USER GUIDE

GPServer software

DATA PUBLICATION USING THE INTERNET

Trimble

NORTH AMERICA
Trimble Engineering &
Construction Group
5475 Kellenburger Road
Dayton, Ohio 45424-1099 • USA
800-538-7800 (Toll Free)
+1-937-245-5154 Phone
+1-937-233-9441 Fax

EUROPE
Trimble GmbH
Am Prime Parc 11
65479 Raunheim • GERMANY
+49-6142-2100-0 Phone
+49-6142-2100-550 Fax

ASIA-PACIFIC
Trimble Navigation
Singapore Pty Limited
80 Marine Parade Road
#22-06, Parkway Parade
Singapore 449269 • SINGAPORE
+65-6348-2212 Phone
+65-6348-2232 Fax

Trimble®

www.trimble.com

Trimble GPServer

Data Publication Using the Internet

User Guide

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Corporate Office

Trimble Navigation Limited
Geomatics and Engineering Division
5475 Kellenburger Road
Dayton, Ohio 45424-1099
USA

800-538-7800 (Toll Free in USA)
+1-937-245-5600 Phone
+1-937-233-9004 Fax
www.trimble.com

Support Offices

Trimble_support@trimble.com

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Release Notice

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Contents

CHAPTER

1

Introduction

In this chapter:

- Welcome
- About GPServer and the Publication of Data Using the Web
- Related Information
- Technical Assistance
- Your Comments

Welcome

Welcome to the Trimble GPServer User Guide. This manual describes how to install, set up, and use the Trimble GPServer software.

Note that this manual cannot replace the pre-system-integration work. Trimble recommends that system integration is performed by Trimble Infrastructure support staff. System integration includes verification and analysis of the communication links, and GPServer configuration as well as an additional administrator training for this GPServer server application.

Even if you have used other Global Navigation Satellite Systems (GNSS) products before and are familiar with web servers and HTML programming, Trimble recommends that you spend some time reading this manual to learn about the special features of this product.

If you are not familiar with GNSS, visit Trimble's website (www.trimble.com) for an interactive look at Trimble and GNSS.

This publication assumes that you know how to use the Microsoft® Windows® operating system. Further, the publication assumes that you are familiar with Microsoft Access and know how to edit its databases or other databases that comply with standard SQL.

About GPServer and the Publication of Data Using the Web

GPServer together with the Trimble GPSWeb web server interface is the Trimble web server solution. It is used for the publication of improved - in terms of applying the network-correction data to a multiple set of single base station data - real-time and post-processing data using the Internet.

The GPServer web server allows easy administration and distribution of archived data, such as RINEX observation, navigation, meteorological and almanac files. GPServer even provides real-time information such as reference station data, network status information like current tracking behavior of the station, atmospheric activity

(ionosphere & troposphere), using the Internet. The GPServer system is fully equipped to allow user identification and accounting.

A major service is the generation of a virtual reference station (VRS™) for postprocessing, if Trimble GPSNet has been running in real-time for the desired time span and the area of interest. In other words, the corrections are computed during the real-time operation and are then stored in files. GPServer then uses these files together with the raw RINEX files to generate the virtual reference raw data file in RINEX format. The customer is required to enter date, time and position information. GPServer then creates the corresponding RINEX file for the virtual reference station in RINEX format.

The RINEX Shop for data request and data download makes the data available to the customer. If customers are charged for data, they can easily check the prices for the requested data. Data can be distributed using e-mail, but are also stored on a hard disk for download for a user-defined time span. Using the new Ntrip protocol, differential correction data can even be disseminated in real-time, if customers use a receiver hardware that is mobile IP (GPRS) capable. For more information, see the section on Ntrip in Chapter 4, Trimble GPServer.

Note - *The GPServer application is based on a modular concept which can be configured to fit the providers' needs and requirements. Several features, such as the Trimble GPStream application that diverts and splits any kind of data streams, are available as additional installation on the Infrastructure CD.*

GPServer configuration settings are defined using a built-in-wizard. For a detailed list of system requirements, see Chapter 2, Installation and Licenses.

Related Information

As well as being supplied in hardcopy, this manual is also available in portable document format (PDF). It is available from the \Manuals\ folder on the installation CD. After installation, you can also find it in the Manual\ sub-folder of your program folder.

Other sources of related information are:

- Readme.txt file – a Readme.txt file contains information added after the documentation was completed. To read this file, double-click it or use a text editor to open it.
- GPSNet User Guide – The manual that provides all information on the GPSNet reference station network software.

Technical Assistance

When you purchase GPServer, you receive free support and upgrades for twelve months from the date of purchase. Before the end of that period, annual Support & Upgrade contracts can be purchased.

For Support & Upgrade contracts, contact your local distributor.

All queries regarding the GPServer software and the installation can be addressed directly using fax, phone, mail, and e-mail. For contact details, refer to the front of this manual. Trimble undertakes to respond within the shortest possible time within the limits of office hours, public holidays and other occasions when the office is closed. Trimble aims at providing the customer with normal response within 48 hours.

If you have a problem and cannot find the information you need in the product documentation, contact your local dealer. Alternatively, do one of the following:

- Request technical support using the Trimble website at www.trimble.com/support.html.
- Send an e-mail to trimble_support@trimble.com.

Your Comments

Your feedback about the supporting documentation helps us to improve it with each revision. To forward your comments send an e-mail to ReaderFeedback@trimble.com.

CHAPTER

2

Installation and Licenses

In this chapter:

- Introduction
- System Requirements
- Installation and Configuration
- Software Protection by Hardware Key

Introduction

According to the purchase and license agreement, the installation of a web server will be done by Trimble's Infrastructure support staff. After the additional on-site administrator training you will be able to update and modify the configuration if necessary.

This chapter gives you an idea of system equipment, licensing and installation-dependent facts. A full installation of a web server system consists of multiple modules, including the GPServer software and the web server configuration GPSWeb.

System Requirements

The GPServer program package is designed to run under Windows 2000, Windows XP, and Windows 2003 Server.

Minimum hardware and software requirements are:

- Microsoft® Windows® 2003 Server; Windows XP Professional; Windows 2000 with Service Pack 2 or later.
- Pentium III PC with 1.6 GHz processor (depends on the estimated maximum number of simultaneous users. Details will be discussed in a pre-sales session. Trimble can recommend the hardware if required).
- 512 MB RAM.
- 20 GB hard disk (depending on stations and amount of data to be archived).
- Connection to the Internet, such as Ethernet, with sufficient band width to support multiple users.
- USB port for licensing.
- Microsoft Internet Explorer, Version 6.0 or later.

GPServer also can make use of multiple processor systems as well as of dual-core processors.

Installation and Configuration

This section gives you an idea on the main components of your web server system. It helps you understand the installation processes and gives you important hints for file backup.

GPServer installation

An automatic installation of GPServer is available from the installation CD-ROM, if you put it into the CD-ROM drive. The setup program will start automatically. Alternatively execute the file setup.exe. From the splash screen select *GPServer*. The installation wizard guides you through the installation process.

In the Start/Programs menu select the item *GPServer / GPServer*. It will automatically start GPServer loading the last used configuration. The first time you start GPServer, this will be the *Default* configuration. Later, you may cancel the automatic loading: During start-up, press the keyboard button ESC. Select *File / Load Configuration* from the main menu. For more information, see Chapter 4, Trimble GPServer.

GPSWeb configuration

Before GPSWeb can be configured it needs the installation of an HTTP server, such as Apache v2.0 (.46 or later) or Microsoft Internet Information Services (IIS) v5.0 or later. Apache is distributed as freeware. It is available from your Infrastructure installation CD-ROM. Typically, you will set port 80 as server port for all users (recommended setting). After installation, the service should run immediately, respecting regional settings.

Microsoft IIS is available from your Windows installation CD. To use Microsoft IIS, it must be installed and activated.

An automatic configuration of the web server is available from the installation CD-ROM. If you put it into the CD-ROM drive, the setup program will start automatically. Alternatively execute the file

setup.exe. From the splash screen select *GPSWeb*. The installation wizard lets you select an installation directory. It guides you through the configuration process. Its main tasks are:

- To configure the HTTP server (select either Apache or IIS),
- To install the PHP script interpreter and the PHP web pages,
- To add or update Trimble databases and to configure the ODBC System data source names (DSN).

***Note** – Make sure that a drive C:\ is available at your computer system, since the GPSWeb installation relies on its existence. Nevertheless, you can install GPSWeb on any other drive.*

GPSWeb settings

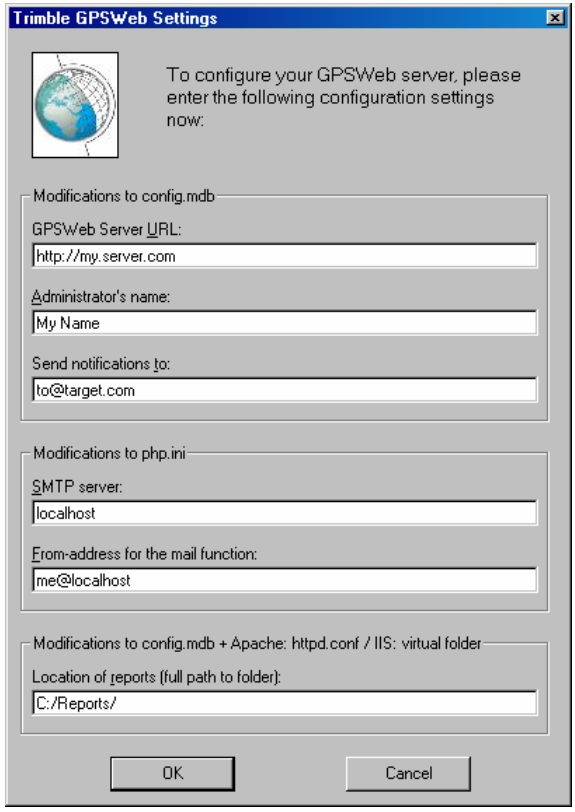
When the installation process is finished it has created on your desktop a link named *Trimble GPSWeb Settings* that lets you edit important addresses in the *Trimble GPSWeb Settings* dialog. See Table 2.1 for details on the settings.

Table 2.1 List of settings for GPSWeb

Setting	Description
GPSWeb Server URL	Edit the URL of your server computer.
Administrator's name	Name of the service administration. Mainly used in e-mails to customers, therefore, you may prefer to enter the name of your web service here. Overwrites the *ServerAdminName* entry in the config.mdb / *Configuration* table (see Chapter 6, Databases).
Send notifications to	E-mail address used for user registration requests. Overwrites the *ServerAdmin* entry in the config.mdb / *Configuration* table (see Chapter 6, Databases).
SMTP server	Either host name or IP address of the SMTP mail server.

Setting	Description
From-address for the mail function	For data delivery by e-mail this e-mail address is used to send e-mails.
Location of reports (full path to folder)	Full path to the local folder at the web server computer, where reports are available for download.

Note *– GPSWeb comes with several PHP scripts and Microsoft Access databases. The installation writes the settings into the php.ini or the* Configuration *table of the config.mdb database.*



If you have selected Apache, the default configuration file httpd.conf is backed up and renamed to httpd.conf.beforeGPSWeb.

httpd.conf.beforeGPSWeb is not overwritten, even if you repeat the configuration, thus storing the default Apache settings.

Warning – Make sure that you start the *Trimble GPSWeb Settings* and accept the dialog with **OK**. Otherwise, the configuration of the selected HTTP server, either Apache or IIS, will be incomplete and the web server system might fail.

Trimble database configuration

If you are updating an installation or adding other Infrastructure software to your system, the installation process needs to update the Trimble databases. The process ensures that no existing information is lost, but new information is added.

- Previously not existing databases are created in the Program Files\Common Files\Trimble\Infrastructure\DB folder.
- If one of the databases is found at another location, a dialog appears that lets you select whether you want to move all infrastructure databases from that folder to the default location or keep the previous path.
- The onlineshop.mdb. database is not modified, if it exists already.
- The installation process may modify the users.mdb, accounting.mdb, config.mdb and the resource.mdb. User-defined data are merged into the default databases provided by the GPSWeb installation. This process ensures that, for example, background information and structural settings are consistent with a new version of GPSWeb. The merging process uses these rules:
  - The *Version* table is for purely internal purposes. It is overwritten by each software update, if Trimble has modified the table or its contents. Do not add or modify entries; user-defined entries will be lost with each update.

- User-defined tables are added to the default databases.
- User-defined columns are added to the default databases.
- User-defined records are added to the default databases.
- For each record of the *StringTable* table in the resource.mdb, a flag defines how the content of this record is handled during update. If the *ReplaceRow* flag is set in the default database, user-defined entries are discarded and the default entries are kept. If the check box is cleared – this is the default – , user-defined entries are kept. The flag only marks the content of the default language columns. User-added languages are not touched.

- Before update, previously existing database files are copied into .bak files. Nevertheless, Trimble recommends that you backup modified databases at a safe place before you start the installation.

Tip – After database update, check the *StringTable* table for the *ReplaceRow* column and for new rows, if you have added further languages to your GPSWeb installation. Localize new entries and, if you find selected check boxes, make sure that the translation matches the English version.

All steps of the installation are logged into a text file named GpsDBUpdate.log. If errors occur, the log file opens in a text window. You must close the log window, before the installation moves on.

Warning – Updated databases are not compatible with previous Infrastructure installations.

With respect to later updates Trimble recommends that you put all databases in the same folder.

When being set up for the first time, GPSWeb installations, of course, resemble each other very much. Therefore, Trimble recommends you to at least customize the most important settings; see Table 2.2.

Table 2.2 Recommendations for GPSWeb customization

Database	Table	What to customize
Config.mdb	Configuration	All settings, especially path and host IP/port settings.
Config.mdb	Links	Add your own links to the navigation bar (optional).
Config.mdb	NetworkImage Map	If you want to create a clickable image map, put the image coordinates and names of your reference stations here.
Config.mdb	Layout	The background color (BGColor): As a rule, the layout of your GPSWeb pages is controlled by the settings in the layout table. However, the RINEX Shop pages are controlled by a style sheet you can find at the following location: <GPSWeb install Dir>\wwwroot\shop\general.css. The style sheet defines the RINEX Shop layout in different sections. Make sure to use the same background color for all services in your GPSWeb setup, either adjusting it in the style sheet or in the *Layout* table.
Resource.mdb	StringTable	IDs 00007,00008,00009: Header and footer text.
Resource.mdb	StringTable	ID 00100: Website main title.

Database	Table	What to customize
Resource.mdb	StringTable	ID OLS_TIMESELECTION_TBL_ GPS_time_offset: Edit the offsets between GPS time and your local time zone for standard time as well as for Daylight Saving Time. This info will help your customers when defining the requested time period.
Resource.mdb	StringTable	ID OLS_HISTORY_TXT_Note_Old_ orders_removed_automatically: Fill in the maximum file age value that is set in the Disk Watch properties for the RINEX generation folder. This folder is configured in the iGate module.
Resource.mdb	StringTable	Optionally all text for welcome.php (or use your own start page by specifying it in config.mdb – see above).
Users.mdb	Passwd / Groups	Add your own users (and optionally groups).
Users.mdb	Access-Privileges	Specify what services should be available to each group.
Users.mdb	Services	Specify which services are available in general on the website.

Tip – The users.mdb database holds user accounts for multiple tasks. By default, it contains a user “Webserver”, which represents GPSWeb in the communication with GPServer or GPSNet. To prevent unauthorized access to your web server system and GPSNet, ***make sure to change the default password for the “Webserver” user***. To do so, go to the users.mdb / Passwd table and there edit the “Webserver” user’s *Password* value. Of course, Trimble recommends replacing all other default passwords too, with emphasis on the default administrator “Admin”.

PHP script configuration

The PHP script interpreter needs the PHP scripts at a predefined location. This is the wwwroot\ subfolder of your GPSWeb installation folder. It is possible to edit the PHP scripts after installation to modify the look-and-feel of your website as well as the functions offered there.

When updating the web server installation with a new version of GPSWeb, PHP scripts from previous installations are overwritten. This is necessary to always provide you with the newest software developments.

Warning – Make sure that you keep backup files of any modified PHP file before re-installation. A re-installation overwrites PHP files.

Software Protection by Hardware Key

GPServer is license-protected. With your purchase of the product you have received a hardware key. Without this hardware key (dongle) you will not be able to run GPServer.

Plug the hardware key to the USB port. The SENTINEL DONGLE driver is installed or updated with each GPServer installation.

If a hardware key is lost, stolen, or destroyed, you must purchase another copy of the software to replace it. Therefore, Trimble recommends that you insure the key for the full replacement cost of the software.

Do not remove the hardware key while running GPServer or any of its software modules. GPServer checks during operation if the license is still present. If it is not, the application is terminated immediately.

CHAPTER

3

Web Server – General Concept

In this chapter:

- Introduction
- Web Server Concept
- Customer Access to the Web Server
- PHP Scripts

Introduction

The GPServer web server system makes data publication using the Internet an easy task. It is based on a GPServer installation combined with a GPSWeb configuration setup. GPSWeb and GPServer can run on the same computer as well as on separate computers.

This chapter introduces the concepts behind a web server installation for post-processing data and gives you basic information on the components of this fully adjustable web server system. For detailed information on real-time data distribution with mobile IP, see the section on the Ntrip protocol in Chapter 4, Trimble GPServer.

Note *– The default GPSWeb configuration is one of many possibilities on how a web server can be set up. You are free to modify any of the following components. However, all GPServer and GPSWeb configurations are designed to match each other. Modifications at one location may induce necessary changes at other modules.*

Web Server Concept

The distribution of GNSS data for postprocessing or real-time applications over the Internet will more and more play a major role. This is based on the facts that the Internet is available almost everywhere, that, for example, GPRS is available for mobile IP communication, and that rover CU's run on Microsoft Windows CE that is already connected to the Internet.

The GPServer web server solution assembles software, scripts, and system components you need to configure a common access point for customers to receive any kind of reference station data and corrections. Each type of data that can be accessed, including user authentication, is called a service.

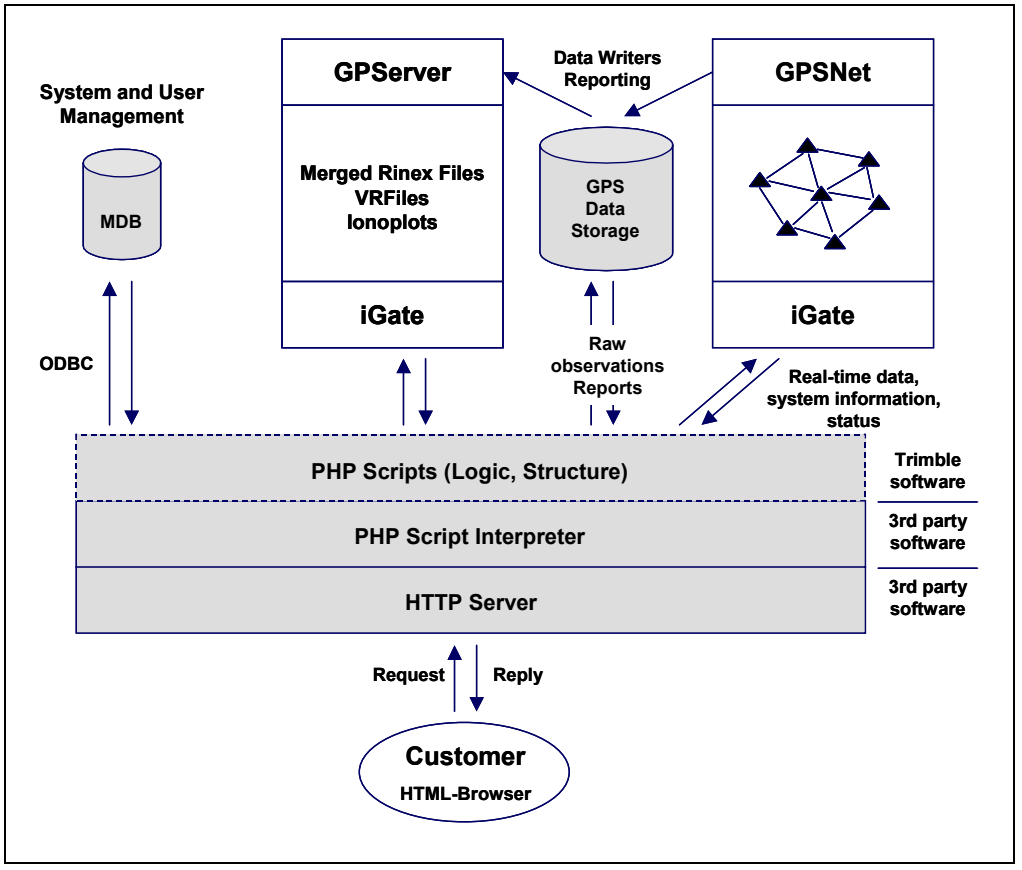


Figure 3.1 System components of a GPServer web server system

A GPServer web server solution (see Figure 3.1) at least consists of the following:

- Input: Data to be distributed and a protocol that allows active communication between the data generating system and the web server system,
- Databases that allow storing configuration and user information for system and user management.

- PHP interpreter and PHP scripts that dynamically create HTML pages from static and dynamic information.
- A server that is able to interpret HTTP commands
- An web browser at the users' side. Cookies must not be blocked.

