

2.2 Workflows

2.2.1 Management Summary

	<ul style="list-style-type: none"> ▪ Process control via Oracle BPEL process engine (Oracle SOA Suite). ▪ BPEL Business Processes (compose multiple discrete WEB-services into an end-to-end process flow) ▪ XML based industry standard BPEL (Business Process Execution Language) ▪ Integration third party WEB-services (e.g.: Siebel, SAP) into the SPECTRAplus business processes
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2.2.2 Benefits

<p>Benefits of using Workflows:</p>	<ul style="list-style-type: none"> ▪ Speed-up of licensing processes ▪ Clearly defined procedures for licensing processes / reduce licensing mistakes ▪ Automatic deadline check (BPEL deadlines) ▪ Protected from modifications by standard users
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2.2.3 Detailed Description

In the ORACLE BPEL engine for each typical process, which is required for the licensing process, a BPEL Workflow can be implemented.

<p>Typical licensing processes are:</p>	<ul style="list-style-type: none"> ▪ New license process ▪ Renewal process ▪ Modification process ▪ Surrender process ▪ Trade process ▪ Type approval process ▪ Other processes
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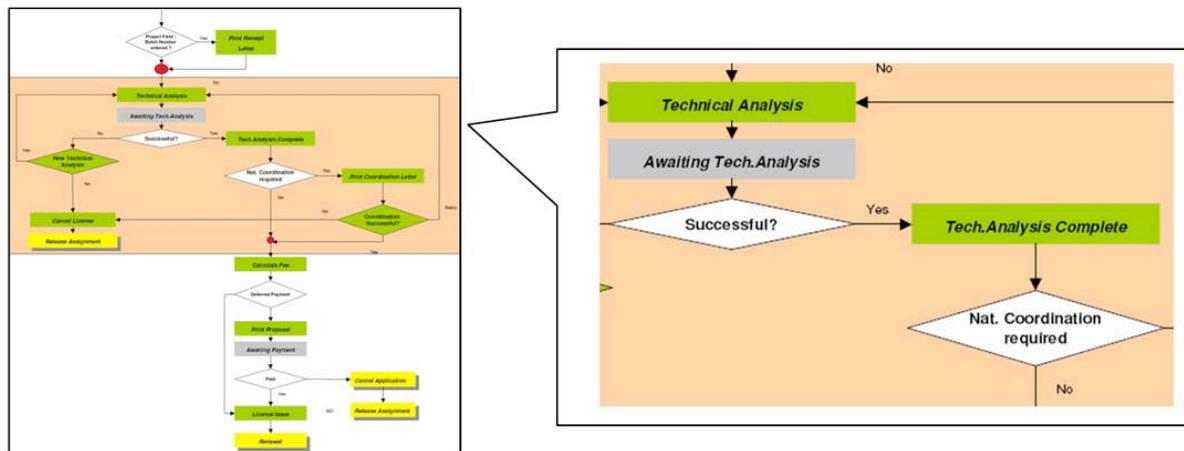


Figure 2-3: Workflow for new licence application

Figure 2-3 shows a typical process for a new license application process. The above workflow can be specified by the customer and once confirmed, it can be implemented in the Oracle BPEL engine as a new BPEL process. Thereafter when the system receives a new application from SPECTRAweb, a new BPEL process will automatically be started for the new application, and the first actions from the workflow will be enabled automatically in the system. Events from different sources (SPECTRA modules or external modules) will trigger automatically the next steps in the workflow.

<p>Typical events are:</p>	<ul style="list-style-type: none"> ▪ Finishing a workflow task ▪ Receiving payment ▪ Finishing technical analysis ▪ Document generation ▪ Transferring data ▪ Reaching payment deadline ▪ Reaching licensing deadline ▪ Other events
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The user will be guided step-by-step through the service/subservice specific procedure by the SOA BPEL engine. This ensures that all required steps have been done and the same procedures will be used for all the applications of the same service/subservice.

ORACLE Enterprise Manager 10g BPEL Control		Manage BPEL Domain Logout Support	
		Logged to domain: default	
Dashboard		BPEL Processes	Instances
Deployed BPEL Processes		In-Flight BPEL Process Instances 1 - 11	
Name	Instance	BPEL Process	Last Modified
AsIs_CancelLiveLicence	130005 : AsIs_NewAp_18365_SPECTRA__	AsIs_NewAp (v. 1.2)	04/11/09 15:34:05
AsIs_NewAp	120002 : AsIs_TecAssign13161_SPECTRA__	AsIs_TecAssign (v. 1.0)	29/09/09 14:51:11
AsIs_ReleaseAssignments	50009 : AsIs_NewAp_18275_SPECTRA__	AsIs_NewAp (v. 1.2)	18/09/09 13:15:27
AsIs_Surrender	20002 : AsIs_TecAssign15290_SPECTRA__	AsIs_TecAssign (v. 1.0)	28/07/09 14:28:45
AsIs_TecAssign	20001 : AsIs_NewAp_15290_SPECTRA__	AsIs_NewAp (v. 1.2)	28/07/09 14:28:44
TaskActionHandler			
TaskManager			

Figure 2-4: Oracle BPEL Control - Dashboard

Figure 2-4 shows the ORACLE BPEL control. This view provides the current available business processes including their version number. Clicking the tab “Instances” will provide all the existing processes started for a certain application in SPECTRAplus.

Dashboard		BPEL Processes	Instances	Activities
List of BPEL Process Instances 1 - 20				
Instance	BPEL Process	Last Modified		
130005 : AsIs_NewAp_18365_SPECTRA__	AsIs_NewAp (v. 1.2)	04/11/09 15:34:05		
✓ 130003 : AsIs_NewAp_18364_SPECTRA__	AsIs_NewAp (v. 1.2)	07/10/09 10:09:36		
✓ 130004 : AsIs_TecAssign18364_SPECTRA__	AsIs_TecAssign (v. 1.0)	07/10/09 09:47:54		
✓ 130002 : AsIs_TecAssign18364_SPECTRA__	AsIs_TecAssign (v. 1.0)	07/10/09 09:39:32		

Figure 2-5: Oracle BPEL Control - Instances

Figure 2-5 shows existing active workflows applied for certain applications. The instance name is including the application ID from SPECTRAplus for easy identification of instances.

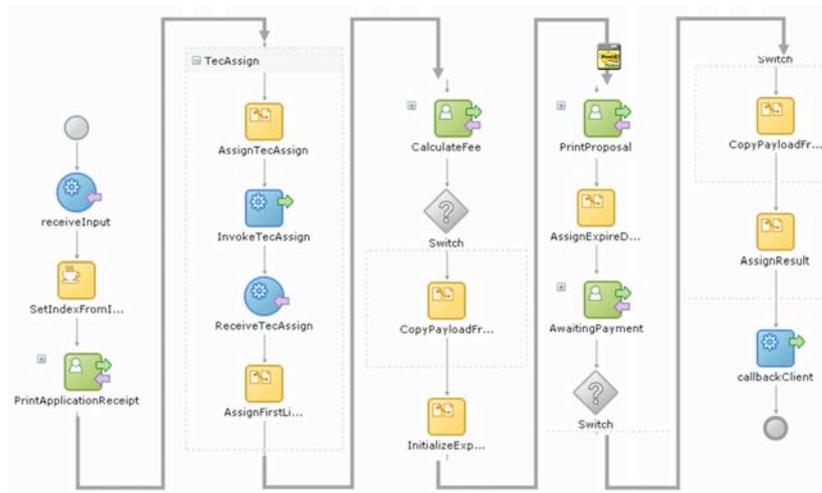


Figure 2-6: Flow View from ORACLE SOA Suite

Clicking to a specific instance will illustrate graphically the current process flow showing the complete process history with all the details (Figure 2-6).

2.3 Web-Services

2.3.1 Management Summary

<p>3rd Party Systems</p>	<ul style="list-style-type: none"> LS telcom has introduced the concept of WEB-services to build Service Oriented Architectures (SOA). Important Members of the SPECTRA family are now offering WEB-services in order to give control to external sources like SPECTRAweb or the ORACLE BPEL engine.
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2.3.2 Benefits

<p>Benefits of using WEB-services:</p>	<ul style="list-style-type: none"> Increased flexibility to system integrators Scalability of system performance Easily integration of external sources Platform-independent, open and flexible architecture
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2.3.3 Detailed Description

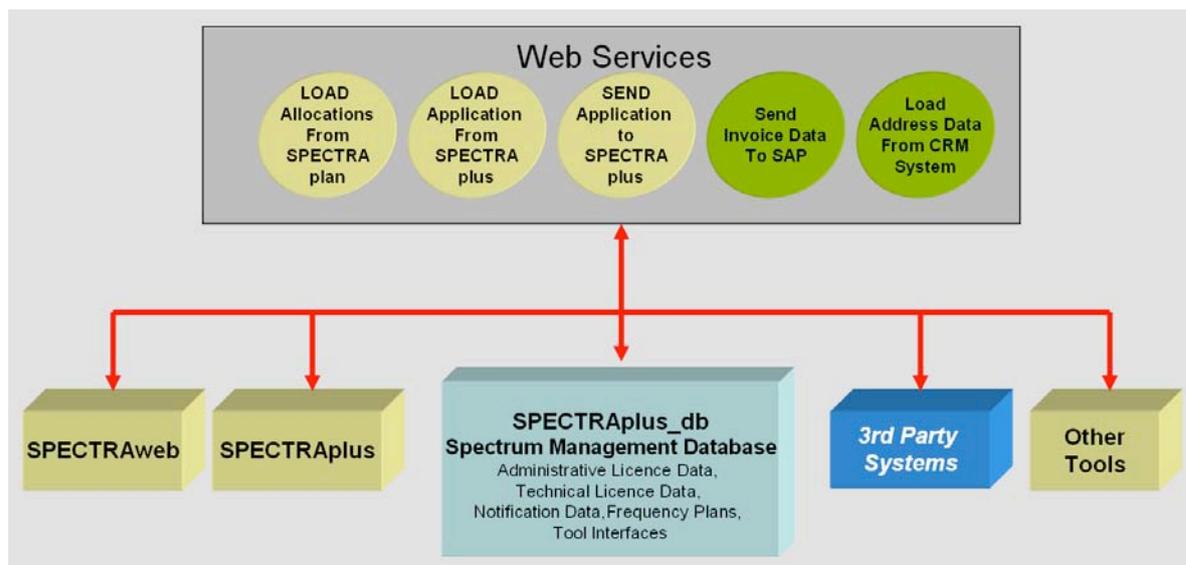


Figure 2-7: WEB-services

Instead of using tool specific interfaces for the data exchange between SPECTRAplus, SPECTRAweb, SPECTRAplan and 3rd party systems (Finance, CRM, etc.), WEB-services have been introduced. These WEB-services can be used by any tools calling for the specific functionality of this WEB-service. Figure 2-7 shows the principle of the WEB-service architecture of SPECTRA Enterprise Solution. Special WEB-services for different tasks have been introduced:

