Core Service Quick Start Guide

Last change: 25.06.2018
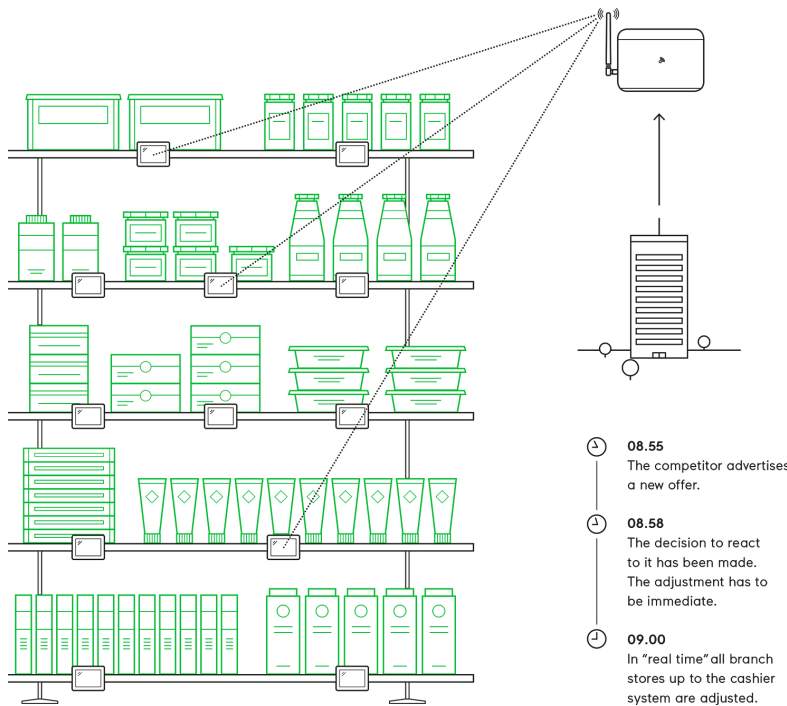
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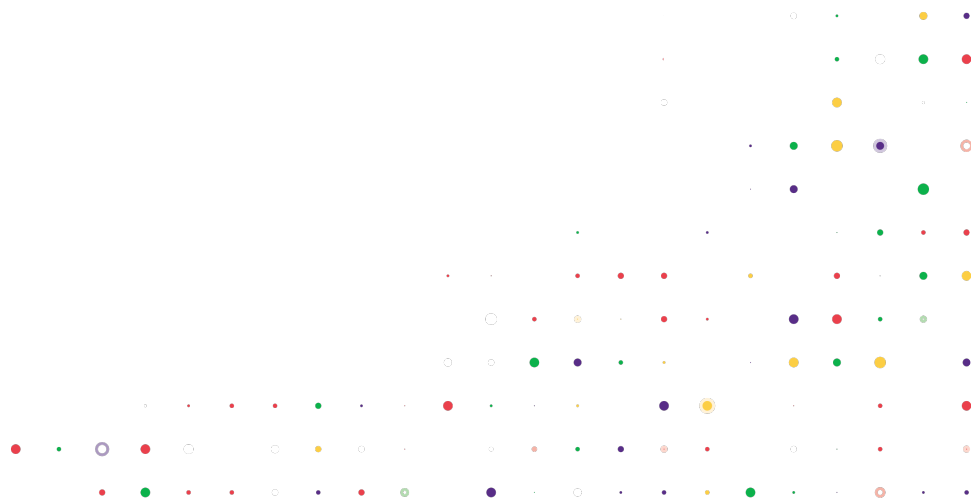
1 Electronic Shelf Labeling – A brief introduction

An electronic shelf label is a device that shows article data and price information on its display. In comparison to printed labels the information is automatically updated if price or article data changes.

08.55
The competitor advertises a new offer.

08.58
The decision to react to it has been made. The adjustment has to be immediate.

09.00
In "real time" all branch stores up to the cashier system are adjusted.

- Cost reduction through elimination of manual price changes
- Fully automatic price updates from the headquarters to the branch stores within seconds
- Process security and price integrity – 100% correlation between cash point and shelf
- Increased flexibility in price design and immediate reaction to market situation Image gain due to use of highly modern technology
- Simplified processes for store personnel
- Enhanced sales & price profitability maximize price performance and profit opportunities

2 Label Family Introduction

In general the SES-imagotag electronic shelf label family offers high-quality display options, operating with a replaceable battery, thus working without any external power supply.

The performance of the labels (updates per hour) depends on the mode of the access point. In the USA and Canada the AP-2010 usa/canada bundle incl. antenna with limited data efficiency is required (based on the FCC/IC regulation).

2.1 General Key Features

- 2.4 GHz proprietary radio protocol
- Radio coverage: up to 25 meters
- Bi-directional communication
- 11 available communication channels
- Ultra-low power consumption
- Customer-replaceable battery
- Full graphical e-Ink display with paper-like readability
- Super wide viewing angle (nearly 180 degrees)
- Flexible mounting options available
- May be used in landscape and portrait mode
- Fast response time (less than 15/30 seconds, depends on wakeup time
- Water resistant
- 128-bit AES encryption with secure key exchange
- Multiple pages support with preloading and fast page switching
- Integrated NFC tag
    - G1 - Passive NFC
    - VUSION - "Active" NFC

2.2 The G1 label family

The SES-imagotag G1 BWR label family is capable of changing all pixels to black, white or red. The current line-up has display sizes from 1.6 inch to 12.2 inch.

Caption	Display Resolution	Density (dpi)	Display Colors	Useable Pages	Active Display Area (mm)	Updates/hour/AP (standard / FCC&IC mode)	Battery lifetime: 5 years with N updates per day
G1 1.6 BWR NFC	152 x 152	140	b/w/r	4*	27.5 x 27.5	7500/4600	1
G1 2.2 BWR NFC / Bossard 2.2 red NFC	212 x 104	111	b/w/r	4*	48.6 x 23.8	8500/5000	2
G1 2.6 BWR NFC	296 x 152	125	b/w/r	4*	60.1 x 30.7	4500/2600	2
G1 2.7 BW NFC	264 x 176	117	b/w	8*	57.3 x 38.2	5000/2700	4
G1 2.7 BWR NFC	264 x 176	117	b/w/r	4*	57.3 x 38.2	4500	2
G1 4.2 BW NFC	400 x 300	120	b/w	4*	84.8 x 63.6	3000/1600	4
G1 4.2 BWR NFC	400 x 300	120	b/w/r	4*	84.8 x 63.6	2000/1300	2
G1 4.5 BW NFC	480 x 176	117	b/w	4*	104.2 x 38.2	4300	4
G1 4.5 BWR NFC	480 x 176	117	b/w/r	4*	104.2 x 38.2	2500/1500	2
G1 6.0 BWR NFC	600 x 448	129	b/w/r	4*	114.9 x 85.8	900/500	2
G1 7.4 BW NFC	480 x 800	126	b/w	12*	97 x 161.6	1000/500	8
G1 7.4 BWR NFC	480 x 800	126	b/w/r	4*	97 x 161.6	600/300	2
G1 12.2 BWR NFC	768 x 960	103	b/w/r	6*	190.08 x 237.60	300/150	2
S-tag 6 HF NFC	-	-	b/w	4	53 x 19.3	20000/20000	4

*One useable page is shared with the registration code page. This page is initially shown when the label is shipped. After registration this page can be used as a custom page. To restore the original content a service utility is required. To prevent accidentials overwrite this page is protected. To unlock this page contact the SES-imagotag support team.

The content of all pages except page number 0 won't remain after a firmware update.

2.3 The VUSION label family

The SES-imagotag VUSION (2.4GHz) BWR label family is capable of changing all pixels to black, white or red. The current line-up has display sizes from 1.6 inch to 7.4 inch.

Caption	Model	Display Resolution	Density (dpi)	Display Colors	Useable Pages	Active Display Area (mm)	Updates/hour/AP (standard / FCC&IC mode)	Battery lifetime: 5 years with N updates per day
VUSION 1.6	EDG2-0160-A	152 x 152	140	b/w/r	4	27.5 x 27.5	7500/4600	1
VUSION 2.2	EDG2-0220-A	212 x 104	111	b/w/r	4	48.6 x 23.8	8500/5000	2
VUSION 2.2 F	EDG2-0220-A	212 x 104	111	b/w	4	48.6 x 23.8	10000/6500	1
VUSION 2.6	EDG2-0260-A	296 x 152	125	b/w/r	4	60.1 x 30.7	4500/2600	2
VUSION 2.6 F	EDG2-0260-A	296 x 152	125	b/w	4	60.1 x 30.7	6500/4500	1
VUSION 4.2	EDG2-0420-A	400 x 300	120	b/w/r	4	84.8 x 63.6	2000/1300	2
VUSION 7.4	EDG2-0740-A	480 x 800	126	b/w/r	4	97 x 161.6	600/300	2

The content of all pages except page number 0 won't remain after a firmware update.

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3 Get the latest software and documentation

Register at the SES-imagotag Customer and Partner Portal to get access to the latest software and documentation.

https://portal.imagotag.com

3.1 Install software

There's several software you'll have to install in order to configure and setup your ESL system. You'll just have to extract the following 3 archives in a location of your choice:

1. SES-imagotag Core Service <server.zip>
2. SES-imagotag Control Center <client.zip>
3. SES-imagotag Template Editor <template.zip>

3.2 System requirements

- Server hardware: Pentium 4 (2 GHz or higher), 2 GB RAM
- Java Runtime Environment Version 6, Update 36 or higher
- Windows XP, Windows 7, Windows Server 2008 (R2), Windows 10, Suse Enterprise Linux 11, Ubuntu 12 (all 32/64-bit versions), Mac OS X
- SES-imagotag Core Service
- SES-imagotag Access Point(s)
- SES-imagotag Label(s)
- License key

3.3 Installation process

Please unpack the zip-archives <server.zip>, <client.zip> and <template.zip> on your machine - e.g. under C:\ses-imagotag-core-service\.

Note: To unpack the zip-files you can either use the windows internal archive-unpacker (see screenshots) or an unpack tool of your choice (e.g. the free tool 7zip – www.7zip.org).