Sources for distributed data

The core of the web server system is a running GPSNet system providing reference station data and corrections, and a system running the GPServer software. Independently archived data also contribute to the system. They can be stored at any location, either on the GPSWeb server computer or on any other computer in a local or wide area network.

GPSNet provides, directly or using its data storage system, stored data, such as maps, reports, and raw observations, or operational information about system availability, failures, and maintenance.

The GPServer software is a set of modules designed to communicate and distribute GNSS data over the Internet. It can be used as a stand-alone tool as well as in combination with GPSNet. GPServer makes the communication protocol available that is used for the distribution, inquiry and retrieval of GNSS data.

In combination with the GPSWeb system for the distribution of data used for postprocessing, GPServer uses the iGate Communication Protocol. Its modules automatically create RINEX files for reference station data, or RINEX files where observations are corrected using virtual reference data. Users can specify the station or position, date and update interval. (In a real-time system, GPServer uses the Ntrip protocol and mobile IP to distribute corrections for DGPS or RTK adjusted with network residuals. See Figure 4.1.)

GPSWeb: Server

The physical connection between the world and the data sources is the web server computer in the GPSWeb configuration. It needs at least a core HTTP server capable of executing scripts, such as Apache 2.0.46, and the PHP script interpreter PHP Version 5.

HTML pages are created dynamically by interpreting PHP scripts. GPSWeb comes with a bundle of PHP scripts that are designed for a default web server. The scripts provide the logic and structure for the HTML creation, while layout definitions, text strings and the links to the servers for dynamically varying contents are loaded from databases.

Databases for user and system management

If customers are to be charged for using web server services, it is essential to collect and store information on the users' identities and accesses. The GPSWeb registration and authentication system is based on the database system. For a detailed description of the usage, contents and interdependencies of the databases, see Chapter 6, Databases.

Customer Access to the Web Server

Customers use a web browser, such as the Microsoft Internet Explorer to access the web services. When your service appears at their screen, it can look like in Figure 3.2.

Note *– For authentication purposes, the web server needs cookies enabled in the user's browser. Therefore, users are not allowed to block cookies completely.*

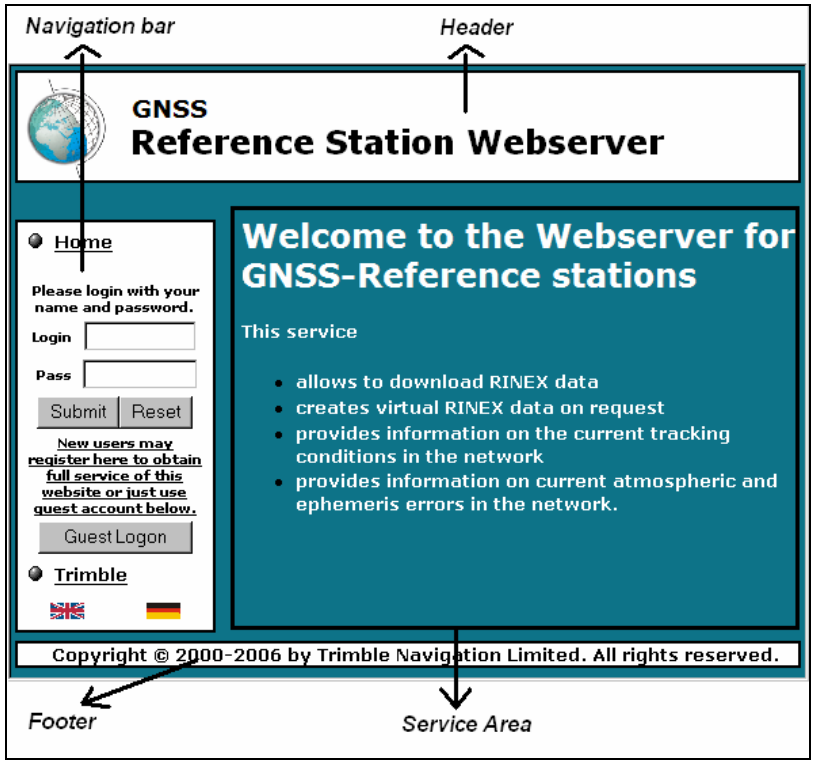


Figure 3.2 Typical web server area displaying the four major frames

Note *– Most probably, the Welcome page will not look like this. It is subject to service requirements and individual agreements. The Trimble installation team will be happy to support you in modifying the welcome page as required.*

The web page consists of four major frames.

- Header area
- Navigation bar
- Service area, also called client frame
- Footer area

PHP scripts generate the frames. The PHP scripts load layout and text information from databases. For example, layout components, such as text font and background colors, are loaded from the config.mdb and can be adjusted ad lib. The *StringTable* table of the resource.mdb database contains text strings (in multiple languages), which you can access and edit. The PHP script refers to the matching ID in the database table. Thus, you can freely adjust the text at the client area. You can, for example, create your web server user interface in any language. For details, see Section Language selection.

Tip – You can even adjust the Windows title and the favicon. The favicon is a website icon which can be seen, for example, in the web browser's address bar or its bookmarks. To adjust the title, go to the resource.mdb and there to the *StringTable* table, and edit string ID 00100.
To add a favicon, an ICO file must be available. You can create it with special software. To use a favicon, go to the *Configuration* table of the config.mdb database. Set the FaviconEnable to 1, if you want to enable the use of customizable icons. By default it is disabled (set to 0). Then edit FaviconURI with the (relative) path and name of the ICO file that contains your customized icons. The default filename is favicon.ico.

Language selection

When customers access your website, it must be displayed in a default language. The customers can then select the language they prefer using the national flags at the bottom of the navigation bar.

Available languages

By default, GPSWeb is delivered with two languages, English (U.S.) and German. You can add other languages to GPSWeb: In the *Language* table of the config.mdb database add a new line for each new language and provide the language name, ISO Code, DBCode, and PHP Locale. The FlagIconURI value is used for the graphical

representation of the language in the navigation bar, see Section Allowing the user to select a language.

***Note** – For each additional language add a column and respective translations to the* StringTable *table of the resource.mdb. See also the section on the resource.mdb in Chapter 6, Databases.*

The user's web browser uses two-letter ISO codes to transmit the preferred languages to the web server. GPSWeb, on the other hand, uses a 3-letter country code in the column headers of the *StringTable* table in resource.mdb to identify the language. The *Language* table of the config.mdb database lets you add or delete languages from the list and maps the ISO code (column *ISOCode*) for each language to the database identifier (column *DBCode*).

For some automatic entries, such as the day of the week, GPSWeb must know the locales to be used in the PHP scripts; they must be available in the ISO 639 language code. To edit the PHP locales for a new language, go to the *Language* table of the config.mdb database and edit the PHPLocale column with a comma-separated list of locales. For more information on the available locales, see the comment text for the PHPLocale column. For more instructions on how to see this text, refer to the Microsoft Access Help.

Setting the default language

The default language is defined in the config.mdb database / *Configuration* table (entry DefaultLanguage). There are two options to influence the initial language detection:

- GPSWeb recognizes the language settings of the customer's web browser, and uses the respective text strings from the data base. In this case the DefaultLanguage setting is ignored.
- GPSWeb uses the language defined in the DefaultLanguage entry.

Web browsers typically allow the setting of a ranked list of preferred languages for display of web pages. For more information on how to do so, refer to the web browser help. ***For automatic language***

detection, GPSWeb can use these settings to compare whether one of the preferred languages is available in its own database. If GPSWeb does not find the user-preferred language in its database, it uses the explicitly-defined (see below) default language instead.

You can enable or disable the automatic language recognition using the *Configuration* table of the config.mdb database. To disable the automatic language recognition, set the field *Value* of the UseBrowserLanguage to 0. By default, it is enabled (1).

If you always want GPSWeb to initially use the default language, disable automatic language recognition (see paragraph above). Use the Configuration table of the config.mdb database to define the language. Edit the *Value* field of the DefaultLanguage with the *StringTable* database code (*DBCode*) of the language.

User-related cookies store the information on their language setting. ***When users re-visit GPSWeb***, it reads the user's cookie and starts up with the respective language.

Allowing the user to select a language

Customers can click a bitmap representing the national flag to select the language, and thus instruct all scripts to display the HTML pages in this language. The default navigation bar lets the user select between English – identified by the flag of the UK – and German.

To change the graphical representation of a language, for example, just exchange the image. To make the URI of the new image known to GPSWeb, edit the FlagIconURI value in the *Language* table of the config.mdb database.

Note *– To provide a written representation of the language instead of an image, just skip or delete the FlagIconURI entry. In this case, the available language is represented by the entry in the respective Language value of the* Language *table.*

Header and footer

The content of the header area is kept as long as the customer stays on your website. By default, it displays a logo and the title of your service. To modify the area contents, edit the header.php and/or the config.mdb database.

The default graphics file for the logo left of the header text is named globe.gif and resides in the wwwroot\graphics subfolder of your GPSWeb installation. To display a different logo, you can either place a different graphics file using the same name into this folder, or edit the *Configuration* table in the config.mdb and change the path to the graphics file. Edit the field *Value* of the TitleLogo1URI entering the path beneath the wwwroot\ folder and the graphics filename. If you leave the field blank, no logo appears in the header area. Similarly, you can add a path to a graphics file for an icon right of the header text. Edit the field *Value* of the TitleLogo2URI.

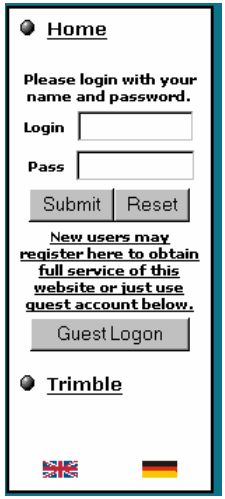
The footer area at the bottom of the client area displays the Copyright statement. For text changes, edit *StringTable* in the resources.mdb database. Edit the Footer text (ID = 00009) for the given languages.

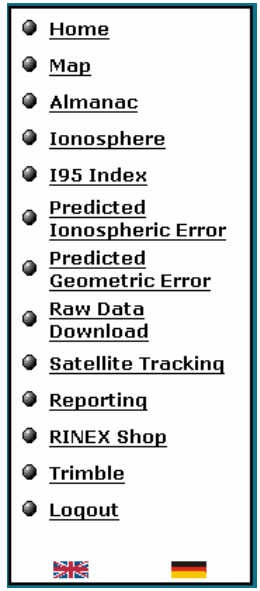
Navigation bar

The navigation bar is the customer's first access to the services. Here, customers log in and out. The login function is a service that is described in Chapter 5, Services. It allows customers to act as guests with typically reduced privileges, to become registered users with specified privileges, or to log in as registered user. After login, the navigation bar changes its display and then offers access to all services that are available for the specific customer. The users.mdb database defines and correlates services, users, user groups, and privileges of user groups. For users who do not have the privilege for a specific service, the related link will not be visible in the navigation bar.

The navigation bar allows also selecting the display language. By default, the navigation bar allows to select English and German. For details on language selection, see Section Language selection.

For adding links to other URIs to the navigation bar, go to the config.mdb database and there edit the *Links* table. The link in the first row (the one with the lowest ID) always refers to the start page and is automatically loaded the first time the user visits the website. By default this link is set to welcome.php. For each link, add a new row and edit its *URI* field. To define the link name shown in the navigation bar, add a new string (IDs 20000 to 29999) to the *StringTable* table (a link to this table is available in config.mdb). Then select the matching string ID in the *NameStringID* field of the *Links* table. For more information on how to define the appearance of links in the navigation, see the section on the *Links* table in Chapter 6, Databases.





Service area

The service area, typically the main area at the right side, changes its contents depending on the selected service. Here customers find detailed information on the service, and submit requests. The HTML

pages are built from various PHP files. For a detailed description of each service and the related PHP scripts, see Chapter 5, Services.

Start page: Welcome

When users first access your website, the start page is loaded in the client frame. It welcomes users and displays first descriptive information on the services you are offering at your web server.

- Default entry in the navigation bar: Home
- Default title of the website client area: Welcome to the Webserver of GNSS-Reference stations.
- Default scripts: welcome.php

For some basic modifications, you can go to the config.mdb database and edit the *Links* table. The row with the lowest ID refers to the start page. To apply another URI as start page, edit the *URI* field. To modify the default display text for the start page in the navigation bar, edit the string with ID = 00001 within the *StringTable* table (a link to this table is available in config.mdb) or add a new string (IDs 20000 to 29999). If you did the latter, then select the matching string ID in the *NameStringID* field of the *Links* table.

Tip – To increase customer convenience, it may be a good idea to add some basic network status information to the homepage.

Use the welcome.php for further modifications, for example, to add text to the Welcome page or to modify it to fit your needs.

PHP Scripts

Your GPSWeb installation comes with a couple of scripts written in PHP which implement the different services of the server. Like static HTML-pages, all of the main scripts will be placed at the server's

document root folder (<installdir>\wwwroot\). Additional function libraries will get installed automatically in the <installdir>\phplib\ folder.

PHP is a recursive acronym and means PHP Hypertext Preprocessor. It is a widely-used general-purpose scripting language that is especially suited for web development. It is mainly focused on server-side scripting, so you can do anything any other CGI program can do, such as collect form data, generate dynamic page content, or send and receive cookies. But PHP can do much more.

See Table 3.1 for detailed descriptions of the default GPSWeb PHP scripts. You can find additional information, introductory tutorials and manuals at the following site: www.php.net.

Table 3.1 List of default PHP scripts used for the GPServer web server

PHP Script *.php	Description
almanac.php	• displays the current almanac in the client frame; • iGate communication to an almanac server (GPSNet) required to obtain this real-time information; • allows the download of the latest almanac data.
bargraph.php	• reporting functionality; • allows the user to display a specified bargraph for a given date; • graphs available for ionospheric Index 95 and predicted errors (geometric and ionospheric); • needs the reporting root folder to be set in the config.mdb.
footer.php	• fills in and prints the footer area with a copyright statement.
header.php	• prints a header on top of all.

PHP Script *.php	Description
index.php	• entry point for the web server; • divides the screen into header, footer, navigation bar and client area; • detects browser language(s).
iono.php	• ionospheric archive page; • allows to seek for specified ionospheric graphics at a specified date; • needs ionoplot generator connected via iGate.
shop*	• RINEX Shop for data download; • users can add data orders here; • makes merged RINEX observation and navigation data for CORS and VRS stations available.
listof.php	• browses through the directories containing the raw observation data.
navigation.php	• implements a site navigation; • user logon/logoff.
network.php	• displays a graphical overview of the network as a map; • offers hyperlinks (embedded in the map) for users to move to another webpage.
phpinfo.php	• test script; • used to detect whether the script engine is running fine or not; • prints a list of the current configuration and all available features of the PHP interpreter, if you activate this function by uncommenting a line in the script (it's disabled by default for security reasons).
push.php	• download function for the raw observation files; • download area navigated via the script listof.php; • called from inside listof.php.

PHP Script *.php	Description
registration.php	• registration form for customers who want to get registered to gain access to particular services; • sends data to the users.mdb; • sends notification e-mail to the administrator of the site, configured in config.mdb.
reporting.php	• a navigation script for the reporting folder structure; • root folder needs to get configured using config.mdb.
satellites.php	• satellite tracking information of the real-time system GPSNet; • requires a connection via iGate.
welcome.php	• by default the first script that gets initially called in the client area.

CHAPTER

4

Trimble GPServer – The Software

In this chapter:

- Introduction
- GPServer – Communication and File Generation
- iGate – The Communication Module
- RINEX Merger
- Virtual Reference File Generator
- Iono Plot Generator

Introduction

This chapter describes the software package GPServer and all its modules generating and providing data, which may be distributed through the Internet or an intranet.

GPServer – Communication and File Generation

The software package GPServer is a set of modules designed to communicate and distribute GNSS data over the Internet. This can be an external World Wide Web server and a client like Internet Explorer or other kind of data inquiry systems like the postprocessing software package Trimble Total Control. GPServer can be used as a stand-alone tool as well as in combination with GPSNet.

The following modules are necessary for a full GPServer setup:

- iGate — makes the communication protocol available that is used for the distribution, inquiry and retrieval of GNSS data.
- RINEX Merger — automatically creates merged RINEX files according to user specification.
- Virtual Reference File Generator — automatically creates RINEX files, where observations are corrected using virtual reference data. User specification is respected.
- Iono Plot Generator — creates graphic images of ionosphere corrections.

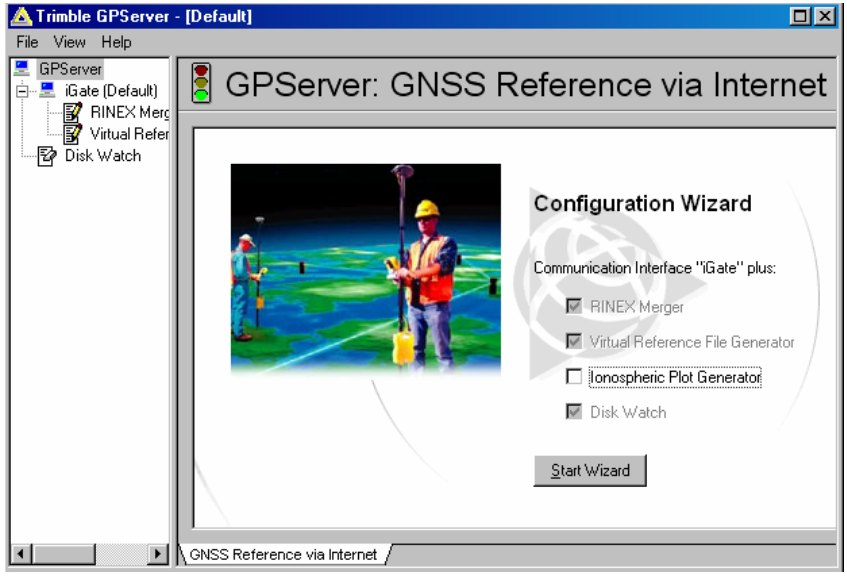
Besides that, the following system monitoring and data streaming modules (refer to the GPSNet User Guide) may be added to GPServer's tree:

- Disk Watch — administration and maintenance of data storage
- Watchdog — supervision of GPServer's activity and automatic re-start in case of failure

- LineRelay distribution of calling rovers to several GPSNet hosts, if you have installed several GPSNet instances for large networks or redundant systems.

Start GPServer

In the Start/Programs menu select the *GPServer/GPServer* item. It will automatically start GPServer. Alternatively, run the executable GPServer.exe from your GPServer installation folder. The procedures to automatically start GPServer and/or to expand its functionality by adding modules to its tree are the same as described for GPSNet (refer to the GPSNet User Guide, Chapter 3, Getting Started).



GPServer information pane

For the GPServer main module, the single information page *GNSS Reference via Internet* lets you select the components of GPServer and start the configuration wizard. The iGate module will

automatically be selected. For selecting other modules, select the respective check box. Click **Start Wizard** to start the configuration wizard whenever you want to (re-)configure GPServer. For detailed information on the configuration wizard pages see the settings description of the modules in this chapter.

iGate – The Communication Module

The iGate module serves as communication center between the source for GNSS data and the users of the data by stream-based transmission over the Internet. It makes the protocol available that is used for the distribution, inquiry and retrieval of GNSS data. The iGate module supports user authentication and accounting.

Stream-based data transmission over the Internet

Currently, the iGate communication module supports two major protocols, the Trimble proprietary iGate Communication Protocol (see Section iGate Communication Protocol) and the public Ntrip protocol (see Section Ntrip – Networked Transport of RTCM via Internet Protocol).

The main task of the iGate Communication Protocol is to distribute through the Internet GNSS data in the RINEX format ***for post-processing***. Distributing any GNSS data (such as reference station data or corrections for DGPS or RTK) through the Internet ***in real-time*** needs the Ntrip protocol. For a comparison of the protocols see Table 4.1.

Figure 4.1 shows you a sample setup for real-time users (Ntrip protocol) as well as for post-processing users (iGate protocol).

Table 4.1 Comparison between the iGate and Ntrip protocols

	iGate	Ntrip
Survey style	Post-processing	Real-time
Client sends	iGate commands	Requests using the Ntrip protocol, based on HTTP
User receives	RINEX	RTCM
Typically used network type	LAN, Internet	Wireless Internet
Transport protocol	TCP/IP	Mobile IP over GSM GPRS UMTS
User software (examples)	Internet Explorer, Trimble Total Control	Survey Controller v.10.7 or later

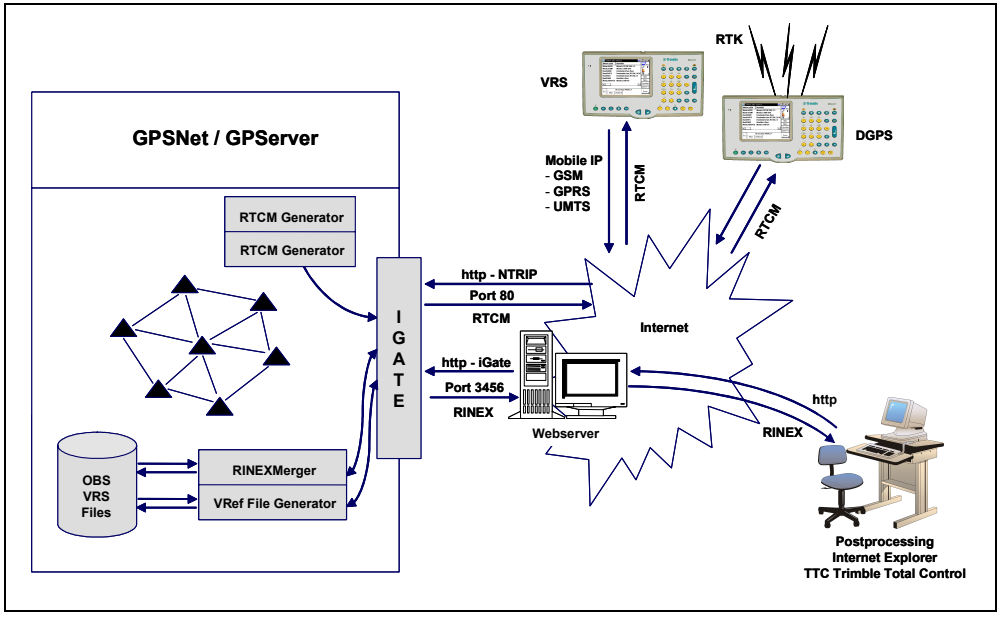


Figure 4.1 Data streaming over the Internet

iGate Communication Protocol

Besides distributing GNSS data, the iGate Communication Protocol is designed to provide an interface for external programs to communicate with the Trimble Infrastructure Software tools. It mainly provides a common server interface to

- RINEX observation and navigation data.
- Almanac data.
- Virtual reference station data and statistics.
- Real time station information (tracking status, positions, …).
- Time service.
- Postprocessing software Trimble Total Control.