- Load a complete application from SPECTRAplus
- Send a complete application to SPECTRAplus
- Load allocation (including channels) from SPECTRAplan
- Send invoice data to SAP (finance system)
- Load address data from CRM (customer relation management system)

2.4 SPECTRAweb Online

2.4.1 Management Summary

	<ul style="list-style-type: none"> ▪ Direct bi-directional data exchange between SPECTRAweb and SPECTRAplus via WEB-services. ▪ Data exchange of antenna data, address data, equipment data, frequency plan data, application data, status data, attachments, ...
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2.4.2 Benefits

<p>Benefits of using SPECTRAweb Online:</p>	<ul style="list-style-type: none"> ▪ Speed-up licensing process (cost reduction) ▪ Simplified data management (master data from SPECTRAplus) ▪ Internal and External Simplified data entry ▪ Improved application handling ▪ Improved user satisfaction/acceptance ▪ Improved client satisfaction/acceptance ▪ Reduce amount of “paper” requests ▪ Eliminate of wrong and incomplete electronic license applications ▪ Frequency Portal with visualization of national frequency plan over the internet
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2.4.3 Detailed Description

“Online” approach that reflects an E-licensing solution via direct data exchange with the central database via WEB-services This approach includes but is not limited to direct access to latest application-, report- and master-data stored on the central database and to latest frequency plans, etc., and actions like (among others) online registration, renewal, amendment and cancellation of applications.

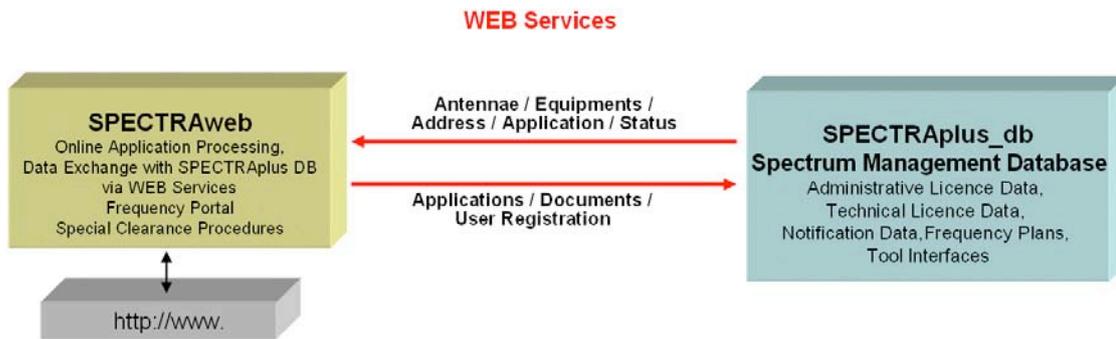


Figure 2-8: SPECTRAweb Online

<p>SPECTRAweb Online functionality:</p>	<ul style="list-style-type: none"> ▪ User/role management based on LDAP (Single-Sign-On) ▪ User self registration ▪ Load applications from SPECTRAplus ▪ Reservation of license numbers from SPECTRAplus ▪ Address master data from SPECTRAplus ▪ Equipment master data from SPECTRAplus ▪ Antenna master data from SPECTRAplus ▪ Frequency allocation data from SPECTRAplan ▪ Submit application to SPECTRAplus ▪ Submit attachments to SPECTRAplus ▪ Tracking application history and status ▪ Team management functionality ▪ E-mail notification
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2.4.3.1 User/Roles Management

User/roles management is based on the LDAP/Active Directory (Single-Sign-On). In order to support this functionality, the existing user configuration in the Active Directory is extended by User/role settings for different SPECTRA enterprise tools.

2.4.3.2 User Self Registration

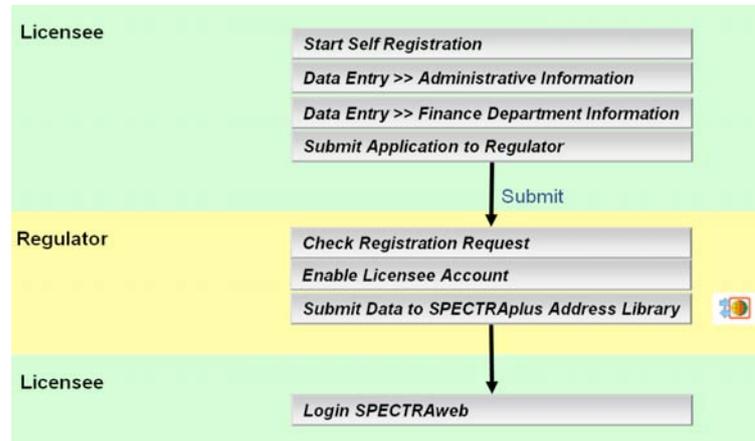


Figure 2-9: User self registration process

A new licensee has to successfully complete a self registration process before he can start using SPECTRAweb for entering new license applications. Figure 2-9 shows the process steps for a user self registration. The new licensee has to deliver administrative and financial address details and thereafter he has to print, sign and attach the applicant’s declaration. After submitting the application to the regulator, an expert has to check the applicant and he has to approve or decline this account.

After approving and enabling the account, the complete address information will be automatically submitted to the SPECTRAplus address library for further usage.

2.4.3.2.1 Detailed Example for Self Registration Process

Figure 2-10: Self registration application form

If a user is not having an existing account, he can start the self-registration process directly from the SPECTRAweb login page (Figure 2-10).

Applicant's Declaration	إقرار مقدم الطلب
<p>I declare that the information provided by me in this application and accompanying documents is correct. I have read the TRA Regulations and the Frequency Spectrum Authorization terms and conditions specified by the TRA which I shall abide upon issuance of the applied Authorization.</p>	<p>أقر بصحة المعلومات المزودة من قبلي أعلام الوثائق المرفقة بهذا الطلب. وقد قرأت التوائح التنظيمية لهيئة وكذلك الشروط والتوائح الخاصة بتصاريح الطيف الترددي الصادرة من قبل هيئة تنظيم الاتصالات والتي سألتزم بها عند صدور ترخيص الطلب المقدم.</p>
<p><input checked="" type="checkbox"/> Yes, I agree. Date: <input type="text" value="9/30/2009"/></p>	

NOTES:

1. When filled the form should be signed and sent by Email to spectrum@tra.ae and then also by post to the TRA at the address: Spectrum Affairs Department, P.O. Box 26662, Abu Dhabi, UAE.
2. An official company letter stating that the persons whose details are listed are correct and will be the focal point for communication with the TRA. Applicants for small boats, amateurs are not required to provide the company details.
3. The username and password will be provided by Email to the contact person E-Mail as provided in Administrative information above.

ملاحظات:

1. ينبغي توقيع النموذج بعد تعبئته وإرساله إلى البريد الإلكتروني spectrum@tra.ae وكذلك بالبريد على العنوان التالي: إدارة شؤون الطيف الترددي، ص.ب 26662، أبوظبي، الإمارات العربية المتحدة.
2. تقديم رسالة رسمية من الشركة تليد بأن بيانات الشخص المزود صحيحة، وأنه سيكون نقطة الاتصال مع الهيئة العامة لتنظيم قطاع الاتصالات. مقدمي الطلبات لخدمات النوارب الصغيرة والهواة غير مطالبين بتقديم بيانات من الشركة.
3. سيتم تزويد الشركة باسم المستخدم والرمز السري الخاص بها عن طريق البريد الإلكتروني للشخص نقطة الاتصال والمزود في البيانات الإدارية أعلام.

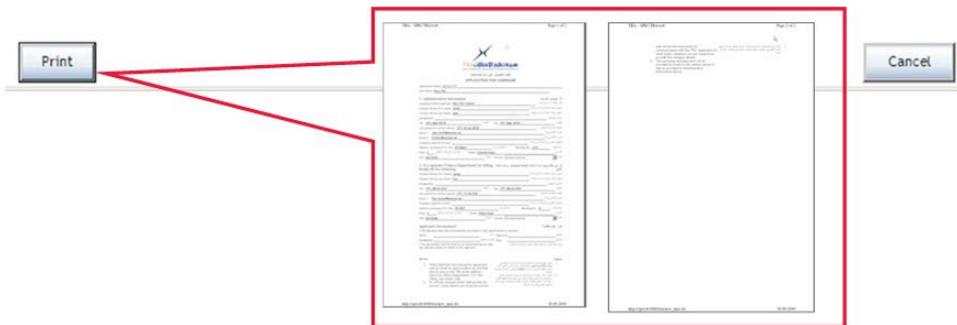


Figure 2-11: Self registration – Print Document

After confirming the applicants' declaration the document must be printed, signed, scanned and attached to the application on SPECTRAweb (Figure 2-11).



Figure 2-12: Self registration – Application submitted

The last step for the licensee will be to submit the application to the regulator. After completing this step, the data can no longer be modified by the licensee (Figure 2-12)!

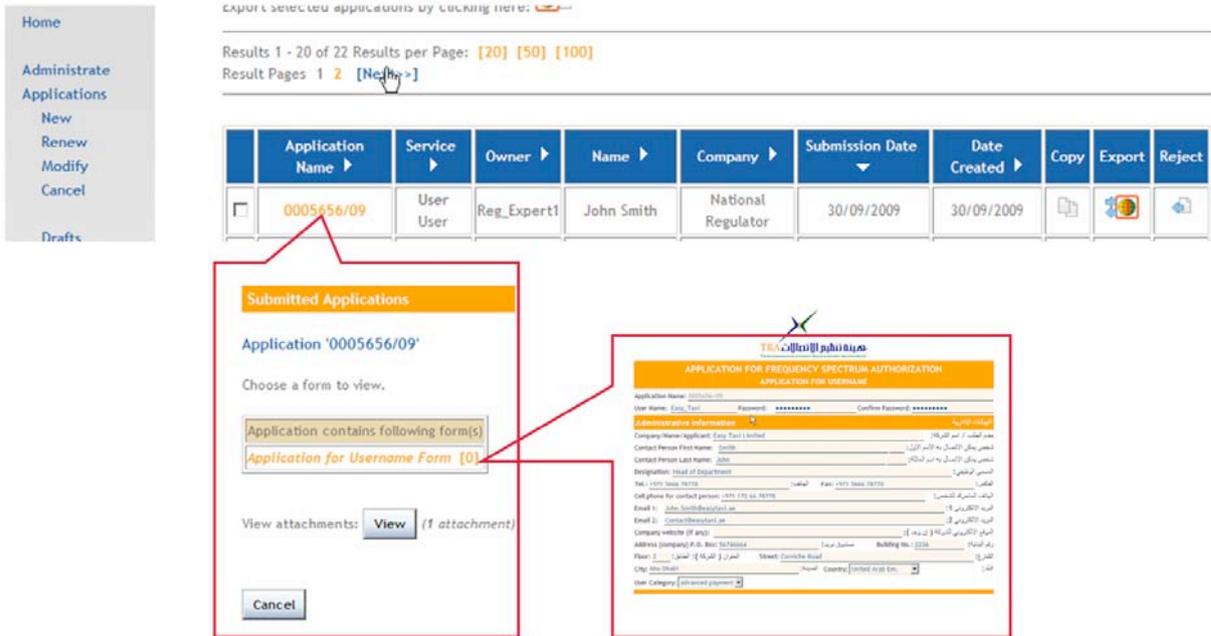


Figure 2-13: Self registration – Validate user

Self-Registration Request appears now at the regulator account. An expert from the regulator has to check the complete application (Figure 2-13).

