps installed via sideload*) are made available for download via the ESL Easy Content Server. If a more recent program version or new language files are available for the mobile device, the app downloads the new files from the ESL-Easy Content Server via web request with SSL encryption. After downloading, a new program version is automatically offered for installation.

For app installations that were carried out via the app stores of the manufacturers (*Google, Apple*), the updates are offered via the respective stores. A local installation of an update is not possible with these versions.

Which version of the app is installed is shown in the lower row of the screen behind the program version:

L – Local installation per Sideload

S – Installation via the manufacturer's app store

An additional **D** after the label indicates a development version. This is not intended for commercial use (*only for development*).

Languages

ESL-Easy, as well as the mobile app, can be made available to the user in any language (not described in detail in this document). All translations in ESL-Easy are available in their own language files (editable text files). For the mobile app, new or changed language files can be transferred to the mobile devices in operation via the ESL-Easy server. For this purpose, the desired language files are made available on the ESL-Easy server (like the software updates, language files are transferred to the mobile device in the background). The user can choose between the available languages (the language is switched in real time without having to restart the app).

German and English are delivered as standard. New languages can be provided by the customer themselves; tools are available for this in the ESL Easy system.

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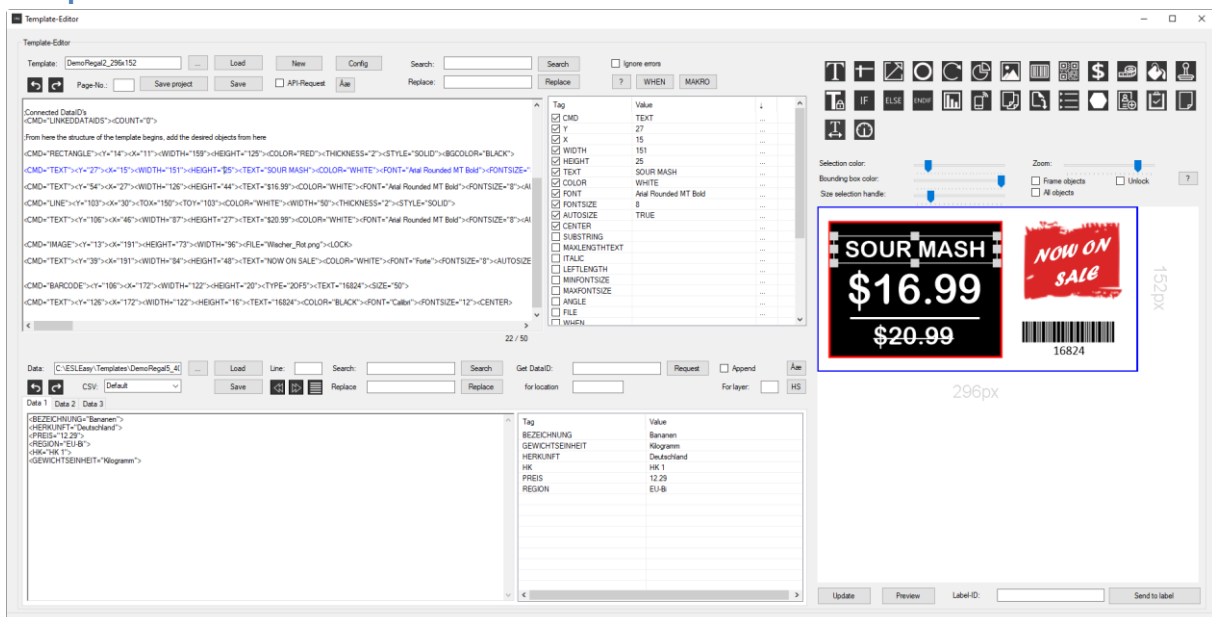
ESLEasy-Manager

The ESL-Easy system is managed via the ESL-Easy Manager. It is a Windows desktop application under DotNet (.NET) that can be started without installation.