FIGURE 1-1:
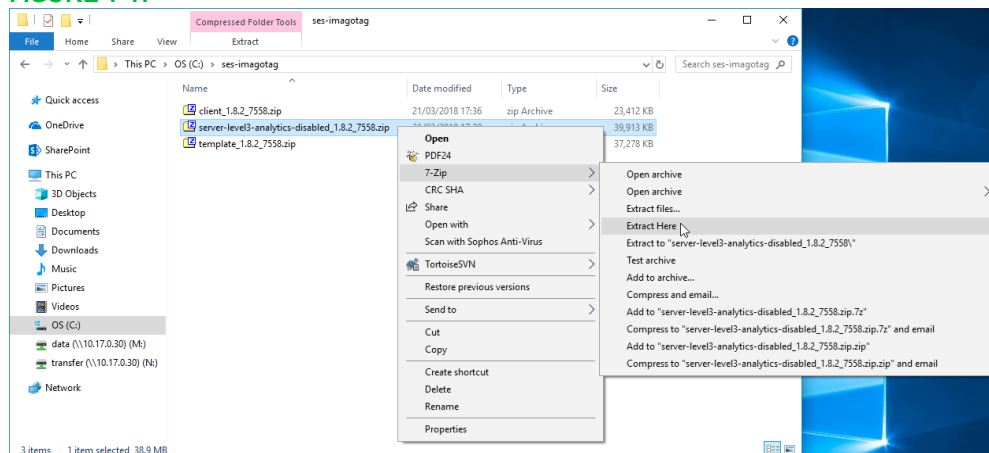
FIGURE 1-2: Unpack/Install imagotag Software #1

After unpacking all 3 archives, your folder should look something like this:

[]
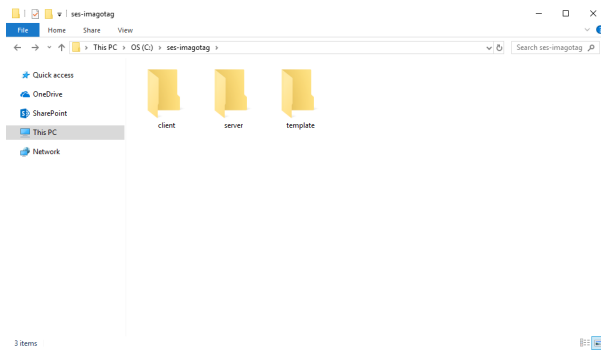
FIGURE 1-3: Unpacked imagotag software folder

The SES-imagotag Core Service is now installed and you can step forward to point see *Start SES-imagotag Core Service and SES-imagotag Control Center* on page 13.

3.4   SES-imagotag Customer and Partner Portal

After user registration and activation you will have access to documentation.

You can activate, manage and download your SES-imagotag software licenses see *Start SES-imagotag Core Service and SES-imagotag Control Center* on page 13.

Your user account will not be assigned to a customer account yet. Ask our sales backoffice team for user assignment (sales.at@ses-imagotag.com).

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4   Core Appliance

The Core Appliance is a compact network device which can be used to run the SES-imagotag Core Service in the store, instead of using an additional dedicated server. The SES-imagotag Core Service is always needed in the store locally, also when cloud-based/centralized middleware systems like Jeegy S3 Centralized/Jeegy Cloud or Bison ESL Manager is used.

4.1   Why is it needed in the Store?

- Continuous communication with access points and labels is required (even without tasks)
- Limited bandwidth between store and headquarters
- Disconnected VPN connection will prevent proper operation
- Load (image rendering…) is distributed to stores

4.2   Key Features

- Core Appliance is optimized to run up to 30 000 labels and 7 access points
- Easier and faster shop installations ("Plug and Play")
- Is not recognized as an additional server
- Low maintenance
- Easy replace/restore when hardware crashes
- Limited deployment variabilities
- Lower development costs
- Lower support costs
- Better brand recognition
- Easier to sell as a "solution in a box"
- Less overall risk for system integrators

5   Core Appliance initial setup

To operate the Core Appliance there are only a few steps necessary:

1. Supply with power
2. Turn it on (button on the backside of the device)
3. Plug it into your network
4. Initial setup
5. Update to the latest version

Per default, the Core Appliance comes with DHCP enabled. So if you have a DHCP service running you can find it with the MAC address which is printed on the bottom side of the Core Appliance.

If there's no way to get access to the DHCP server we recommend to use an USB device with a configuration file to configure the appliance initially.
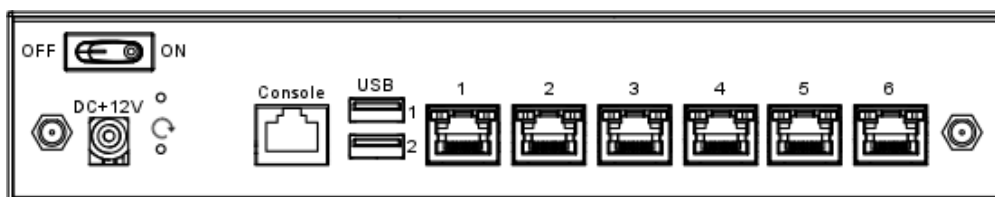
FIGURE 1-4: Core Appliance rear view

5.1   USB device configuration

You can find an example configuration file (**example.config**) at ourSES-imagotag Customer and Partner Portal.

Core Appliance service reference mode | Core Appliance example.config file

After downloading, editing and copying the configuration file onto any USB device, the configuration is automatically adopted after plugging in the USB flash drive into the Core Appliance. A triple beep indicates the successful configuration. A single beep signals that the configuration hasn't been set successful.

The web user interface of the Core Appliance is now available under http://<ip-address>.

The initial configuration of the Core Appliance can be compared with the installation and start of an SES-imagotag Core Service. After configuration, you can access the Core Appliance via the SES-imagotag Control Center from every system connected to your network (see *Starting* on page 1).

Example.config file

To set up your Core Appliance for the first run you'll have to set at least the following network parameters:

- IP address
- Subnet mask
- Optional: Gateway, DNS

To set the parameters mentioned above the contents of the configuration file might look like this:

```
# Set IP address of bridge interface
set network br0 192.168.1.100 255.255.255.0
# Set a gateway
```

```
set gateway 192.168.1.1
# Set a nameserver
set dns 192.168.1.21
```

Note: This simple bridge configuration connects the network interfaces. No matter where the network cable is plugged in, the appliance is accessible via the configured bridge address.

5.2 Front side LED description

On the front side of the appliance you can see several status information:
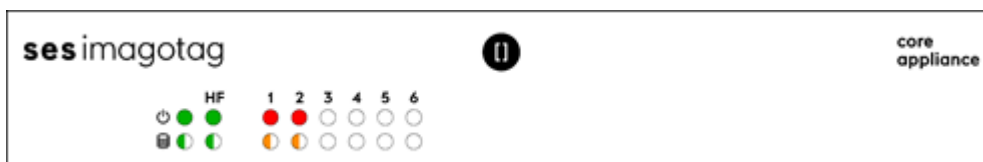
Core Appliance front view LED status information (Core Appliance version 1.8.0 or higher)

⏻ ● 🖴 ◖	Upper LED: Power on Lower LED: Core Appliance is active
HF ● ◖	Upper LED: **OFF**=service not running | **Flashing**=restart or software update in progress | **ON**=service Lower LED: **OFF**=no internet connection | **Slow flashing**=no VPN configuration | **Fast flashing**=VPN not connected | ON=VPN connected running
1 2 3 4 5 6 ● ● ○ ○ ○ ○ ◖ ◖ ○ ○ ○ ○	Upper LED: Port in use (color based on transfer rate) Lower LED: Port/Device is active

5.3 Additional documentation

You can find additional documentation regarding the Core Appliance (e.g. a complete service mode reference) on our SES-imagotag Customer and Partner Portal.

6 Start SES-imagotag Core Service and SES-imagotag Control Center

6.1 Starting SES-imagotag Core Service

If you've recently configured yourCore Appliance the SES-imagotag Core Service software is already running and you can step forward to the next step.

In order to start the SES-imagotag Core Service with the default configuration, just execute the jar file "server.jar" as described in *Troubleshooting* and wait for the small service GUI to show up (if the window doesn't show up after all, make sure your Java installation and configuration is correct).
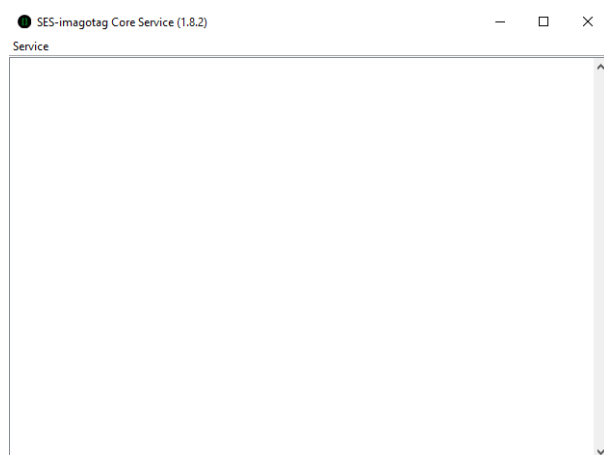
FIGURE 1-5: Core Service web UI

The SES-imagotag Core Service will listen to TCP connections on Port 8000 and 8001 and UDP connections on Port 8000. Please make sure that there is no firewall issue and/or interference with other systems.

After start of the SES-imagotag Core Service you can check the web user interface:

URL: http://<host|ip>:8000
Login: admin/admin

During the first start the SES-imagotag Core Service will automatically create a Derby[1] database. If another database connection is needed or preferred, the connection parameters should be validated by SES-imagotag GmbH.

Note: As you can see there are several level numbers. You can find the description of the different levels in the Developer Reference (which is also part of the documentation available at the SES-imagotag Customer and Partner Portal) under "Integration Levels".

6.1.1 Example articles

For easier usage some example articles can be preloaded at the time you start the SES-imagotag Core Service. You can find the corresponding XML article data here: C:\ses-imagotag-core-service\server\data\fixtures\.

---

[1]Apache Derby, an Apache DB subproject, is an open source relational database implemented entirely in Java

To enable and disable the preloading of these fixtures go to the system configuration and set the corresponding property "importFixtures" true or false.

Note: The article records are based on the XML-standard.

6.2   Starting SES-imagotag Control Center

Go to the extracted directory and execute the "client.jar" file.
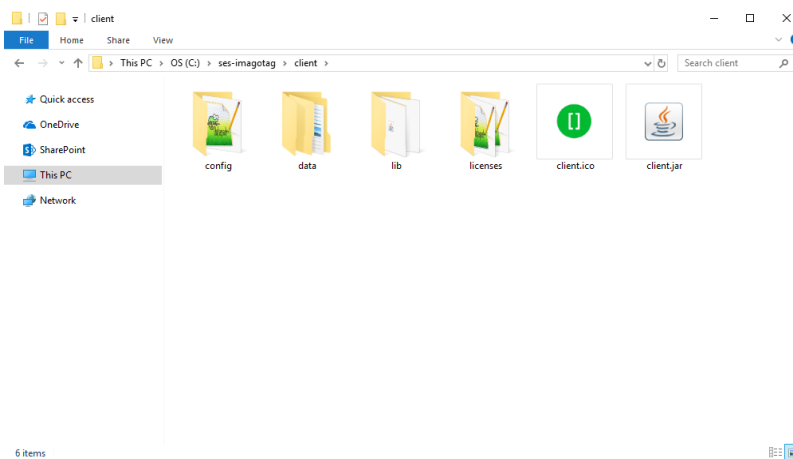
FIGURE 1-6: Starting SES-imagotag Control Center

The SES-imagotag Control Centeris configured to connect to a server on the local machine per default. In order to change this to a remote machine in a network you have to start the SES-imagotag Control Center with an additional parameter:

Windows
- Create a shortcut/Edit existing short cut
- Right click to the shortcut and select "Properties"
- Append " --host hostnameOrIPAddress" at the end of the "Target" field. (Note: The text to append starts with an space and there are 2 hyphens to add!)