The screenshot shows a 'User Data' form with the following fields and values:

- User Name: Easy_Taxi
- Company: Easy Taxi Limited
- Agency: (empty)
- First Name: Smith
- Surname: John
- Forms of Address: (dropdown menu)
- Title: (empty)
- Street: Corniche Road
- Postal Code: 56746664
- City: Abu Dhabi
- State: (empty)
- Country: United Arab Em. (dropdown menu)
- Tel.: +971 5666 78778
- Mobile no.: +971 172 66 78778
- Fax no.: +971 5666 78770
- E-mail: John.Smith@easytaxi.ae

At the bottom, there is a section for 'general user enabling' with radio buttons for 'Locked' (selected) and 'enabled'.

Figure 2-14: Self registration - Enable user account

Once the expert has approved the application the Licensee Data can be loaded to the SPECTRAplus Database and enable the Licensee Account in SPECTRAweb. After pressing export, automatically the new licensee account will be set to “enabled” and can be used. (Figure 2-14).

Figure 2-15: Self registration – Licensee details in SPECTRAplus

The licensee data is now also available in the SPECTRAplus Address Library with a unique address number (Figure 2-15).

TRA - SPECTRAweb

If you already have a TRA Login user name and password, please enter it and click Login

User Name

Password

If you don't have a username and password please click [here](#)

Forgot your password kindly send your user name to this email spectrum@tra.ae

Figure 2-16: Self Registration – User login enabled

The licensee now can login with his personal account. He can create new applications for different services.

The forms will be filled automatically with the licensee details from the user account.

User Password can be changed by the Licensee itself and also by the regulator experts (Figure 2-16).

2.4.3.3 Load Applications from SPECTRAplus

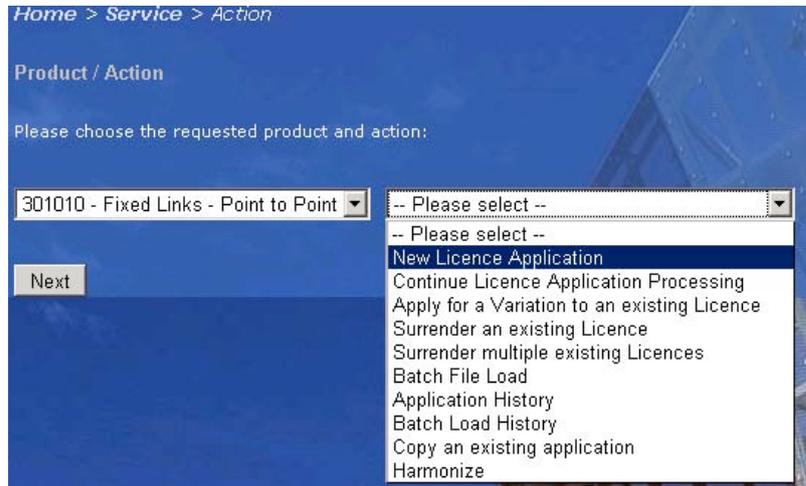


Figure 2-17: Selection of Product and Action

After selecting the desired service/sub service the user has to select an action. The actions for variation, surrender and copy are dealing with existing licenses in SPECTRAplus, therefore the complete application will be loaded via WEB-service from SPECTRAplus to SPECTRAweb.

2.4.3.4 Reservation of License Numbers

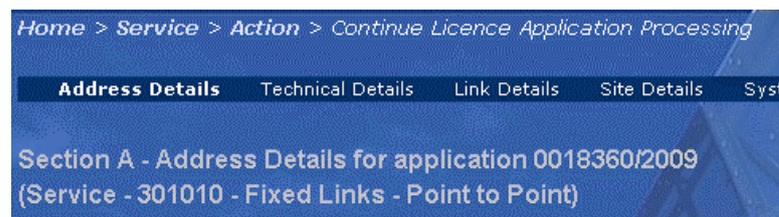


Figure 2-18: License number in SPECTRAweb

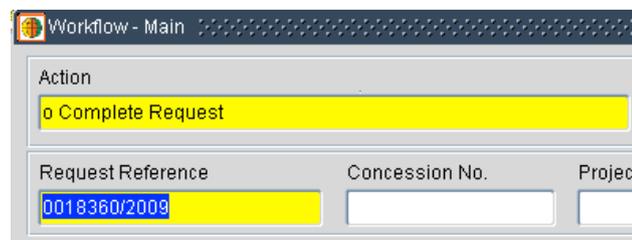
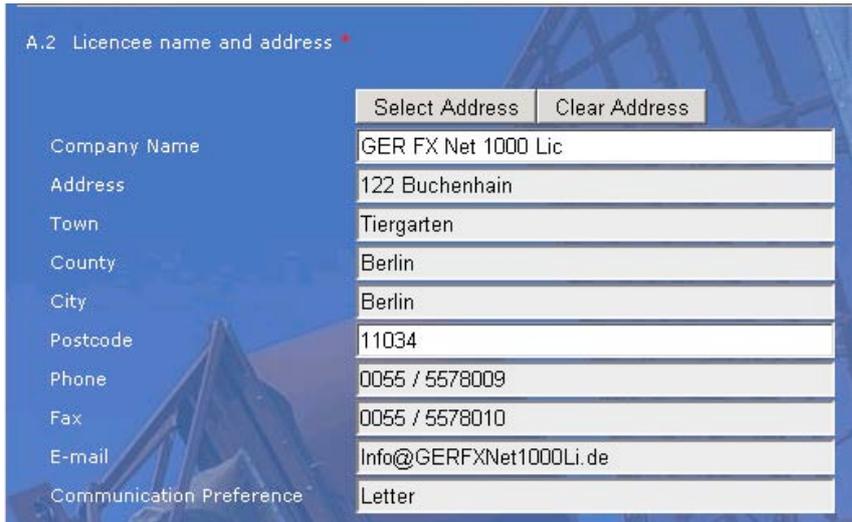


Figure 2-19: License number in SPECTRAplus

After selecting the action “New License Application” SPECTRAweb will request from SPECTRAplus a new unique license number to be used for this application. The user will constantly see this application reference number during data entry in SPECTRAweb. After submitting the application to SPECTRAplus the same number will be used as request reference in the license database.

2.4.3.5 Address Master Data from SPECTRAplus

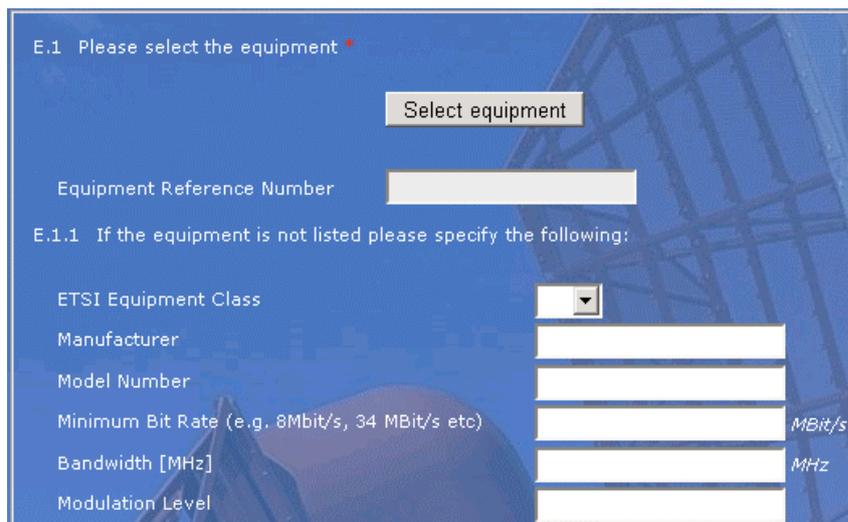


A.2 Licencee name and address *	
	<input type="button" value="Select Address"/> <input type="button" value="Clear Address"/>
Company Name	GER FX Net 1000 Lic
Address	122 Buchenhain
Town	Tiergarten
County	Berlin
City	Berlin
Postcode	11034
Phone	0055 / 5578009
Fax	0055 / 5578010
E-mail	Info@GERFXNet1000Li.de
Communication Preference	Letter

Figure 2-20: Selection of address data

To set the address details the address library from SPECTRAplus can be loaded to search and select the desired address.

2.4.3.6 Equipment Master Data from SPECTRAplus



E.1 Please select the equipment *	
	<input type="button" value="Select equipment"/>
Equipment Reference Number	<input type="text"/>
E.1.1 If the equipment is not listed please specify the following:	
ETSI Equipment Class	<input type="text" value="v"/>
Manufacturer	<input type="text"/>
Model Number	<input type="text"/>
Minimum Bit Rate (e.g. 8Mbit/s, 34 MBit/s etc)	<input type="text"/> MBit/s
Bandwidth [MHz]	<input type="text"/> MHz
Modulation Level	<input type="text"/>

Figure 2-21: Equipment master data from SPECTRAplus

Instead of entering the equipment details manually the equipment from the approval service in SPECTRAplus can be loaded (via WEB-service) and selected for the current application. SPECTRAweb can automatically filter the equipment master data for specific services, by frequency ranges or by approval status.

