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Embedded Systems GmbH

**Getting started
Real Estate Portal IRIS
User manual and features**

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Getting started in four steps:

①.

Setting up the terminal

②.

Introduction of Real Estate Portal IRIS

③.

Working with existing digital contents

④.

Miscellaneous



1.

Installing the terminal

- A terminal consists of hardware and software components:
 - IRIS display terminal
 - Android OS version 4.0.4 with default configuration files
 - Graphical user interface application (Carousel APK)
 - Terminal control and monitoring application (Wave5CTRL)
 - Optional set of configuration files

A fully equipped terminal will automatically boot Android after being powered on and automatically run the Carousel APK and Wave5CTRL applications after operating system has been started.

Each terminal system interacts with the following software components:

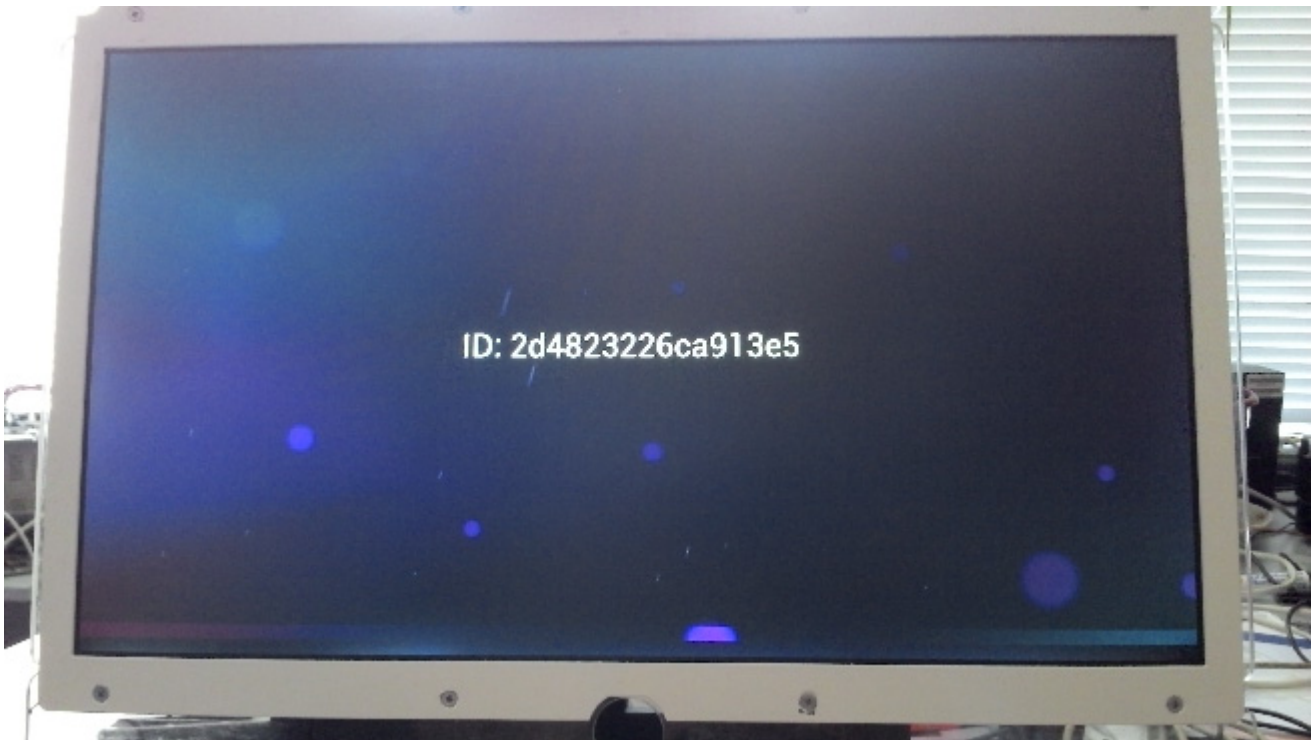
- centralized database system, storing information on all available offers
- web application offering access to this centralized database system
- web application offering user interface for creating/modifying terminal system configuration files
- mobile phone application allowing to export information collected on the phone to the centralized database
- web application offering import of OpenImmo real estate data
- GUI tool for automating configuration changes and configuration updates

1.1 Android OS version 4.0.4

Terminals come with preinstalled Android ICS built for Telechips microcontroller TCC8920. It is a standard Android build with the following extensions:

- Dedicated driver for brightness control (using TCC PWM module)
- Dedicated driver for camera module and v4l layer driver

Each terminal has a unique identifier assigned to it, that can be used to identify and address the terminal, modify its configuration and assign/request data for it.



Terminal identifier is shown by the Carousel GUI application when it is started (Identifier is shown only when Carousel application is started and there are no configuration files available). Once this identifier is shown, a system administrator (user) should log in with his credentials to configuration site available at:

<http://www.wave-five.com/cnfms/>

and register the terminal. After a terminal has been registered, a default configuration will be created for it and downloaded automatically to the terminal device.