The ESL-Easy Manager is purely an administration system and is not required by employees for regular operations. There is currently no separate authorization system as all functionalities are in the administrative area. The program can be used without user registration (the system is prepared for user management for later expansion).

The ESL-Easy Manager provides all information about the system (*current status of hardware and data*) and offers the option of configuring the system.

Template-Editor



The ESLEasy Manager offers a comprehensive template editor that can be used to create layouts (templates) for output on the ESL labels. The template editor combines graphic design using the mouse with the option of programming in ESL-Easy's own simple script language. This makes it possible to draw simple layouts, while complex data queries (e.g. making an output dependent on the data content) are also possible. This combination makes it possible to create any layout according to the customer's specifications and wishes. The layout can adapt dynamically according to the data passed.

The templates created are then used when linking ESL labels and data or when changing data to create the image for output on the ESL label and send it to the ESL label. The template system is the most important and powerful part of ESL-Easy.

Employees can only select layouts (templates) for output on the labels that have been specified centrally. Only layouts that match the currently scanned label (and possibly the location) are offered for selection. In the simplest case, there is only one layout per ESL label type. In this case, an employee does not have to choose which representation should be used. For the employee, work on the mobile device is then limited to linking ESL labels to products.

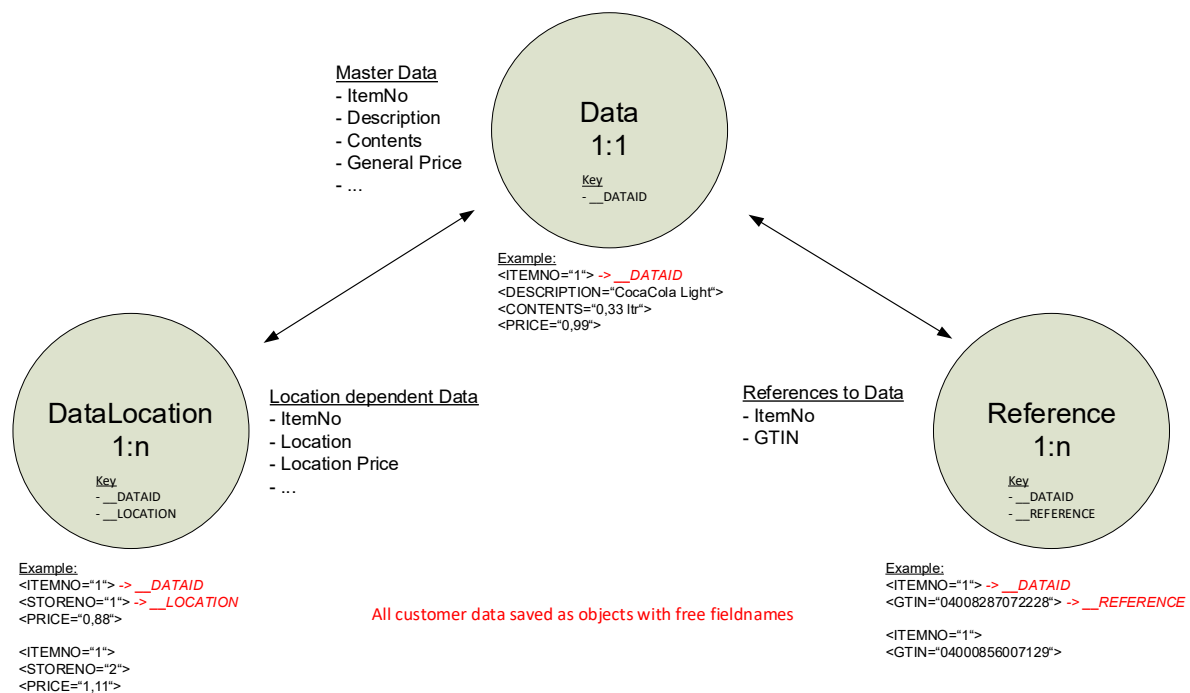
Data

ESL-Easy can be used to output static information (output of information without a connection to external data), but in regular operation the representation on the ESL labels is determined by dynamic data (e.g. the customer's master data from the ERP system).