The iGate server uses a stream connection (such as TCP) and HTTP-like commands and responses. It is designed to accept multiple connections from client hosts, and to provide a simple interface to the GNSS database. For more information about the interface definition, refer to “iGate Communication Protocol Documentation”.

iGate is an interface between programs and the GNSS data. It does not perform any user interaction or presentation-level functions. These "user-friendly" functions are left to the client programs (for example, www-server generating HTML interface), which have a better understanding of the environment in which they are operating.

Ntrip – Networked Transport of RTCM via Internet Protocol

For the broadcast of a large number of real-time data streams to an even higher number of users all over the world, Trimble recommends the open non-proprietary Ntrip protocol that was released in March 2003.

“Networked Transport of RTCM via Internet Protocol” (Ntrip) stands for an application-level protocol streaming Global Navigation Satellite System (GNSS) data over the Internet. Ntrip is a generic,

stateless protocol based on the Hypertext Transfer Protocol HTTP/1.1. The HTTP objects are enhanced to GNSS data streams.

Ntrip is designed for disseminating differential correction data (for example, in the RTCM-104 format) or other kinds of GNSS streaming data to stationary or mobile users over the Internet, allowing simultaneous PC, Laptop, PDA, or receiver connections to a broadcasting host. Ntrip supports wireless Internet access through Mobile IP Networks like GSM, GPRS, EDGE, or UMTS." (Quote: German Federal Agency for Cartography and Geodesy (BKG), Ntrip Version 1.0 Design – Protocol – Software, Frankfurt March 2003, see igs.ifag.de/index_ntrip.htm).

Using the Ntrip protocol any kind of GNSS data can be distributed and multiplexed in real-time by the application of Radio broadcasting software.

Table 4.2 Ntrip system components and GPSNet equivalents

Component	Description	GPSNet equivalents
Ntrip Source	Generates data streams.	RTCM Generator (Single Station, VRS, …), LineRelay, Splitter
Ntrip Server	Transfers the data streams from a source to a caster.	-- not needed --
Ntrip Caster	Main component for administration and connection of clients and data streams.	iGate module
Ntrip Client	Sends HTTP 1.1 request message. Runs, for example, on a -PC / Laptop, -a PDA, -a Survey Controller v 10.7 or later (GPRS-capable)	Users

An Ntrip system consists of Ntrip Sources, Ntrip Servers, Ntrip Casters and Ntrip Clients. The Table 4.2 explains the functions of these system components.

Tip – A freeware tool that can be very helpful to test the data transmission by the Ntrip protocol is the GNSS Internet Radio software. This freeware is available from the German Federal Agency for Cartography and Geodesy at its website igs.ifag.de/index_ntrip.htm.

Adding and removing the iGate module

The iGate module is only available from the navigator root item GPServer. Open its short-cut menu and select the command *Insert Modules*. From the TAM *Module Selector* dialog, select *iGate* and click **OK**.

The *iGate Configuration Selector* dialog appears. With the default installation, it has the *Default* configuration pre-selected. To add a new configuration, type a unique name into the edit field and click **OK**. (After you have added an iGate module to GPServer, you may save the configuration, save it under a new name or load another configuration using the module's short-cut menu commands.)

The first page of the setting wizard for the iGate configuration appears. For details on the settings see Section iGate settings.

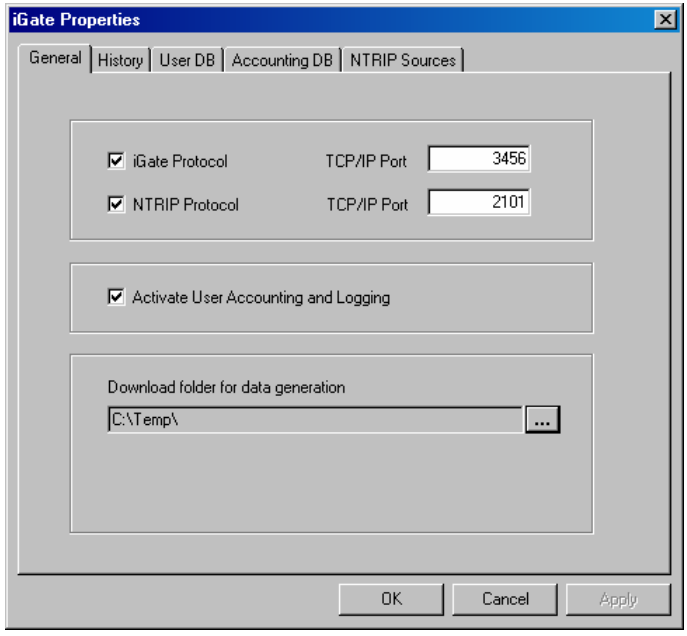
Once you have done configuration properly, the iGate module is ready to start and listen for incoming connections.

Warning – You may remove the module at any time from GPServer: Select the shortcut menu command *Remove Module*. But, if you remove an iGate module from GPServer, be aware that this removes dependent modules, such as the RINEX Merger or the Virtual Reference File Generator.

For an iGate module two pages of information about the status and the history exist in the module-view window. For details on the information pages see Section iGate information pane.

iGate settings

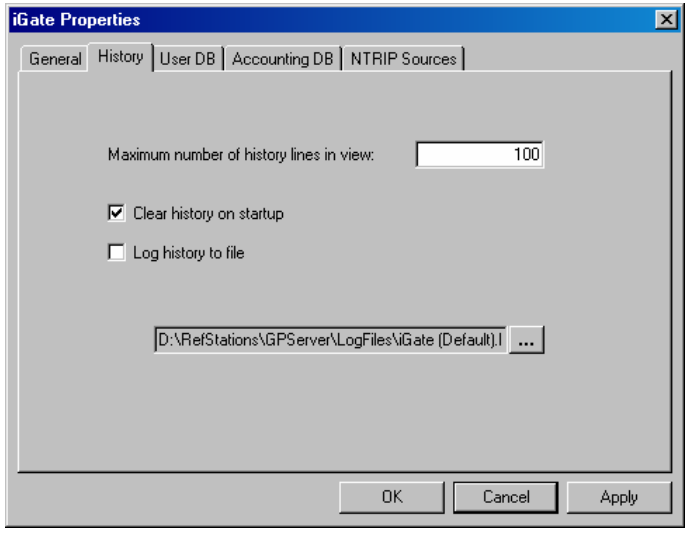
To edit the settings for the iGate module, select the *Properties* command from its short-cut menu. The *iGate Properties* dialog appears. It consists of a variable number of pages, depending on the options selected at the *General* page. By default, only the iGate protocol option is selected. Use the dialog to view and edit the properties of the module. You may change the properties at any time.



For a complete configuration of iGate, the following selections and setups are necessary:

- Select the communication protocol(s) and make the matching server port known to the system (*General* page). With the Ntrip protocol selected, use the additional page *Ntrip Sources* for further configuration settings.
- Set the download folder for data generation (*General* page). This folder is used by the RINEX Merger, the Virtual File Generator, and the Iono Plot Generator to store the generated files in.

- If user accounting and logging is selected on the *General* page, specific databases must be configured (use the additional pages *User DB* and *Accounting DB*).
- The settings on the *History* page let you modify the *History* module-view. The *History* page of the information pane lets you view iGate's last finished connections. By default, the last 100 connections are listed. To set a different limit, edit the *Maximum number of history lines in view* field. Additionally, all connections are logged into a log file, if you select the *Log history to file* option. The history log file is a text file named iGate [<configuration name>].log. It contains the connection and disconnection time, the user and service identification, bytes received and sent and the protocol used. Use the browser button that opens the *Browse For Folder* dialog. Use it to create (click **Make New Folder**) or select the folder the log file should reside in.



iGate ports configuration

The *iGate Properties / General* dialog lets you select iGate protocol for communication and the TCP/IP server port. The default port assigned for the iGate service is port 3456, but can be any free port.

Similarly, select the port for communication using the Ntrip protocol in the second row of the *General* dialog. The default port assigned for the Ntrip service is port 2101. Port 2101 is registered by IANA (Internet Assigned Numbers Authority) in the list of well known ports for the usage of GNSS data.

Data location for generated data

Use the *iGate Properties / General* dialog to define the path and folder where all generated data (merged RINEX files, RINEX files of the virtual reference stations and ionosphere plots) are located when generated.

User accounting and logging

If you wish to authenticate clients to the server before granting access to service, the following is required:

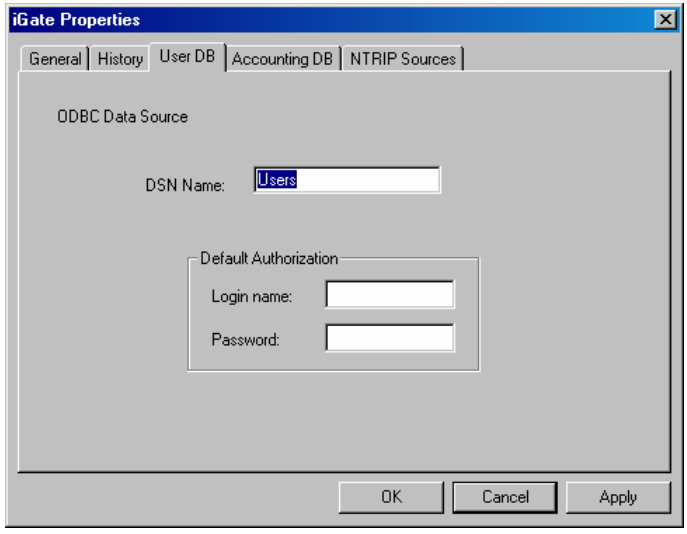
- Enable the option *User Accounting and Logging* on the *iGate Properties / General* dialog. By default: disabled.
- Make sure a user database is set up. With the installation of GPServer, the user database comes as a skeleton including all tables needed as Microsoft Access Database file. It resides in Program Files\Common Files\Trimble\Infrastructure \DB\users.mdb.
- Make sure an accounting database is set up. The default accounting database resides in Program Files\Common Files\Trimble\Infrastructure\DB\accounting.mdb.

Chapter 6, Databases, gives you detailed information on the default databases.

The user authentication and logging function uses two data sources. With the *User Accounting and Logging* option on the *General* dialog enabled, two additional settings pages become available. You may configure the login name, the password, and the ODBC data source name (DSN) as well for the Users database as for the Accounting database to match the respective settings in the databases. With the Configuration Wizard click **Next** to open the dialogs *User DB* and *Accounting DB*.

Database authorization

Since each ODBC data source can be protected by a password (refer to ODBC Microsoft Access Setup) you can configure the iGate module to use database authorization depending on your level of security. The *User DB* dialog displays the name of the user database. By default this is the database *Users*. This database is used to keep user information such as login name and password for valid users. Leave the *Login name* and *Password* fields empty if your system data source does not need authorization.



The similar *Accounting DB* dialog lets you set login name and password for the administrator of the accounting database. The DSN

is by default named *Accounting* and is used to log the activity of each known user, such as GNSS data inquiry and retrieval.

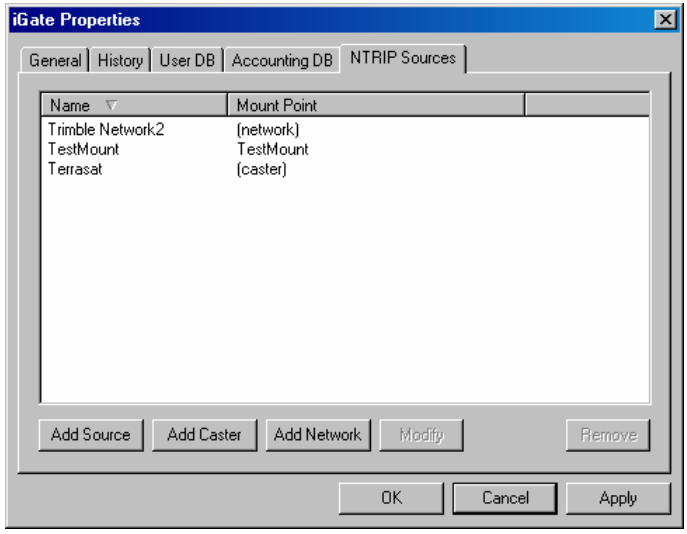
Ntrip configuration

To use the Ntrip protocol for real-time data communication between the Ntrip client and GPServer, the following is required:

- Enable the *Ntrip protocol* option on the *iGate Properties / General* dialog. By default: disabled. Select port 2101. The *Ntrip Sources* dialog becomes available.
- Add the streaming sources to the list of sources.
- Optionally add further caster descriptions to the list.
- Typically, add a description of your network to the list. Optionally add further network descriptions.
- To allow user authentication and accounting for received data streams, make sure to appropriately set up the databases. Add and enable a service for each streaming source in the user database, at the *Services* table. Identify a streaming source by its mount point (for the definition of mount points, see below). Define which users or user groups have the right to access the service(s). See Chapter 6, Section Users.mdb.

When the Ntrip protocol is selected, GPServer serves as an Ntrip caster. The iGate module lets you act as the operator of the system. Use the *iGate Properties / Ntrip Sources* dialog to administer the Ntrip settings.

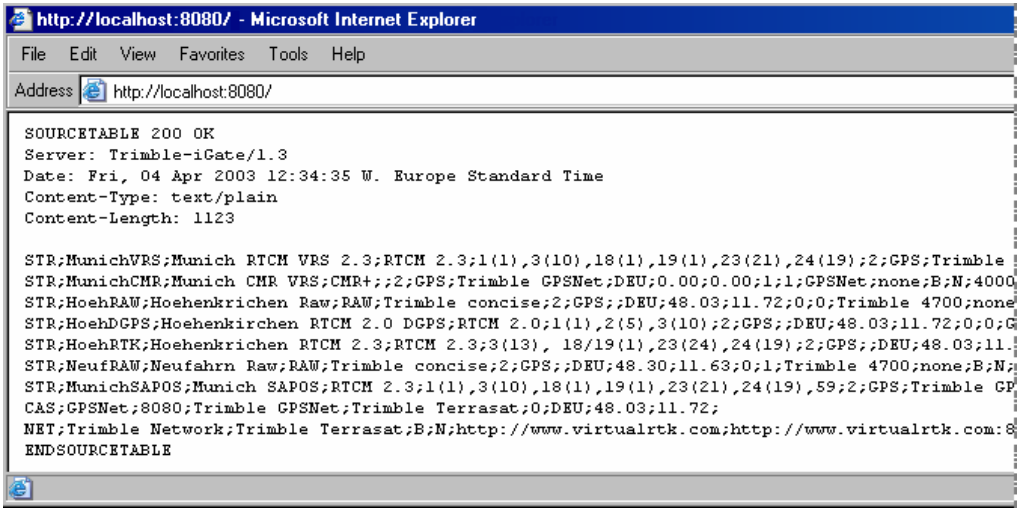
A short excursion to theory: The Ntrip concept expects one or several sources (Ntrip sources) that generate data streams at a specific location. The Ntrip system needs unique identifiers for the data sources, which are called “Mount Points”. An Ntrip server transfers the data streams from an Ntrip source to the Ntrip caster, the major system component. Clients (such as a rover connected to a Survey Controller v 10.7 or later) connect to the caster to access the real-time data stream. To do so, clients need to know the host address and IP port of the caster.



Tip – To make the clients known to the Ntrip system use iGate's accounting and logging functionality. For charging the clients for the service of accessing data of a source, the respective source must be made known to the *Service* table in the user database.

The Ntrip caster (here: the iGate module) provides the source-table, a table that lists Ntrip sources and mount points as well as other information, to the clients using HTTP. When clients use their Internet browser to connect to the caster host, the website displays the source-table. There, the clients find a record for each data stream, for each network of data streams, or for each caster. The type of record is identified by the first entry of the record, where

- STR stands for data stream,
- CAS stands for caster,
- NET stands for network.



To start data streaming, the client selects from the list the mount point for access and adds it to the host name and IP port in the address field of the Internet browser. User hard- and software components exist already that can access the source-table data automatically. For example, at a Trimble ACU running Survey Controller v. 10.7 the selection from the source-table would look as shown in Figure 4.2.

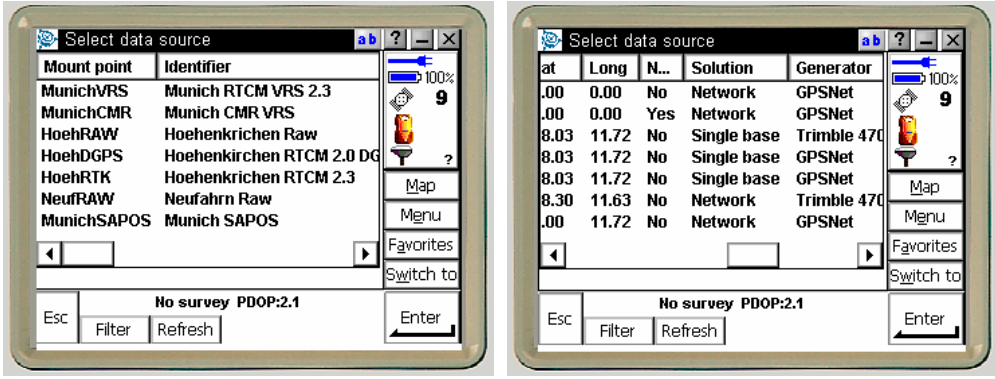


Figure 4.2 Selection field (first view and right-scrolled view) at a Trimble ACU running Survey Controller v. 10.7

For the administrator at the caster side, therefore, the most important task is to define (and to keep up-to-date) all available data sources

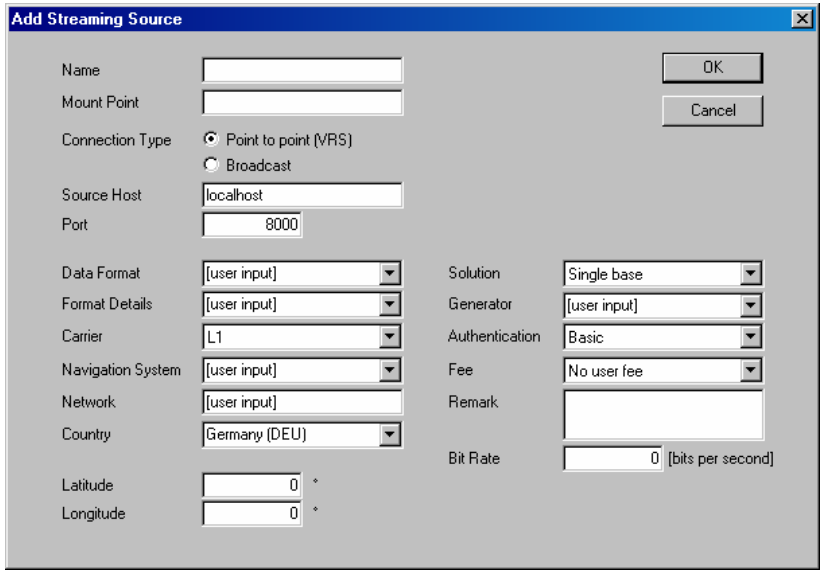
and to add them to the source-table. To do so, the administrator adds sources to the list. See Section Adding a streaming source.

If you want to make other casters or whole networks known to the users, you can add this information to the source-table. See Section Adding a caster and Section Adding a network.

Adding a streaming source

To make a data stream source known to the system by adding it to the source-table, go to the *iGate Properties / Ntrip Sources* dialog and click **Add Source**. The *Add Streaming Source* dialog appears. Use it to define the unique source mount point and the IP address / port of the host computer.

***Note** – For the Broadcast connection type (see Table 4.3), GPServer makes sure that the source-table only displays actually available sources. For example, if you have defined a source at a specific IP port, but there is no IP client connected to it, this source will not be displayed in the source-table.*



The main part of this dialog is descriptive. If you are offering a large number of data sources, it helps you to clearly identify the properties of the particular data source. See Table 4.3 for a description of the parameters.