Linux
- Append " --host hostnameOrIPAddress" at the end of command (e.g. "java -jar client.jar --host 192.168.1.100" Note: The text to append starts with an space and there are 2 hyphens to add!)
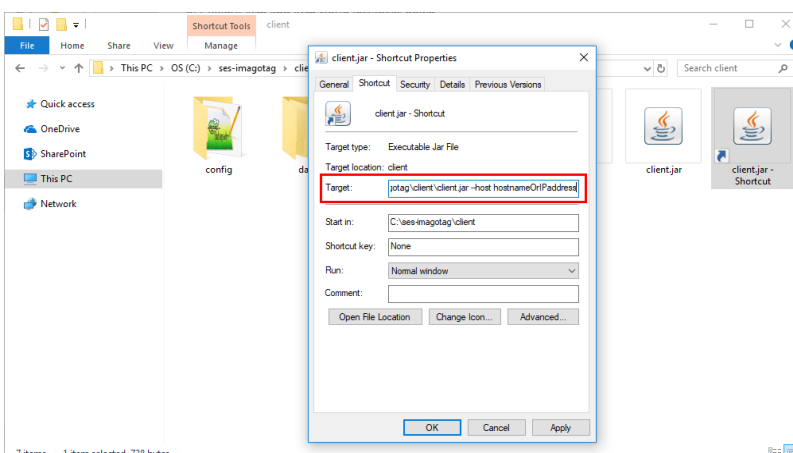
FIGURE 1-7: Starting SES-imagotag Control Center with parameter

6.2.1 SES-imagotag Control Center Login

- Username: admin
- Password: admin
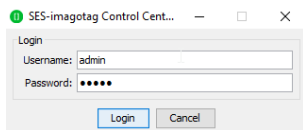
FIGURE 1-8: SES-imagotag Control Center Login

6.3 Activating your license

After starting the SES-imagotag Core Service and SES-imagotag Control Center it's necessary to activate the license key which is included in the "Software License Document". To view your current license status there's a License status dialog. You can find it in the SES-imagotag Control Center under "Help - License status". Since no license is activated/imported yet the window should look similar to this:
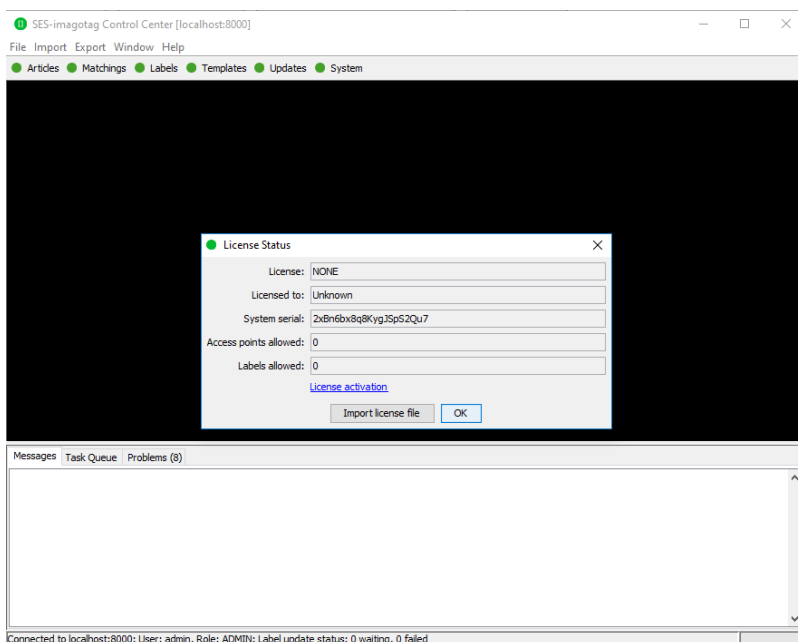
FIGURE 1-9: License Status Dialog

Copy the "System serial" to the clipboard (STRG+C or right click "Copy to clipboard") and then click the "License activation". You'll be automatically redirected to the SES-imagotag Customer and Partner Portal https://portal.imagotag.com.

Please **log in** (or register a new user). After log in, you can see a summary of already activated licenses and/or activate a new license. Click "**activate new license**".

Fill in "**License key**", copy/paste the "**System serial**" (from the "License Status" dialog), add a **Comment** (optional) and click the "**Activate**" button.

FIGURE 1-10: Activate License (SES-imagotag Customer and Partner Portal)

Download the generated license file and complete the licensing process by importing the license file to your ESL system. With the successful activation of your license you're now able to register labels and add ESL access points.

FIGURE 1-11: Import of license file downloaded before

Note: Press "F5" (after 15 seconds) to update the license status after license file import.

Fore more details about the licensing mechanism see *Per-server licensing from version 1.4.0* on page 1

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7 ESL Access Point Configuration

The ESL access points AP-2010, MAP-2014 T/LANCOM L-151E and LANCOM LN-830E are the communication center in the store that transmits information to the labels. In order to ensure the communication between SES-imagotag Core Service, access point(s) and the labels the access points have to be configured at the start of the SES-imagotag Core Service.

7.1 Connect and configure AP-2010

7.1.1 Connect and configure

Before labels are able to communication with the SES-imagotag Core Service at least one ESL access point needs to be configured. In standard configuration the AP-2010 gets an IP-address via DHCP (recommended) and is accessible via imagotag AP-2010 web UI:

URL: http://<host|ip>:8080
Login: admin/admin

Important Note: In this part of the Core Service Quick Start Guide it is assumed that a DHCP server is present (you can find the steps to discover the access point without DHCP in the Troubleshooting section - see *Establish a network configuration when no DHCP is available – Step by step*

7.1.2 Discover the Access Point

Before you can configure the ESL access point it's necessary that it will be discovered.

The following points have to be observed:

- Connect your machine to the same network as the AP
- Plug in the power supply of the access point
- During the boot process of the access point, start the SES-imagotag Core Service software on the computer
- When the access point is up (LED turns orange), the SES-imagotag Core Service will discover it with an IP address (Note: The discovering process may take up to 2 minutes)
- Use the SES-imagotag Control Center to connect to your SES-imagotag Core Service
- Under System – Access Point Status – the AP should be listed as discovered (after successful boot sequence)
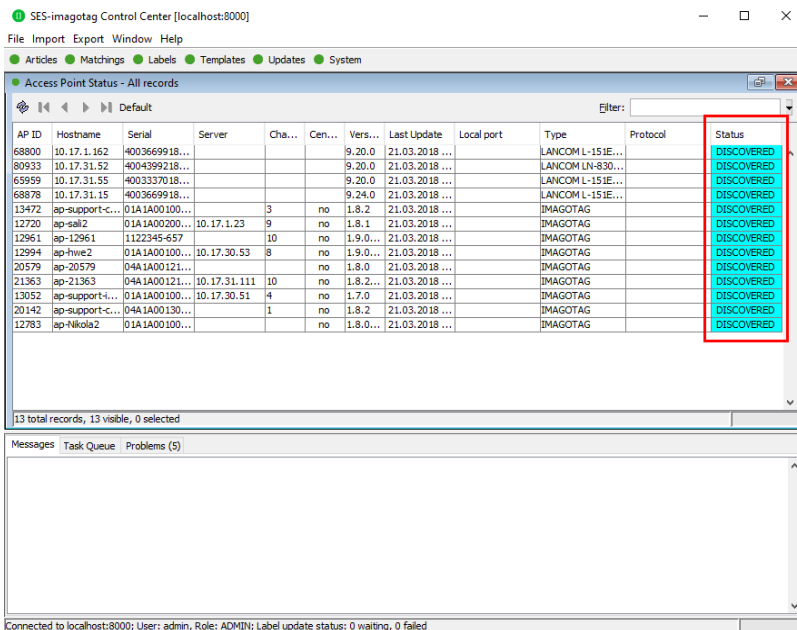
FIGURE 1-12: List of discovered ESL access points

Now you're able to configure the ESL access point via AP-2010 web UI under http://<DHCP-IP-address> or a right click on the discovered AP –> Open in browser....

In the status overview you get some details about the AP-2010:
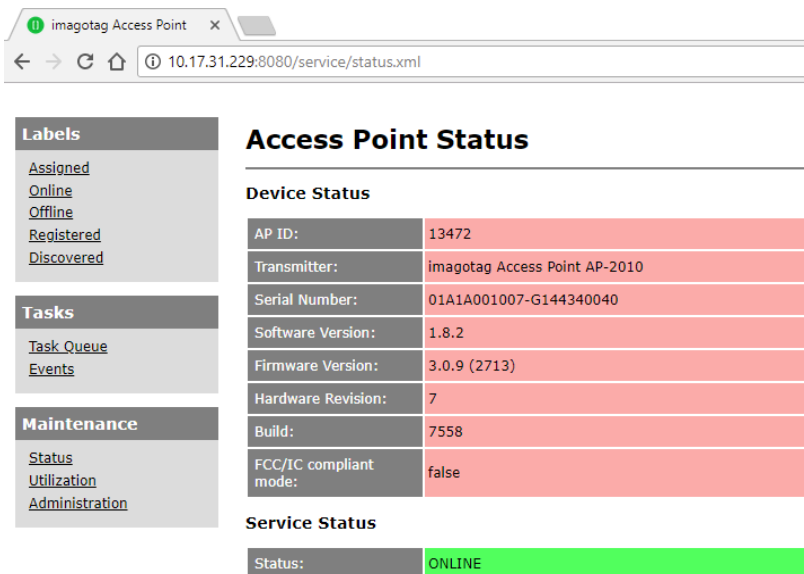
FIGURE 1-13: AP-2010 Status overview

It's recommended for the demo installation not to use the "Centralized Configuration" feature and configure the AP manually.

7.1.3 Necessary configuration over the AP-2010 web UI

The following actions need to be performed over the AP-2010 web UI

1. Deactivate Centralized Configuration: Administration -> Configuration Mode
2. Set up network details (or leave DHCP): Administration -> Network
3. Set up an ESL channel: Administration -> Wireless Channel

⚠️ The AP-2010 supports 11 ESL channels. It's recommended to **choose one of the recommended channels: 3, 5, 8, 9 or 10**. These channels do not interfere with standard Wi-Fi channels 1, 6, 11 and are scanned by the labels more often. For further information about selecting channels see point see *Selecting channels* on page 25.

7.1.4 Necessary configuration at the SES-imagotag Control Center

After the configuration in the AP-2010 web UI it's necessary to add this AP via the SES-imagotag Control Center: System – Access Point Configuration – New … or right click on a discovered AP - Create configuration.
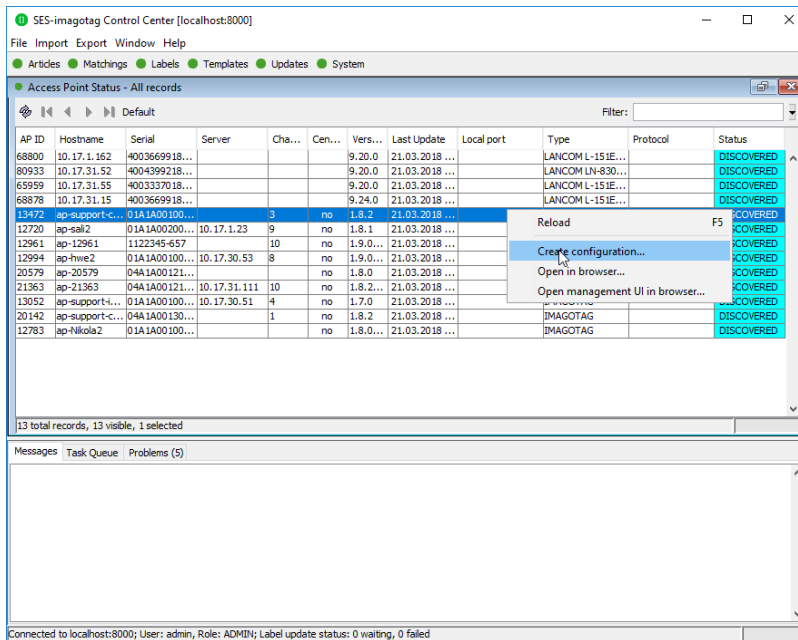
FIGURE 1-14: SES-imagotag Control Center System - Access Pont Status - Create configuration

Choose "Manual Configuration" if you don't use Centralized Configuration and enter Access Point ID (AP ID) and IP address (Host).