Over time, ESL-Easy has been equipped with more and more options for working with external systems.

All available data from connected systems and the internal ESL-Easy database are transferred into a simple data model:

ESL-Easy internal Database Model



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Depending on the type of interface connection, this data is stored in ESL-Easy or retrieved in real time via an interface from a connected system.

Any data can be transferred to ESL-Easy via an interface. Each piece of information is always provided in the format field name=data. For a price, for example, this would be price=10.99 or offer price=9.99 etc.

There is basically no restriction as to which and how much data is transferred to ESL-Easy. However, ESL-Easy must know which data field is the key field (in ESL-Easy the DataID) (e.g. the article number). This data record can then be accessed in ESL-Easy using this key field.

Data

All data fields that are the same across locations (e.g. the item name).

DataLocation

Location specific data.

In a multi-location environment, certain data (such as price) differs between locations. Here, too, there can be any number of data fields that are location-related. Therefore, these fields are stored separately.

Reference

Data to identify a DataID (e.g. EAN).

In order to identify products (or a DataID in ESL-Easy), barcodes are often used in retail (and other areas of application) for identification (e.g. EAN, GTIN). The special feature here is that there can be several barcodes for the same product (DataID). Therefore, any number of references that point to the same product (DataID) can be created in ESL-Easy.

Import from CSV files

The easiest way to connect to external systems is to provide a CSV file as an export from an ERP system. ESL-Easy includes a service for automatically importing data. This import can be flexibly adapted to the data provided. This means that it is usually not necessary to program a special export for ESL-Easy in an external system (which is of course possible). By configuring an import for ESL-Easy, the necessary information for operation is taken from the data provided.

The ESL-Easy-FileImporter and ESL-Easy-BulkImporter services are available for data import (see the relevant documentation).

It is also possible to import EXCEL tables. ESL-Easy then takes over all columns of the specified table (usually the first table in the EXCEL file) as data. No installed EXCEL is required for the EXCEL import!

When data is imported, ESL-Easy automatically detects if it has changed since the last import. If ESL-Easy detects a change, all ESL labels affected by the data change are automatically updated (all labels that are linked to this DataID). ESL-Easy takes into account if data changes only relate to certain locations. Accordingly, only ESL labels for which this data change is relevant are then updated.

Data can always be transferred to ESL-Easy completely or incrementally (only changed data).

ESL-Easy can also be linked directly to an external system. The ES-LEasy-UniversalGateway service is used for this (see the relevant documentation). If ESL-Easy is operated with a direct connection to an external system, no data is stored locally in the ESL-Easy database. Whenever ESL-Easy needs data for processing, it is retrieved in real time from an external system via the ESL-Easy Universal Gateway. This eliminates the need to provide the data as an export and the import process of the data into ESL-Easy.

It is possible to combine both types of data processing. ESL-Easy always combines all available data (local data in the ESL-Easy database and external data) into one large data set. For example, additional

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data can be maintained directly in ESL-Easy, which is then available for output on the ESL labels in addition to the data from the ERP system.

If a connection to a customer system cannot be implemented using the standard ESL-Easy modules, our experienced development team has the option of creating an individual module according to customer requirements. This module is then integrated into ESL-Easy as a standard process. The standard modules themselves from ESL-Easy are not changed. Customer-specific modules are only available to the client; other companies do not have access to them (unless this is explicitly agreed).

Events

In ESL-Easy, events refer to the possibility of reacting to hardware status data. For example, if a battery level for an ESL label is below a defined value from the ESL hardware to ESL-Easy, or if an access point fails, an event can be created in ESL-Easy. If the event occurs, a defined action is carried out by ESL-Easy. The possible actions can be expanded depending on customer needs. An email can be sent, an SQL procedure can be called or a program can be started on the server. It would also be possible to transmit the event to a customer's monitoring system in order to then display it, for example, in a monitoring center.