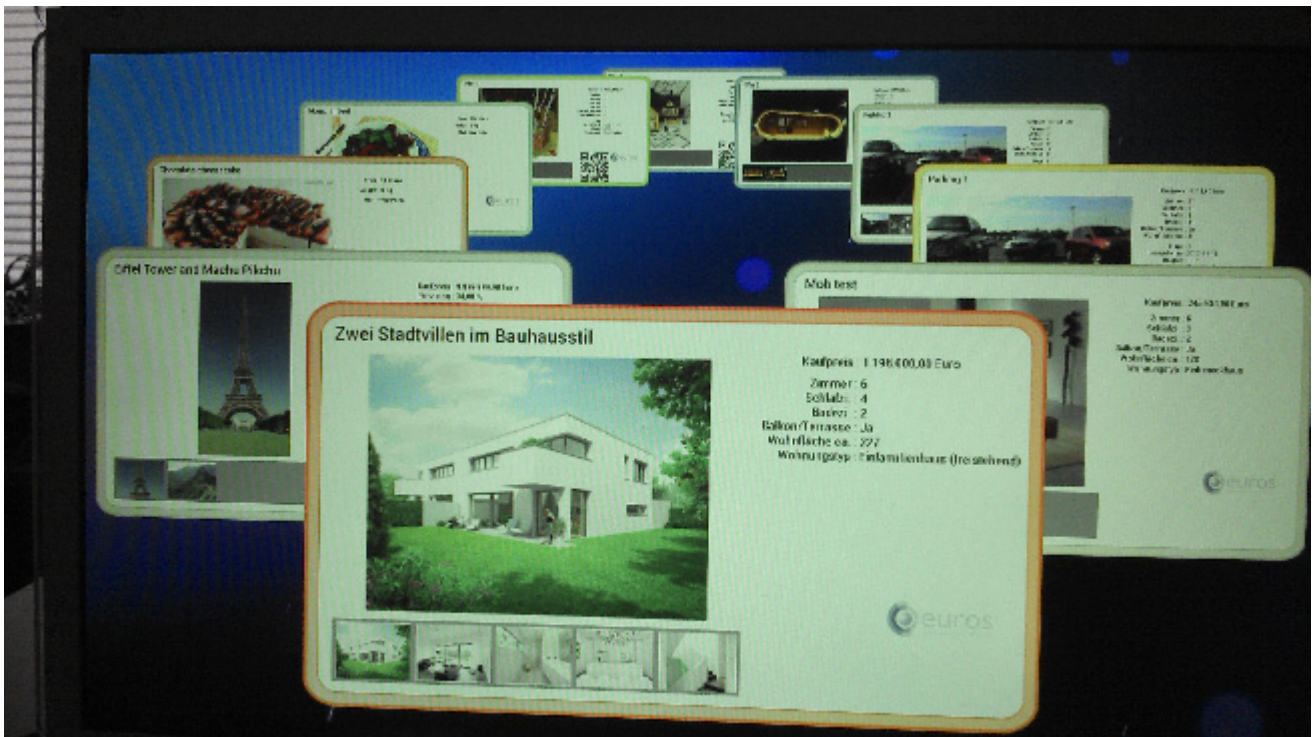
Note: Terminals delivered with standard configuration inside will not show this message at startup. The idea of this message is to assign system administrators into registering the terminals for a first time.

Normal users are not expected to see it or make use of this feature.

1.2 Graphical user interface application

Graphical user interface application is essential for providing terminal services¹. It is responsible for:

- Display of available digital contents in user-friendly way (e.g. as carousel)
- Download and regular update of available information from centralized database
- Download and update of configuration files from centralized configuration database
- Automatic (or manual upon request, when there is a keyboard available) change of displayed items and navigation between their visual elements (detailed pictures)



A carousel type of graphical user interface application is started automatically upon system boot and remains active as long as the terminal is running. In case of a problem (for example software exception or power failiure) the application is automatically re-stated to ensure that there is always an active carousel application running in full-screen mode.

1. Herein “terminal services” refers to showing digital contents in a structured way and updating it regularly

1.3 Terminal control and monitoring application

Terminal control and monitoring application is running in the background (without accessible visual elements). Primary responsibilities of this application are:

- Continuously monitor the system temperature and in case it reaches pre-defined boundaries to try to decrease it by reducing brightness of the screen.
- Check regularly for available updates for Carousel application (and install them when available)
- Check regularly for available updates for control and monitoring application (and apply them in case they are available)
- Report temperature and usage statistics to a centralized database system
- Check if the Carousel application is running and restart it if necessary



Monitoring and control application makes use of temperature and brightness sensors to read information about system status and take corrective actions if necessary.

When temperature rises above a dangerous level (configured in a XML file) then monitoring and control application starts to reduce screen brightness (steps can be configured also in the XML file, but default step is to reduce/increase current level by 5%).

1.4 Default set of configuration files

Prior to its delivery to a customer a terminal system has to be configured. This section gives a short overview of the configuration files, their structure and default values.

1.4.1 Configuration of Carousel application

Carousel application reads the basic user configuration from XML files during its initialization. There are four XML files which determine the particular configuration and they are described below in this document. All of the files are stored on the Android device in `/sdcard/demo/` directory

- **config.xml** - the main configuration file

`<DeviceName>` element which contains the name of the device. It is reserved for future use.

`<RequestInterval>` time interval in seconds for checking new/updated digital contents in the database. If this element is missing or not set properly, then the default interval will be set by the application (60 seconds).

`<ActiveFilterSet>` name of a filter from `filters.xml` which determines the digital contents from the database to be loaded in the carousel.

`<ActiveCommandSet>` name of a command set from `commands.xml`. The selected command set controls the carousel actions.

`<Path>` sets the name of the trajectory of the carousel. The application searches the particular trajectory in `trajectories.xml` and if it is not found the application calculates the coordinates. So far there are three types of trajectories: "horizontal", "vertical" and "oval". If the trajectory is not set, then the application accepts the default trajectory - "horizontal".

`<DeviceID>` is the identifier of the particular terminal. It is set automatically from the carousel application.

- **commands.xml** - contains command sets for control of the carousel

`<CommandSet>` every element of this type collects sufficient description of commands to determine the behavior of the carousel. It has one attribute called "name" that identifies the command set. The content of a command set might be elements which refer to particular commands. The supported commands are:

- *Repeat* (has attribute "count" that defines the number of repetitions)
- *Wait* (has attribute "value" which determines the wait time in milliseconds)

- *Enter*
- *TurnRight*
- *TurnLeft*
- *GoBack*.