Note: After the basic configuration in the AP-2010 web UI, it is also possible to fill in AP-ID and AP-IP address automatically. For this choose "Create Configuration..." under System – Access Point Status - Right click on the discovered and configured access point.

After saving the AP configuration you should see the AP under System – Access Point Status as ONLINE. In addition the AP status LED should turn BLUE.

Note: It is possible to configure the access point via hostname. To get this working there has to be a corresponding entry in the DNS.

7.1.5 The Status LED

There are several LED colors that indicates the main status of the access point.

Color	Description	Note
Red	Boot process	Can take about 2 minutes, if it takes much longer, the device is defective and there is a need for service.
Blue	Normal mode	---
Yellow	Operational, but not connected to any server or no channel selected	---
Red (blinking)	Running Firmware Update	During this time there is no connection to the electronic label

If there are any problems regarding the ESL access point please see chapter see *Troubleshooting* on page 40.

7.2 Connect and configure LANCOM access point

The LANCOM access point with Wireless-ePaper is the communication center in the store that transmits price information to the labels. In order to ensure the communication between SES-imagotag Core Service, access point and the labels the LANCOM access point with Wireless-ePaper has to be connected after the start of the SES-imagotag Core Service.

One way to configure the access point is on the client.

7.2.1 First configuration steps

As described in the **Installation Guide (printed version included in the package)** you'll have to configure the basic settings before setting up **Wireless-ePaper** using the SES-imagotag Core Service.

1. Installing the software or configuration using a web browser and setup wizards
2. Deploying and connecting the device
3. Searching for and configuring the device

After setting up the basic settings the following points have to be fulfilled:

- Knowing the IP address of the LANCOM access point
- WLAN activated

Important Note:LANCOM access point and the computer on which the SES-imagotag Core Service runs should be connected via Ethernet and **not** via Wi-Fi, as this will result to regular failures.

7.2.2 Access Point IP address

Before labels are able to communication with the SES-imagotag Core Service at least one access point needs to be configured. After setting up the basics you should know the IP address of your LANCOM access point:

URL: http://<LANCOM-IP-address>

Login with the password set before.

FIGURE 1-15: LANCOM Web GUI Login

7.2.3 Configuration: Wireless ePaper

Under "Configuration – Wireless ePaper" you can check whether the module is activated or not. You can also select an ESL channel or leave the "Automatic selection" .
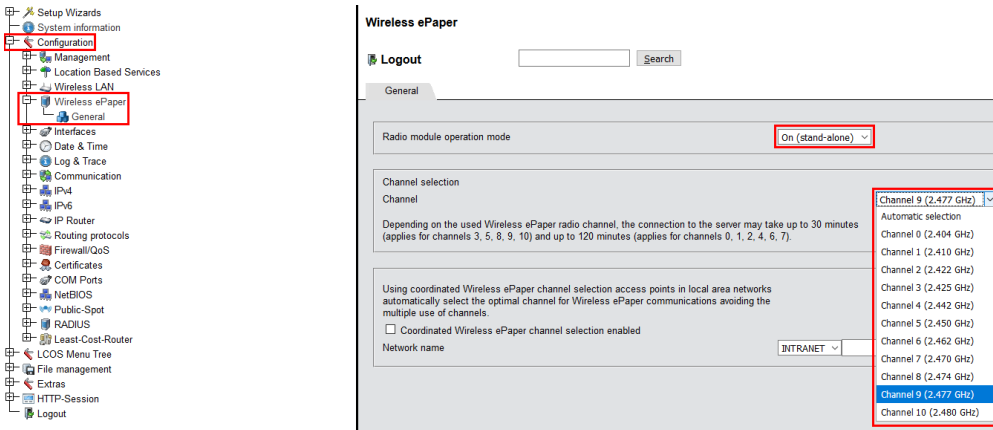
FIGURE 1-16: Configuration - Wireless ePaper

 The LANCOM access point supports 11 wireless ESL channels. It's recommended choose one of the recommended ESL channels: 3, 5, 8, 9 or 10 first. These channels are scanned by the labels more often.

7.2.4 LCOS Menu Tree

Here you'll find the necessary information for the SES-imagotag Core Service Access Point Configuration settings.

7.2.5 Setup – Wireless ePaper

Navigation: "*LCOS Menu Tree – Setup – Wireless ePaper*"

It's possible to change the ESL channels and do activate or deactivate the Wireless ePaper system. Here you can also find the selected UDP port for the communication (port 7353 per default).
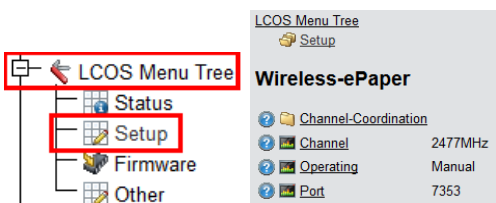
FIGURE 1-17: LCOS Menu Tree - Setup - Wireless ePaper

 The SES-imagotag Core Service will listen to TCP connections on Port 8000, 8001 and also UDP connections on Port 8000 and the port set in LCOS Menu Tree (default 7353). Please make sure that there is no firewall issue and/or interference with other systems.

7.2.6 Status – Wireless ePaper

Navigation: "*LCOS Menu Tree – Status – Wireless ePaper*"

After configuration you can see a summary of your Wireless ePaper settings under
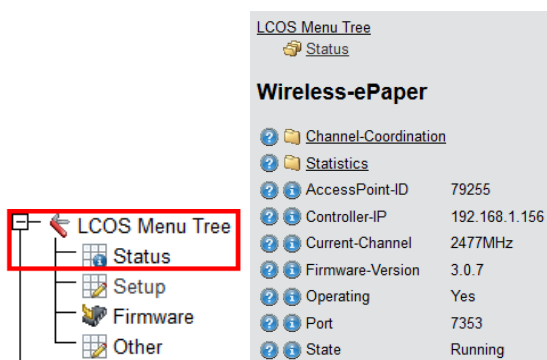
FIGURE 1-18: LCOS Menu Tree - Status - Wireless ePaper

7.2.7 Necessary configuration at the SES-imagotag Control Center

After the configuration in the LANCOM web user interface it's necessary to add this AP via the SES-imagotag Control Center: **System -> Access Point Configuration -> New …** when the access point is discovered via **System -> Access Point Status**, right click on the discovered access point and create the configuration.
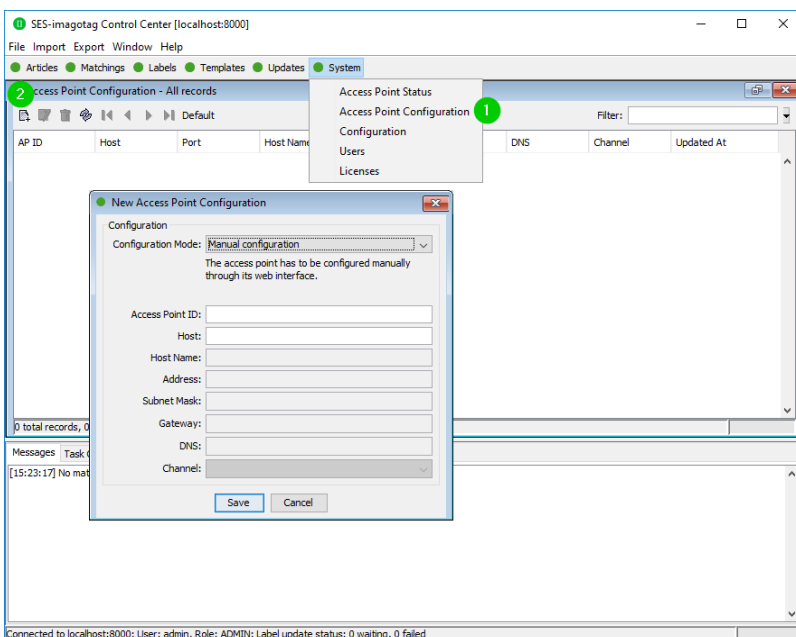
FIGURE 1-19: SES-imagotag Control Center - System - Access Point Configuration - New

Choose "Manual Configuration" and enter Access Point ID (AP ID), IP address (Host) and correct port value.
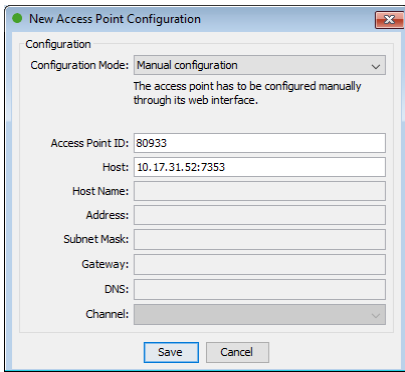
FIGURE 1-20: New Access Point Configuration

Note: You can find the access point ID under "LCOS Menu Tree – Status – Wireless ePaper" or on the backside of the access point, shown below.
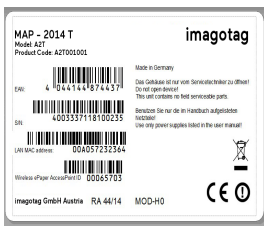
FIGURE 1-21: Wireless ePaper AP-ID on the backside of the access point

After saving the AP configuration you should see the AP under **System -> Access Point Status** as ONLINE. Also the Status in the web-GUI of the LANCOM access point changes from State "*Waiting-for-Controller-Connection*" to "**Running**"
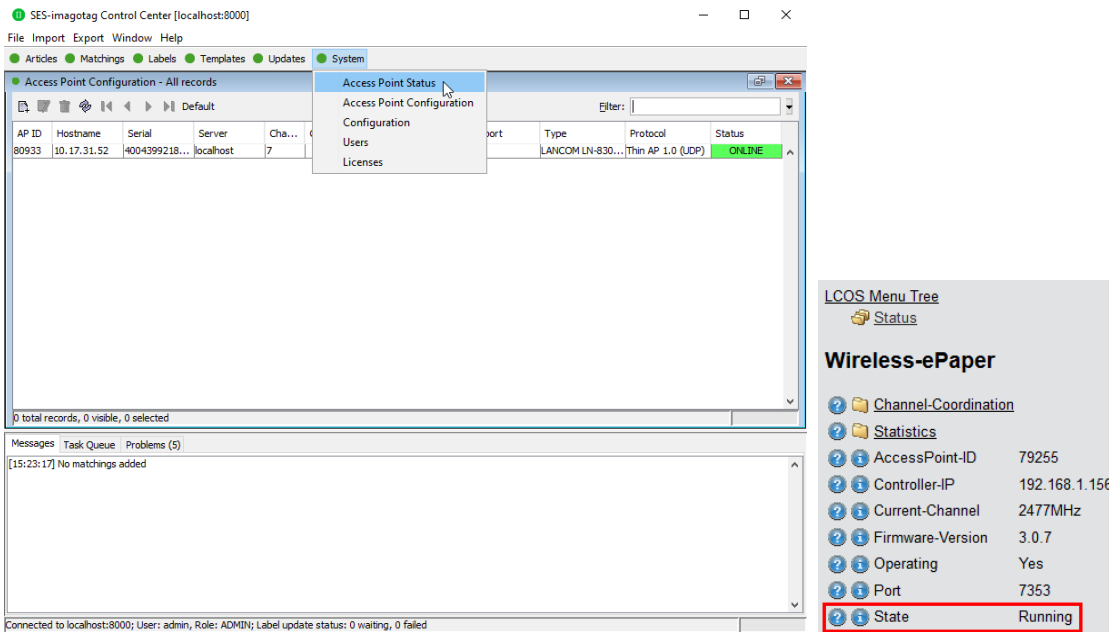
FIGURE 1-22: Access point and Wireless-ePaper status changes

7.2.8 Automatic channel selection

If you don't want the access point(s) to decide the channels (*Automatic selection*) automatically an ESL channel must be selected on each access point in the network. There are 11 non overlapping

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ESL channels reserved for the communication with the labels. Five of these ESL channels do not interfere with typical Wi-Fi installations and should therefore be favored. These are the ESL channels 3, 5, 8, 9 and 10 and they should be selected if there is a Wi-Fi installation on the Wi-Fi channels 1, 6 and 11.