Table 4.3 Entries into the Add Streaming Source dialog

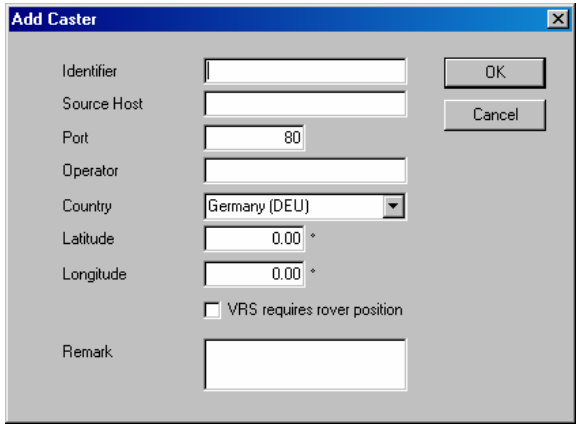
Field	Description	Comment
Name	Descriptive Identifier of the data source	Advisable. Description should contain important information on the service, for example location and/or output data type.
Mount Point	Unique caster mount point. Identifies the service in the source-table and for authentication if activated.	Mandatory. Should be as short as possible. Clients use the mount point to identify the source. If authentication is enabled, each streaming source acts as a service in the Services table of the user database. There, enter the Mount Point as Feature.
Source Host	Source Internet host domain name or IP address	Mandatory. Both address formats are allowed. Hidden, if the Broadcast option is selected.
Port	IP port of the source	Mandatory. For example, port of the RTCM Generator.
Point to Point (VRS)	If selected, the connection acts as socket client, waits for incoming NMEA position.	Typically used for the connection to RTCM VRS Generators. To allow multiple users to connect to the VRS sources, a LineRelay module must be available at the GPSNet side.
Broadcast	If selected, the connection acts as socket server, data are multiplexed immediately after service is started.	Typically used for the connection to RTCM Single Station Generators.

Field	Description	Comment
Data Format	Output type and format	Select or type in; For example, RAW, RTCM 2.1, RTCM VRS.
Format Details	RTCM message types or RAW data format, update rates in parenthesis in seconds	Select or type in; for example 1(1),2(1),3(30).
Carrier	Does the data stream contain carrier phase information?	Select.
Navigation System	The navigation system, the data is based on.	Select or type in.
Network	Network of data sources, for example a VRS network.	Select or type in. You can add further networks to the source-table using the **Add Network** button in the *Ntrip Source* dialog.
Country	Three character country code in ISO 3166	Select or type in.
Latitude	Position relative to North (approximate position if VRS requires rover position)	Type in. Floating point number, two digits after decimal point.
Longitude	Position relative to East (approximate position if VRS requires rover position)	Select or type in. Floating point number, two digits after decimal point.
Solution	Is the stream generated from single reference station or from networked reference stations?	Select.
Generator	Hard- or software generating data stream	Select or type in.
Authentica-tion	Is user authentication necessary?	Select.

Field	Description	Comment
Fee	User fee for receiving this particular data stream.	Select.
Bit Rate	Minimum bit rate of data stream necessary to guarantee correct and complete data transmission.	Type in. Integer number required.
Remark	Additional comments, miscellaneous information.	Type in.

Adding a caster

To make another caster known to the system by adding it to the source-table, go to the *iGate Properties / Ntrip Sources* dialog and click **Add Caster**. The *Add Caster* dialog appears. Use it to specify the IP address and port of the host computer.



The main part of this dialog is descriptive. It helps you to clearly identify the properties of the particular caster. See Table 4.4 for a description of the parameters.

Table 4.4 Entries into the Add Caster dialog

Field	Description	Comment
Identifier	Descriptive identifier of the caster.	Advisable.
Source Host	Caster Internet host domain name or IP address.	Mandatory. Both address formats are allowed.
Port	IP port of the caster host.	Mandatory.
Operator	Name of institution / agency / company operating the caster.	For example: Terrasat
Country	Three character country code in ISO 3166	Select or type in.
Latitude	Position relative to North (approximate position if VRS requires rover position)	Type in. Floating point number, two digits after decimal point.
Longitude	Position relative to East (approximate position if VRS requires rover position)	Select or type in. Floating point number, two digits after decimal point.
VRS requires rover position	If selected, the caster is able to handle incoming NMEA GGA message with approximate position from client.	
Remark	Additional comments, miscellaneous information.	Type in.

Adding a network

To make your and additionally other networks known to the users by adding it to the source-table, go to the *iGate Properties / Ntrip Sources* dialog and click **Add Network**. The *Add Network* dialog appears. Use it to specify network IP addresses and ports. See Table 4.5 for a description of the parameters.

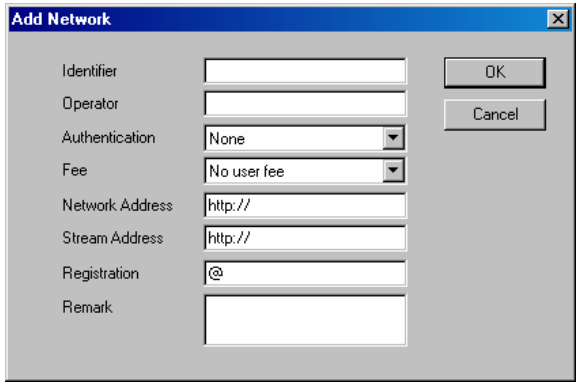


Table 4.5 Entries into the Add Network dialog

Field	Description	Comment
Identifier	Descriptive identifier of the network.	Advisable.
Operator	Name of institution / agency / company operating the network.	For example: Trimble, ASCOS
Authentication	Is the access protected for data streams of the network?	Select.
Fee	Are users feed for receiving data streams from this particular network?	Select.
Network address	Web address for network information	Type in.
Stream Address	Web address for stream information.	Type in.
Registration	Web address or mail address for registration.	Type in.
Remark	Additional comments, miscellaneous information.	Type in.

Modifying and deleting a source-table entry

After you have added information on sources, casters or networks to the list, you may easily modify each entry: In the list of the *iGate Properties / Ntrip Sources* dialog select the entry and double-click it or click the **Modify** button. Change the parameters that need update in the *Modify* dialog.

Clicking **Delete** removes the highlighted source, caster or network entry from the list.

iGate information pane

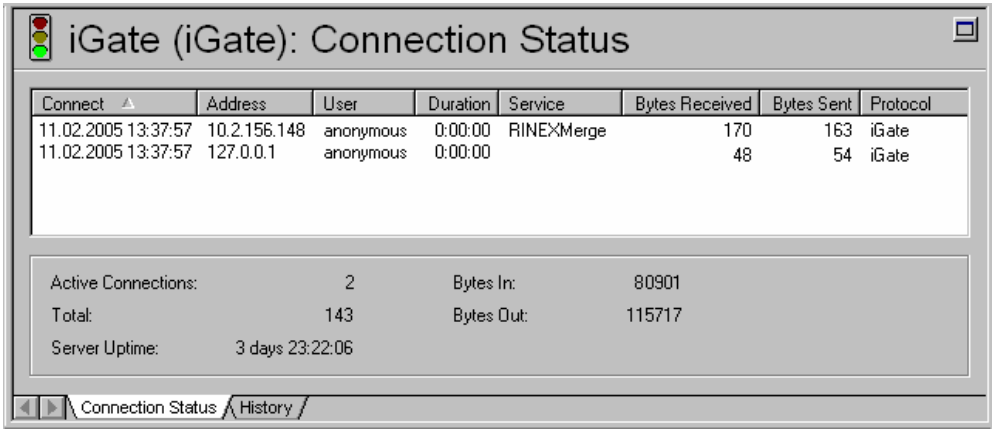
For the iGate module, two information pages exist. See current connections in the *Connection Status* page, while the *History* page lists previous connections.

iGate – Connection Status

The *Connection Status* view provides information about current connections and connection statistics.

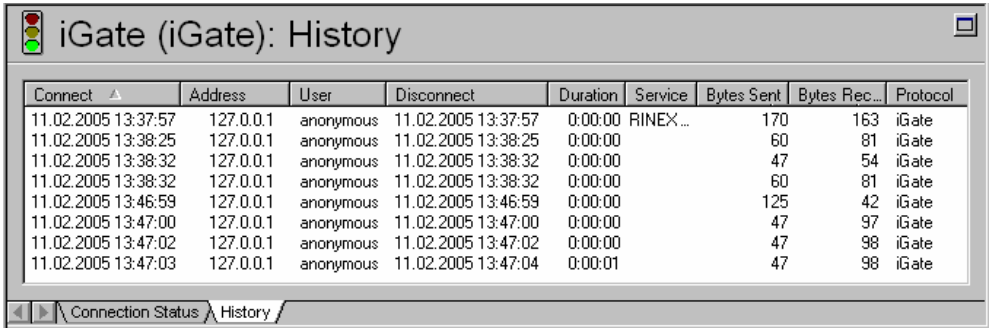
The list field displays all users currently connected to the iGate module, with connection start time (*Connect* column), IP address of the client, the selected service and protocol, and, if known, the user name. If no user authentication is necessary, the entry in the *User* column is *anonymous*. The values in the *Duration*, *Bytes Received* (bytes received by iGate) and *Bytes Sent* (bytes sent by iGate) columns count up as long as the user is connected. After disconnection, the respected row disappears from the *Status* page and is added to the *History* page.

The statistics part in the lower group displays the current number of active connections and the total number of connections since server uptime. In the right section of the group, you can obtain a combined activity statistic about the received and sent bytes, since the time the module has started.



Tip – With the Ntrip Protocol, the following applies: User login is restricted by user authentication; a specific user name and password can be used only for a configurable number of simultaneous logins (see the section on the *Passwd* table in Chapter 6, Databases). Typically, users are allowed to login only once at a time. The iGate module additionally allows user login only with NtripClients. Since HTTP is used, access from a non-NtripClient is possible, but restricted to 60 seconds.

iGate – History



The *History* view gives you an overview of the last connections. It lists connections that are not anymore active in the same way as the *Status* view lists the active connections. The maximum number of

displayed rows depends on your settings in the *iGate Properties / History* dialog. The default value is 100 lines.

RINEX Merger

GPServer puts observation and navigation (station-independent broadcast ephemeris) data at the user's disposal. The data is stored on a local hard drive or a network share in RINEX format version 2.10 or in the compressed format according to Yuri Hatanaka (Compact RINEX). For a detailed description of the RINEX Storage module and its file storage options as well as for the Compact RINEX module, refer to the GPSNet User Guide, Chapter 7.

Data stored on the hard drive is mostly organized in a special way and has been recorded with a certain (fixed) interval (for example, 1 sec). Users may want to obtain reference data sets for time periods, which cover several files.

The aim of the RINEX Merger module is to merge observation or navigation data for a defined station and a defined observation period into one file. This way, it saves users from tedious data manipulation and file management tasks. It allows output intervals (sampling rates) depending on the input data rate. The RINEX Merger module uses RINEX files or compact RINEX files, whichever found in the specified data folder.

Tip – Trimble recommends you to use the ***Enhanced Day*** folder structure for the input data, as the web server procedures require known data structures.

Adding and removing the RINEX Merger module

The RINEX Merger module is available

- Using GPServer's configuration wizard at the *GNSS Reference via Internet* info page. The *RINEX Merger* option must be selected.

- From the iGate module. Open its short-cut menu and select the *Insert Modules* command. From the TAM *Module Selector* dialog, select *RINEX Merger* and click **OK**.
- From the navigator root item *GPServer*. Use its short-cut menu command *Insert Modules*.

The first page of the setting wizard for the RINEX Merger appears. For details on the settings see Section RINEX Merger settings.

Once you have done configuration properly, the RINEX Merger module is ready to start scheduled and / or manually started file merging.

For a RINEX Merger module one page of information about the status exists in the module-view window. For details on the information page see Section RINEX Merger information pane.

You may remove the module at any time from GPServer: Select the shortcut menu command *Remove Module*.

RINEX Merger settings

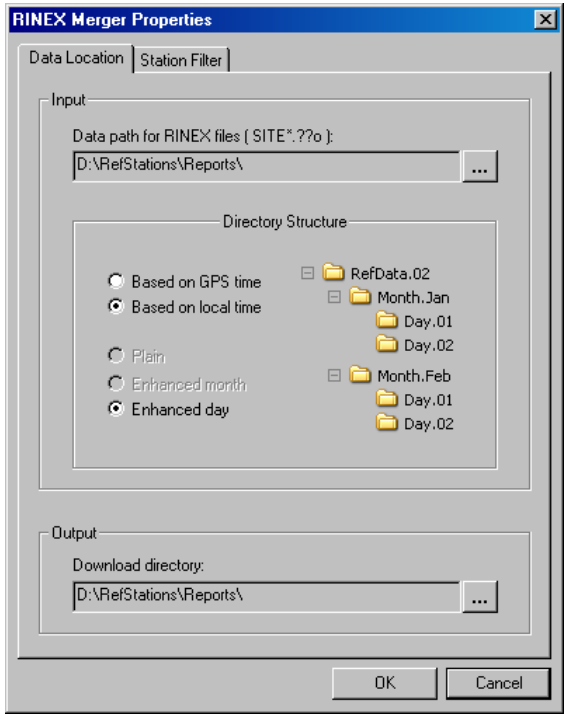
To edit the settings for the RINEX Merger module, select the command *Properties* from its short-cut menu.

The *RINEX Merger Properties* dialog consists of two pages:

- *Data Location*
- *Station Filter*

RINEX Merger settings – Data Location

The RINEX Merger needs to know the path to the source RINEX data. Use the *Data path for RINEX files* field to select the folder, where the original RINEX files or compressed RINEX files are located. Use the browser buttons for file and path selection.



The time information in RINEX files refers to GPS time. However, GPSNet offers to organize the data storage according to GPS time or local time. This setting determines the data being held in a day folder.

For example, imagine we are in a time zone minus 2 hours from UTC. If we have specified storage in GPS time, a day folder includes files from 00:00 to 24:00 GPS time. If we have specified storage in local time however, a day folder holds files from 22:00 of the previous day to 22:00 of the selected day (GPS time).

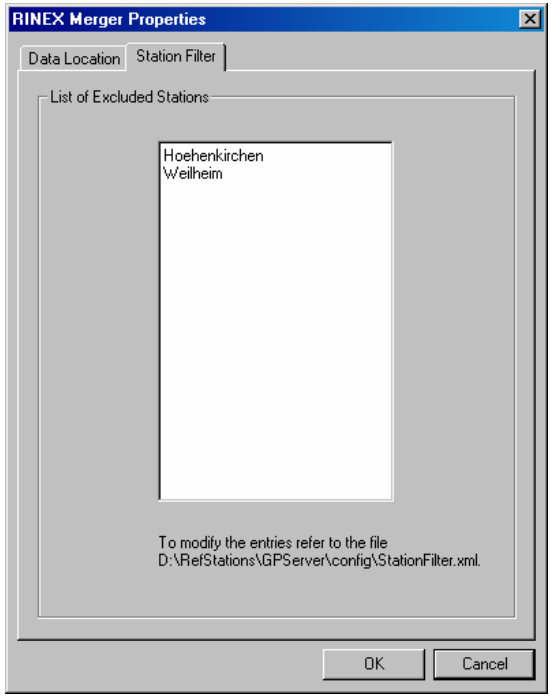
Check how your RINEX data is organized, and select the corresponding setting.

For the merging of RINEX files, the folder structure of the input data must obey to the *Enhanced Day* option. Therefore, this is the only option available.

RINEX Merger settings – Station Filter

A station filter lets you exclude stations from the RINEX merging service (and for the Virtual Reference File Generator as well). This is done using a XML file that contains the station names to be excluded. A sample file is located in the config\ subfolder of your GPServer installation. It is named StationFilter.xml. It contains one sample of a station named “station name”.

The *List of Excluded Files* list field of the *RINEX Merger Properties / Station Filter* dialog displays all stations that are mentioned in the RINEX section of the StationFilter.xml file and, therefore, not available for the merging of RINEX data.



To modify the entries in the StationFilter.xml file, open it in any text editor. Go to the section **<Service name="RINEX">**. Add the following tag and edit the string **station name**.

```
<ExcludeStation>station name</ExcludeStation>
```

Beware to write the station name exactly as it is written in the header of the RINEX observation file, otherwise the exclude statement for this station is ignored.

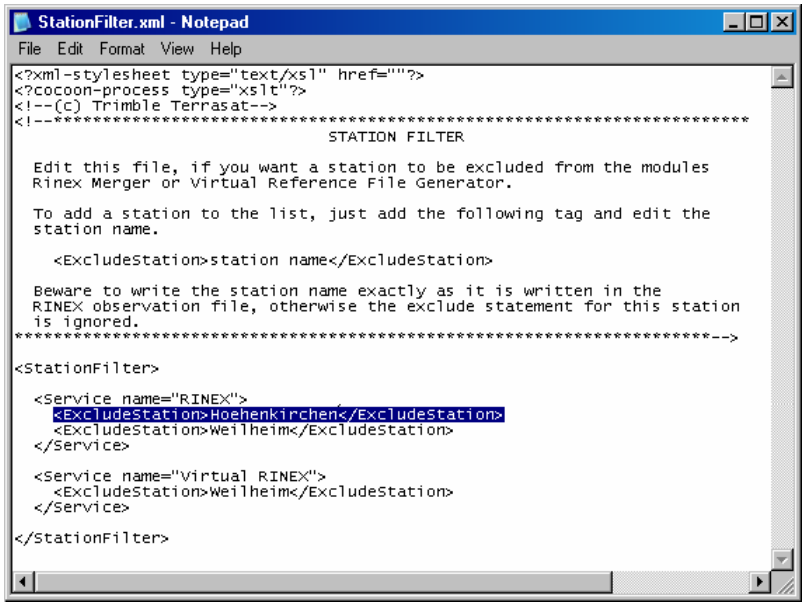


Figure 4.3 The default file StationFilter.xml extended by the two stations Hoehenkirchen and Weilheim to be excluded from RINEX merging.

Manual merging of RINEX files

Additionally to requesting RINEX files via Internet, you may manually merge RINEX files using the *Generate* dialog. To open the dialog, select the *Generate* command from the module's short-cut menu.

First, select the start and end date and time (in GPS time) and the update rate in seconds for which the data is to be generated. When you click **Show stations**, the data folder of the selected date and time is scanned for available stations. Select a station. If ephemeris data is to be merged, select the *Ephemeris* check box. The RINEX Merger

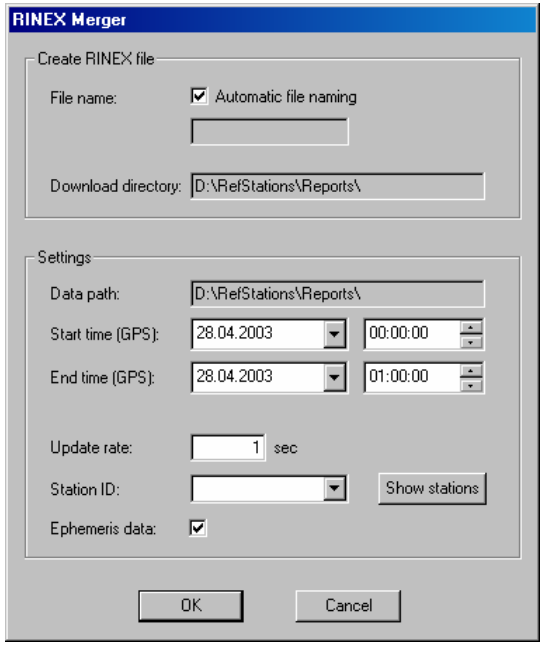
module then merges the station-independent Ephm*.yyn files into the requested file.

When automatic file naming is selected, the filenames are created as follows:

<4 digit station name><day of year of requested start time>_<request ID>.<RINEX file extension>

For example: Augs114_1.02o and Augs114_1.02n

If the filename already exists (for example, after a restart of the module), a one- or two-digit session character is added, for example Augs114_1A.02o or Augs114_1ZZ.02o.

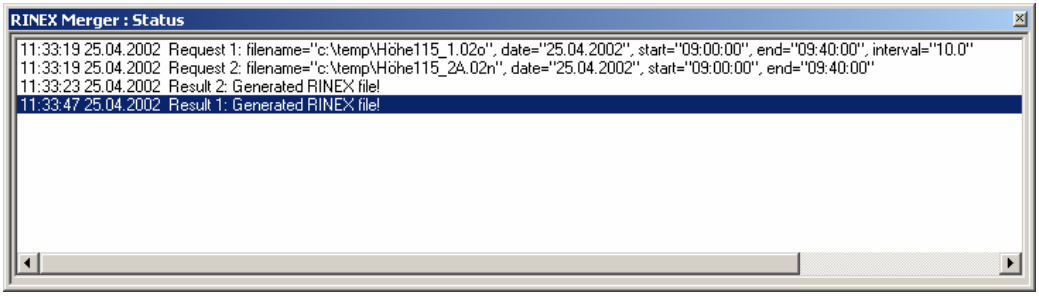


RINEX Merger information pane

The status view shows the parameters of a request as well as the result status. Note that the requests are not processed consecutively, but independently of each other.

When the merge process is running, the traffic light of the status view switches to yellow. If the RINEX Merger module does not find any files to be merged, the traffic light switches to red. Accordingly, the module's icon in the navigator displays malfunction by the red exclamation mark.

If the module is closed while requests are still being processed, the processing is cancelled.