Example contents of commands.xml:

```
<?xml version="1.0" encoding="UTF-8"?>
<Commands>
<CommandSet name="demo">
<Repeat count="inf"><Wait value="4000" />
<Enter /><Wait value="5000" />
<Repeat count="[count]-1">
<TurnRight />
<Enter /><Wait value="3000" />
</Repeat>
<GoBack /><TurnRight />
</Repeat>
</CommandSet>
<CommandSet name="demo3"><Repeat count="inf"><Wait value="2000"/><TurnLeft /></Repeat></CommandSet>
</Commands>
```

- **filters.xml** - contains filters of offers

<FilterSet> is the main element in filter.xml. There can be more than one element from this type. The content of FilterSet should be sub-elements of type FilterGroup.

The attribute "maxcount" stores the maximum number of digital content items which can be loaded in the carousel.

The attribute "name" identifies the particular FilterSet.

The attribute "logic" sets the logic operation which will be applied for its sub-elements in the FilterSet to filter offers. The supported logic operations are "logical and" and "logical or".

<FilterGroup> set of simple sub-filters. FilterGroup has one property - "logic". It determines the logic operation to be applied for its sub-elements. Operations can be "logical and" and "logical or". Sub-elements of FilterGroup are:

- *AgentUserName*
- *Area*
- *Year*
- *Balcony*
- *ContactName*
- *City*
- *Type*.

All of them have one attribute called "cond" and their content is text. The sub-elements refer to fields in the database. The attribute "cond" sets the condition in the filter. The supported conditions are: "equals", "not_equal", "contains", "not_contain", "greater", "less".

The conditions are applied for the content of a sub-element of FilterGroup versus the values for a particular field in the database.

Example contents of filters.xml:

```
<?xml version="1.0" encoding="UTF-8"?>
<Filters>
<FilterSet name="test" logic="and" maxcount="8">
<FilterGroup logic="and">
<AgentUserName cond="equals">admin</AgentUserName><Year cond="greater">1999</Year>
</FilterGroup>
<FilterGroup logic="or">
<City cond="not_equal">Munich</City><Year cond="less">2013</Year>
</FilterGroup>
</FilterSet>
</Filters>
```

- **trajectories.xml** - description of the possible trajectories of the carousel.

If this XML file does not exist, it can't be read or its data is corrupted then the application calculates each coordinate of the selected trajectory.

<Path> element which describes one trajectory. It has two attributes - "name" and "width". There can be a third attribute called "default", but it is reserved for future use.

The attribute "name" identifies the trajectory.

The attribute "width" shows the width of the display in pixels for which the trajectory is calculated.

The content of a "Path" element are elements of type "Point" that determines the coordinates. Each Path should include exactly 361 "Point" elements (0-360 degrees). If their number does not reach 361, the particular trajectory is not valid and the application calculates the coordinates.

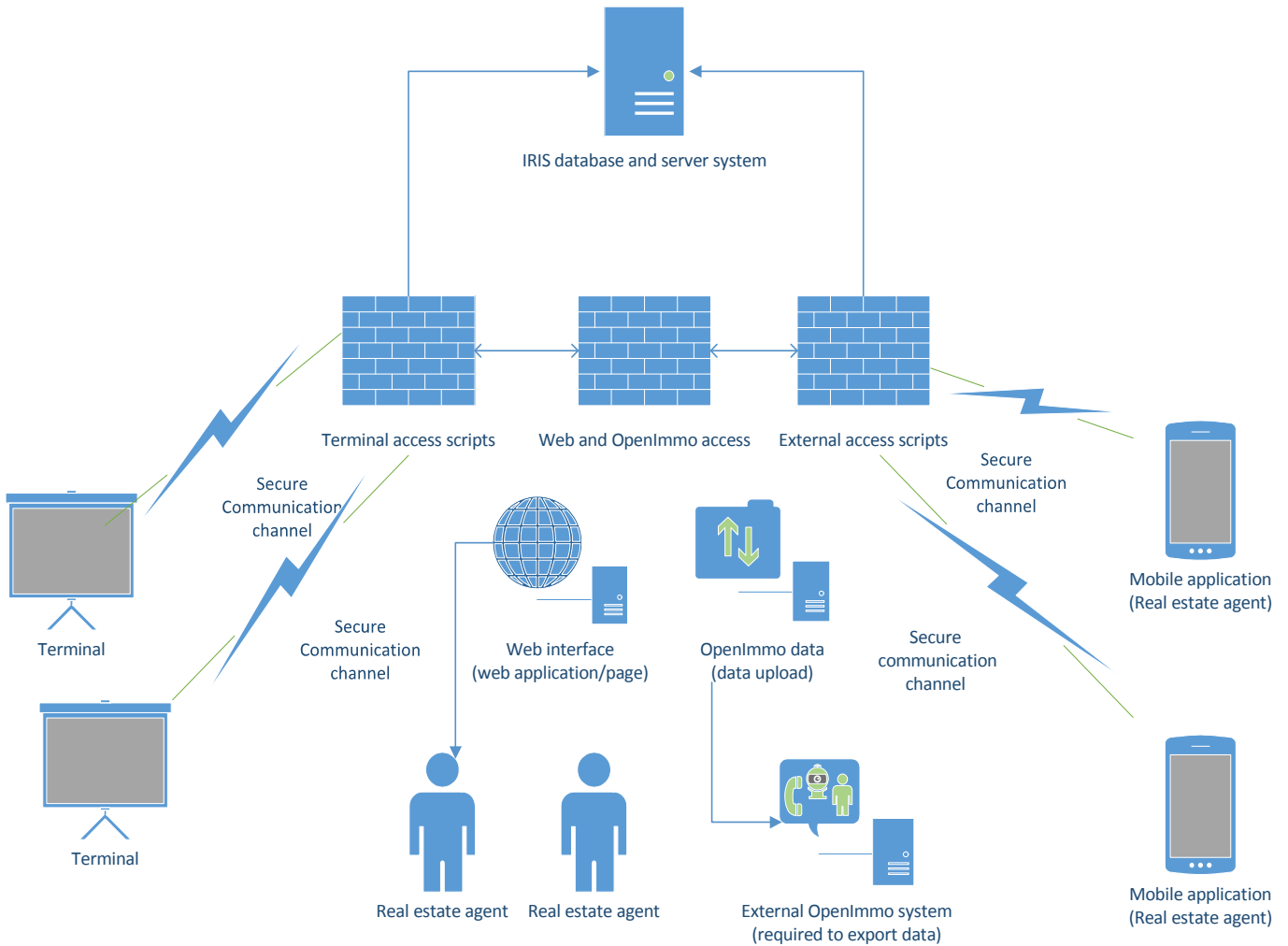
<Point> contains the coordinates (x, y, z) for an angle (0-360). A Point element has four attributes and no space. The first attribute is called "angle" and it stores the angle which coordinates are described by the other attributes. Only non-negative integer numbers are accepted for "angle". The other three attributes are the coordinates ("x", "y", "z"). They are read by the application as float numbers.