FIGURE 1-23: Visualization of ESL channels vs. Wi-Fi channels

Warning: Do not select the same ESL channel on two access points within one area. This will cause interferences and avoids labels from joining the network. The same ESL channel may only be selected on two access points if it can be guaranteed that every label is within the range of only one of these access points.

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8   Selecting channels

For a working installation an ESL channel must be selected on each ESL access point in the network. There are 11 non overlapping ESL channels reserved for the communication with the labels. Five of these ESL channels do not interfere with typical Wi-Fi installations and should therefore be favored. These are the **ESL channels 3, 5, 8, 9 and 10** and they **should be selected if there is a Wi-Fi installation** on the **Wi-Fi channels 1, 6 and 11**.
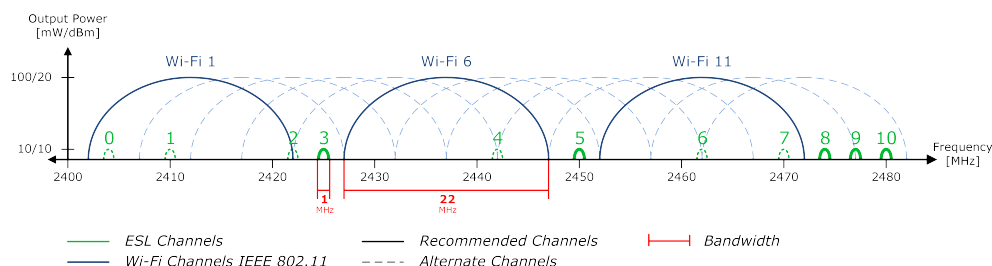
FIGURE 1-24: Comparison between common used Wi-Fi and ESL channels

If there is a Wi-Fi installation operating at 2.4 GHz (IEEE 802.11 b/g/n) or any other radio frequency (RF) technology that uses the 2.4 GHz ISM band make sure to select the ESL channels that are least overlapping with the existing installation. If there is no ESL channel without any overlapping both the ESL and existing installation should still work but there might be a reduced overall speed in both installations.

Warning: Do not select the same ESL channel on two access points within one area. This will cause interferences and avoids labels from joining the network or being updated. The same ESL channel may only be selected on two access points if it can be guaranteed that every label is within the range of only one of these access points.

9 Setup Security

The security concept is based on individual registration codes for each label. Not only that the new concept simplifies installations, it also provides stronger encryption and a secure key exchange with individual communication key derived from a user defined network key.

9.1 General encryption features and how does it work

- Solid improved safety
- Encrypted data type AES128 (Advanced Encryption Standard)
- User defined 128 bit network key for each installation
- Key is distributed to labels automatically

The system requires a user defined 128 bit network key for each installation. The key is derived from a passphrase that is defined by the customer and stored in the SES-imagotag Core Service and used by all ESL access points connected to that SES-imagotag Core Service to encrypt data communication to the labels.

A per-label communication key is transmitted to the labels during the registration of them. Each label is assigned an individual registration code (it combines label ID and PIN code and it's an alphanumeric case-sensitive code with 11 characters). The SES-imagotag Core Service will than automatically start the key exchange with the label secured by the PIN extracted from the registration code.

9.2 Set the encryption key

First step is to set the parameter "encryptionPassphrase" under System – Configuration (you can choose the encryption passphrase on your own).
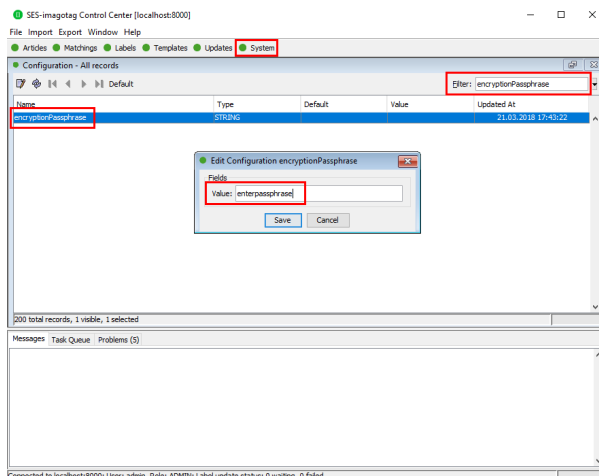
FIGURE 1-25: Set encryption key

Note: Do not change encryption passphrase if labels are already connected and encrypted (if you want to change the encryption passphrase you'll first have to unlock all labels – see *Troubleshooting* on page 40).

10 Register labels

In order that labels can join the network it is necessary to register them first.

10.1 General procedure

Via the SES-imagotag Control Center under File – Register Labels it's possible to register your labels manually with the registration code shown on each single label or you could import a CSV file with your registration codes.

Important Note: After the registration it could last a certain time until all registered labels are joined to the network (from 30 minutes up to two hours, depending on configured ESL channels). After this you can send images to each label (see *Start tagging* on page 31).
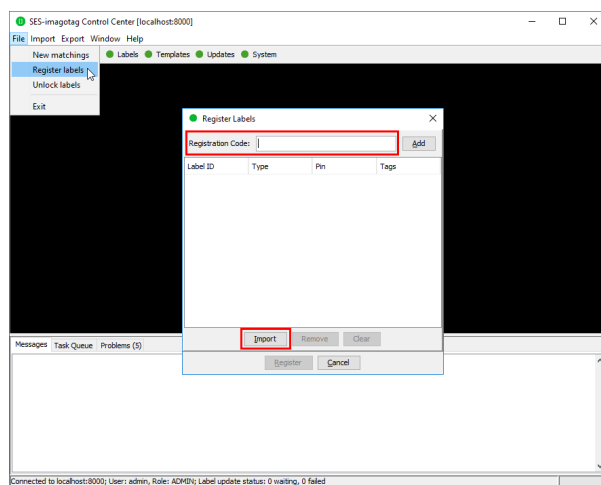
FIGURE 1-26: Add/Delete Label and refresh entries

10.2 What's on the label?

All labels will arrive with its registration code (11-digit alphanumeric) shown on the display of the label. The code is printed as a 2D QR code, as a 1D Code128 barcode and as human readable text. The registration process for the customer is easy – he has only to scan one of the barcodes. The SES-imagotag Core Service will than automatically start the key exchange with the label secured by the PIN extracted from the registration code.

The two relevant codes:

1. The **label ID (8-digit hexadecimal)** to identify the label (it's also the radio address which is similar to a MAC address).
2. The **registration code (11-digit alphanumeric)** is required to activate the encryption. This code also contains the label ID and a random PIN code.

10.2.1 Registration page vs. Reset page

The sticker (on the bottom and on the back) always contain only the label ID and therefore should not be used for registration if the encryption will be used. They are only intended for the later article assignment (matching process).

Here you can see the registration dialog in the SES-imagotag Control Center where one single label has been entered with the registration code (Pin = yes - security enabled) and the other one with the label ID (for old label versions < 3.0.0, Pin = no, no secured communication).

FIGURE 1-27: Register labels dialog (registered with registration code and label ID)

Note: New versions of the SES-imagotag Core Service, SES-imagotag Control Center and AP-2010 (≥ 1.3.0) will also support old labels that do not come with a pre-programmed PIN code. New labels (≥ 3.0.0) will also work in old installations together with old labels but the SES-imagotag Core Service will not accept registration codes during the registration process. To register the labels it is required to scan the barcode with the label ID from the backside or the bottom edge of the label. As the SES-imagotag Core Service will not start the key exchange all data is transmitted unencrypted to the labels.

10.3 Handheld terminals, USB barcode scanner and SES-imagotag Core Service iOS-App

It's also possible to register labels with a commercial USB barcode scanner (2D/1D). You can also use the SES-imagotag Core Service iOS-App (for iPhone and iPod touch [only available on request]).

Handheld terminals are mobile devices that are used to manage the ESL installation. If the handheld provides a barcode scanner, it may be used easily to link articles and labels by scanning the article barcode (usually EAN, UPC or GTIN) and the unique ID of the label.

Here you can see some screenshots of our SES-imagotag Core Service iOS-App:
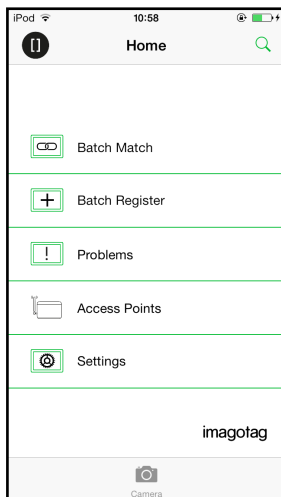
FIGURE 1-28: ESL-App Home-Screen
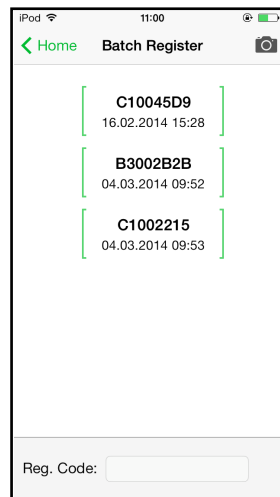
FIGURE 1-29: ESL-App Registration Page
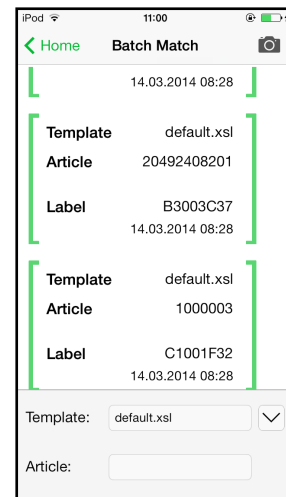
FIGURE 1-30: ESL-App Matching Page

10.4 Encryption status

Here are the encryption status a label could have:

- **AES:** Communication with label is encrypted with 128 bit AES
- **No PIN:** Could not set encryption key as no PIN (registration code) was provided
  - Solution: Re-register label with registration code
- **Key unset:** Communication is NOT yet encrypted
  - Solution: Set encryption passphrase and ping the label to start the encryption process
- **Unsupported:** Encryption is not supported by label firmware
- **Unknown:** Security status is not determined yet

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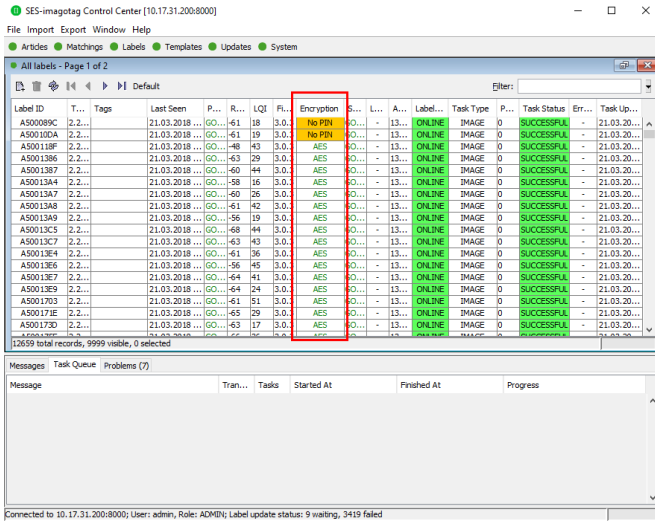
FIGURE 1-31: Encryption status

10.5 Unlocking labels

If the label was registered and a communication key was set it will no longer work in other networks using a different network key passphrase. To unlock this labels for other networks an unlock code is required. The unlock code is similar to the registration code - it is a combination of the label ID and a 128 bit PUK code.