System Details > Equipment List

Equipment selection

301010 - Fixed Links - Point to Point

Reference Number: Search *Note: Please use '%' as wildcard*

Reference Number	Manufacturer	Model Number	Bit Rate [MBit/s]	Bandwidth [MHz]	Modulation Level	ETSI Class
E/19/EY/05/004/NE	NEC	PASOLINK TRP-18G-5A	8	3.5	16 QAM	4
E/19/DS/05/008/NE	NEC	TRP-18G-5A 28MHZ	34	27.5	QPSK	2
E/19/DT/06/080/NA	NERA LTD	18G EVOLUTION(METRO)	155	27.5		5A

Figure 2-22: Equipment list from SPECTRAplus

2.4.3.7 Antenna Data from SPECTRAplus

E.2 Please select the antenna for each site:

Select antenna

[clear selection](#)

Site A

Antenna Reference Number:

Select antenna

[clear selection](#)

Site B

Antenna Reference Number:

E.2.1 If the Antenna is not listed please specify the following :

	Site A	Site B
Antenna ETSI Class	<input type="text"/>	<input type="text"/>
Antenna Manufacturer	<input type="text" value="ANDREWS ANTENNAS"/>	<input type="text" value="ANDREWS ANTENNAS"/>
Antenna Model Number	<input type="text" value="VHLP2-18"/>	<input type="text" value="VHLP2-18"/>
Antenna maximum (bore-sight) gain	<input type="text" value="40.8484"/> dBi	<input type="text" value="40.8484"/> dBi

Figure 2-23: Selection of antennas

Instead of entering the antenna details manually, SPECTRAweb allows to select an antenna from SPECTRAplus antenna library via WEB-service. SPECTRAweb can automatically pre-filter the antenna library to show only approved antennas fitting to the selected equipment (Figure 2-24).

System Details > Antenna List

Antenna selection

301010 - Fixed Links - Point to Point

Reference Number: Search Note: Please use '%' as wildcard

Reference Number	Model Number	Manufacturer	ETSI Class	Gain(dBi)
A/19/H/08/053/MR	HPLP1-18	RADIO WAVES INC	3	34.0
A/19/H/07/068/ER	UKY 210 77/DC12	ERICSSON MICROWAVE SYSTEMS AB		39.8
A/19/O/89/072/DT	NK 1.8/8/1	DTI		30.8
A/19/H/08/046/RF	SBX1-190BB	RFS KABELMETAL	2	33.8

Figure 2-24: Antenna list from SPECTRAplus

2.4.3.8 Frequency Allocation Data from SPECTRAplan

Application: 0018366/2009 (409510 - Business Radio - Area Defined)

Channels (Duplex)

	Frequency Plan Element	Mode	Bandwidth [kHz]	Channel Name	Base Frequency	Mobile Frequency
<input checked="" type="checkbox"/>	BR_U2_12D5/BR_U2_12D5	D	12.5	L1104/U1104	460.3	453.8
<input checked="" type="checkbox"/>	BR_U2_12D5/BR_U2_12D5	D	12.5	L1103/U1103	460.2875	453.7875
<input checked="" type="checkbox"/>	BR_U2_12D5/BR_U2_12D5	D	12.5	L1102/U1102	460.275	453.775
<input type="checkbox"/>	BR_U2_12D5/BR_U2_12D5	D	12.5	L1101/U1101	460.2625	453.7625
<input type="checkbox"/>	BR_U2_12D5/BR_U2_12D5	D	12.5	L1107/U1107	460.3375	453.8375
<input type="checkbox"/>	BR_U2_12D5/BR_U2_12D5	D	12.5	L1106/U1106	460.325	453.825

Figure 2-25: Frequency allocation data from SPECTRAplan

SPECTRAweb can load allocation data from SPECTRAplan Server via WEB-service. All the detailed frequency plan data, stored on SPECTRAplan server (Service/Sub service matrix, open/closed attribute, etc.), can be used to simplify the data entry process and to avoid requesting not assignable bands or channels. SPECTRAweb can pre-filter the frequency plan data to offer only valid allocations/channels (Figure 2-25).

2.4.3.9 Submit Application to SPECTRAplus

Home > Service > Action > Continue Licence Application Processing

Application Drafts

Service: 301010 - Fixed Links - Point to Point

SMS REF ID:

Licencee:

	SMS REF ID	Licencee	Transaction Type	Creation Date	Last Modification	Valid
<input checked="" type="checkbox"/>	0018361/2009	GER FX Net 1000 Lic	New Licence	Oct 7, 2009	Nov 4, 2009	<input checked="" type="checkbox"/>
<input type="checkbox"/>	0018362/2009		New Licence	Oct 7, 2009	Nov 4, 2009	<input type="checkbox"/>

Figure 2-26: Submit application to SPECTRAplus

If the application has been successfully validated, it can be submitted to the SPECTRAplus database. Pressing “Commit to SpMS” will start this process (Figure 2-26).

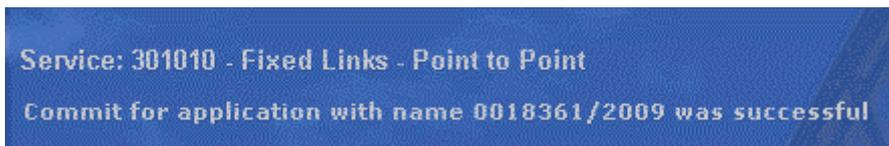


Figure 2-27: Submit to SPECTRAplus successful

There are 2 different modes to transfer the application depending on the regulators security concept:

Mode	Description	Technology
Direct Mode	Direct transfer to SPECTRAplus. The WEB-service will create automatically a new application in the SPECTRAplus database.	WEB-service
Protected Mode	Direct transfer to SPECTRAplus open interface. Regulator expert has to perform the final import into SPECTRAplus	WEB-service

2.4.3.10 Tracking Application History/Status



SMS REF ID	Licensee	Creation Date	Import Date	Transaction Type	Status	In Charge
0018363/2009	GER FX Net 1000 Lic	Oct 7, 2009	Oct 7, 2009	New Licence	Granted	frank.fischer
0018143/2009	GER FX Net 1000 Lic	Aug 13, 2009	Aug 13, 2009	New Licence	Granted	frank.fischer

Figure 2-28: Tracking Application History/Status

The application history shows the licensee all the submitted applications and the current status in SPECTRAplus. The licensee can then track online the progress in the licensing process at the regulator.

2.4.3.11 Submit Attachments



Application 'pmn00001024'

To edit a form click on the form in the list below.

Application contains following form(s) :

Form	Delete
Type Approval Form [0]	✖

Add/view/remove attachments (e.g.: *.pdf *.doc *.xls etc.):

To complete entry for this application, press "Submit Application".
To leave this application in current state (and work later on it) press 'Save'.

Figure 2-29: Submit attachments

In SPECTRAweb the licensee can attach any kind of document as a file attachment to his application. The licensee can easily attach documents with additional technical details (antenna, equipment, filter ...), location details (photos, maps ...) or any other information. After submitting the application to SPECTRAplus the attachments can be found in the request letter table.

2.4.3.12 Team Management Functionality

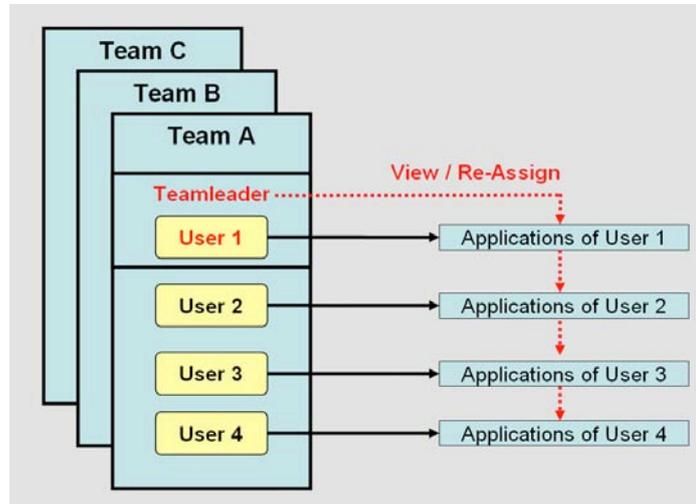


Figure 2-30: Team management functionality

Team management functionality has been implemented between SPECTRAplus and SPECTRAweb. Each user can be a member in one or several teams. Each team can have one or several team leaders. These team settings are stored in SPECTRAplus and will be loaded into SPECTRAweb. The team leader can assign applications to the different users to be officially in charge. The users can only see their assigned applications. The team leader can monitor and re-assign all applications of his team (Figure 2-31).

Team Leader

View applications of your team members

SMS REF ID:

Licencee:

Team:

List of Applications								
Product	SMS REF ID	Licencee	Transaction Type	Creation Date	Last Modification	Valid	Official In Charge	
307030 - Satellite - Transportable Earth Station Cat 1	0018367/2009		New Licence	Nov 5, 2009	Nov 5, 2009	✘	philipp.grimm	Reassign
307030 - Satellite - Transportable Earth Station Cat 1	0017137/2009	GER FX Net 1000 Lic	New Licence	Jun 30, 2009	Nov 5, 2009	✔	frank.fischer	Reassign
307030 - Satellite - Transportable Earth Station Cat 1	0017139/2009	GER FX Net 1000 Lic	New Licence	Jun 30, 2009	Nov 5, 2009	✔	dietmar.loeffler	Reassign

Figure 2-31: Team management / Re-assign official in charge

After submitting the application to SPECTRAplus the responsible employee as well as the team information will also be stored in SPECTRAplus. This information can be visualized in

SPECTRAemc request table. Based on this each user can easily search for applications assigned to him.