②. Introduction of Real Estate Portal IRIS

2.1 IRIS ecosystem

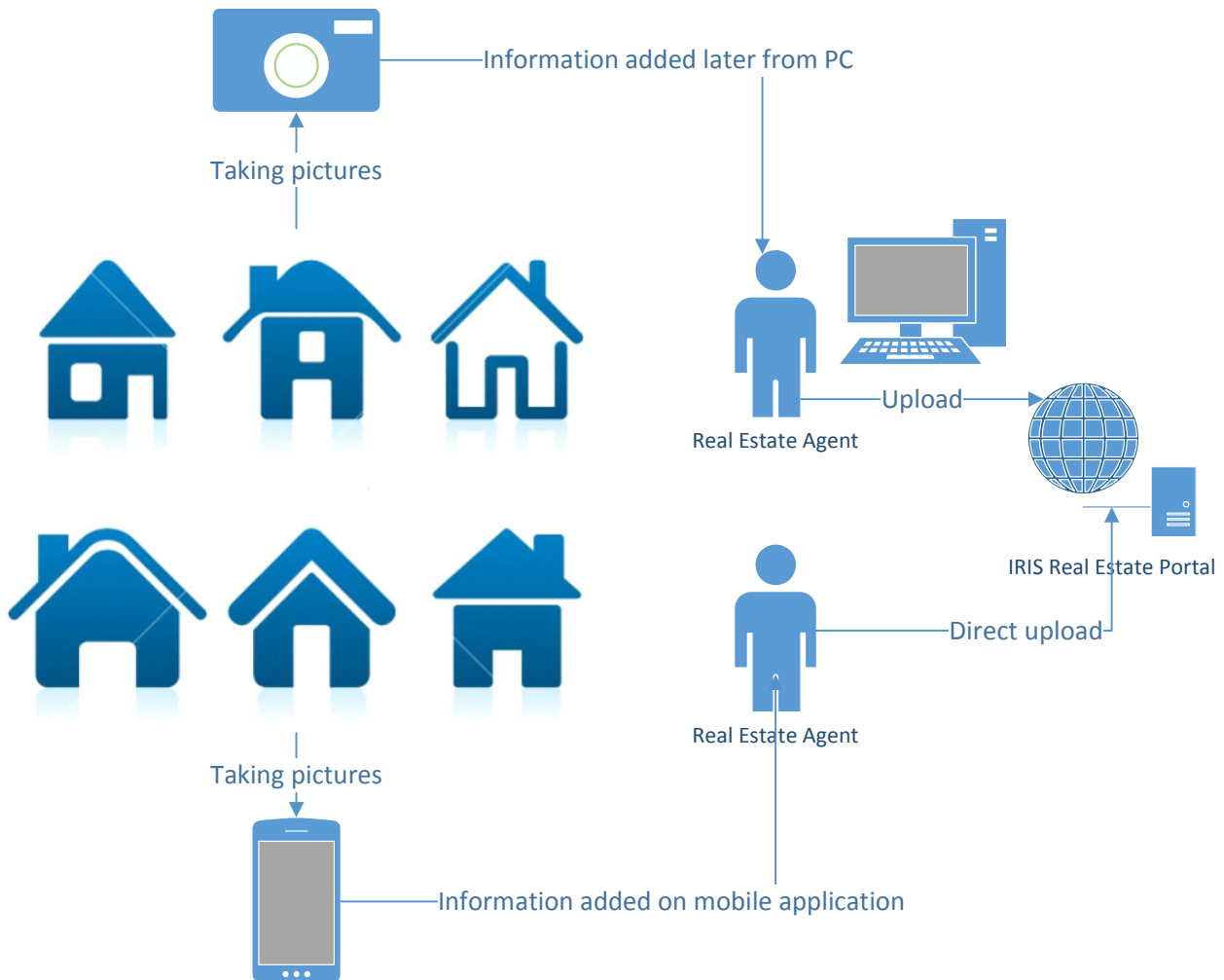
IRIS terminals are part of a larger ecosystem that includes database servers, web applications, data import interfaces and mobile device applications. Although a terminal can work as a standalone system, making use of its full potential requires to have a network connection and the ability to exchange information with other components as shown on the figure below.



Therefore a terminal should be configured to establish and use a secure communication channel to terminal access scripts. These scripts provide a secure access to IRIS database system. Web interface and OpenImmo import scripts interact also with the main database to ensure data integrity.

2.1.1 Creating digital content through web interface

The IRIS system allows to add and modify digital content (e.g. offers) and their properties through convenient web interface. In this case the process of adding offers is shown on the diagram below:



There are two possibilities to add information about a real estate offer:

- manually inserting the offer through web interface

In this scenario user needs to login on IRIS web page (www.wave-five.com) and fill-in offer description elements. Picture and video files that have been taken in advance can be uploaded and assigned to newly created offer.