Via SES-imagotag Control Center select **File – Unlock labels** and enter the unlock key.
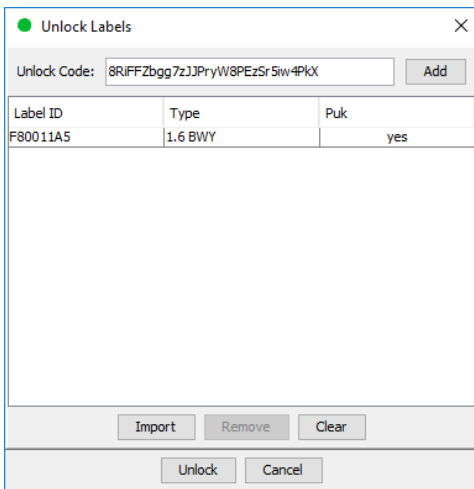
FIGURE 1-32: Unlock Labels Dialog

11   Start tagging

11.1   What can I do now?

As soon as labels are online you can do several things:

Send images to labels, assign tags, show the current images, ping labels, reset labels (reset display to show label ID and label ID barcode), refresh displays, switch to a preloaded page, create a new matching (or multi-matching/multi-facing), set (extended) filters, check update logs, ...

11.2   Sending pictures to labels

1. Right click on one or more labels -> Send image…
2. Select a picture (Note: Display size must match the resolution of the image)
   A. In the right pane, a priority (currently not relevant) could be set for the task, as well as the page to which the image should be sent and whether the image is preloaded.
   B. If preloaded, the image is placed in the memory of the label, but not yet displayed. The image change will only be performed after the change to the relevant page. This allows for each label that images are cached on the various pages and be accessed quickly by switching to the relevant page.
3. By clicking on "open" the corresponding task(s) for the label(s) will be created and the transfer begins.

11.3   Article management

For complete management of your articles select **Articles – All Articles** in the SES-imagotag Control Center. Here you're able to create/delete and edit your articles.

The Smart Box Package comes with some predefined articles which you can see here. You can add some more demo articles, edit the existing ones or just step further to the next point Matchings.
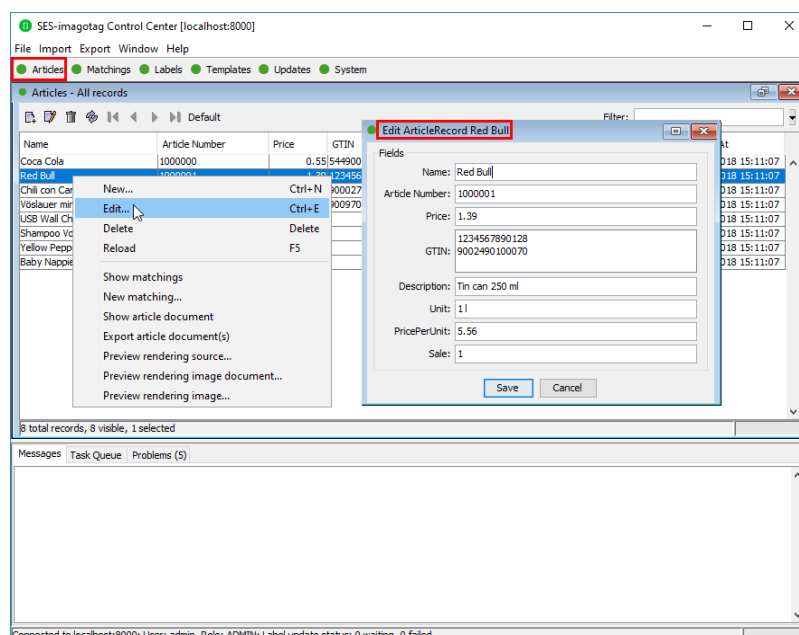
FIGURE 1-33: Article management

11.4 Matchings/Multi-Facing

The logical link between articles and the label that shows the article information and price of this articles is called matching. With a matching the layout of the image rendered for the label is also defined by specifying the name of a template.

In a more technical way a matching is the triple of:

- Label ID
- Article number(s) or GTIN
- Name of the template file

Note: Only one matching per label is allowed but articles may be matched to more than one label.

Select File – New matchings to open the dialog where you can select the desired data records and create a number of matchings at the same time. To generate a multi-matching, multiple article numbers separated with a comma have to be specified. Keep in mind that your template has to be able to render a image for multiple articles.
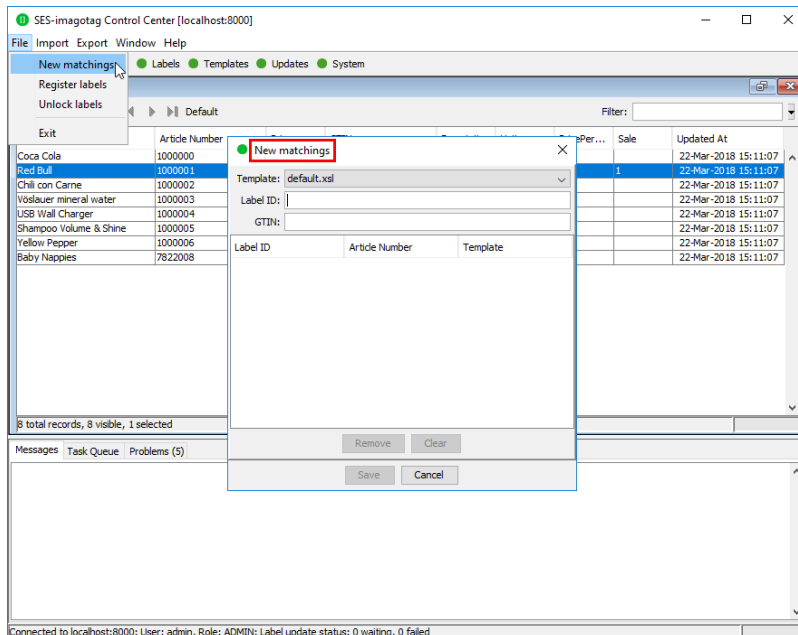
FIGURE 1-34: New matchings dialog

Another way to create/edit matchings is under "*Matchings – All Matchings*":

- Select the desired data records (Label ID, Article Number) in the following window "*New Matching Record*" (either manually or with the magnifying glass symbol). Select an appropriate template via "*Template*" that should be used to generate the image.
- Confirm your choice by clicking Save. After that, the generated image is sent to the selected label.
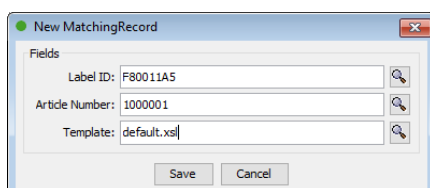
FIGURE 1-35: Create a matching

It's also possible to create Matchings with SES-imagotag Control Center under Labels and Articles, for this just select the desired article or label, right-click on it and select "New matching…" (the new matching dialog will be pre-filled with the article or label information).

11.5 Set (extended) filters for enums

There are various filter options. Besides the known filter options you'll now have the possibility to set extended filters. Enable/disable the extended filter as shown in image below.

FIGURE 1-36: Use and enable the extended filter mode

With the extended filter options it's possible to set and combine several filters. Click on the drop down menu to see the different choices.

FIGURE 1-37: SES-imagotag Control Center extended filter options

11.5.1 Extended filter operators

The following operators are available:

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Operator	Description
<	Less than
>	Greater than
<=	Less than and equal
>=	Greater than and equal
!	Negation (Not)
=	Equals
:	Defines a range (e.g. RSSI filter -65:-75 shows all labels with current RSSI value within -65 and -75) Doesn't apply to date and text.

12 Templates

The template is used to specify the fields, which should be rendered into the image. The SES-imagotag Core Service can handle multiple templates.

12.1 General information about templates

The image rendering process is based on XSL (EXtensible Stylesheet Language) templates. The individual image for the label is then generated by applying the template to a XML, which is based on the properties of the label and is expanded by a custom XML from the user.

The following steps are executed when processing a template:

- Generating a record XML based on the label/task information and custom information provided by the user
- Applying the template (XSL) on the generated record XML. This results in a document containing the fields, specified in this reference and values referenced from the XML
- Rendering the image (*.PNG) based on the previous output

FIGURE 1-38: Input and result of the rendering process

12.2 SES-imagotag Template Editor

In order to use our rendering engine you must know our template language which is basically XSL. We do also have a SES-imagotag Template Editor with live preview, but you need a little bit time to setup everything and get familiar with it. Therefore we suggest to send pre-rendered images to labels (right-click on a label -> send image) which you can create with every image manipulation software you want (e.g. Gimp, Photoshop, Paint, …). You can even take some pre-rendered images from us for each label type with the correct resolution as a template – you'll find some in the SES-imagotag Control Center's directory under data/images.