2.4.3.13 E-Mail Notification

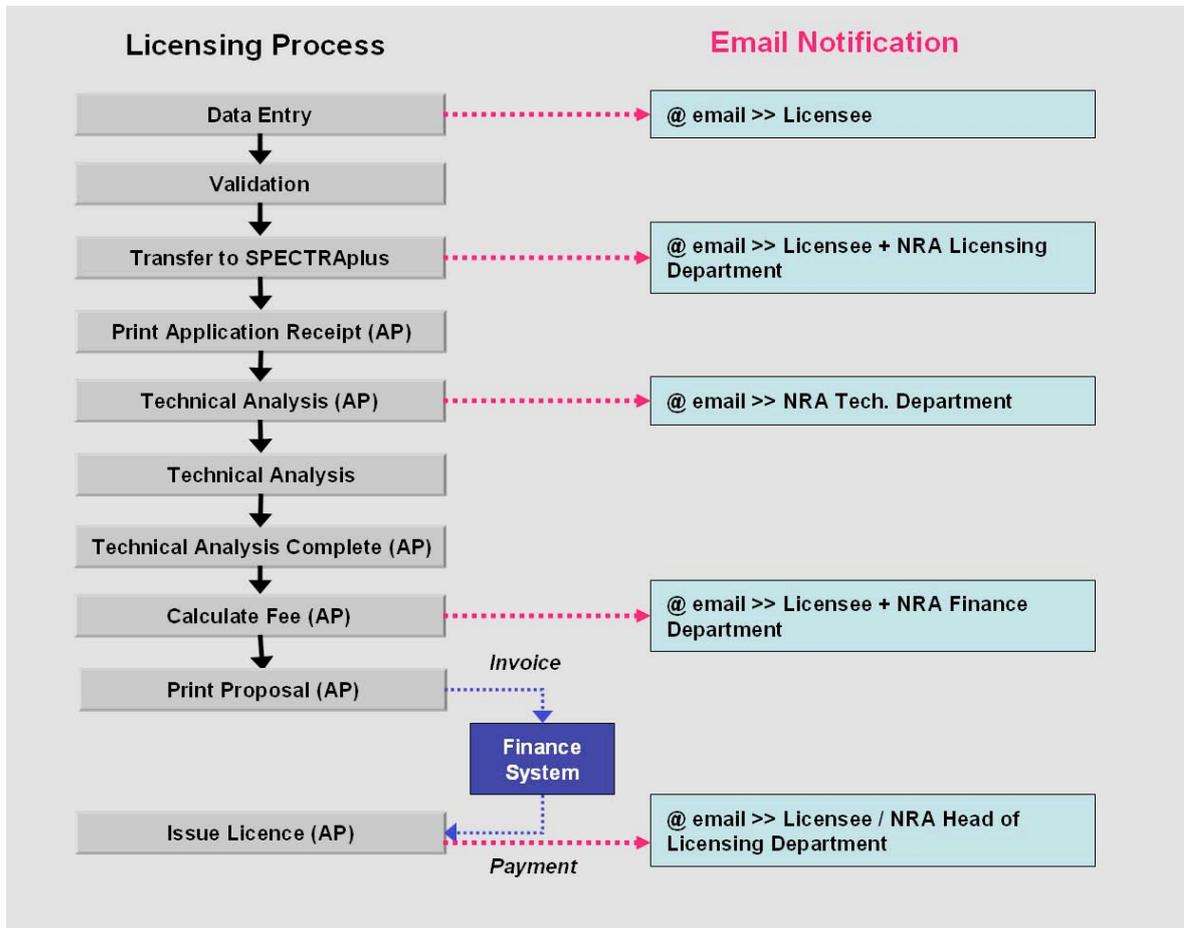


Figure 2-32: Team management / Re-assign official in charge

SPECTRAplus and SPECTRAweb offer a configurable, automated E-mail functionality to inform involved parties (licensee, licensee payment office, licensee contact, involved staff, involved departments, other authorities ...) about licensing progress and / or to trigger any further action.

2.5 3rd Party Systems

2.5.1 Management Summary

	<ul style="list-style-type: none"> Integration of existing 3rd party systems via WEB-service, e.g. financial system, customer relation management systems, ...
-----------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

2.5.2 Benefits

<p>Benefits of integration of 3rd Party Systems:</p>	<ul style="list-style-type: none"> Established systems can continuously be used Organisation-wide systems for CRM, Finance, or others (also covering additional items as Spectrum Management) can be seamlessly integrated within the SPECTRA System
-----------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

2.5.3 Detailed Description



Figure 2-33: 3rd party systems

With the WEB-service based architecture of the SPECTRA enterprise solution, a 3rd party sub-system can be seamless integrated via WEB-services. In case the organisation does already have an existing CRM (Customer Relation Management system) and/or an existing financial system, the 3rd party product can continuously be used. At certain positions in the licensing workflow interaction between the LS tools and these external systems is required:

- Address data entry in SPECTRAweb, using existing address records from CRM
- After creation of an invoice in SPECTRAplus the invoice details must be submitted to the Finance sub-system.
- After receiving payment in the Finance sub-system the payment information must be submitted to SPECTRAplus.

Currently there are already existing interface to SAP (Finance sub-system) and to Siebel (CRM sub-system). WEB-services to communicate with additional 3rd party systems can be established.

2.6 Wizards

2.6.1 Management Summary

	<ul style="list-style-type: none"> ▪ Automation of technical analysis via wizards ▪ Wizard to run complex tasks in a manual or automatic mode ▪ Definition of required actions via XML file ▪ Helps to do typical use cases more efficient <ul style="list-style-type: none"> - Query for data - Map handling - Technical analysis
-----------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

2.6.2 Benefits

Benefits of Wizards:	<ul style="list-style-type: none"> ▪ Consistent Processing of „Technical“ Spectrum Management Tasks ▪ Speed-up technical analysis ▪ Improved quality of results (reproducible) ▪ Minimize user mistakes ▪ Junior staff can run pre-developed wizards ▪ Wizards could be developed by experts within the organisation or by LS telcom
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2.6.3 Detailed Description

The wizard functionality in SPECTRAemc allows running complex technical analysis tasks in a manual or automatic mode. All required steps are stored in an XML file based wizard description (Figure 2-34).

```

- <WIZARD_PAGE>
  <WIZARD_PAGE_NAME>set_prop_model_par_itu452</WIZARD_PAGE_NAME>
  <WIZARD_PAGE_DESCRIPTION>Set propagation model parameters</WIZARD_PAGE_DESCRIPTION>
  <WIZARD_PAGE_COMMAND>-set_prop_model_par_itu452=YES;50;UNWANTED</WIZARD_PAGE_COMMAND>
</WIZARD_PAGE>
- <WIZARD_PAGE>
  <WIZARD_PAGE_NAME>calc_freqassign</WIZARD_PAGE_NAME>
  <WIZARD_PAGE_DESCRIPTION>Frequency assignment calculation</WIZARD_PAGE_DESCRIPTION>
  <WIZARD_PAGE_COMMAND>-calc_freqassign=PROCESS;C_OPT:(60,M,RX_F,TX_F,M,PAIR_YES,BOTH);;-<
</WIZARD_PAGE>
- <WIZARD_PAGE>
  <WIZARD_PAGE_NAME>wait_for_user</WIZARD_PAGE_NAME>
  
```

Figure 2-34: Example wizard XML file

The user can send an application from SPECTRAplus to SPECTRAemc for doing a technical analysis. The application appears in SPECTRAemc in the SPECTRA Requests table (Figure 2-35).

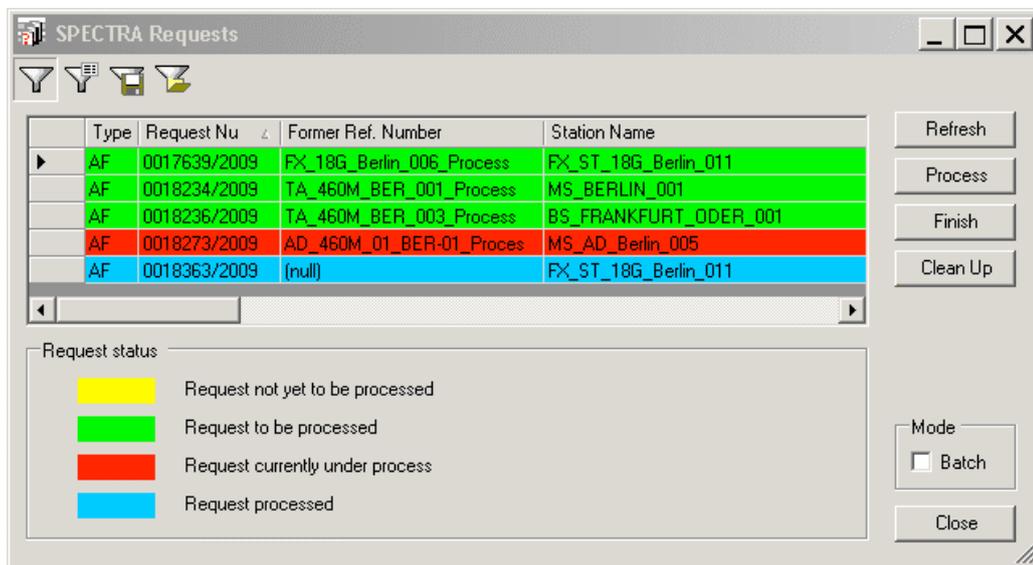


Figure 2-35: SPECTRAemc - SPECTRA Requests dialog

The user has to mark the specific record. After pressing the button “Process” automatically the pre-configured wizard will be loaded into SPECTRAemc wizard tab (Figure 2-36) based on different criteria like frequency range, service, sub service, action, etc.

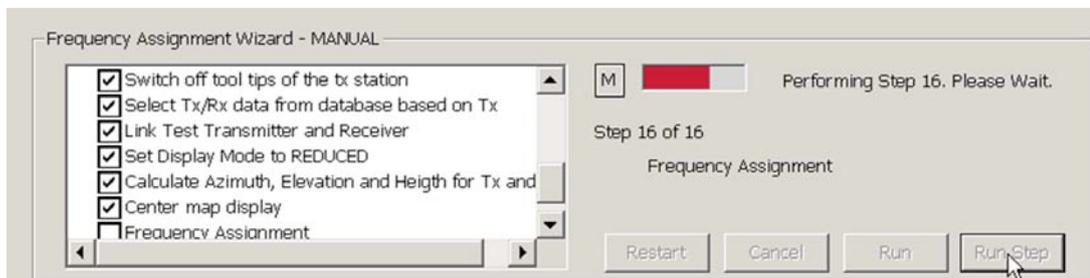


Figure 2-36: Wizard Tab in SPECTRAemc

From the wizard tab the user can start and control the wizard. In the automatic mode the wizard will do all the required actions. Whenever interaction with the user is required the wizard will stop

for the required decision of a user. This feature minimizes the work for the user. On the other hand the wizard mapping ensures that always the same procedure will be applied for a specific task. The user doesn't have to think about which propagation model should be used, which topographical data should be selected or which assignments must be taken into account for a specific analysis. All these details are pre-defined by the wizard.

2.6.3.1 Wizard Example

Band	Steps	Preparation	Channel Scan Order	Cosite Analysis	RAS - Radio Astronomy	PES - Permanent Earth Stations	Frequency Assignment	Exclusion Zone	Coordination Zone	Finish
GHz		1		2	3	4	5	6	7	8
1.4	56	X	Standard	X			X	X	X	X
4	71	X	Standard	X		X	X	X	X	X
6L	71	X	Standard	X		X	X	X	X	X
6U	54	X	Standard	X		X	X			X
7.5	55	X	Standard	X		X	X	X	X	X
13	71	X	Standard	X		X	X	X	X	X
15	71	X	Standard	X		X	X	X	X	X
18	71	X	A/B	X		X	X	X	X	X
23	62	X	Standard	X	X		X	X	X	X
25	39	X	Standard	X			X			X
32	39	X	Standard	X			X			X
38	39	X	Standard	X			X			X
52	39	X	Standard	X			X			X
55	39	X	Standard	X			X			X

Figure 2-37: Fixed Service Wizards – Table overview

Figure 2-37 shows a typical example for fixed service. For different frequency ranges the procedures for the technical analysis are different. The table explains which functionality (module) is required for a certain band.