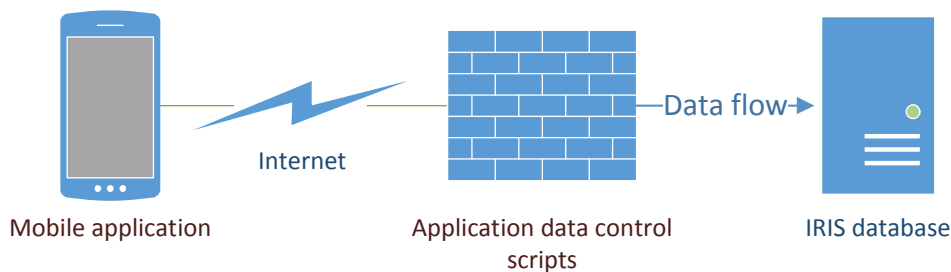
- creating and modifying a real estate offer that has been created with IRIS mobile application

In this scenario, real estate agent phone is used to temporary hold important object information and media files associated with a given real estate. Once

enough information has been collected there it can be exported automatically to IRIS database and offer will be created automatically.

2.1.2 Creating digital contents through IRIS mobile application

IRIS mobile application supports Android smartphones and makes it possible to dramatically reduce the effort of collecting information, pictures and video files used to describe a real estate. Collected information can be later on exported to IRIS database and displayed on terminal screen.



Mobile application has the following features:

- Describing real estate objects
- Making pictures of real estate objects
- Making video files of real estate objects

Information is kept locally on the smartphone until it is successfully exported to IRIS database server. Depending on customer preferences, real estate objects can be kept (archived) in smartphone internal storage even after they have been exported to the database server.

Each real estate object can have arbitrary number of pictures and video files assigned to it. However since web page limits the number of assigned video and picture files to ten that means that after export only the first ten items will be used.

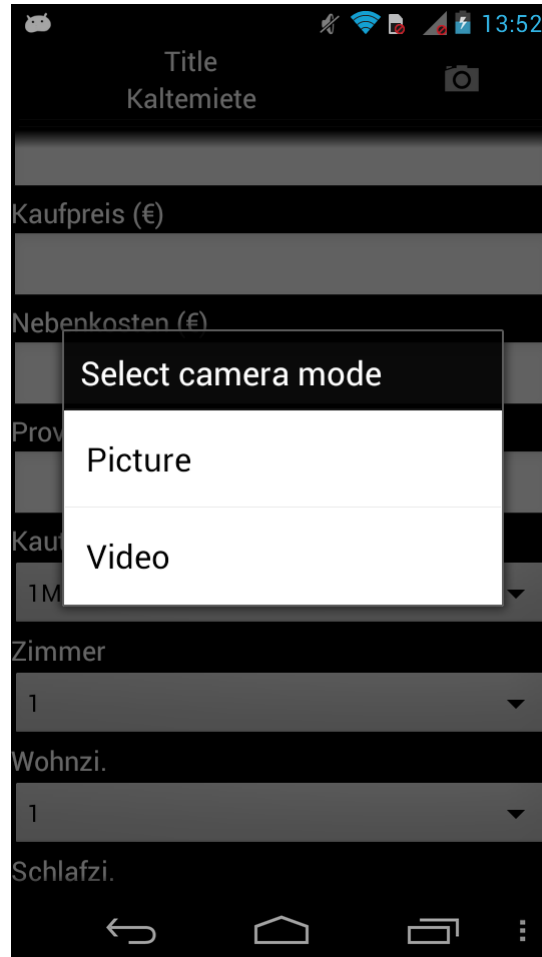
Mobile application can be installed from an APK file available at:

<http://www.wave-five.com:3000/scripts/Real%20Estate.apk>

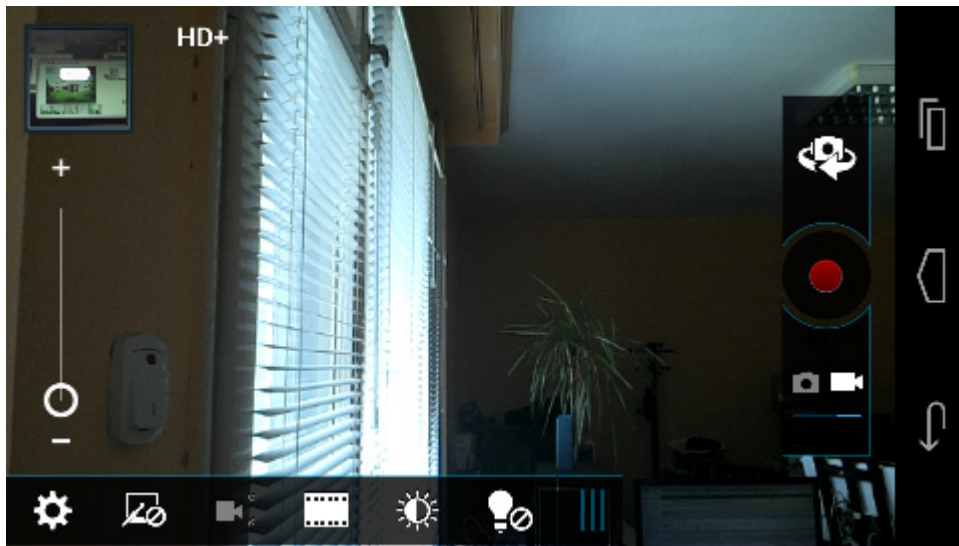
Users should be aware that although application can be downloaded and installed without any required login information, in order to export data to IRIS

server they would need to configure it and provide valid user name and password.

Mobile application makes use of smartphone camera to create pictures and video files.



Therefore picture and video quality depends on smartphone features but usually it is high enough to represent correctly real estate natural features.