12.2.1 Starting SES-imagotag Template Editor

Navigate to the unpacked SES-imagotag Template Editor (see point *Get the latest software and documentation* on how to unpack the software package) and execute the "template.jar" file (see *Troubleshooting* on page 40).
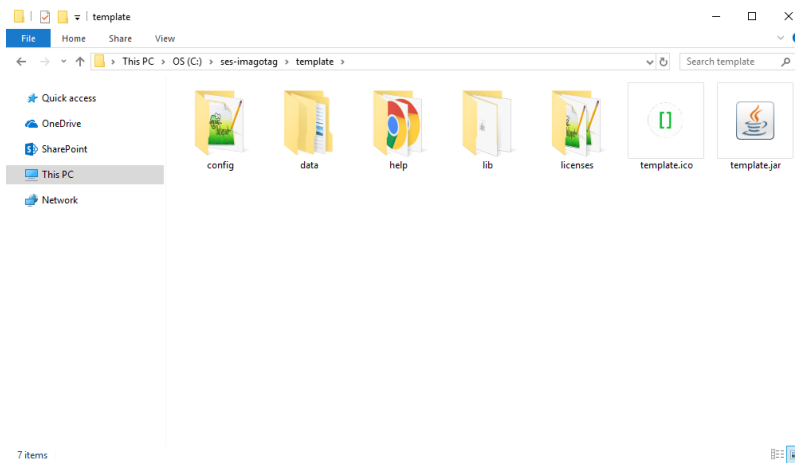
FIGURE 1-39: Starting the SES-imagotag Template Editor

12.2.2 Open default template file and load records from server:

- Open the SES-imagotag Template Editor by clicking the "template.jar" file located in the template-directory (In our example it should be C:\imagotag\teamplate\).
- Next step is to create a new template file or to open an existing one (The default.xsl template file is located in the server-directory under C:\imagotag\server\data\template\).
- To get a live preview you'll have to load some records, in our case we load the demo article records from our running server, see the following figure.
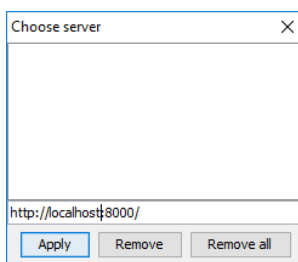
FIGURE 1-40: Load Records from Server

After these steps your SES-imagotag Template Editor window should look something like this:
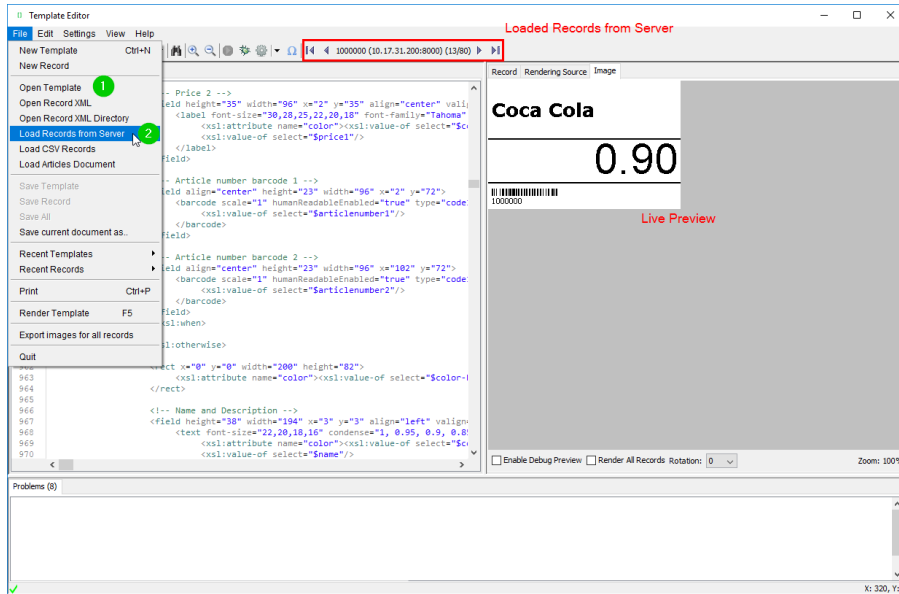
FIGURE 1-41: SES-imagotag Template Editor with loaded records from server and default.xsl template file

12.2.3 Design Mode

You can enable the graphical mode of the SES-imagotag Template Editor by selecting **Settings – Configuration** – tick **Enable Design Mode** and finally the Save-button. The Design Mode can be used for creating very simple templates. If you want to use for example conditions in your template, you cannot use the design mode and you should start from zero without the design mode of the SES-imagotag Template Editor.
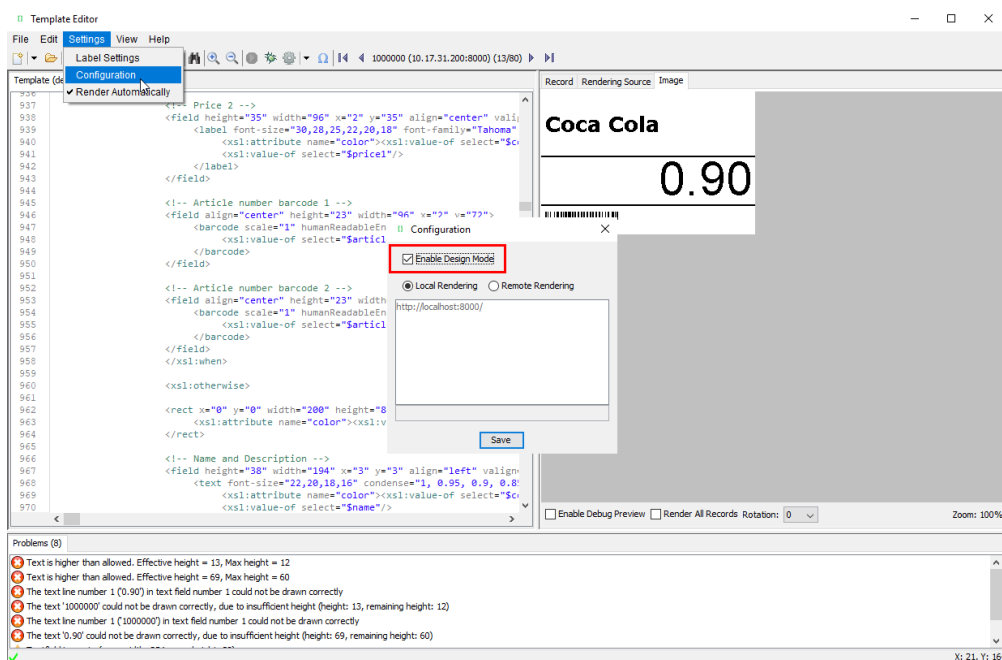
FIGURE 1-42: Enable Design Mode in SES-imagotag Template Editor

After enabling the Design Mode a new tab will show up.
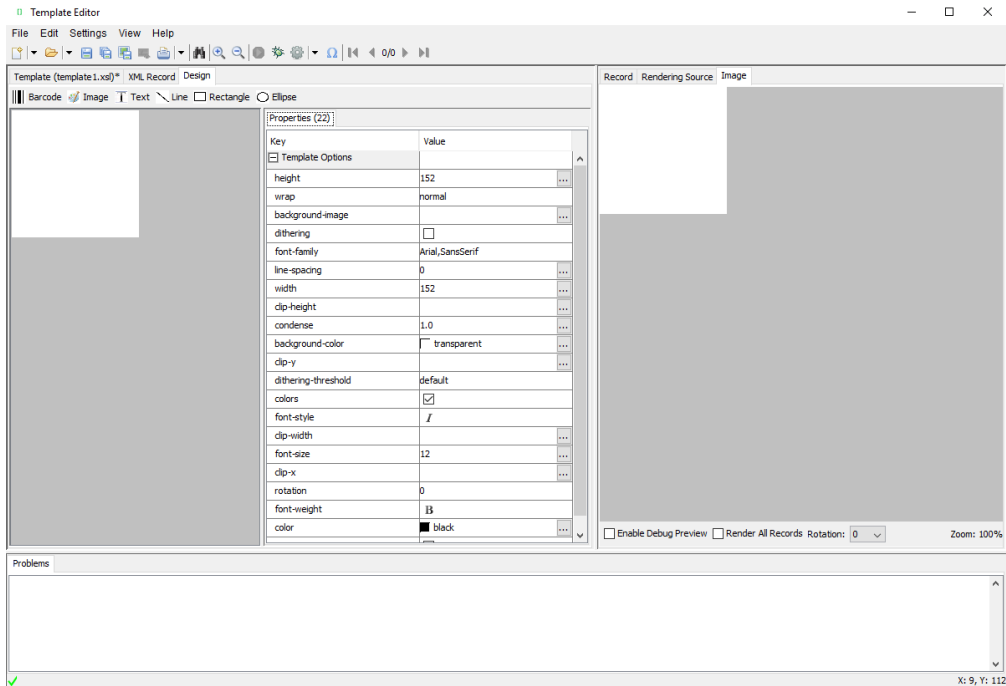
FIGURE 1-43: SES-imagotag Template Editor Design Tab

12.2.4 Enable and show color red

As there are label types which are capable of showing the color "red" there's a short description how to enable this inside the xsl template file.

- *Optional: Query whether it is a "red" label*
  - `<xsl:when test="Label/DisplayWidth = XXX and Label/DisplayHeight = XXX and Label/DisplayColors = 'BLACK_WHITE_RED'">`
- Add colors option to image tag:
  - `<image width="XXX" height="XXX" colors="true" font-family="XXX">`
- Show something in color red, e.g. text:
  - `<text font-size="XXX" condense="XXX" font-weight="XXX" color="red">`

12.2.5 Help Content

There's a link to the Help content for the SES-imagotag Template Editor, open it by clicking Help – Help Content in the SES-imagotag Template Editor or open the file *index.html* located in C:\imagotag\template\help\.

Also you can find further information on the USB Stick under **Documentation - Image Rendering Reference**.

13 Integration

13.1 Webservice integration

The SES-imagotag Core Service provides access to its interfaces methods through a RESTful web service API. The web service is designed according to the "Representational State Transfer" (REST) architectural pattern.

The SES-imagotag Core Service listens for incoming HTTP web service requests on the TCP port 8001 by default.

You can find further information and documentation about the webservice integration online under https://portal.imagotag.com/get/documentation

13.2 Plugins

We provide several plug ins which are used for importing article information into the SES-imagotag Core Service.

You can find further information and documentation about our integration plugins online under https://portal.imagotag.com/get/documentation

13.3 Custom integration

For custom integration we provide a Plugin-Interface. Software development service is available from SES-imagotag software development team or third-party integration partners.

For pricing get in touch with our sales team (sales.at@ses-imagotag.com).

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14 Troubleshooting

If you run into any errors during connecting or sending images to labels, please refer to the documentation included in the SES-imagotag Core Service. This documentation can be found in the AP-2010 web UI of the SES-imagotag Core Service under "Documentation".