Module 1: Preparation	Loading maps, propagation model parameters...
Module 2: Co-Site Analysis	Check to find out which sub-band can be used for the 2 stations.
Module 3: RAS	Check against existing Radio Astronomy stations
Module 4: PES	Check against existing Permanent Earth Stations
Module 5: Frequency Assignment	Perform a frequency assignment for the new link
Module 6: Exclusion Zone	Perform a check against existing exclusion zones
Module 7: Coordination Zone	Perform a check against existing coordination zones
Module 7: Finish	Send results back to SPECTRAplus DB

For each module a certain amount of wizard commands is required to cover the necessary functionality. Figure 2-38 gives an overview of all modules including their single wizard steps.

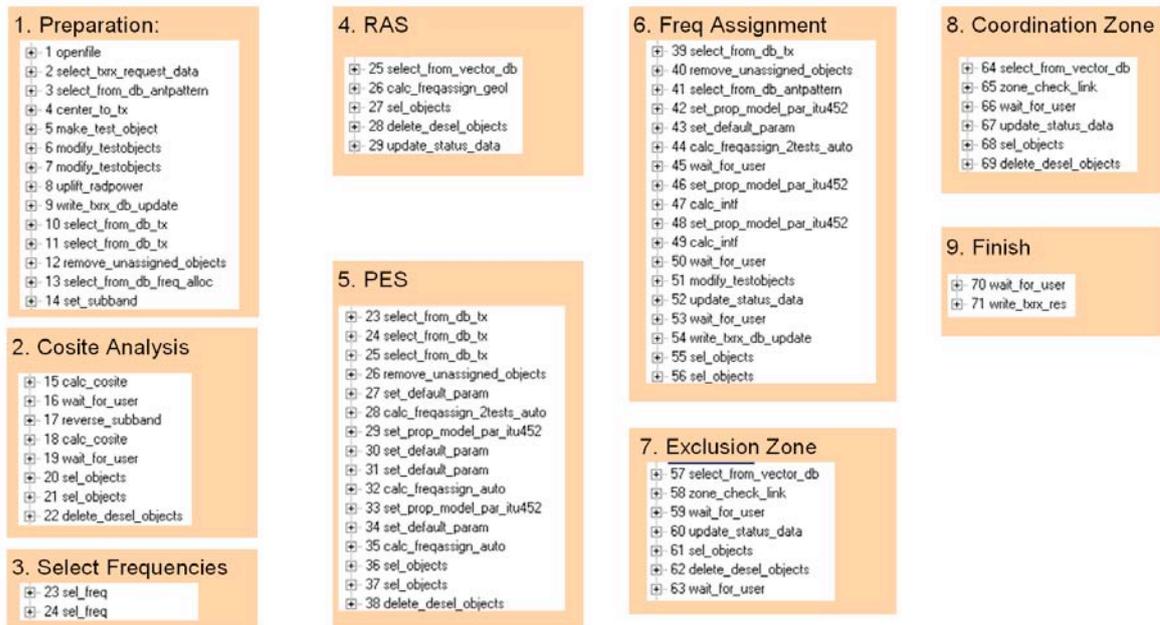


Figure 2-38: Fixed Service Wizards – Module Overview

To create a specific wizard for a certain band the wizard modules must be combined according to the specification table. Figure 2-39 shows the needed wizards for the band 23 GHz and 38 GHz.

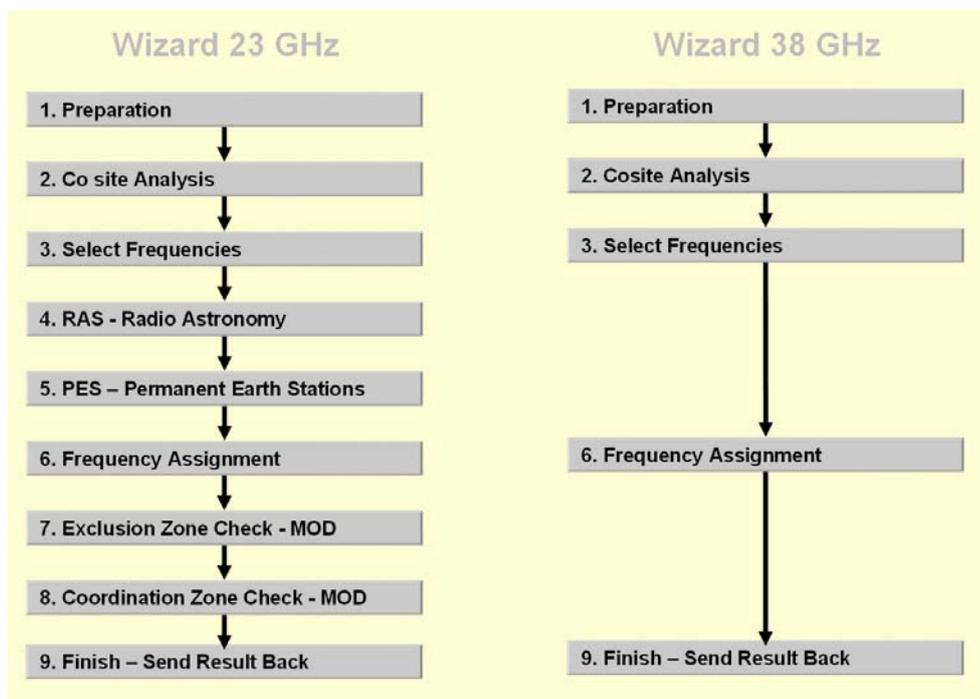


Figure 2-39: Fixed Service Wizards – 23/38 GHz examples

3 SPECTRA System – Fee calculation and money collection

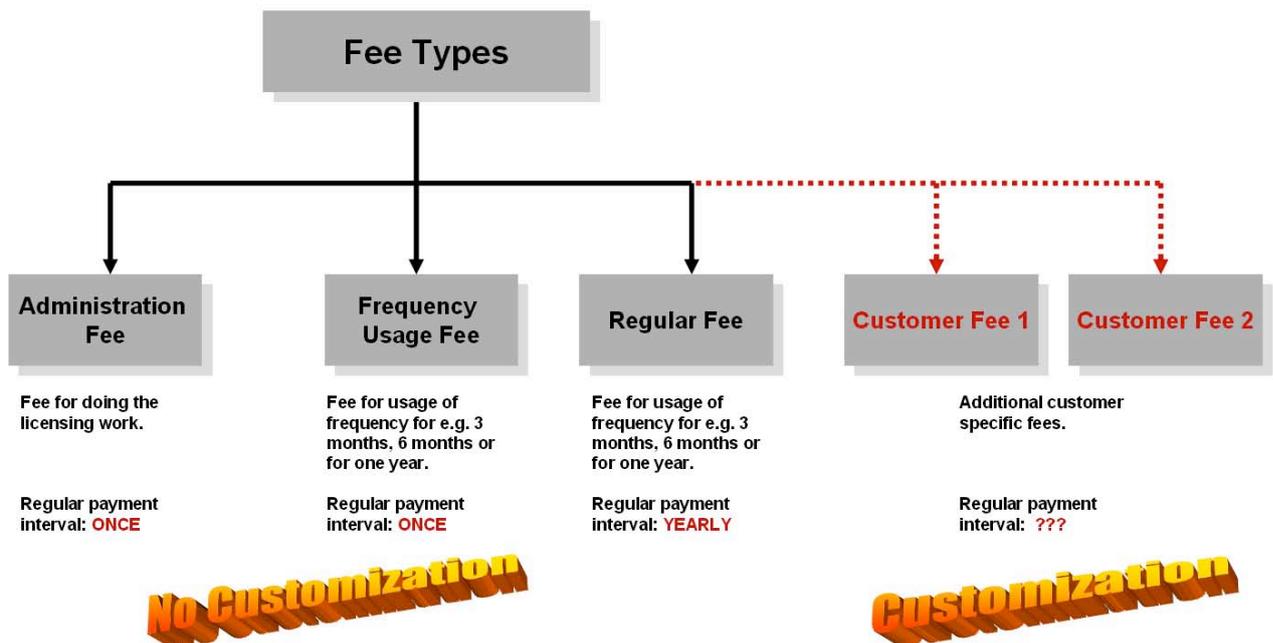
Fees are very important for a regulator as it is financing it's business. Therefore a fast, comprehensive and accurate process is of utmost importance.

Within SPECTRAplus, the whole complex is split into two major steps:

- The fee calculation, which may be quite complex dependent on the fee model a customer is using
- The fee collection, which is a comprehensive process involving report generation, workflow processing, payment tracking and axially steps in case of non or not complete payments.

3.1 Fee calculation

Basis of the fee calculation is the fee decree usually laid down in the local law. SPECTRAplus offers here several variants as there is no standard method used everywhere. The diagram below illustrates what kind of fees appear usually and how it is dealt with.



Typical Fee Types in Spectrum Management

For standard cases which follow simple rules like a specific administration fee for a specific kind of application or for regular fees like a annual license renewal being bound to the required bandwidth, link length, service type or similar cases SPECTRAplus has a standard configurator. Wherever this is not applicable, there is the possibility to introduce a separate fee module which may be programmed by LS telcom but can also be modified by the customer when required and given the customer are keeping software developing resources in their staff. These module then can

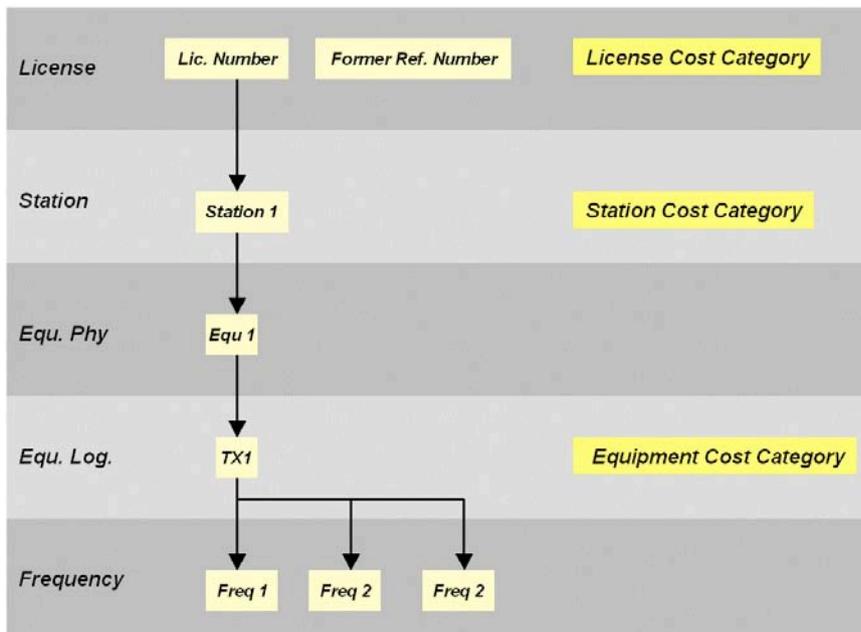
completely free analyse the scenario and calculate also fees which are e.g. incorporating rebate tables according to the actual customers total network or fees with local dependencies.