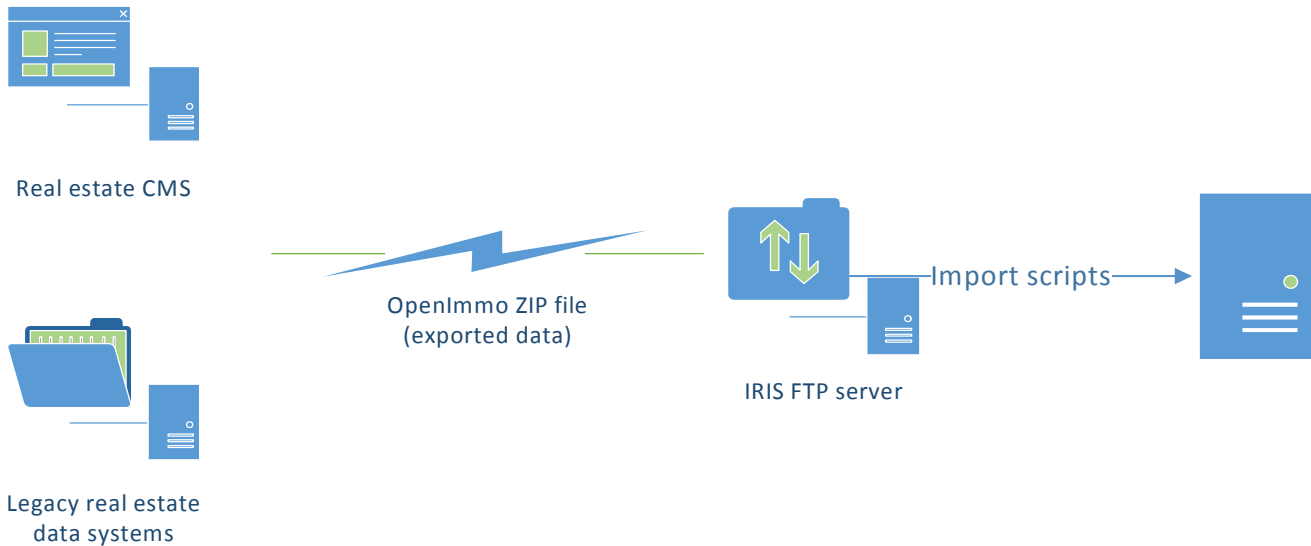


Real estate offers that have not been uploaded, can be modified also from mobile application (however once they are uploaded, they can be modified only from IRIS web site). A typical offer editing screen is shown below.

A screenshot of a mobile application's offer editing screen. The screen is dark-themed with white text. At the top, there is a status bar with the time 13:51 and various icons. Below the status bar, the title 'Title' is displayed above a text input field containing 'Kaufpreis (€)'. The form consists of several sections, each with a label and an input field: 'Title' (text input), 'Kaufpreis (€)' (text input), 'Nebenkosten (€)' (text input), 'Provision' (text input), 'Kaution' (dropdown menu with '1M' selected), 'Zimmer' (dropdown menu with '1' selected), and 'Wohnzi.' (dropdown menu with '1' selected). At the bottom, there is a navigation bar with icons for back, home, and other functions.

2.1.3 Adding information through OpenImmo import

IRIS system also allows to import existing data from OpenImmo standard archive files. Data transfer can be accomplished either through FTP or HTTP services with version 1.0 of application scripts supporting only FTP.



OpenImmo import functionality allows to connect IRIS terminals to different legacy systems and fill in offer data automatically.



IRIS import function expects to receive an OpenImmo archive file containing estate information (XML data) and media files (pictures and video files).

During import only data relevant to IRIS database entries is kept. Any additional information that is available but cannot be stored into IRIS database is dis-

carded. In case of a successful upload, original archive file is removed from FTP location and stored in a backup folder for keeping track of information flow.

2.1.4 How to work with web management interface

Web management interface for terminal system provides a lot of services that make it much easier to set up and modify terminal settings. In order to get access to the web management interface, one should have a valid login data (user name and password) for the IRIS web portal. This login data can be used also to access the full functionality of the web management interface:

- Register and Config

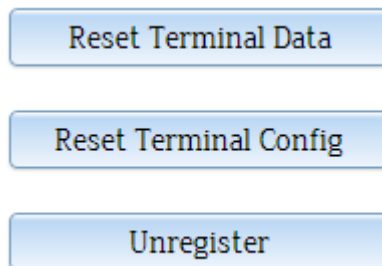
In order to remotely manage a terminal system it has to be registered for a specific user. Since one user can manage multiple terminals, settings can be modified for each of them separately.

Registration of a terminal is done by entering its unique identification number and pressing the “Register” button.

A screenshot of a web form for terminal registration. It features a text input field labeled "Terminal ID:" followed by a blue button labeled "Register".



Once a terminal identifier is registered different properties like name and location can be assigned to it. These properties are used in order to be able to easily recognize and identify the terminal with human-readable strings. Terminal properties can be changed dynamically and are automatically downloaded and applied to the respective terminal device. Therefore it is important to type in correctly the terminal identifier - otherwise the system will not be able to correctly match the physical terminal device.

There are three main configuration functions available for each terminal:

A vertical stack of three blue buttons with rounded corners. The top button is labeled "Reset Terminal Data", the middle button is labeled "Reset Terminal Config", and the bottom button is labeled "Unregister".

- Reset Terminal Data function is used when it is necessary to initiate a complete download of digital contents assigned to this terminal. Therefore this function should be used only when its necessary.
 - Reset Terminal Config function is used when it is necessary to wipe-out old terminal configuration and trigger a download of configuration currently set through the web management interface. Therefore this function should be used with care and only when its necessary.
 - Unregister terminal function will remove registration of the currently selected terminal. In case the terminal needs to be accessed again through the web management interface it has to be registered again as described above.
- Assign Properties

This functional set allows to configure digital contents filter to be assigned to currently selected terminal.

	Offer 2	Show estates from: <input type="text" value="30 Days"/> <input type="button" value="Select All"/> <input type="button" value="Deselect All"/> <input type="button" value="Sort by Title"/> <input type="button" value="Sort by Date"/>
	Offer 3	
	Offer 0	

The period selection combo box allows to show only those of the available entries that fit a pre-defined time period. This is only done for convenience and to ease selection. If one wants to have a more complete list of objects assigned to his IRIS portal then timing period can be extended to 1 year.