- For problems updating the labels (error code column in labels window) refer to "Update Error Codes" or (task status column in labels window) refer to "Task Status"
- For connection status problems refer to "Connection Status"
- For label hardware errors (label error column in labels window) refer to "Label Error Codes"

Code	Problem	Solution
1	Label not licensed	The label is not licensed. Import the proper license file for the label or check for typos in the label id.
3	Label not registered	The label may have been deleted or has never been registered at all. Register label.
10	Image does not match display size	The size of the image does not match the label's display size. Please check the width and height of your image and look up the display size in pixels for the label. These sizes have to be equal.
11	Error during image rendering	Check template (wrong or faulty)
12	Error during image conversion	Change format of the image to standard format (e.g. PNG or BMP)
13	Invalid page	Page not supported by label type, choose a different page
14	Could not process task because there are unfinished tasks waiting for this label	Abort task or wait until unfinished tasks are finished
20	Template not found	Check template directory for missing template file
21	Error during template parsing	Correct template file (Invalid content found)
22	Error during content document creation	Check server and article record configuration
30	Could not send update because label has insufficient power to perform the update	The power status of the label is "Bad", which means it is very low on battery that in may not accomplish the display update. Replace the battery of the label.
62	HTTP communication error with the access point	The server was not able to send the task to the Access Point. Please make sure that the Access Point is not offline (System -> Access Point Status) and there is an established network connection between Access Point and Server.
63	Label authentication failed (wrong encryption key)	Unlock the label
64	Task was removed from pipeline because previous transmission was not finished in time	Resend the corresponding task(s)
80	Error while writing task to database	Check database connection
92	Task type not supported	Upgrade AP software to process this kind of task

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14.1   SES-imagotag Core Service Dashboard

To get a better overview accross your complete ESL system you can use the dashboard of the SES-imagotag Core Service. All kind of helpful information is shown here. You'll find the dashboard under **http://<core-service-ip>:<port>/service/dashboard.xml**
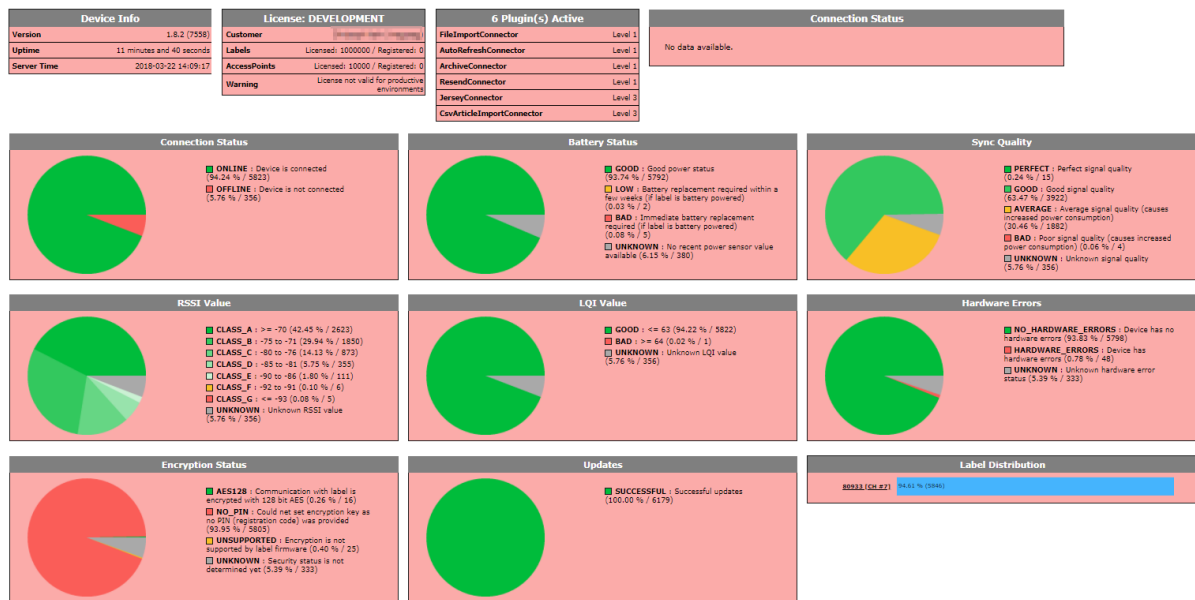
14.2   Running the SES-imagotag Core Service as a background service

The SES-imagotag Core Service may be started as a normal application, but on a productive system it is usually required to have it automatically started without a user logged in. To achieve this the SES-imagotag Core Service can be registered as a Windows service. It is than started automatically without any graphics user interface.

To install the SES-imagotag Core Service as a Windows service the batch file **install_service.bat** is provided. If this file is executed with administrator privileges (Right click – Run as Administrator) it will install the SES-imagotag Core Service installation from the same directory as a Windows service with the name ESL_SERVICE.

The file uninstall_service.bat will remove the Windows service if executed with administrator privileges.

If you have any problems regarding the background service:

- Check if you have installed the correct JAVA version corresponding to your system (x86/x64)
- If the SES-imagotag Core Service is already installed as a Windows service you have to uninstall it first (uninstall_service.bat) and reinstall it again (install_service.bat).

14.3   Where can get a demo/development license key?

Ask the support.at@ses-imagotag.com or sales.at@ses-imagotag.com team for a demo/development license.

14.4   Deleting the demo articles

In order to prevent the example articles from being re-added to the server, go to "System -
Configuration" and set the "importFixtures" variable to false. Note: Please do not use the "Smart Box
Package" for productive installation.

14.5   Establish a network configuration when no DHCP is available – Step by step

1. Set a laptops Ethernet adapter to DHCP
2. Turn off all other network adapters (Wi-Fi)
3. Connect to the same network as the AP-2010 (use a common Ethernet cable to connect your
   device directly with the AP-2010)
4. Start local SES-imagotag Core Service on laptop
5. Use the SES-imagotag Control Center to connect to your local SES-imagotag Core Service
6. Under System – Access Point Status – the AP should be listed as discovered (after successful
   boot sequence – may take up to 2 minutes)
    - Press F5 on your keyboard or the refresh button in the ESL client to refresh the access
      point status (the Client doesn't refresh the status automatically!)
7. One Column of the AP should now show the IP address
8. Open a browser, type in http://<discovered-ip>:8080 or
    - at the SES-imagotag Control Center perform a right click on the discovered access
      point – Open in browser – Maintenance – Status

Note: Restart your access point if discovering process takes more than 2 minutes.
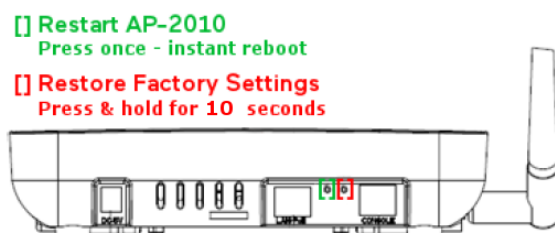
FIGURE 1-44: Restart and Factory Defaults button

14.6   Access point discovering with Bonjour Services

You still got problems to find your ESL access point in your network? There's another workaround:
You can use Apple's "Bonjour Print Services".

Download and install "Bonjour Print Services" for Windows (pre-installed under OSX):

http://support.apple.com/kb/DL999

Note: After installation there's no reboot required.

If the access point is connected directly to the system where the "Bonjour Service" is installed (or on a
network with running "Bonjour Service") you can find the access point by typing the following in the
browser of your choice:

http://ap-<ID>.local:8080 (e.g. http://ap-12724.local:8080)

Note: You can reach older versions of the AP with http://imagotag-ap.local:8080 (custom hostnames
are only available on newer versions of the access point)

14.7 What can I do if the Status LED of the AP-2010 access point doesn't turn blue?

- Check the access point status
- Check the access point configuration
    - No channel set
- Check network reachability of the access point
- Is the access point registered to the SES-imagotag Core Service?
- Reboot the access point

14.8 Labels don't come online

After the registration it could last a certain time until all registered labels are joined to the network (up to two hours, depending on number of access points and the channels used.

- Up to 30 minutes with channels 3, 5, 8, 9 and 10
- Up to 2 hours with channels 0, 1, 2, 4, 6 and 7

Warning: A label must not be registered to multiple SES-imagotag Core Service installations at the same time. It will only connect to one of this installations.

14.9 The encryption does not work

Check the encryption passphrase via the SES-imagotag Control Center - System – Configuration.

If label was already registered with a different passphrase you'll have to unlock the label first in order to register it on the SES-imagotag Core Service.

14.10 Unlocking labels

If the label was registered and a communication key was set it will no longer work in other networks using a different network key passphrase. To unlock this labels for other networks an unlock code is required.

Select **File – Unlock labels** and enter the unlock key.

If you have any problems (the unlock code wasn't included or you can't find it) please contact the SES-imagotag Support Team (support.at@ses-imagotag.com).

14.11 Starting Java applications

Before starting a Java application, make sure you have Java Runtime Environment Version 6 or higher installed and you have set the necessary environment variables.

If the .jar file extension is known and associated with Java, just double-click the jar file to start the application. Otherwise if the extension is not recognized:

Windows:

Create a shortcut of the jar file, right-click on it and open properties. Prepend "javaw.exe –jar" to the path in the "Target" field. Double-click the shortcut.

Linux:

Navigate via command line to the directory where the jar file lies and execute "java –jar <filename>.jar"

In case your environment variables are not set properly (e.g. javaw.exe/java command could not be found) do the following steps:

1. Locate your installation directory of your Java Runtime Environment
2. Set JAVA_HOME Variable

Under Windows:
- Right-click on "**My Computer**" and select "**Properties**"
- Click the **advanced** tab
- Click the "**EnvironmentVariables**" button
- Under "**SystemVariables**", click **New**.
- Enter the variable name as **JAVA_HOME**
- Enter the variable value as the installation directory of your Java Runtime Environment
- Click **OK**
- Look for the Path variable in "**SystemVariables**" and edit it
- Append a semicolon (;) and %JAVA_HOME%\bin to it
- Click **OK**
- **ApplyChanges**

Under Linux:
- Use the "export" command to set your variables
- **export JAVA_HOME=<pathToJRE>**
- **export PATH=$PATH:<pathToJRE>/bin**
- In order to make these changes persistent, write them into your .**bash_profile** file and use "source ~/.bash_profile" to apply the changes

14.12 Encoding problems

Per default, UTF-8 encoding is used. If you have any problems regarding encoding you can force any java application to use UTF-8. By setting the (Windows) environment variable **JAVA_TOOL_ OPTIONS** to **-Dfile.encoding=UTF8**, the (Java) System property will be set automatically every time a JVM is started.
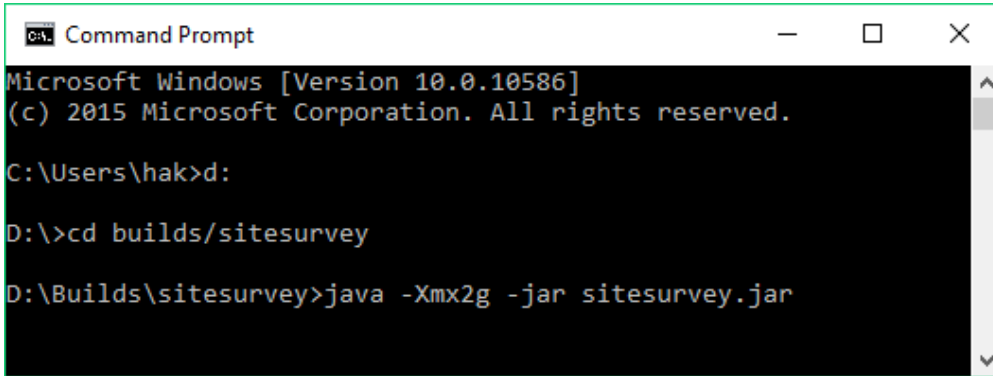
14.13 Reserve RAM for Java heap space

As the generation of PDFs in the Site Survey Tool might need a lot of memory (depending on the amount of measurements, uploaded pictures, …) we recommend to use half of the available memory for the Site Survey Tool.

In this case, please start the Site Survey Tool via Command Line (or create a corresponding shortcut respectively batch file) with corresponding parameters.

If your notebook has 4 GB RAM, please reserve 2 GB for the Site Survey Tool with following command:

D:\Builds\sitesurvey>java -Xmx2g -jar sitesurvey.jar

```
Command Prompt                                    —    □    ×

Microsoft Windows [Version 10.0.10586]
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C:\Users\hak>d:

D:\>cd builds/sitesurvey

D:\Builds\sitesurvey>java -Xmx2g -jar sitesurvey.jar
```

Example:

- m for megabyte
  -Xmx512m

- g for gigabyte
  -Xmx2g

The same method can be used to reserve memory for the SES-imagotag Core Service.

Detailed information regarding JAVA options: https://docs.oracle.com/cd/E13150_01/jrockit_jvm/jrockit/jrdocs/refman/optionX.html

14.14 Further documentation

Please visit https://portal.imagotag.com for further documentation.