Virtual Reference File Generator

The Virtual Reference File Generator is a module for the automatic creation of RINEX (or compact RINEX) observation files used as reference datasets in post-processing solutions using all benefits of a reference station network. This includes corrections for the geometric and ionospheric effects monitored by the reference station network.

What kind of data is required to run this service? First, we need the original observation and navigation data (broadcast ephemeris) stored on a local hard drive or a network share in RINEX format version 2.1 or in the compressed format according to Yuri Hatanaka. Second, we need the VRS files generated by GPSNet's VRS Data Storage module (refer to the GPSNet User Guide, Chapter 7). Data must be stored in local time.

The original RINEX data on the hard drive is mostly organized in a special manner and has been recorded with a certain (fixed) interval (e.g. 1 sec). Users may want to obtain virtual reference data sets for a

time period, which covers several files. This module does all the work to save users from data manipulation and file management tasks.

Adding and removing the Virtual Reference File Generator

The Virtual Reference File Generator module is available

- Using GPServer's configuration wizard at the *GNSS Reference via Internet* info page. The *Virtual Reference File Generator* option must be selected.
- From the iGate module. Open its short-cut menu and select the *Insert Modules* command. From the TAM *Module Selector* dialog, select *Virtual Reference File Generator* and click **OK**.
- From the navigator root item *GPServer*. Use its short-cut menu command *Insert Modules*.

The first page of the setting wizard for the Virtual Reference File Generator appears. For details on the settings see Section Virtual Reference File Generator settings.

Once you have done configuration properly, the Virtual Reference File Generator module is ready to start scheduled and / or manually started file merging.

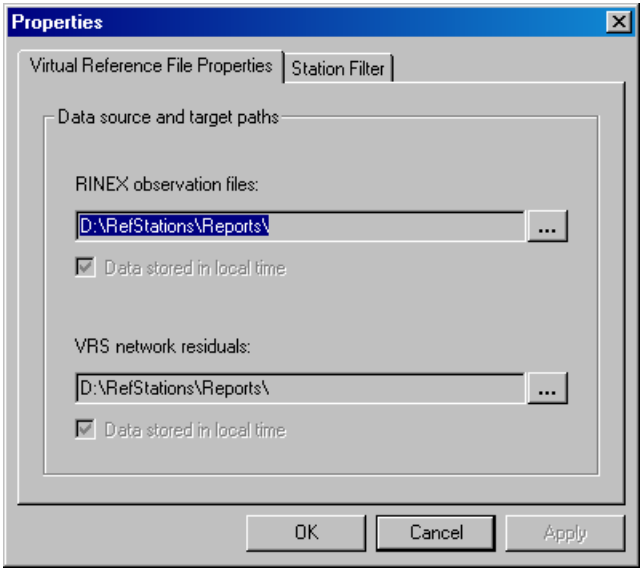
For a Virtual Reference File Generator module one page of information about the status exists in the module-view window. For details on the information page see Section Virtual Reference File Generator information pane.

You may remove the module at any time from GPServer: Select the shortcut menu command *Remove Module*.

Virtual Reference File Generator settings

To edit the settings for the Virtual Reference File Generator module, select the *Properties* command from its short-cut menu.

Use the *Properties* dialog for the settings necessary to create virtual reference files of your network data. It consists of two pages.



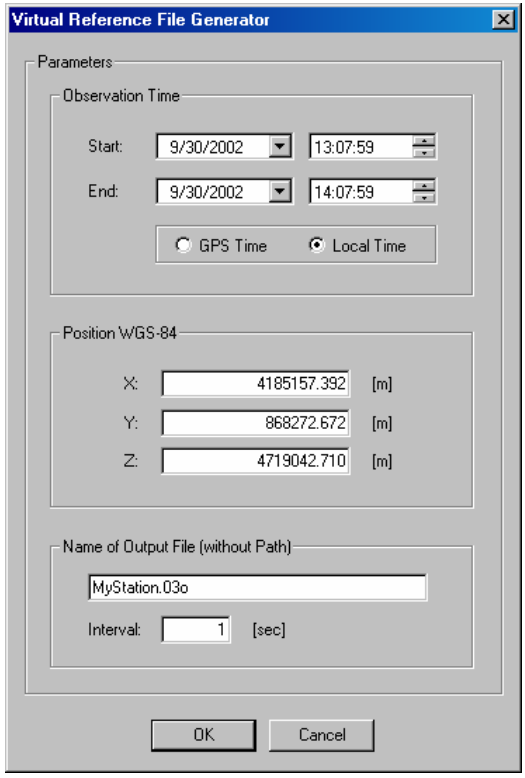
The *Virtual Reference File Properties* page is used to define the source and target file location. Use the browser buttons for folder selection. From the *Browse For Folder* dialog you can select from existing folders or create a new one: Click **Make New Folder**.

The *RINEX observation files* field specifies the current location of all the GNSS observations stored in RINEX or in compressed RINEX format, which are used as basis for the creation of virtual reference files.

Tip – The Virtual Reference File Generator needs the default ***Enhanced day*** folder structure based on ***local*** time for the input data. The web server procedures require data structures to be in local time.

The *VRS network residuals* field points to the network residuals stored as .vrs files on disk.

The Virtual Reference File Generator saves the created RINEX files in the folder defined in the iGate properties. The files are created and named according to the RINEX file convention.



The *Station Filter* page lets you control which stations are excluded from the RINEX file merging for a virtual position in the RINEX Shop service. To exclude stations, edit the StationFilter.xml file located in the \config subfolder of your GPServer installation. There, the tags of the **<Service name="Virtual RINEX">** section refer to the Virtual Reference File Generator. For more information on station exclusion, see Section RINEX Merger settings – Station Filter, since both modules make use of the same XML file.

Manual generating of Virtual Reference Files

Usually the Virtual Reference File Generator will be used by external query and data request using the Internet in connection with the iGate communication protocol. Anyway, there is an interface for the manual

generation of datasets using the *Virtual Reference File Generator* dialog. To open this dialog, select the *Generate* command from the module's short-cut menu.

Use the *Observation Time* group to define the observation period: select the start and end date with corresponding times and define whether GPS time or local time is to be used. Edit the X, Y, Z coordinates for the position of the virtual reference in the group *Position WGS-84*. To define the update rate in seconds, edit the *Interval* field with a value between 0.1 and 3600. Set the name of the output RINEX file (*Name of Output File*). Do not add a path to the file name.

After you've finished your settings and have clicked **OK**, a progress bar will come up for that specific request.

Virtual Reference File Generator information pane

The *Status* information page displays a summary of all requests that have been made, including given parameters supplied by the user and the results.

Iono Plot Generator

The Iono Plot Generator module uses network correction (VRS) files to generate JPEG images, which display the differential ionospheric effects and geometric corrections. 4 types of images are created, as shown in Table 4.6.

The Iono Plot Generator creates for every type a normal-sized image as well as a thumbnail. Thumbnails are image files, which are considerably reduced by size. They are used as preview pictures on the Internet.

Table 4.6 Types of Iono plots

Type ID	Image displays:
0	Geometric Corrections North-South [in ppm]
1	Geometric Corrections East-West [in ppm]
2	Differential Ionosphere North-South [in ppm]
3	Differential Ionosphere East-West [in ppm]

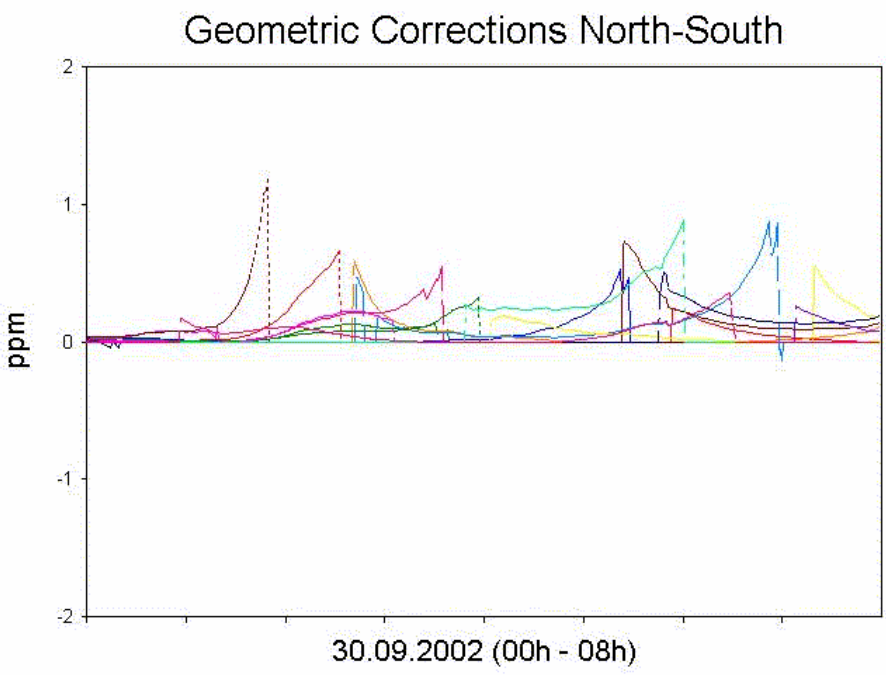


Figure 4.4 Ionospheric plot: Geometric Corrections North-South [in ppm]

Tip – The Iono Plot Generator needs the default ***Enhanced day*** folder structure based on ***local*** time for the input data. The web server procedures require data structures to be in local time.

Adding and removing the Iono Plot Generator

The Iono Plot Generator module is available

- using GPServer's configuration wizard at the *GNSS Reference via Internet* info page. The *Ionospheric Plot Generator* option must be selected.
- from the iGate module. Open its short-cut menu and select the *Insert Modules* command. From the TAM *Module Selector* dialog, select *Iono Plot Generator* and click **OK**.
- from the navigator root item *GPServer*. Use its short-cut menu command *Insert Modules*.

The first page of the setting wizard for the Iono Plot Generator appears. For details on the settings see Section Iono Plot Generator settings.

Once you have done configuration properly, the Iono Plot Generator module is ready to start the scheduled generation of plots for ionospheric and geometric corrections.

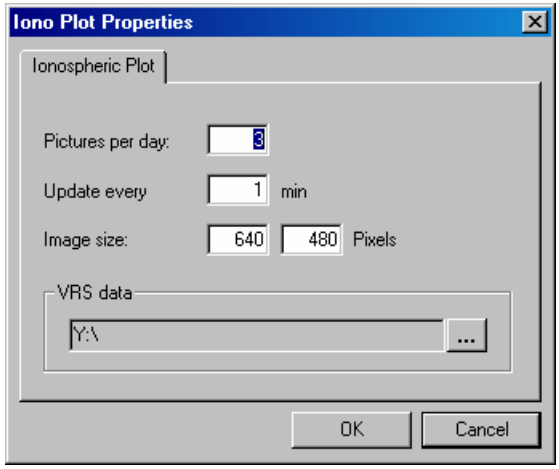
For an Iono Plot Generator module one page of information about the status exists in the module-view window. For details on the information page see Section Iono Plot Generator information pane.

You may remove the module at any time from GPServer: Select the shortcut menu command *Remove Module*.

Iono Plot Generator settings

To edit the settings for the Iono Plot Generator module, select the *Properties* command from its short-cut menu.

Use the *Iono Plot Properties* dialog (single page *Ionospheric Plot*) to specify settings such as the number of pictures per day, how often the image files are updated, the image size in pixel and, finally, where the source VRS files can be found. The graphic files are stored in the target folder defined in the iGate properties.



The number in the *Pictures per day* field specifies, which time span the images shall cover. A value of 3 means that for each image type 3 images will be stored, where the first one covers the time from 00:00 to 8:00, the next one from 8:00 to 16:00 and the last one from 16:00 to 00:00. Acceptable values range from 1 to 24. Default value: 3.

Note – The Iono Plot Generator needs the default setting of three pictures a day, if you plan to run it together with GPSWeb. The web server interface lets customers select from three daily time periods.

The JPEG files are named automatically. The file naming convention is as follows:

IonoPlot<two-digit picture number per day>_<typeID>.jpg

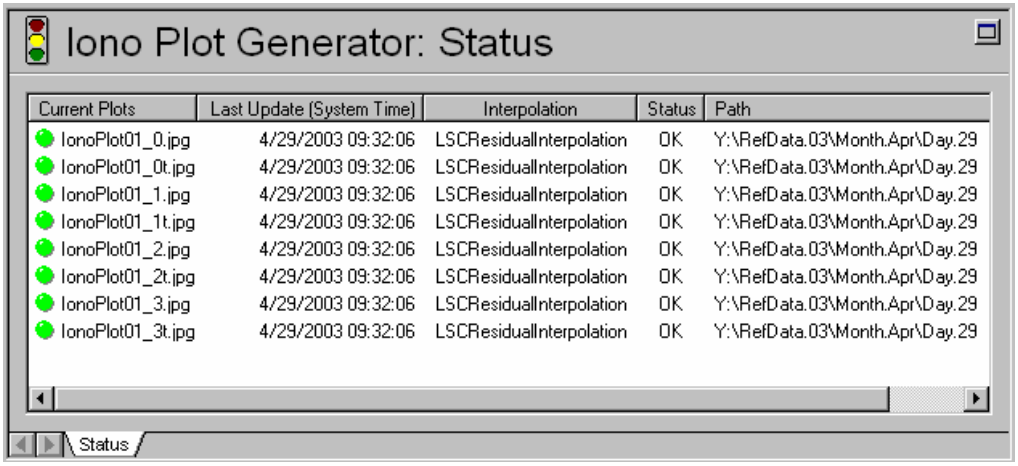
For example: IonoPlot02_0.jpg

The corresponding thumbnails are characterized by an added “t”, e.g., IonoPlot02_0t.jpg.

Iono Plot Generator information pane

The information given on the single *Status* page includes the names of the current plots, the time of the last update, the method used to interpolate the VRS corrections and, if any, the last error reported for the respective image type.

When the image generation process is running, the traffic light of the information pane switches to yellow. If the module is closed while image generation is running, the file generation is cancelled.



CHAPTER

5

Services

In this chapter:

- Introduction
- Enabling and Disabling Services
- Login / Logout and Registration
- Map of Stations
- Raw Observation Data
- Satellite Tracking
- Ionospheric Effects
- Ionospheric Index I95
- Predicted Errors
- RINEX Shop
- Reports
- Ntrip Support for Real-time Data Streaming

Introduction

This chapter lists and describes all services that can be accessed by your customers using the Internet or an Intranet. Most of the services are available via HTTP, while the Ntrip service uses mobile IP. Table 5.1 gives you a quick overview on the services available from the GPSWeb web server.

Since the GPSWeb web server offers dynamical HTML-pages, all elements of the browser's client area are generated from PHP scripts. This manual refers to the script and the default names of the services everywhere, where it is appropriate.

Enabling and Disabling Services

The default installation of GPSWeb includes the installation and activation of all services that come along with it. However, if you do not want to offer some of the services to your customers, these services can be disabled. The respective links are then not available for the customers.

All available services are listed in the *Services* table of the users.mdb database. Each row lists a service (*Feature*) with ID and enable status. For *ID* and *Feature* see Table 5.1. When the navigation.php script is executed, it detects the enabling status. It displays links at the website's navigation bar only for enabled services.

To disable a service set the integer value at the respective *Enable* column to 0.

To enable a service set the *Enable* value to 1.

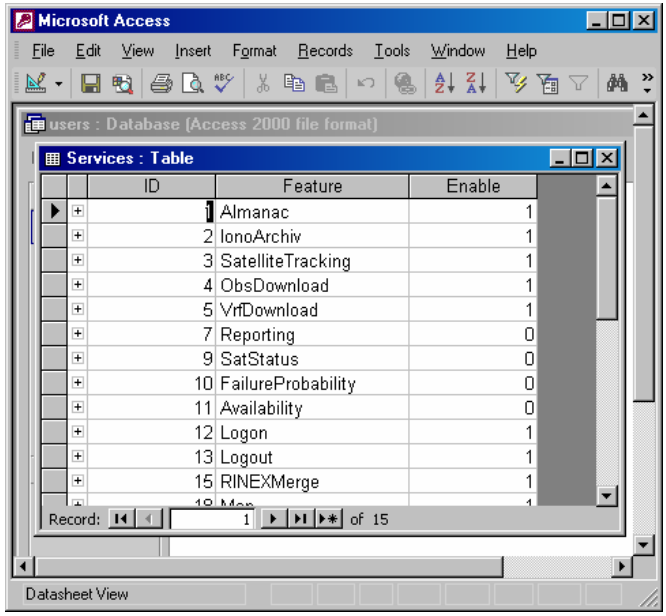


Table 5.1 List of services (in Users database, at the website and scripts)

Service ID (Services table)	Feature (Services table)	Default Link at Website	PHP Script *.php	Description
1	Almanac	Almanac	almanac	Display the latest almanac data from the host running the Almanac module.
2	Iono-Archive	Ionosphere	iono	Display graphics of ionospheric corrections for each satellite supplied by the GPServer Ionosphere module.
3	Satellite Tracking	Satellite Tracking	satellites	Select a station and view the satellite tracking status of the Station. Data is available from a host running the Receivers module.
4	ObsDownload	Raw Data Download	listof, push	Display and distribute any type of observation data to the customers. Data is available from a network or local drive.

Service ID (Services table)	Feature (Services table)	Default Link at Website	PHP Script *.php	Description
7	Reporting	Reporting	reporting	Display reports to the customers. Data is available from a network drive.
10	FailurePro bability	Risk of Failure	navigation	Direct link to current report on Failure Probability for a station
11	Availability	Availability	navigation	Direct link to current reports on Availability (daily, monthly, yearly)
12	Logon	Input fields below 'Home'	navigation	Edits for registration and logging. Necessary for user accounting.
13	Logout	Logout		Disconnect user from the service.
18	Map	Map	network	Display a picture of arbitrary contents, by default, the map of the network.
19	Online Shop	RINEX Shop	shop*	Buy and download post-processing data for reference stations and virtual reference stations in RINEX format.
20	I95Index	I95 Index	bargraph	Display JPEG files of ionospheric index I95 for selected dates. Data is available from a network drive (needs Reporting).
21	Network-Model-Integrity	Predicted Ionospheric/ Geometric Error	bargraph	Display JPEG files of predicted ionospheric and geometric errors for selected dates. Data is available from a network drive (needs Reporting).

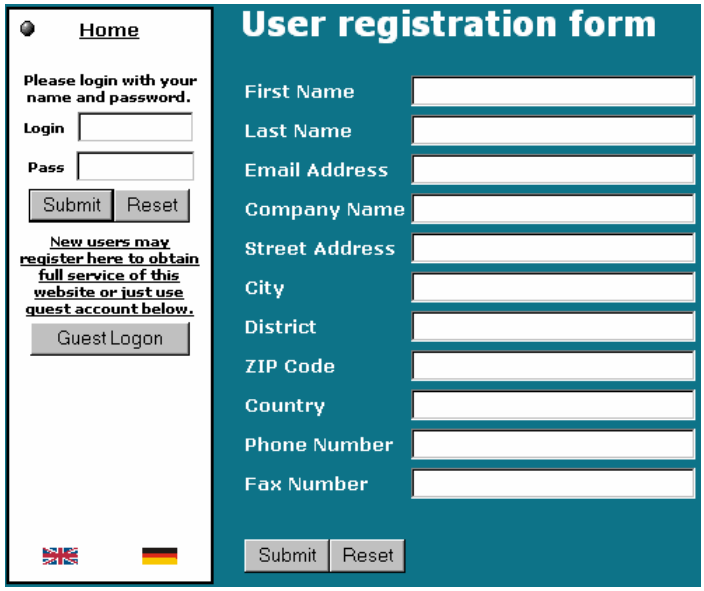
Login / Logout and Registration

- By default at the first view of the navigation bar
- Default entry in the second view of the navigation bar to return to the first view: Logout
- Default scripts: navigation.php, registration.php

The interface to all registration and logging functionality is GPSWeb's navigation bar. When the customer first accesses your homepage or when he/she selects the Logout function, the first page of the navigation bar appears.

Two input fields let registered customers enter the Login name and password. **Submit** sends this information to the server and tries to login; **Reset** clears the input fields.

Users that do not have an account can use the **Guest Logon** button to enter your website with limited access. To activate or deactivate services for guests, edit the users.mdb / *AccessPrivileges* table.



By default, the GPSWeb navigation bar offers a link that lets users register. To hide the registration link, edit the *Configuration* table in the config.mdb database. Edit the *Value* field of the EnableRegistration. 1 enables the registration link; to hide it, enter 0.

New users click the link named *New users may register here to obtain full service of this website*. This opens the User Registration Form.

Users enter their identification information at the User Registration Form and click **Submit**. (**Reset** clears all input fields.) All input fields require entries in specified format, with the exception of the *District* and the *Fax Number* fields. Submitted information is automatically written into the *Registration* table of the users.mdb database. A notification is sent automatically to the web server administrator, whose name and e-mail address are specified in the *Configuration* table of the config.mdb database. The Administrator is responsible for creating an account for the new user, assigning the new user to a user group, and starting all other actions necessary for registration and accounting. For details see Chapter 6, Databases.

Tip –The web server computer can only send emails, if the PHP interpreter is configured correctly. The GPSWeb installation has created on your desktop a link to the *Trimble GPSWeb Settings* dialog. Use this dialog to edit the SMTP server address and the From-address for the administrator email account.
These settings update among others the php.ini file that resides in your windows installation folder. They refer to the **SMTP =** and **sendmail_from** lines in the [mail function] section. Using the *Trimble GPSWeb Settings* dialog you do not have to manually update these lines.