Only items that have been explicitly selected will be downloaded and shown on the terminal. To avoid misunderstanding of selection terms please note that “Show estates from” combo box refers only to the management interface. Only properties that have been checked are downloaded to the terminal. In case there is nothing checked on the list, digital contents to download are selected in random way.

- **Commands**

“Commands” functions let user specify a command set to be used by a terminal. Command sequence can be either pre-defined or user-defined sequence.

The screenshot displays the IRIS terminal management interface. At the top, there is a section for selecting a command set. It includes a dropdown menu currently set to 'continuous', a 'Delete' button, and a 'Command set name' input field with a 'Create new' button. Below this, there is a 'Command:' dropdown menu currently set to 'Repeat', with an 'Add' button and a 'Delete selected' button. A dropdown menu is open under 'Command:', showing options: 'Repeat', 'Wait', 'Enter', 'TurnLeft', and 'TurnRight'. The text 'Command Options' is visible to the right of the dropdown menu.

Each terminal is delivered with three pre-defined command sets:

- **demo** - iterates through all available digital content entries and shows them one after another. For each shown entry, all available pictures and video files are shown in a row. Demo command set keeps going through available digital content entries until application is stopped (or command set is changed).
- **continuous** - iterates through all available digital content entries and shows them without putting focus on each of them. This means that when an entry comes to a top-front position it is not zoomed to full screen and its video and picture files are not shown in a row.
- **single** - it brings the first available digital content entry and starts showing in an endless loop its video and picture files.

Depending on user requirements, a custom command set can be created and loaded to IRIS terminals. Custom command sets can be built by combining five different commands:

- *Repeat* defines a loop that can hold other commands
- *Wait* defines a wait block of specific duration
- *Enter* defines a command to bring current top-front entry to full screen

- *TurnLeft* defines a request to rotate carousel one position to the left (clock-wise)
- *TurnRight* defines a command to rotate carousel one position to the right (counter clock-wise)

2.1.5 Setting up and modifying terminal personalization

Terminal personalization are typically set prior to delivering the terminal to a customer. However later on, they can be modified and automatically reloaded by terminal software through a dedicated web application that is available at:

<http://www.wave-five.com/cnfms>

This application provides a list of all terminals that are registered for a user (terminals can have different physical locations) and allows to modify their configuration parameters.

Terminal ID:

Configuration:

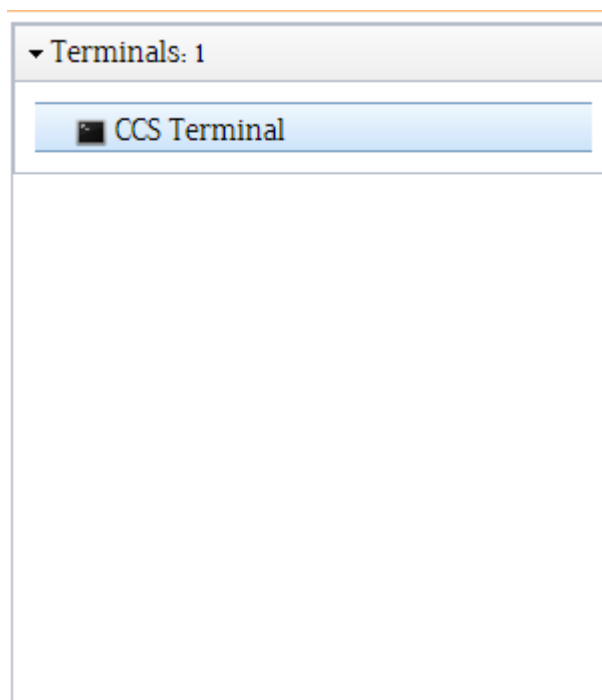
Terminal Name:	<input type="text" value="CCS Terminal"/>	Company Name:	immobilien-boecker
Terminal ID:	<input type="text" value="103465367513268475"/>	Agent Name:	Sievers
Request Interval:	<input type="text" value="30"/> seconds	Location:	<input type="text" value="Krefeld"/>
Command set:	<input type="text" value="demo"/>	Street:	<input type="text"/>
Trajectory:	<input type="text" value="oval"/>	Number of Terminals:	1

Typical configuration parameters are:

- **Request interval** - the interval of time at which to check for data updates
- **Command set** - example sequence of commands executed while showing automatically different offers (e.g. different real estate offers).
- **Trajectory** - selection of available trajectories that should be used when moving different objects on terminal screen

Terminal configuration interface also allows to modify list of terminals assigned to a particular account (e.g. add, modify or remove existing terminals). This is particularly useful when a customer has a large number of terminals and would

like to assign them a particular roles (for example serving information provided by one employee only) or to assign them to a particular offer.



Terminals are identified by their unique ID (as described at the beginning of this document) but they can also be given a human readable name and an address, which makes it possible to keep track on installed terminals and associate them with different digital contents.

In order to reconfigure a terminal please refer to this the opening of this section or to respective “How to ...” items in Chapter 4.



3. Working with existing digital contents

Real estate offers frequently need to be modified or even deleted. This can be done from the IRIS web application, as shown below:

WAVE FIVE

Anbieten

**Komplett NEU RENOVIERT mit BALKON in Nürnberg NORD!!!
Top 2 Zimmer Wohnung Nürnberg Rechenberg!**

✎ 🗑️ ⏏️

Flur

Kaufpreis: **USD 280000,00**

Provision: **3.57 %**

📍 Berlin Kreuzberg

Immobilie ID: 8070

Marken

Zimmer:	3
Fläche:	73.77 m ²
Schlafzimmer:	1
Badezimmer:	1
Wohnzimmer:	1

Editing digital content is accessible via dedicated icon.