API interface

If necessary, API access to a REST service on the Internet/Intranet can be defined, for example to retrieve current weather data and incorporate it into the creation of the graphic for an ESL label. An API query is always executed at the moment of the ESL label update and therefore always works with the most current data.

Automatic operation

ESL-Easy was developed in such a way that no administrative actions are necessary in regular operation. This is particularly important for installations in small companies, as they usually do not have their own IT department that can take care of the system.

ESL-Easy provides the ESL-Easy-CleanUp system service, which works in the background and takes care of all the necessary actions that ensure smooth operation of ESL-Easy over a long period of time.

This includes the following tasks:

- Check for label update tasks. For example, if updates are found for ESL labels that were not executed by the ESL hardware, these updates will be sent again, etc.
- Deleting old data (old update jobs for ESL labels, old time-controlled tasks of the scheduler, ...) How long data is retained can be configured.
- Reorganization of the database at specified times.

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- Backup of the database at specified times.
- Backup & restore the database (with checking) at specified times.
- Backup of the ESL-Easy configuration (for restoration).
- Deleting old log files from the ESL-Easy services.

The backups provided by ESL-Easy-CleanUp should be transferred to an external backup medium so that the backup is available even in the event of a system crash.

Necessary administrative work on the ESL-Easy system is limited to the following tasks during regular operation:

- Configuration of new access points (system expansion)
- Creating new locations
- Release of mobile devices if necessary (it can also be specified that all new devices can work immediately without release)

If you have problems with ESL updates:

- Checking the queue entries for errors
- Restart tasks if necessary

Problems with hardware (ESL labels, access points):

- Check hardware status

Adapting templates (layouts for display on the ESL labels):

- Create or adapt appropriate templates

Problems with data:

- Checking the log entries of import runs or the gateway to the external system

Attachment

ESL-Easy communication ports

Firebird 2.5

Port -> 49125

ESL Easy

ESLEasy_Server -> 49190

ESLEasy_Hanshow -> 49191

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ESLEasy_UniversalGateway -> 49192

ESLEasy_Display and ESLEasy_DigitalSignage -> 49193 (*only when using digital signage*)

ESLEasy_Preview -> 49195

ESLEasy_DigitalSignage -> 49196 (*Software Updates and Digital Signage Content, only old DS version*)

ESLEasy_ApiGateway -> 49197

ESLEasy_FileTransferServer -> 49198

ESLEasy_ZOC -> 49200

ESLEasy_MessageServer -> 49201

ESLEasy_Yalatech -> 49202

ESLEasy_ElnkSmart -> 49203

ESLEasy_ContentServer -> 49205 (*Software Updates and content download*)

ESLEasy_DS -> 49204 (*only when using digital signage*)

MQTT server (internal in the ESLEasy_ZOC service) -> 1883 (*access point communication*)

MQTT server (internal in the ESLEasy_Yalatech service) -> 1884 (*access point communication*)

MQTT server (internal in the ESLEasy_ElnkSmart service) -> 9080 (*access point communication*)

Discover port for UDP auto configuration: 50000

If additionally installed: IXOP Play Server for Digital Signage -> 49199

If additionally installed: ESLEasy_DS_Server for Digital Signage -> 41111

Access point ZOC (ZKong, Ontime, Century)

MQTT communication -> 1883

MQTTS communication -> 8883

UDP broadcast port -> 14901

Web interface for service -> 80

Yalatech access point

MQTT communication -> 1884

UDP broadcast port -> 8899

Configuration port -> 12088

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E-Ink Smart access point

MQTT communication -> 9080

Configuration port -> 9081

UDP broadcast port -> 50000

Hanshow:

ESL-Working Hanshow (*ESL driver software*):

Discovery -> 8800

Access point -> 37021

Access point SSL -> 37022

Notification -> 5649

FTP -> 21

Communication with ESLEasy -> 9000

Communication with ESLEasy SSL -> 9443 (*currently not used*)

Access point configuration web interface->80 (*HTTP*)

EWS key server (www.service-ews.de) for registering labels: 29200 (*outgoing*)