Map of Stations

- Default entry in the navigation bar: Map
- Default title of website client area: Network overview
- Default script: Network.php

The Map function calls a JPEG graphic file. Typically the JPEG displays the network on a map, but can be modified ad lib. The following lists typical information on the map.

- Topography
- Icon indicating reference station position. Hyperlinks allow user access to any URI.

- Reference station name
- Reference station ID
- Reference station baselines
- Legend
- …

The Map functionality requires knowing name and the local path to the graphic file. To configure the path, edit the *Configuration* table of the config.mdb database. Edit the *Value* field of the NetworkMapURI.

Tip – You can use hyperlinks in the map to offer users a direct connection to a URI with station related information. The user's mouse cursor changes its shape if it moves on a hyperlink field.

To define hyperlinks in your map, use the *NetworkImageMap* table of the config.mdb database. For each hyperlink add a new row to the table and define coordinates in the map (*Coordinates* column), shape of the hyperlink (*Shape* column), URI (*URI* column), the type of the target window (*Target* column) and a tool-tip text (*Tooltip* column). The StationName column refers to the CORS Station selection in the RINEX Shop service. For details on the table, see the section on the config.mdb in Chapter 6, Databases.

Raw Observation Data

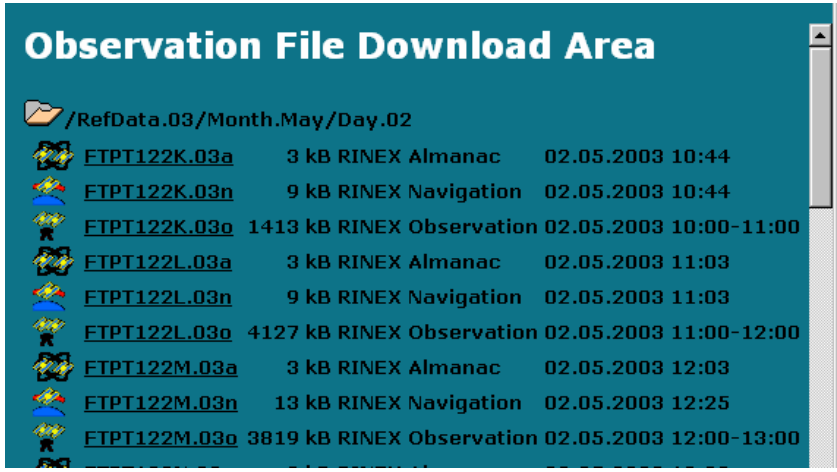
Two web server functions make raw observation data and almanac data available to users, the Almanac function and the Raw Data Download function. Users can select, view, and download the data files. The data files are in the format generated by the GPSNet Storage modules. They are not modified in any way with respect to update rates, or observation periods.

The data files reside at a specified location on the web server hard disk or at a mapped folder.

Observation files

- Default entry in the navigation bar: Raw Data Download
- Default title of website client area: Observation File Download Area
- Default scripts: listof.php, push.php

Use the Raw Data Download function to display and distribute any type of observation data to the customers.



The Observation File Download Area website allows recursive navigation through the folder structure containing GNSS observation and navigation files. The displayed filenames are automatically linked to the location on the hard disk. Some types of files are hidden.

With data in text format, such as RINEX files, the extension of the file is connected to a text editor. A click to the link immediately displays the file contents at the website. A click to the folder icon of the first list entry moves the user back one step.

Clients can save the displayed raw data file using the default Internet Explorer shortcut command *Save target as*.

The Observation File Download function requires knowing the local path to the root folder for raw data storage. To configure the path, edit

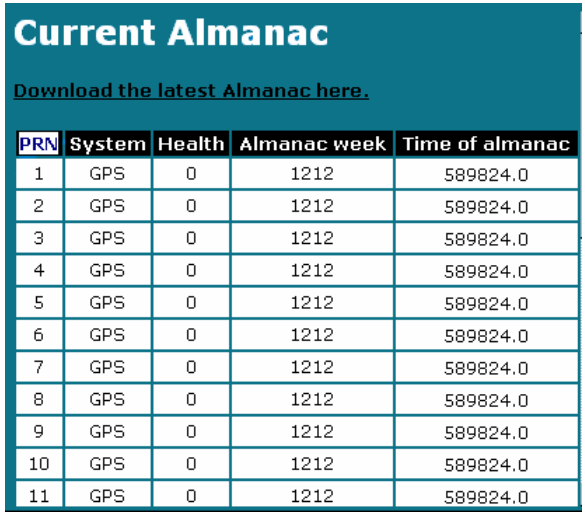
the *Configuration* table of the config.mdb database. Edit the *Value* field of the RefDataPath.

***Note** — The raw data must reside on the computer running the GPSWeb web server or on a mapped drive in a local network. The download folder does not necessarily need to be the GPSNet target folder for data storage. You can use GPSNet's FTPMirror module for data transfer.*

Almanac

- Default entry in the navigation bar: Almanac
- Default title of website client area: Current Almanac
- Default script: welcome.php, almanac.php

Use the Almanac function to display and distribute the latest almanac to the customers.



Current Almanac

Download the latest Almanac here.

PRN	System	Health	Almanac week	Time of almanac
1	GPS	0	1212	589824.0
2	GPS	0	1212	589824.0
3	GPS	0	1212	589824.0
4	GPS	0	1212	589824.0
5	GPS	0	1212	589824.0
6	GPS	0	1212	589824.0
7	GPS	0	1212	589824.0
8	GPS	0	1212	589824.0
9	GPS	0	1212	589824.0
10	GPS	0	1212	589824.0
11	GPS	0	1212	589824.0

The Almanac function requires a connection to a PC running the Almanac module and the iGate communication interface. To configure the connection, edit the *Configuration* table of the config.mdb database. To define the IP address of the host running the

TAM Almanac, edit the *Value* field of the AlmHostIP. The AlmHostPort lets you define the iGate port number of the GPSNet computer.

By default, the Almanac website displays the latest health status and time of almanac. A click to the link *Download the latest Almanac here*, immediately starts the download of the latest almanac.

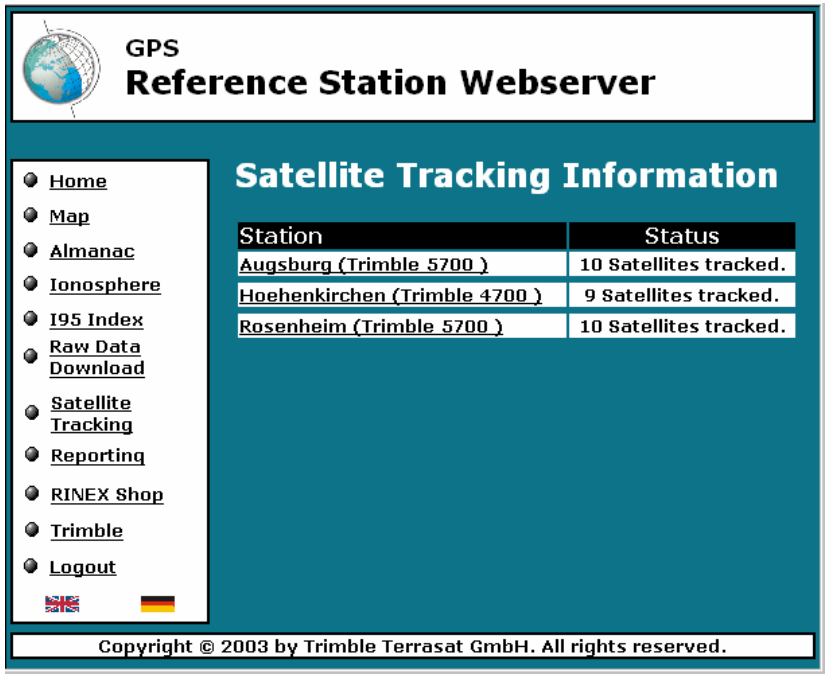
Satellite Tracking

- Default entry in the navigation bar: Satellite Tracking
- Default title of website client area: Satellite Tracking Information
- Default script: satellites.php,

You can make the information on the tracking status at your network stations available to your customers using the Satellite Tracking function.

The Satellite Tracking function requires a connection to a PC running GPSNet with the Receivers module and the iGate communication interface. To configure the connection, edit the *Configuration* table of the config.mdb database. To define the IP address of the host running the TAM Receivers, go to the TrackingHostIP and edit the *Value* field. The TrackingHostPort lets you define the iGate port number of the GPSNet computer.

The default Satellite Tracking Information page lists the available stations and the number of satellites tracked at each station. The station names are linked to a second page, where detailed current tracking information for the station is displayed together with its geographical coordinates.



Satellite Tracking Information

Hoehenkirchen (Trimble 4700)	Geographical coordinates
	Latitude: 48° 1' 21.603044" N
	Longitude: 11° 43' 14.106629" E
	Elevation: 645.920 m

System	PRN	Elev	Az	SnrCA	SnrP2	CA	P2	URA	Health
		[°]	[°]	[dB]	[dB]				
GPS	16	12.0	187.6	41	19	12743	12743	0	OK
GPS	14	15.3	133.8	40	20	1631	1427	0	OK
GPS	18	30.4	49.6	43	30	12743	12743	0	OK
GPS	15	51.1	65.9	51	40	12743	12743	0	OK
GPS	31	58.4	296.3	53	43	7703	7690	1	OK
GPS	11	16.6	267.9	42	21	1961	1950	1	OK
GPS	3	74.3	164.8	52	42	12743	12743	1	OK
GPS	22	61.7	80.9	51	42	10746	10735	2	OK

13:34:58 March 15 2004 W. Europe Standard Time

Back Reload

The main part of the second page is covered by the detailed tracking information for each satellite derived from the Receiver module. Below, you find the epoch in local date and time (Daylight Saving Time respected) for which the information is displayed. Users can update the display with the newest tracking information by clicking the **Reload** button.

For a detailed description of the parameters displayed refer to the section on the information pages for Receiver modules in the GPSNet User Guide, Chapter 6, Instruments: Network Data Input.

Ionospheric Effects

- Default entry in the navigation bar: Ionosphere
- Default title of website client area: Network ionospheric and geometric corrections
- Default script: iono.php

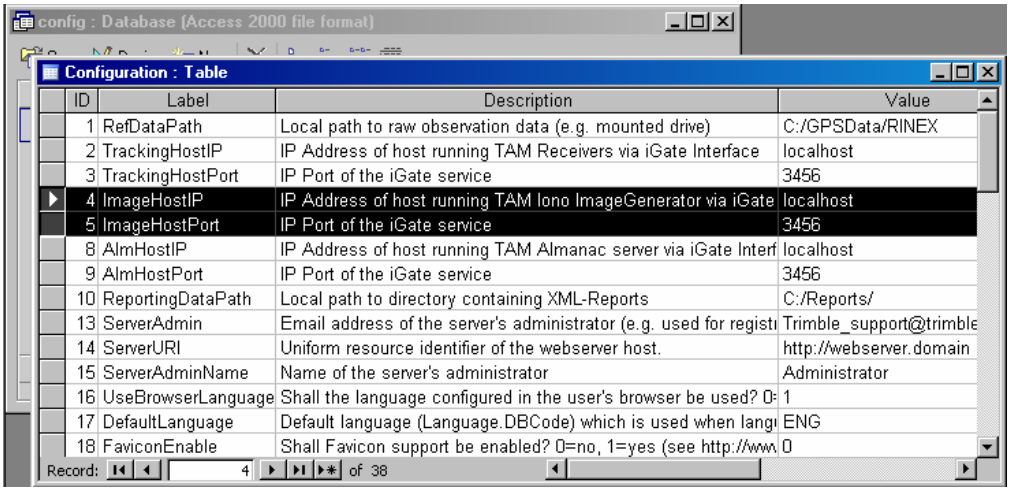
The Ionosphere function distributes information on the differential ionospheric effects and geometric corrections in the network. It lets the customer select the observation date and period for which the corrections are displayed using four JPEG images on the website. For a better overview, the four images come as thumbnails in reduced size on one page; the user can enlarge an image by left-clicking on it. The standard Internet Explorer shortcut-menu commands let the user store the image on his/her hard disk.

Configuring the service

The Ionosphere function requires a connection to a PC running GPServer, the iGate communication module, and the Iono Plot Generator module. To configure the connection using the iGate communication protocol, edit the *Configuration* table of the config.mdb database. To define the IP address of the host running the TAM Iono Plot Generator, edit the *Value* field of the ImageHostIP.

The ImageHostPort lets you define the iGate port number of the GPServer computer.

Tip – Ionosphere plots and virtual reference data are stored in the same download folder. For defining that folder at the GPServer side use the *Properties* dialog of the Virtual File Generator module.



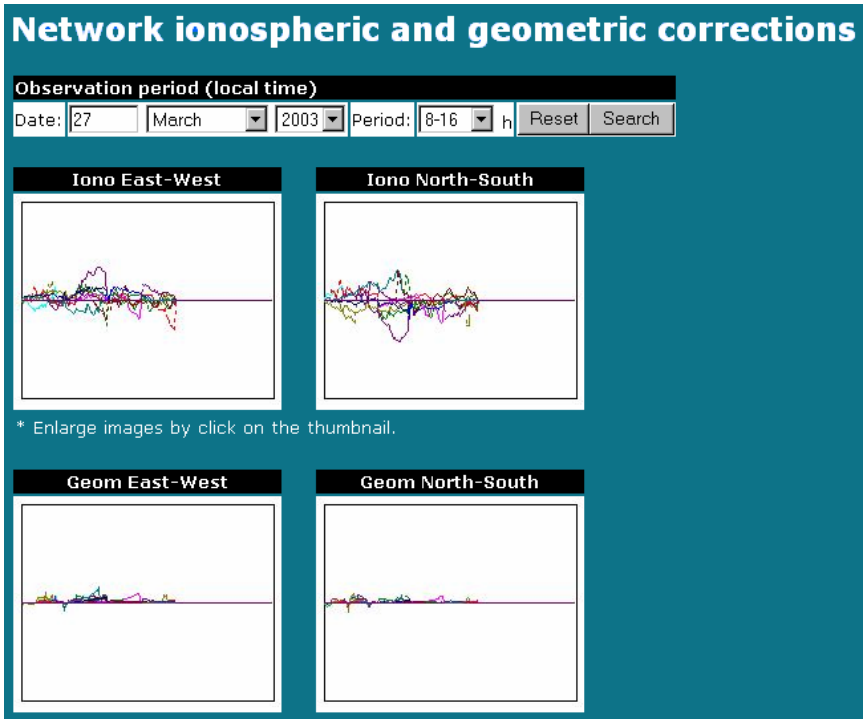
The default user interface

The user can select the observation period by entering a one- or two-digit day, selecting the month and year from the respective selection fields, and selecting one of the time periods for which the graphs display. By default, the following periods are available for selection from the *Periods* drop-down list:

- 0-8: 00:00 am to 08:00 am
- 8-16: 08:00 am to 04:00 pm
- 16-24: 04:00 pm to 12:00 pm

These periods match an Iono Plot Generator module at the GPServer side that generates three pictures of a type per day.

Tip – For defining data periods that match other settings of the Iono Plot Generator module at the host side, the iono.php script can be adapted.



The **Reset** button resets all values to the current date and time period. With **Search** the request is sent to the host.

Ionospheric Index I95

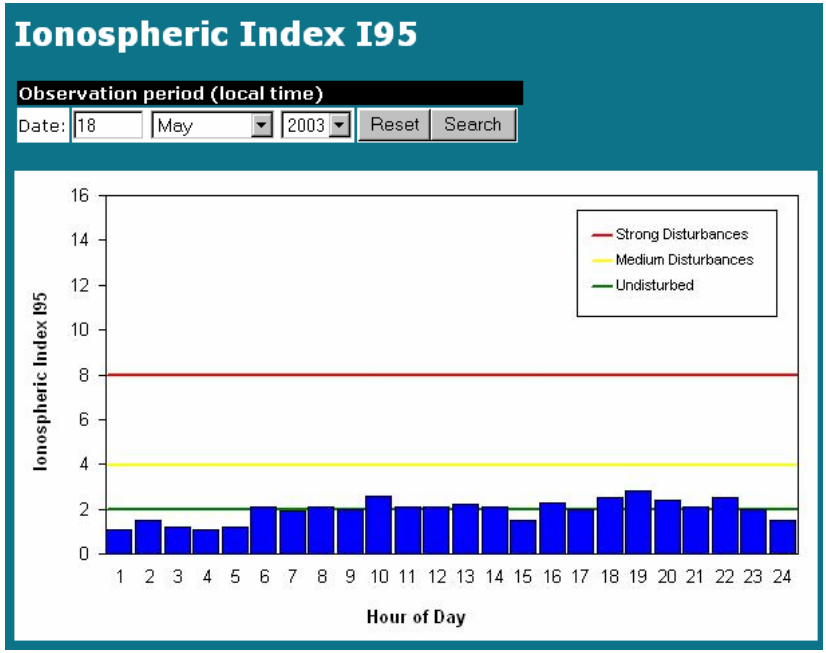
- Default entry in the navigation bar: I95 Index
- Default title of website client area: Ionospheric Index 95
- Default script: bargraph.php

The Ionospheric Index 95 function accesses a bar chart displaying the network Ionospheric Index 95 values for each hour of the selected day. The values reflect the intensity of ionospheric disturbances in the reference station network.

With GPSNet, the Ionospheric Index 95 for the current day is displayed on the tab *Ionosphere* in the VRS Processor information pane. Graphs for previous days are stored in the Ionosphere I95 Index report.

Configuring the service

The Ionospheric Index 95 function requires knowing the local path to the root folder for reporting. If the Reports service is enabled, you need no additional configuration. To configure the path, edit the *Configuration* table of the config.mdb database. Edit the *Value* field of the ReportingDataPath.



The default user interface

The function first calls the JPEG graphic file for the current day. Customers can use the selection and input fields on top of the graphic to select previous days for display. Clicking **Search** displays the graphic for the selected day. The button **Reset** resets the edit to the current day.

To print the graphic the default Internet Explorer commands can be used. Users can download the respective report using the Report function.

Predicted Errors

Predicted ionospheric and geometric errors allow a good estimate of the interpolation error of a rover in a GPSNet network. The predicted errors are made available by the GPSNet Network Model Integrity module. Data for previous days are stored in the Ionosphere reports.

Each of the Predicted Error functions accesses a bar chart displaying the Index 95 values of the predicted errors for each hour of the selected day.

Configuration of the services and access to the predicted error graphic files is done in the same way as to the Ionospheric I95 graphics.

Ionospheric error

- Default entry in the navigation bar: Predicted Ionospheric Error
- Default title of website client area: Predicted Ionospheric Error
- Default script: bargraph.php

The graphic files give an overview on the ionospheric contribution to predicted residual errors.

Geometric error

- Default entry in the navigation bar: Predicted Geometric Error
- Default title of website client area: Predicted Geometric Error
- Default script: bargraph.php

Here, the geometric predicted errors can be viewed.

RINEX Shop

- Default entry in the navigation bar: RINEX Shop
- Default title of website client area: RINEX Shop – Overview
- Scripts: shop*.php

The RINEX Shop offers customers a specific form to order and download RINEX data (either for continuously operating reference stations or for Virtual Reference Stations) for pre-defined periods and reference stations. After generation, the data is available for download or transmitted by email to the customers.

The RINEX Shop lets customers request data and define how that data is delivered to them. The customer defines an order, which contains information answering the following questions:

- Which types of RINEX data are requested?
- For which reference station(s) does the customer request data?
- For which time period(s) is data requested?

If customers are charged for requested data, they will always be kept informed on the prices for each file request and each order.

Configuring the service

The RINEX Shop requires a connection to a PC running GPServer, the iGate communication module, both the RINEX Merger and the Virtual Reference File Generator modules, and typically additionally

a Disk Watch module. This section describes how to configure the connection to GPServer.

Configuring the connection to GPServer

To configure the connection using the iGate communication protocol, edit the *Configuration* table of the config.mdb database for both modules.

To enter the IP address of the host running the iGate module, edit the *Value* field of the IGateHostIP. The IGateHostPort value gives the iGate port number of the GPSNet computer.

For defining the download folder for reference station and Virtual Reference Station data at the GPServer side use the iGate module's *Properties* dialog. The available reference stations are found by scanning the current day folder plus the previous 3 days. This scan is performed when the RINEX Merger module starts up and is repeated every hour.

Configuring choices available to the user

By default, the RINEX Shop offers the selection of CORS or VRS RINEX data. You may disable the selection of one of the station types. To do so, edit the ShownStationTypes value of the config.mdb *Configuration* table. Valid station type entries are *CORS* for Continuously Operating Reference Station, *VRS* for Virtual Reference Station, and *CORS, VRS* for both.

The RINEX Shop requires knowing the name and the local path to the graphic file displaying the network and its CORS stations. To configure the path, edit the *Configuration* table of the config.mdb database. Edit the *Value* field of the NetworkMapURI.

To use and define hyperlinks in the map, edit the *NetworkImageMap* table of the config.mdb database. For each hyperlink add a new row to the table and define coordinates in the map (*Coordinates* column), shape of the hyperlink (*Shape* column), and the exact marker name of the station (*StationName* column). The other columns of the table

refer to the network map, see Section Map of Stations. For details on the table, see the section on the config.mdb in Chapter 6, Databases.