Editing an offer may be necessary not only to fix a mistyped or wrong figure in offer description but also due to the following important reasons:

- Marking offer as non-visible on the terminal

This can be done by using the “Don’t show” icon on the icon tab:






Changing an offer visibility will trigger also an update of terminal data, which means that file changes will be triggered next time terminal application checks for offer updates.

- Changing picture ordering for an offer

Changing picture ordering is important to make it possible to show new pictures or more informative pictures first.

Multimedia

Bild 1		Bildtitel <input style="width: 80%;" type="text"/>	 
Bild 2		Bildtitel <input style="width: 80%;" type="text"/>	 

 [Bild hinzufügen](#)

Videos

[Video hinzufügen](#)

Picture ordering can be changed in one direction only - by bringing a specific picture “up” (e.g. to a position closer to the top/front).

- Deleting an offer



The function “Deleting an offer” allows to keep only those offers that are still active. There is an important difference between deleting and offer (which

means that it is completely removed from the database) and changing its visibility (which means that the offer remains in the database but is not shown on the terminal screen).

Note: Once an offer has been deleted, it can't be reconstituted.



4

4. Miscellaneous

4.1 How to force an update of terminal application

Terminal applications are designed to automatically check for updates and install them. However in some rare cases a system administrator may need to update the application manually.

There are two possibilities to trigger the update process:

- Forcing CTRL application to do the updates

This method relies on the fact that when started CTRL application automatically does a check for available updates. Therefore the easiest way to trigger an update check is to force stop and restart WaveFiveController application. In order to force stop an application please use “*Force stop*” Android function available from “*System settings*” menu in Android and then “*Apps*” configuration menu in Android.

- Updating manually

Applications can also be updated manually by force stopping both WaveFiveController and CarouselDemo applications from “*Settings menu*” in Android and then “*Apps*” configuration menu. Then applications can be uninstalled manually from this menu and re-downloaded from the following URLs:

- www.wave-five.com/scripts/wavefivecontroller.apk - for CTRL application
- www.wave-five.com/scripts/CarouselDemo.apk - for Carousel application

Packets can be downloaded with default Android browser and installed by double clicking on them. Android package manager recognizes the application type and initiates installation process automatically.

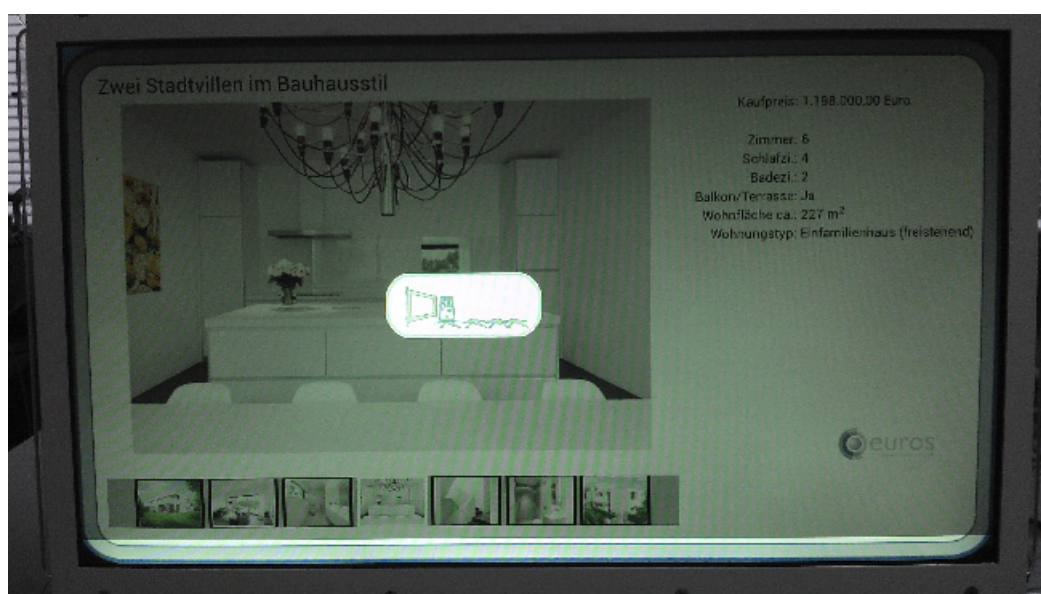
4.2 How to force an update of application data

Application data is automatically updated when this is necessary - in case of new offers, offer modification (including offer deletion) and/or modification in configuration data. However in some rare cases a system administrator may need to trigger a data update manually.

In order to trigger full data update please follow these steps:

1. Stop CTRL application (from Settings -> Apps menu)
2. Stop CarouselDemo application (from Settings -> Apps menu)
3. Start a file explorer (Terminals come with preinstalled explorer package)
4. Delete /mnt/sdcard/Demo
5. Log in to the configuration panel (www.wave-five.com/cnfms) and select “Reset Terminal data” button in “Reset and Config” section.
6. Start CarouselDemo application (from Settings -> Apps menu)
7. Start CTRL application (from Settings -> Apps menu)

At this point Carousel application should contact the server again and download all data. Kindly note that in order to complete the download process, internet connection should be available. Depending on the amount of data downloading can take long time and download progress is communicated through an animated GIF shown on the terminal screen:



4.3 Known limitations

The following limitations are known and enforced by planning and design decisions:

Table 1: Known limitations

Module	Description
IRIS web application	Each digital content entry can have up to 10 pictures and up to 10 video files.
IRIS web application	Each user account should have a valid email address assigned to it. One email can be assigned to multiple accounts.
Carousel graphical application	Each entry can display up to 14 textual and numerical properties. Each visible digital content property (text or number) consists of a single line, new line characters are not used and not handled by the Carousel application.
Carousel graphical application config	Each path description should contain exactly 361 points. Path descriptions with less than 361 points are considered invalid.
Controller application config	Controller application configuration cannot be updated remotely and requires to update the application itself. Update is done automatically when new version of controller application is released

Known limitations can be released on demand, as they relate to current design and optimizations implemented to reduce code complexity and concentrate mainly on core features.