An example of the standard configurator is shown in the drawing below. The fees can be individually set for a license class, a specific service or sub-service or even for a specific customer. SPECTRAplus will automatically fill the Quantity fields and compile the according payment total for the customer, site, station or device, dependent on the network definition.

	Quantity	Amount	Cost Type		Value
per site	2	5000.00	Annual costs per site in network	Range costs	11,340.00
per TX	1	0.00	Annual costs per Transmitter	Combined range costs	11,160.00
per RX	1	300.00	Annual costs per Receiver	Range Costs	
per channel	0	100.00	Annual costs per TX Channel	Proport. Factor	298 / 360
per frequency	1	150.00	Annual costs per 25kHz Band	Total	18,625.00
per subscriber	0	10.00	Annual costs per NW Subscriber	Factor	100 %
per equipment	2	20.00	Annual costs per sold equipment	Allowance	- 0.00
per km Link	0	200.00	Annual costs per km link-length	Total	18,625.00
per request		400.00	One time admin fee	VAT	0 % 0.00
Additional costs	Edit	250.00	Additional Inspection	Total	18,625.00

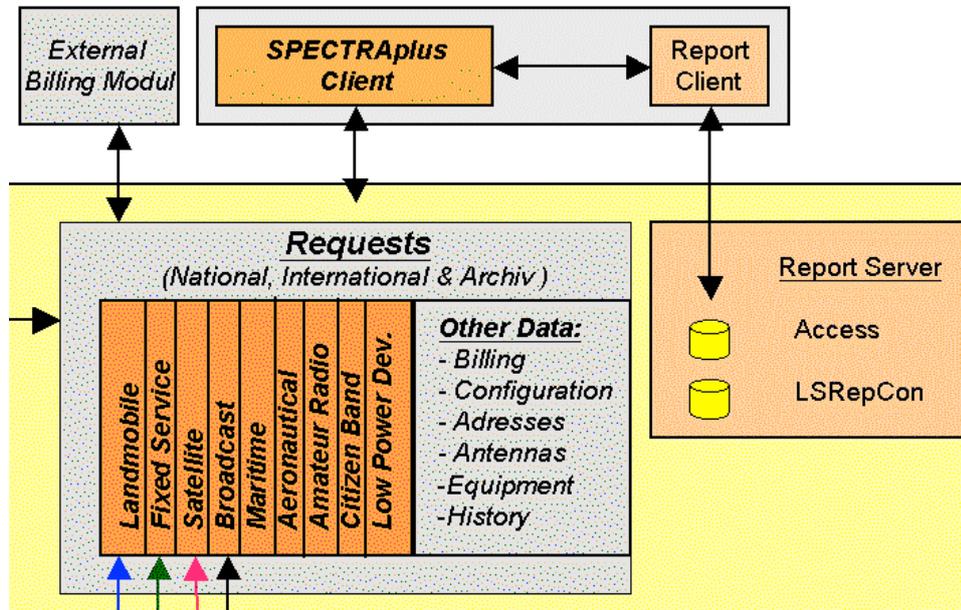
Standard Fee Configurator available in SPECTRAplus

In order to understand better the impact of licenses structure, the following drawing shows some possible levels on which so called cost categories, being fee model elements may reside. This is a very important feature, as license structures and hence also the invoicing methods vary from customer to customer.



License structure and related cost models

Using an external billing module, as shown in the drawing below, one is capable of embedding very complex scenarios as well. This module is usually written in C++ or C# and can be linked to the system at runtime.



Embedded Billing Module in SPECTRAplus

An example of a fee model which can be handled with such an external billing module is shown below:

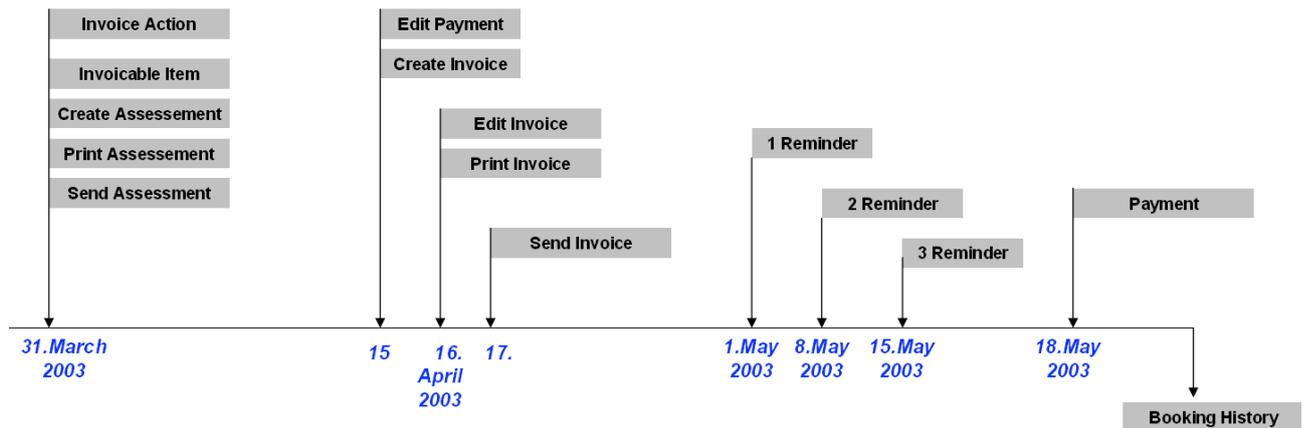
Service	LS-Subservice	Cost Category	lb	lp
Fixed Service	PP	<NULL>	0,050	0,290
	PMP	[TCS_CSST_CATEGOR Y]=['FDMA']	1,360	0,110
	PMP	[TCS_CSST_CATEGOR Y]=['TDMA']	0,230	0,490
	PMP	[TCS_CSST_CATEGOR Y]=['CDMA']	0,070	0,490
	PMP	[TCS_CSST_CATEGOR Y]=['WLL-P']	0,410	0,910
	PMP	[TCS_CSST_CATEGOR Y]=['WLL-S']	0,020	0,060
	PP Private	<NULL>	0,050	0,290
PMP Private	<NULL>	0,060	0,290	
Satellite	Satellite	<NULL>	0,143	0,000
	Earth Fixed	<NULL>	0,040	0,180
	Earth Mobile	<NULL>	0,040	0,180
	VSAT	<NULL>	0,080	2,520
Land Mobile (public)	AMPS	<NULL>	8,210	0,630
	GSM/DCS	<NULL>	8,790	4,200
	IS95	<NULL>	3,400	11,710
	Trunking	<NULL>	14,970	0,590
	Paging	<NULL>	24,240	0,790
Land Mobile (private)	Standard	<NULL>	2,720	0,130
		<NULL>	11,690	0,650
		<NULL>	0,290	0,020
	Trunking	<NULL>	33,980	1,330
	Paging	<NULL>	3,640	0,150
	Taxi	<NULL>	32,280	1,930
	Research	<NULL>	0,030	0,110
	Special Services	<NULL>	0,230	0,020
Cordless Telephone	<NULL>	0,000	0,000	
		<NULL>	0,001	0,018

Aeronautical	Ground-To-Air	<NULL>	0,000	0,000
	Aircraft	[EQP_EQUIP_TYPE]= ['Portable']	0,000	0,000
		[EQP_EQUIP_TYPE]= ['Handheld']	0,000	0,000
Maritime	Coast Station	<NULL>	0,000	0,000
	Vessel Station	[EQP_EQUIP_TYPE]= ['Portable']	0,000	0,000
		[EQP_EQUIP_TYPE]= ['Handheld']	0,000	0,000
Broadcast	AM	<NULL>	10,930	0,240
	FM	<NULL>	0,840	0,490
	TV	<NULL>	0,640	8,430
Other Services(*)	CB	<NULL>	0,000	0,000
	Navigation	<NULL>	0,000	0,000
	Astronomy	<NULL>	0,000	0,000
	Meteorological	<NULL>	0,000	0,000
Amateur	AR-Standard	<NULL>	0,000	0,000
Type Approval	TA-Standard	<NULL>		

Typical customized Fee schedule using specialised cost categories

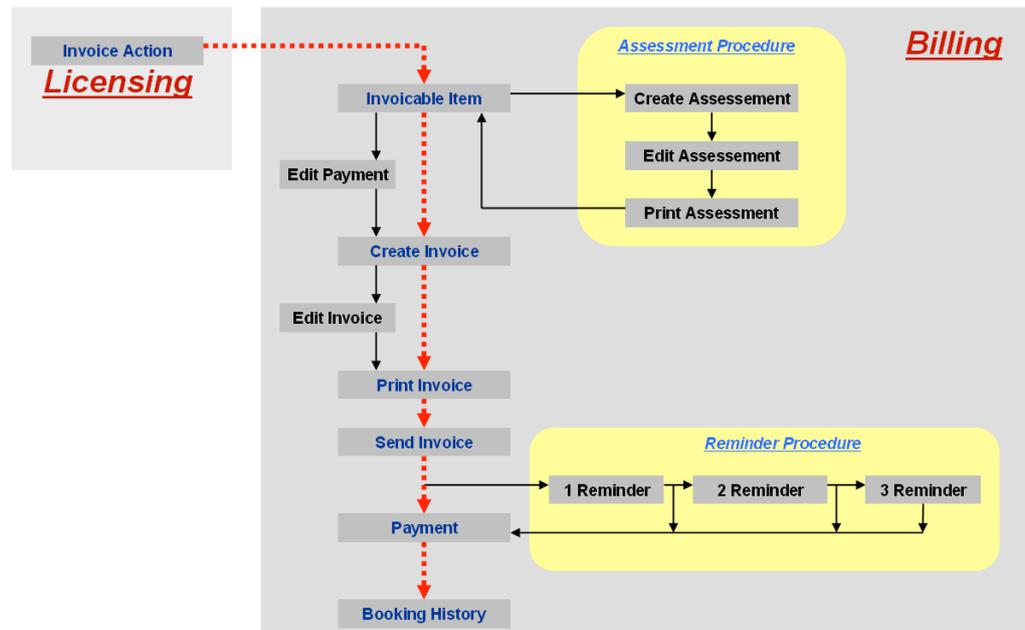
3.2 Billing (Fee collection)

The often very complex step is the fee collection or billing. As this are time dependent processes and every invoice is an individual of itself, a license may contain at one time possibly several such workflow driven processes. Theses processes may, dependent on the local law act independently or have to be controlled on a general basis. One typical scenario of a billing process involving also reminder steps is shown below.