***Note** – If your map, for example, displays a circle to represent the reference station as well as a text for the station name, you may want to define two hyperlinks: One covering the circle and a second one covering the text string in rectangle form. Defining a hyperlink, however, does not create any mark on the map; edit these marks on the map using a bitmap editor.*

The position for RINEX data for a Virtual Reference Station can be displayed with default coordinates in both the geographical, and the geocentric Cartesian coordinate systems. The VRFDefaultLatitude lets you set a default latitude of the Virtual Reference Station in the format degrees, minutes, seconds, North or South, where the values are separated by spaces. For example: For 48°, 1', 0.0" North, write **48 1 0.0 N**. VRFDefaultLongitude stands for the default longitude and VRFDefaultElevation stands for the default elevation (in meters) of the Virtual Reference Station.

The VRFDefaultXCoord, VRFDefaultYCoord, and VRFDefaultZCoord values define default coordinates in the geocentric Cartesian coordinate system.

The following two settings in the config.mdb apply for CORS as well as for Virtual Reference Station file generation. By default, customers can select from several intervals (in seconds) for file generation, where 15 seconds is the interval displayed by default in the selection field. To define the selectable intervals and the default interval, edit RINEXVRFIntervals (values must be separated by spaces) and DefaultInterval. Make sure that the highest data rate offered (minimum interval) matches the available data sampling rate. For example: If RINEX data are available with a data interval of 30 sec, the customers must not be allowed to order 1 sec data.

Configuring accounting and file management settings

By default, the GPSWeb pages do not display prices for requested data. Edit the AccountingModel value in the config.mdb /

Configuration table, to select an accounting model (0 = no accounting, 1 = price per epoch, 2 = price per minute). To define the price per epoch, edit the PricePerEpoch value; to define the price per minute, edit the PricePerMinute value. Of course, prices are in your own currency, so edit the CurrencySymbol value, too, using ASCII characters or HTML code.

Tip – Typically, you set up the GPServer system with a Disk Watch module that automatically searches pre-defined folders for files older than a defined time span and deletes these files. Thus, you make sure that the computer running GPServer always provides sufficient empty disk space. After deletion, of course, the generated data are not any more available for customers.

Note *– The DaysToKeepDBEntries value is usually larger than the Disk Watch maximum age setting, to allow accounting after the generated order archives have been deleted to save disk space.*

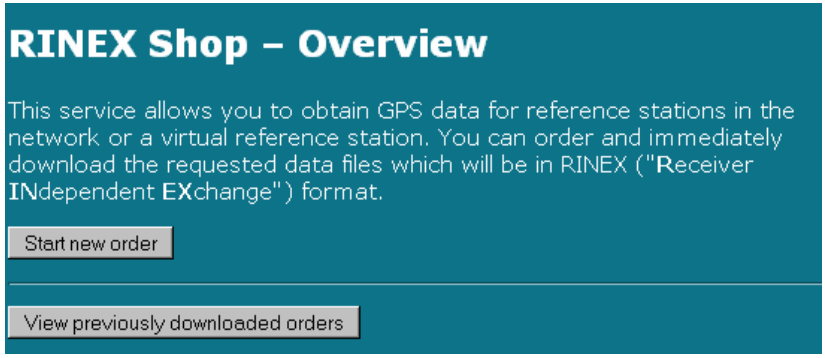
At the History view, users see informational text on how long the generated data files for orders are kept and available for download. The number of days displayed there should match the maximum file age setting at the Disk Watch. Provide this value (the number of days) in the resource.mdb / *StringTable* table, by editing the value OLS_HISTORY_TXT_Note_Old_orders_removed_automatically.

After generation, orders are kept in the onlineshop.mdb / *Orders* table for a defined number of days. To define this number, edit the DaysToKeepDBEntries value of the config.mdb / *Configuration* table.

The DataGapMinimum value, which is to be configured in the config.mdb / *Configuration* table (in seconds), has no impact on the price calculation. It is only used for data analysis and displayed at the File Details view. A RINEX data segment which has, after file generation, missing epochs over a continuous time period greater than this value will be considered as a data gap. Default: 60 sec.

The RINEX Shop main page Overview

The start page of the RINEX Shop is the Overview page.



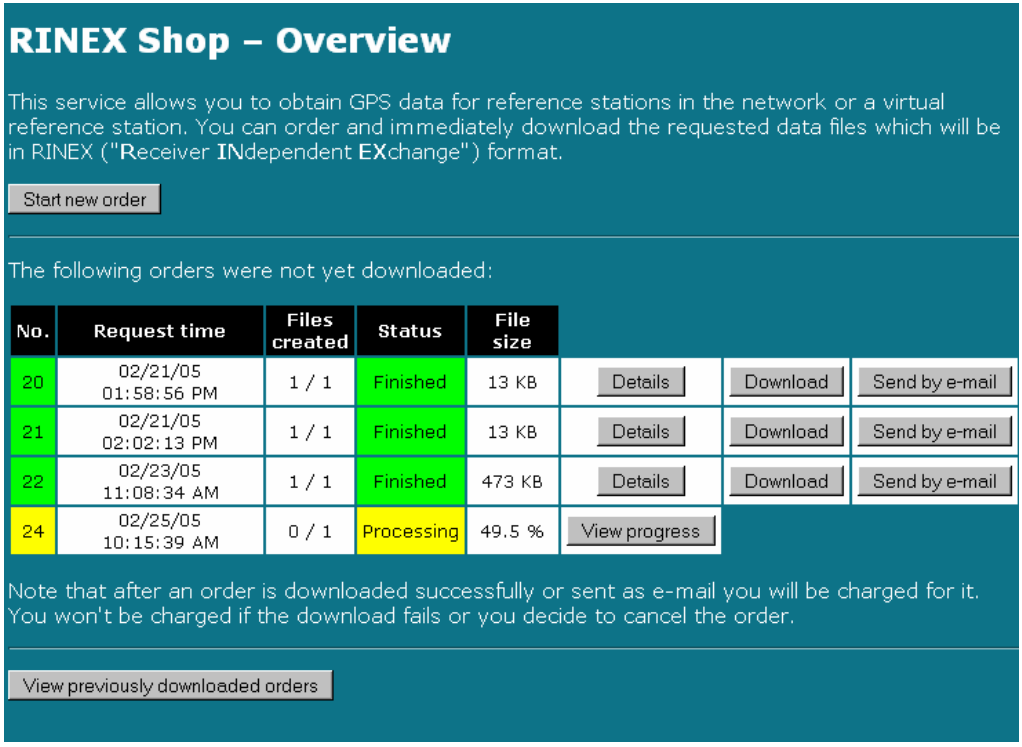
The first time a customer accesses the RINEX Shop, a short note informs customers that they can add new orders here with **Start new order**.

An ***order*** can consist of several RINEX files. If customers need several stations or data for discontinuous time spans, they add several files to an order.

A ***file*** contains the RINEX data (observation and ephemeris files) of a continuous time span for a single station (either CORS or VRS). Additionally, a summary text file, delivered with the order, gives the customer an overview over order and file settings as well as the resulting values.

After orders have been generated, the Overview gives a status of all orders for the registered user which were not yet delivered, with the first order shown at the top of the list. For each order a unique ID is automatically created and displayed together with its request time, the number of files requested, the order status, and the file size of the zipped order archive. Several buttons connect to the view that lets the customers view or change the respective setting.

The *ID* and the *Status* fields are colored according to the current data generation status. Possible states are: *Processing* (yellow), *Finished* (green, if all requested files are available and waiting for download) and *Failed* (red, if one or several files are missing from the order).

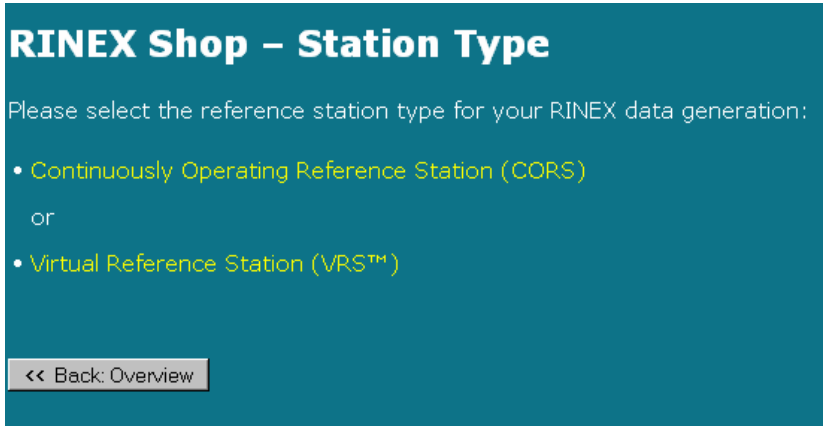


This list only displays orders that are either in progress or generated, but have not yet been delivered to the customer. After the first delivery (by e-mail or by customer download), the order disappears from the list and appears at a history list. This list is displayed at the History view, which customers access by the **View previously downloaded orders** button.

Adding files and orders

To add a new order customers click the **Start new order** button at the Overview view. Thus, they start a first request for a file for the new order. Later, they may add more stations or more time periods to the order, see also Section Status of the order. The Station Type view appears.

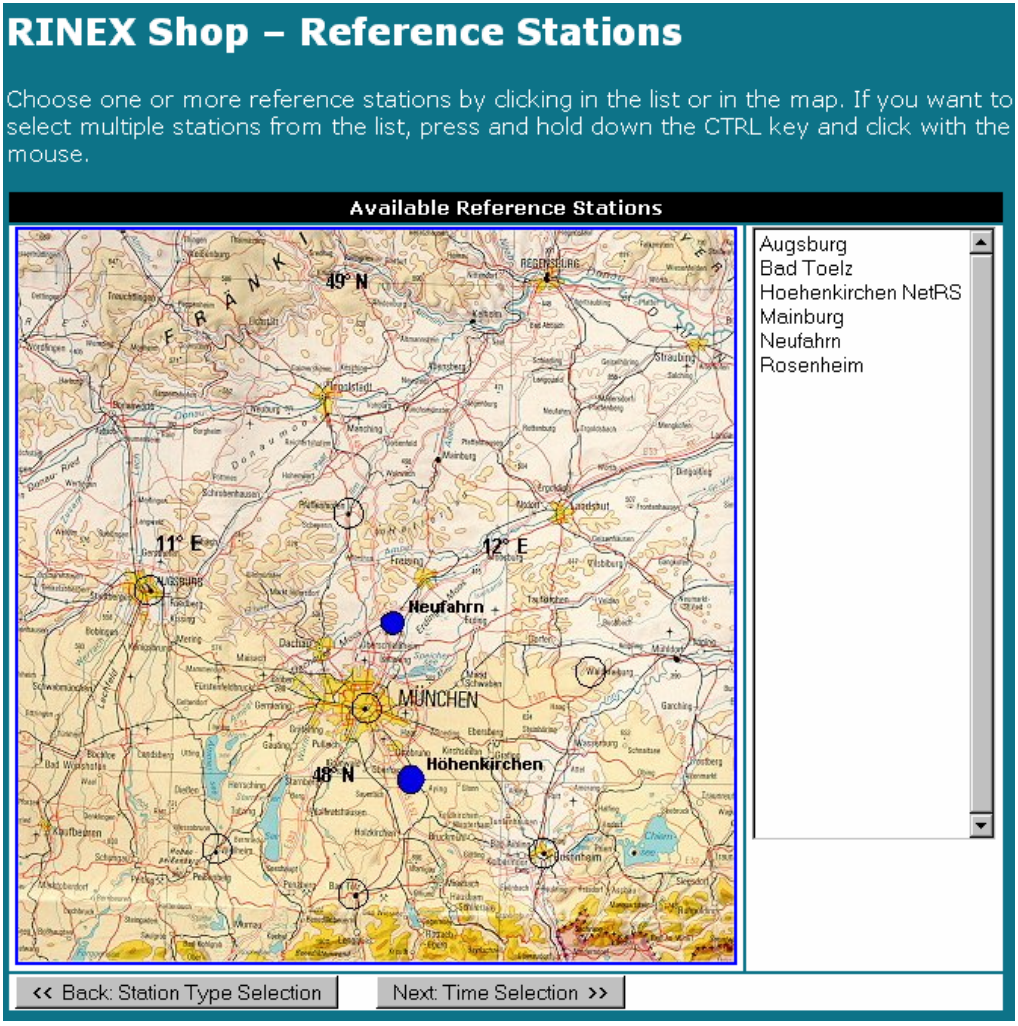
The customer selects as station type either one or several continuously operating reference stations (CORS), or a virtual reference station (VRS). The user may also go back to the Overview view. You may, however, switch off one of the stations types. To do so, edit the ShownStationTypes value of the config.mdb / *Configuration* table.



The next page depends on the station type selected. For CORS stations, a clickable map and a station list appear for station selection. For a Virtual Reference Station, a form for the input of coordinates appears.

CORS selection

If customers have selected CORS as station type, the Reference Station view appears. Here, a clickable map may display available stations and may allow station selection by mouse clicks on hyperlinks. The mouse cursor changes its shape if it moves on a hyperlink field. For how to configure the service for the use and definition of a map with hyperlinks, see Section Configuring the service.



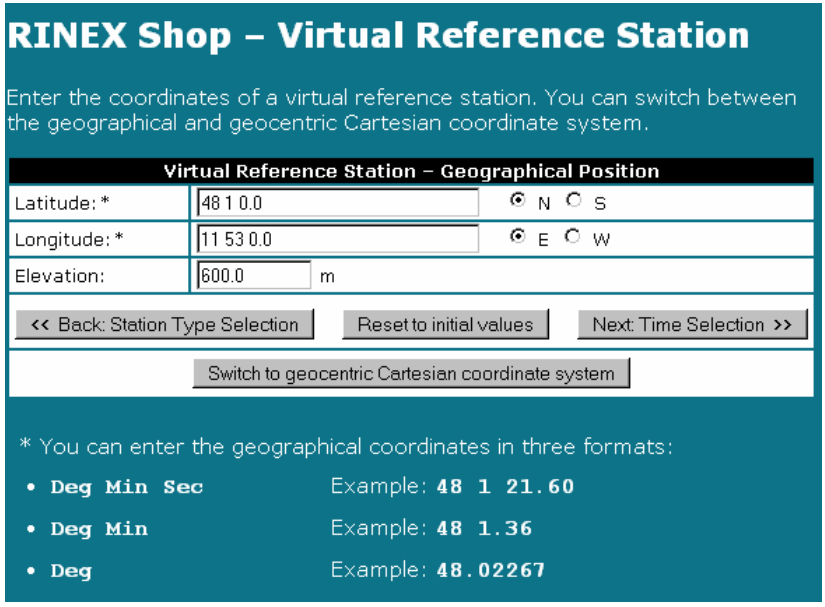
Next to the map a list of stations allows station selection by station names.

Note — *Customers can select several CORS stations in one step using the standard Windows Ctrl and Shift keys. In this case, the settings for the RINEX file generation are identical for all stations. To add stations with different settings, users add new files to the order in a second step.*

Two buttons let the users move back to the station type selection view or forward to proceed with date and time selection.

VRS position definition

If customers have selected VRS as station type, the Virtual Reference Station view appears. Here, customers enter the coordinates of the Virtual Reference Station. They can use a button to switch between geographical and geocentric Cartesian coordinates. For geographical coordinates, several formats are allowed for the entry of latitude and longitude.



Note — *Switching to the other coordinate system does not include a coordinate transformation function. When the user clicks the* ***Switch to …*** *button, the default values as defined in the* Configuration *table of the config.mdb database or those previously entered will be displayed in the matching coordinate system. How to set the default VRS coordinates is described in detail in Section Configuring the service.*

Customers can always reset their entries to the initial values (those displayed when the customer accessed the page) with the **Reset to initial values** button. Two further buttons ´let the users move back to the station type selection view or forward to proceed with date and time definition.

Date and time selection

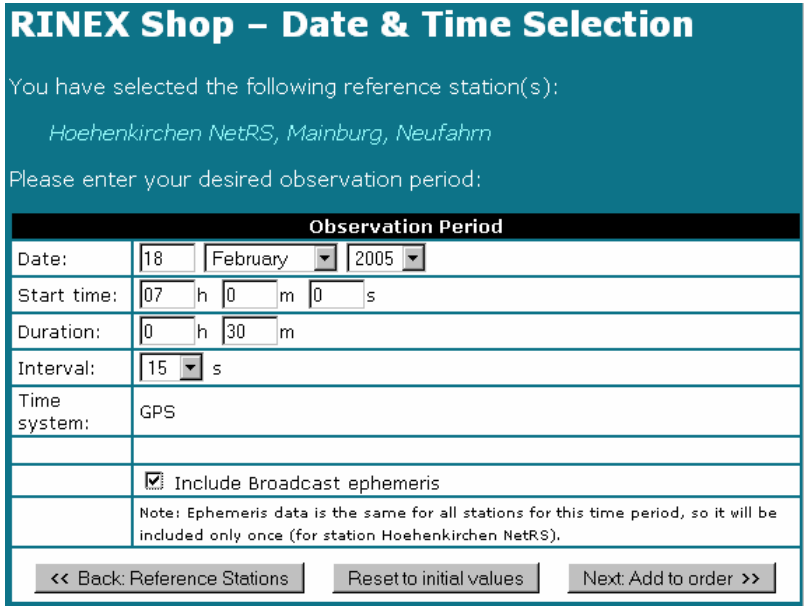
After (multiple) station selection or coordinate input (for Virtual Reference Stations) customers use the Date & Time Selection view to assign for all selected stations the start date and time, the duration, and the interval. Dates and times are always in the GPS time system. An optional text string informs your customers on the time offset between GPS time and the local time at your server. To edit this text string, go to the resource.mdb / *StringTable* table, and edit the OLS_TIMESELECTION_TBL_ GPS_time_offset value.

***Note**: In some cases, it may happen that customers request data from a computer residing in another time zone than yours. To provide for such cases, you should change the information text in an appropriate way.*

The selectable intervals depend on your settings in the *Configuration* table of the config.mdb, see Section Configuring the service. Broadcast Ephemeris can be included in the zipped delivery files. With multiple stations selected, ephemeris data is the same for all stations for this time period, so it will be included only once. A comment indicates the station, for which the ephemeris data is included.

Customers can always reset their entries to the initial values (those displayed when they accessed the page) with the **Reset to initial values** button. Two further buttons let the users move either back or forward.

When customers click the **Next: Add to order** button, they are adding one or several new file(s) to an order. The Current Order view appears.



With a new order, a new entry is created in the onlineshop.mdb / *Orders* table and the new (requested) files are assigned to this order. Files are listed in the *Files* table of the onlineshop.mdb. If customers add further files to the order, these new file requests appear as further entries in the *Files* table and are assigned to the existing order in the *Orders* table. Due to limitations by the RINEX file naming convention, customers are not allowed to request additional files for the same station starting in the same hour (no matter, whether the minutes / seconds of the following requests differ or not).

Status of the order

Depending on the generation and delivery status of the order, the contents of the Order view may vary a little bit as well for the table contents as for the available buttons. However, general features are the same.

The Order view is where customers see:

- How many reference stations or Virtual Reference Stations they have selected so far,
- The names of reference stations or the positions of Virtual Reference Stations, if they move the cursor over the VRS link in the Station column,
- The time, duration, and interval settings for these stations,
- Whether ephemeris data are included for a station,
- If accounting is activated (see Section Accounting): The estimated price, if the requested files have not yet been generated (Your Current Order) or the actual price after file generation,
- After file generation, the effective duration in minutes.
- The actions allowed for this order. See the following paragraphs.

Actions on the current order

With the current order, where data are not yet generated, users can select the actions for a requested file from the *Choose action* selection field. They can:

- Request more data for the same station for a different time period; in this case, the Date & Time Selection view will appear.
- Request more data for the same time period for a different station; in this case, the Station Selection view will appear, the Date & Time Selection view for the new station will show the current time selection as pre-definition.
- Delete the file from the order.

Possible actions on the current order as a unit are the following:

- Cancel the order (see Section Deleting files or orders)

- Add more stations to the order: the Station Type selection view appears. Users can now request new files for this order, see Section Adding files and orders.
- Move on to the next step, defining the delivery options (see Section Defining order delivery).
- Move back to the Overview view.

Actions on an order not yet delivered

With an order, where data are already generated, but not yet downloaded, users can select the following actions on the requested files:

- View the file details,
- Remove the file from the order. If they do so, and if accounting is enabled, all added values in the “Total” row will adjust to the remaining requested files.

Possible actions on the order are the following:

- Cancel the order (see Section Deleting files or orders)
- Download the order data, see Section File download.
- Start sending the order data by e-mail.
- Move back to the Overview view.

Actions on an order delivered at least once

With an order, where data have already been delivered, users can select the following action on the requested files:

- View the file details.

Possible actions on an already delivered order are the following:

- Download the order data again, see Section File download.
- Start sending the order data by e-mail again.
- Move back to the History view.

Deleting files or orders

Deleting files and deleting orders is very similar.

- To delete an order, whether generated or not, the customer clicks the **Cancel order** button at the Order view, or at the Overview view, if the order has not yet been submitted. The order is immediately deleted from the list.
- To delete a requested station file already generated from an order, the customer clicks the **Remove file** button at the Order view. The station is immediately deleted from the list.
- To delete a requested station file ***not yet*** generated from an order, the customer selects the *Remove file* action at the Order view and then clicks the arrow button. The station is immediately deleted from the list.