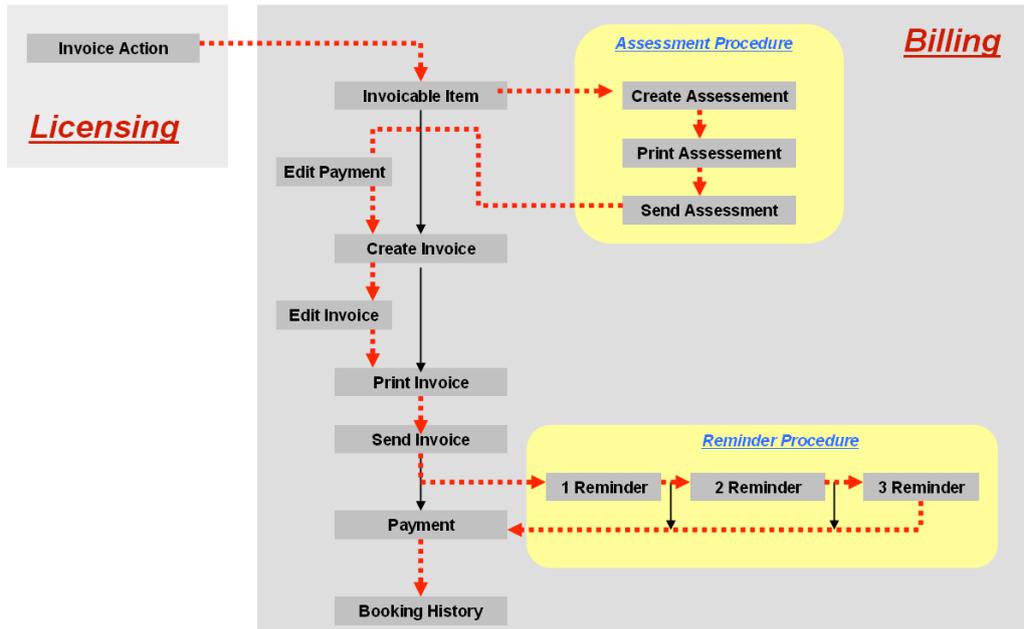


A typical invoicing process for a fee related to a license.

Especially in case of frequent payment duties there may occur several processes at once. SPECTRAplus can deal with such scenarios and has facilities to handle partial payment and payment via different channels like bank transfer, cheque, or cash.



Possible Workflow with regular process path indicated



Possible Workflow with auxiliary process path indicated

The system keeps control over the complete billing process. Therefore invoices can be created,

List of Invoices

Date: [] from [] to [] Service: [] Currency: Euro [] Only unpaid Only paid All Records in Selection: 22

Invoice	Invoice Type	Cost Type	Amount	VAT	VAT %	Allowance	Amount paid
0001019	bill (paid)	Frequency Fe	43,500.00	6,000.00	16	0.00	43,500.00
0001020	bill (paid)	Frequency Fe	52,200.00	7,200.00	16	0.00	52,200.00
0001021	bill (paid)	Frequency Fe	31,900.00	4,400.00	16	0.00	31,900.00
0001022	bill (paid)	Frequency Fe	52,026.00	7,176.00	16	0.00	52,026.00
0001023	bill (paid)	Frequency Fe	166,518.00	22,968.00	16	0.00	166,518.00
0001024	bill (paid)	Frequency Fe	1,334.00	184.00	16	0.00	1,334.00
0001025	bill (paid)	Frequency Fe	1,334.00	184.00	16	0.00	1,334.00
Total			633,067.95	87,319.72		0.00	626,687.95

Detail Rem. History Records in Selection: 1

Invoice	Request Reference	Former Ref. Number	Amount	VAT	VAT %	All
0001021	0013164	LM_ST_68_74.8_M	31,900.00	4,400.00	16	

Buttons: Cancel, Print, Query

Invoice Overview page in SPECTRAplus

All payments coming in are tracked for their origin using the given reference number. This leaves to a daily payment history and related to that an overview over settled and unsettled account and

Booking History

Cust. Account: [] Booking Acc.: [] Reference No.: [] From date: [] To date: [] Service: [] Views: [Standard]

Book Type: [] Currency: [Euro] Invoice User Ref. No.: [] Query: [] Selected Record: []

Initial Amount: [0.00] [0.00] [0.00]

Date	Cust. Account	Booking Acc.	Book Type	Reference No.	Amount	Cur.	VAT %	VAT	Amount
21.02.2003	Fixed		Invoice	0001033	64,960.00			8,960.00	56,000.00
21.02.2003	Fixed0002		Invoice	0001028	28,420.00	EUR	16	3,920.00	24,500.00
21.02.2003	Fixed0002	ACC_CityB	Inv. Payment	0001028	-28,420.00	EUR	16	-3,920.00	-24,500.00
21.02.2003	GSM C		Invoice	0001024	1,334.00	EUR	16	184.00	1,150.00
21.02.2003	GSM C	ACC_CityB	Inv. Payment	0001024	-1,334.00	EUR	16	-184.00	-1,150.00
01.05.2003	GSM C0001		Annulation	0001015	-11,717.16	EUR	16	-1,616.16	-10,101.00
01.05.2003	GSM C0001		Reminder	0001015/1	11,834.33	EUR	16	1,632.32	10,202.01
08.05.2003	GSM C0001		Annulation	0001015/1	-11,834.33	EUR	16	-1,632.32	-10,202.01
08.05.2003	GSM C0001		Reminder	0001015/2	12,071.02	EUR	16	1,664.97	10,406.05
15.05.2003	GSM C0001		Annulation	0001015/2	-12,071.02	EUR	16	-1,664.97	-10,406.05
21.02.2003	GSM C0001	ACC_CityB	Inv. Payment	0001030	-7,540.00	EUR	16	-1,040.00	-6,500.00
21.02.2003	GSM C0001	ACC_CityB	Inv. Payment	0001027	-7,540.00	EUR	16	-1,040.00	-6,500.00
21.02.2003	GSM C0001		Invoice	0001030	7,540.00	EUR	16	1,040.00	6,500.00
21.02.2003	GSM C0001		Invoice	0001027	7,540.00	EUR	16	1,040.00	6,500.00

Sum: [8,700.00] [1,200.00] [7,500.00]

Final Amount: [8,700.00] [1,200.00] [7,500.00]

Buttons: [Cancel] [Print Selected] [Print List]

Booking history (for a definable time span)

payments due.

Payment

Date: [21.02.2003] Bank Reference: [] Bank Booking Acc.: [ACC_CityB] From amount: [0.00] To amount: [0.00]

Name: [City Bank] Sorting Code: [1020] Bank Account: [89898] Currency: [Euro] Paym. Mode: [Account] Records in Selector: []

Cust. Account	Invoice Reference No.	Invoice User Ref. No.	Amount	Unsett. amount	Amount paid	VAT	Inv.
GSM C0001	0001027		7,540.00	7,540.00			21.02
Fixed0002	0001028		28,420.00	28,420.00			21.02
GSM C0006	0001029		38,860.00	38,860.00			21.02
GSM C0001	0001030		7,540.00	7,540.00			21.02
Fixed	0001031		64,960.00	64,960.00			21.02
Fixed	0001032		42,688.00	42,688.00			21.02
GSM C	0001024		1,334.00	1,334.00			21.02
GSM C0005	0001025		1,334.00	1,334.00			21.02
GSM C0003	0001026		1,334.00	1,334.00			21.02
Taxi	0001019		43,500.00	43,500.00			21.02
Publi	0001020		52,200.00	52,200.00			21.02
Emerg	0001021		31,900.00	31,900.00			21.02
Easy	0001022		52,026.00	52,026.00			21.02
Easy	0001023		166,518.00	166,518.00			21.02
Fixed	0001033		64,960.00	64,960.00			21.02

Buttons: [Cancel] [OK] [Query]

Open Invoices

As reporting is very important, like all other database stored information, all kind of payment related subjects may be drawn out of the system as statistics in report form.

billing_history: Previewer

File View Help

Page: 1

Billing history 21 FEB 2003

From : To :

Type of booking : Invoice

Currency : EUR

Service : Fixed Service

Name	Bank Referenz	Customer	Date	Reference	Amount	VAT	Amount
		Fixed	21.02.2003	0001031	56,000.00	8,960.00	64,960.00
		Fixed	21.02.2003	0001032	36,800.00	5,888.00	42,688.00
		Fixed	21.02.2003	0001033	56,000.00	8,960.00	64,960.00
		Fixed0002	21.02.2003	0001028	24,500.00	3,920.00	28,420.00
		GSM C0001	17.04.2003	0001015	10,101.00	1,616.16	11,717.16
		GSM C0001	21.02.2003	0001027	6,500.00	1,040.00	7,540.00
		GSM C0001	21.02.2003	0001030	6,500.00	1,040.00	7,540.00
		GSM C0006	21.02.2003	0001029	33,500.00	5,360.00	38,860.00
Total Service : Fixed Service					229,901.00	36,784.16	266,685.16

Service : Land Mobile (private)

Name	Bank Referenz	Customer	Date	Reference	Amount	VAT	Amount
		Easy	21.02.2003	0001022	44,850.00	7,176.00	52,026.00
		Easy	21.02.2003	0001023	143,550.00	22,968.00	166,518.00
		Emerg	21.02.2003	0001021	27,500.00	4,400.00	31,900.00
		Publi	21.02.2003	0001020	45,000.00	7,200.00	52,200.00
		Taxi	21.02.2003	0001019	37,500.00	6,000.00	43,500.00
Total Service : Land Mobile (private)					298,400.00	47,744.00	346,144.00

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