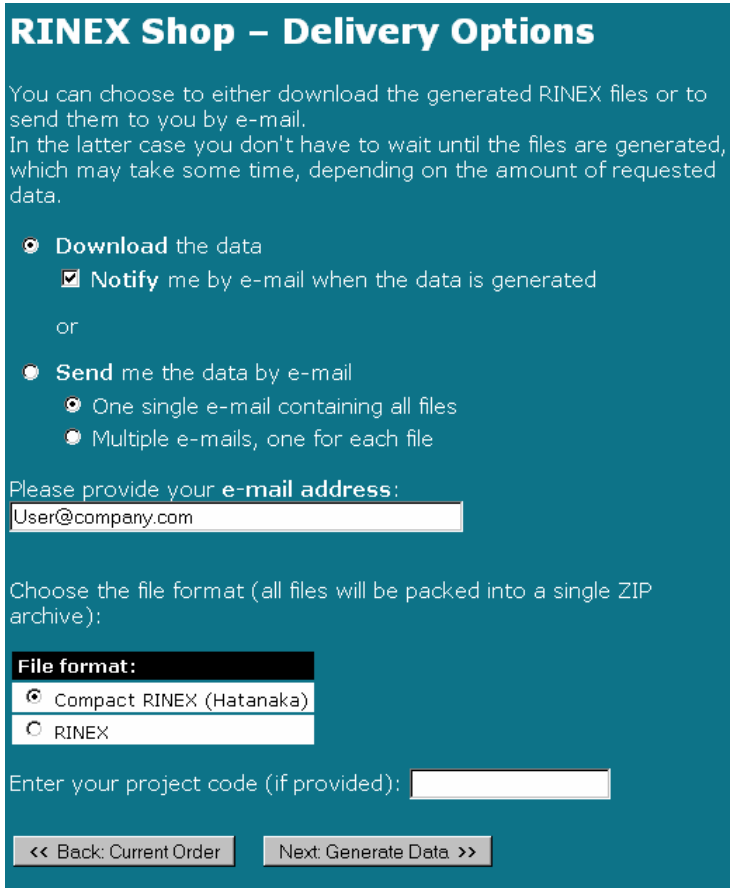
Customers can only delete files from orders that have not yet been delivered for the first time. After deliverance, only the GPSWeb administrator can remove the order from the web site. Typically, this is organized in an automatic process, where the Disk Watch module deletes files older than a certain time span, and the GPSWeb configuration makes sure, that old orders are deleted from the onlineshop.mdb database. For the necessary configuration settings, see Section Configuring the service.

Defining order delivery options

Before an order is started, customers are requested to select how data is to be delivered. After customers have clicked the **Next: Delivery Options** button from the Your Current Order view, the Delivery Options view appears and offers the following selections:

- Customers can choose to download the generated RINEX files from the web server computer. Users can select to receive an email notification after data generation announcing that the result files are available at the website.

- Files can be delivered by e-mail, after the last item of the order has been carried out. Here customers can select, whether all files are compressed into one zip file and one mail is sent, or whether multiple mails are sent, one for each station. Result zip files are still available for download on the web pages.



Only if an e-mail address is necessary, a line appears that lets the user enter an e-mail address. After the e-mail address has been once provided by a user, it will then automatically be available for editing, since it is stored in a cookie.

Users can select, whether they want the data as RINEX files or as Compact RINEX files in the Hatanaka format. For download and e-mail delivery, the files will additionally be zipped.

The next step, if users do not want to move back to the Current Order view, is to start the file generation with the **Next: Generate Data** button.

Starting data generation

To start the RINEX file generation customers go to the Delivery Options view and click the **Next: Generate Data** button.

When customers have selected to receive the data by e-mail, the Confirm Mail Delivery view appears. It contains detailed information on the terms of data delivery and serves as payment acknowledgement by the customer. From this view, customers can move back to the Delivery Options view or forward to generate the data. In the latter case, data generation starts in the background. The website returns to the Overview view.

The generated download files are stored at the location you have set in the *Properties* settings of the iGate module. For each order, a new folder Order<OrderID> is created, where the zipped order file resides and each file stays in a subfolder Request<RequestID>.

Information about the results such as the type of service, number of epochs, start and end time and much more is stored in the onlineshop.mdb database to allow accounting about the requested files.

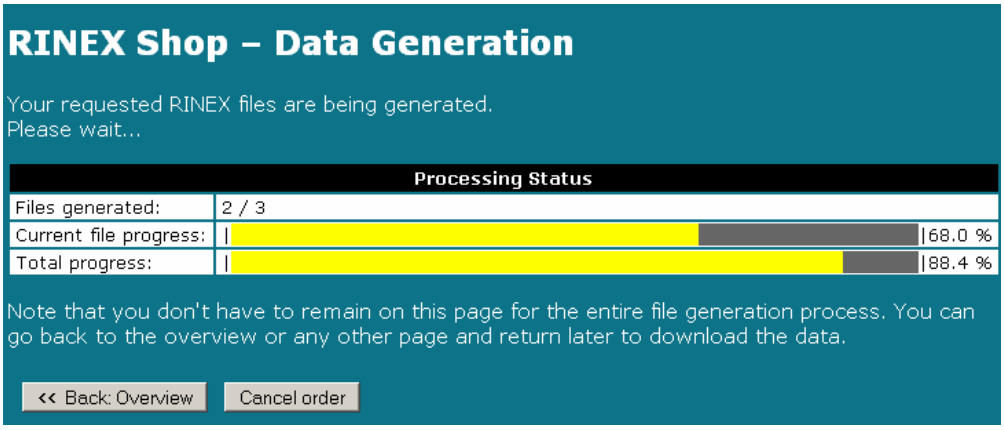
Viewing the file generation progress

Customers can view the file generation progress at the Data Generation view. It appears,

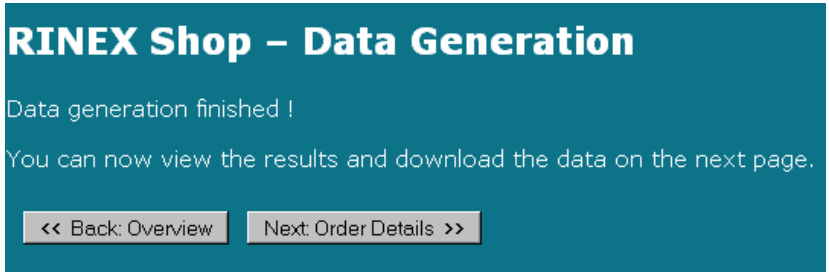
- If customers have selected the download option from the Delivery Options view and have clicked the **Next: Generate Data** button.

- If customers click the button at the Overview view. This button is only available during the file generation time.

Customers can still cancel the order from Data Generation view, as long as the data are generated. They can view the current status of the process, but they need not to watch the view.



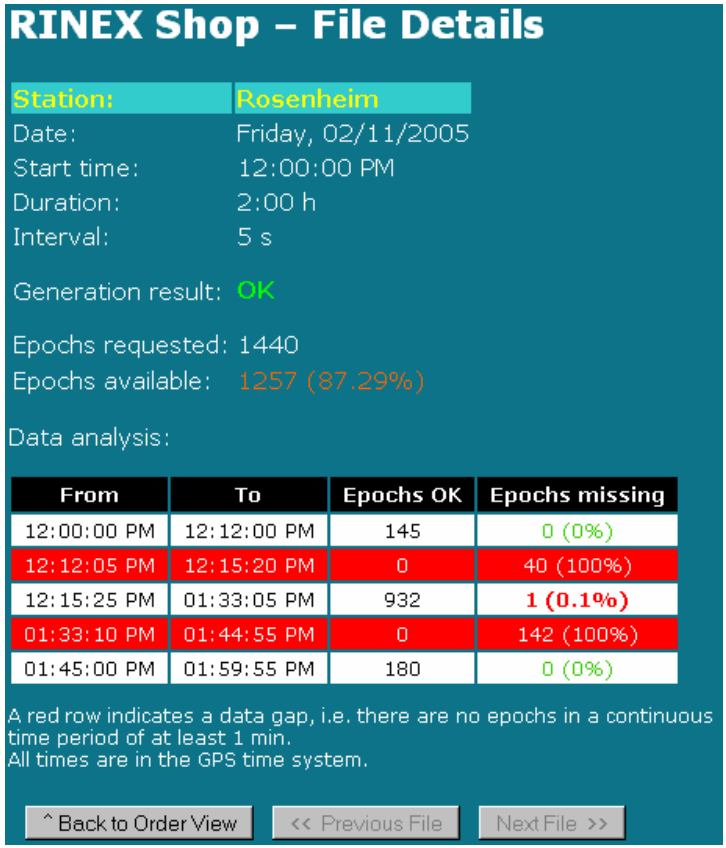
When the RINEX file generation has finished for all requested files, the Data Generation view lets the users see the order and RINEX file details from the Order view, where they can download the data (see Sections Status of the order and Viewing the results of the RINEX file generation), or to go back to the main Overview view.



Viewing the results of the RINEX file generation

After file generation, detailed information on each generated RINEX file is available from the File Details view. This view is accessible by clicking the **Details** button from the Order view For more information on the order view, see Section Status of the order.

Besides the CORS station name or the VRS coordinates, depending on the selected station type, the settings sections of the File Details view gives an overview on the requested date and start time, the duration and the interval for the update rate.



The main part of the File Details view gives the customer information on the file generation result and referring statistics. If at least one

requested epoch is available, the Generation result is **OK** in green letters. If the amount of available epochs does not equal the number of requested epochs, the number of available epochs and the percentage of the requested epochs display as red. If no data is available for the whole requested time span, the result text is **Failed**, highlighted red, together with information on the reason for failure.

The *Data analysis* table gives an overview on missing data for the requested period. The color of the rows depends on the setting for a maximum data gap in the *Configuration* table of the config.mdb database, see Section Configuring the service. For data segments with consecutive missing epochs of less than the maximum data gap, the row displays in white, red rows indicate missing data periods. The Epochs missing column displays the numbers and percentages of missing epochs during the indicated periods.

Customers can consecutively view the File Details for all requested files within an order using the **Previous File** and **Next File** buttons. For more actions on the file or on the order they move back to the Order view.

The content of the File Details view is derived from a status text file that the iGate module creates for each requested data file. This file is even created, if the requested data is not available. Its filename obeys the RINEX file naming convention with the extension .txt.

File download

From several views of the RINEX Shop website, customers can download the zipped order files using the **Download** button**,** or receive the zipped files using the **Send by e-mail** button:

- If the order has not yet been delivered, the requested order is available from the Overview view.
- From the History view, if the order has already been delivered.
- From the Order view, independently, whether already delivered or not.

Customers can receive the generated RINEX files as long as they are stored at the server hard disk, even if the data has already been delivered.

***Note** — The duration of file storage at the hard disk depends on you. Trimble recommends that you use the Disk Watch functionality to monitor disk space and to delete the oldest files. See the Section Configuring accounting and file management settings.*

After files have been delivered for the first time, the orders are not any more available form the Overview view, but appear at the bottom of the order list in the History view.

Accounting

How the GPSWeb pages are configured to allow for accounting, is described in the Configuring accounting and file management settings section of this description.

***Note** – By default, accounting is not configured for the RINEX Shop. However, all order-related information is stored in detail in the onlineshop.mdb database.*

Before the data files for an order are generated, displayed prices are estimated prices based on one of the following:

- Either on the duration for the price per minute model. This model results in the same price for a minute independent of the update rate. Customers can influence the price for a certain time period less than with the price per epoch model.
- Or on duration and interval for the price per epoch model, which results in a number of requested epochs. The higher the Interval value, the less the customers must pay. For example, with an interval of 1 second the generated epochs are 10 times more than with an interval of 10 seconds.

These prices are maximum prices; that means that the customers know they will not be charged higher than the price displayed.

After data generation, the actual prices are displayed in the Order view. The actual prices may be less than the estimated ones due to missing epochs.

- With the price per epoch model, all epochs contained in the generated RINEX data files are counted and multiplied with the price.
- Also with the price per minute model the generated epochs are counted. The price per epoch here depends on the interval setting. For example, if an interval of 15 seconds is chosen, the price for an epoch is a quarter of the price per minute. With an interval of 1 second, each missing epoch reduces the calculated price for the sixtieth part of the price per minute only.

GPSWeb assumes that customers are charged only once for generated and delivered data, independent on how often the data is delivered to them.

Customers cannot be charged for files not delivered. If the customer deletes generated files or orders, before they are delivered, the entries for these files are deleted from the *Files* table in the onlineshop.mdb, and, therefore, the estimated or calculated prices for the files are not anymore available for accounting.

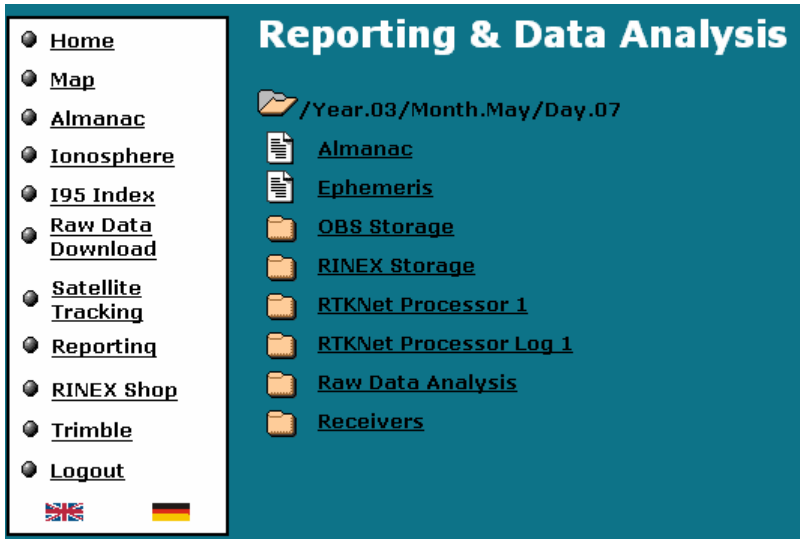
Reports

- Default entry in the navigation bar: Reporting
- Default title of website client area: Reporting & Data Analysis
- Default script: reporting.php

Use the Reporting function to display and distribute XML reports and data analysis information to the customers.

The Reporting & Data Analysis website allows recursive navigation through the folder structure containing all types of XML reports. The function pools the reports according to the source module to virtual sub-folders. For example, all reports written by the Raw Data

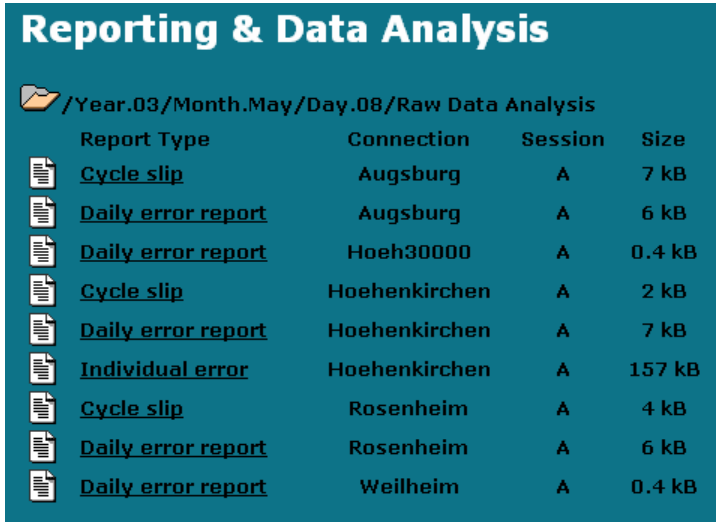
Analysis module (Cycle Slip report, Individual Error report, Daily Error report) can be found in a folder named Raw Data Analysis.



The function uses the filename to display its information in tabular form. The filename contains the report type, the name of the connection to the reference station and the Session identifier. Additionally, the file size is displayed. The displayed reports are automatically linked to the location on the hard disk. Other file types than XML files are hidden. Customers can save the displayed raw data file using the default Internet Explorer shortcut command *Save target as*.

The XML files are connected to a XSL transformation engine. A click to the link immediately transforms and displays the report contents at the website. A click to the folder icon of the first list entry moves the user back one step.

The Reporting function requires knowing the local path to the root folder for reporting. To configure the path, edit the *Configuration* table of the config.mdb database. Edit the *Value* field of the ReportingDataPath.



Note *— The XML files must reside on the computer running GPSWeb or on a mapped drive in a local network. The download folder does not necessarily need to be the GPSNet target folder for reporting. You can use GPSNet's FTPMirror module for data transfer.*

Ntrip Support for Real-time Data Streaming

Using the Ntrip protocol any kind of GNSS data (such as reference station data or corrections for DGPS or RTK) can be distributed and multiplexed through the Internet ***in real-time*** by the application of Radio broadcasting software.

For detailed information on the Ntrip protocol and the setup of an iGate module letting customers use this protocol, see Chapter 4, Trimble GPServer.

Each Ntrip data stream, identified by its Mount Point, defines a new service. If authentication is enabled and accounting depends on selected services, make the services known to the database system. Use the *Services* table from the users.mdb and create a new entry for each service. Make sure that the Mount point is typed in exactly as it is defined in the Add Source dialog of GPServer's iGate module (see

the section Adding a Streaming Source in Chapter 4, Trimble GPServer).

Tip – To make the Ntrip services available for user accounting, edit the *AccessPrivileges* table to assign new services to groups. You may think of creating specific groups with all or selected Ntrip rights and assign your Ntrip users to (one of) the Ntrip group(s).

CHAPTER

6

Databases

In this chapter:

- Introduction
- Config.mdb
- Resource.mdb
- Users.mdb
- Onlineshop.mdb
- Accounting.mdb

Introduction

The configuration of the web server system mainly depends on a set of, currently, five databases. The databases contain the necessary information not only for configuration, but also for user management, administration of privileges, accounting, RINEX Shop, multiple language support, and much more.

The default databases are Microsoft Access Database files residing in the Trimble Common Files \ Infrastructure \ DB folder (the default path is: C:\Program Files\Common Files\Trimble\Infrastructure\DB.)

The default databases are used as templates that are modified during run time. For example, to add information on users you will fill in the users.mdb. To modify or translate the text at the web server's home page, you will edit or expand the resource.mdb.

See Table 6.1 for an overview on the default databases and tables within of your GPSWeb setup. The following sections describe the contents of each database and how databases depend on each other.

Table 6.1 List of databases and tables

Database	Table	Description
Config.mdb		Configuration issues: – connections to hosts – user interface layout.
Config.mdb	*Configuration*	Defines the local paths and socket connections to the host PC running the TAM modules using the iGate interface. Lets you modify default settings for GPSWeb layout and services.
Config.mdb	*Language*	Defines the languages available for the GPSWeb pages.
Config.mdb	*Layout*	Defines layout components of the website, such as the colors used for the background or for links.
Config.mdb	*Links*	Defines the welcome page and further links in the navigation bar.

Database	Table	Description
Config.mdb	*Network ImageMap*	Defines coordinates of hyperlinks in your network map.
Config.mdb	*StringTable*	A link to the resource.mdb / *StringTable* table.
Config.mdb	*Version*	Contains database and web server version information. Should not be touched. Will be overwritten by each software update, if Trimble has modified the table or its contents.
Resource.mdb	*StringTable*	Contains all strings that appear on the website. Lets you offer your services in any language. Provided default languages: English and German.
Resource.mdb	*Version*	Contains database and web server version information. Should not be touched. Will be overwritten by each software update, if Trimble has modified the table or its contents.
Users.mdb		User and service administration.
Users.mdb	*Registration*	Used for temporary entries. Filled in by users applying at the website for the service. The System Administrator uses this information to add the new user to the *Passwd* and *Users* tables.
Users.mdb	*Passwd*	The main table used for user management, defining user identities. Contains password and group.
Users.mdb	*Users*	Additional user information for administration and accounting purposes.
Users.mdb	*Groups*	User group definition. All users must be assigned to a group that is defined by its privileges.
Users.mdb	*Access-Privileges*	Sets the privileges for groups.
Users.mdb	*Services*	Enables the services for display at the website. Disabled services will not be displayed.
Users.mdb	*Version*	Contains database and web server version information. Should not be touched. Will be overwritten by each software update, if Trimble has modified the table or its contents.

Database	Table	Description
Onlineshop.mdb		Used by the RINEX Shop system to create and deliver orders and file requests.
Onlineshop.mdb	*Orders*	Filled in automatically, if customers create orders. Assigns orders to users and file requests. Stores order settings. Used in combination with users.mdb.
Onlineshop.mdb	*Files*	Filled in automatically, if customers are logged on and request data files for an order. The System Administrator uses this information to account for the services.
Onlineshop.mdb	*Relative-OrderIDs*	Filled in automatically, if customers are logged on and request data files for an order. Provides the numbers for the next relative order IDs.
Onlineshop.mdb	*Version*	Contains database and web server version information. Should not be touched. Will be overwritten by each software update, if Trimble has modified the table or its contents.
Accounting.mdb	*Actions*	Keeps track of user activity and data retrieval. Used for billing purposes. Filled in automatically, if customers are logged on and download data of any kind other than from the RINEX Shop. The System Administrator uses this information to account for the services. Used in combination with users.mdb.

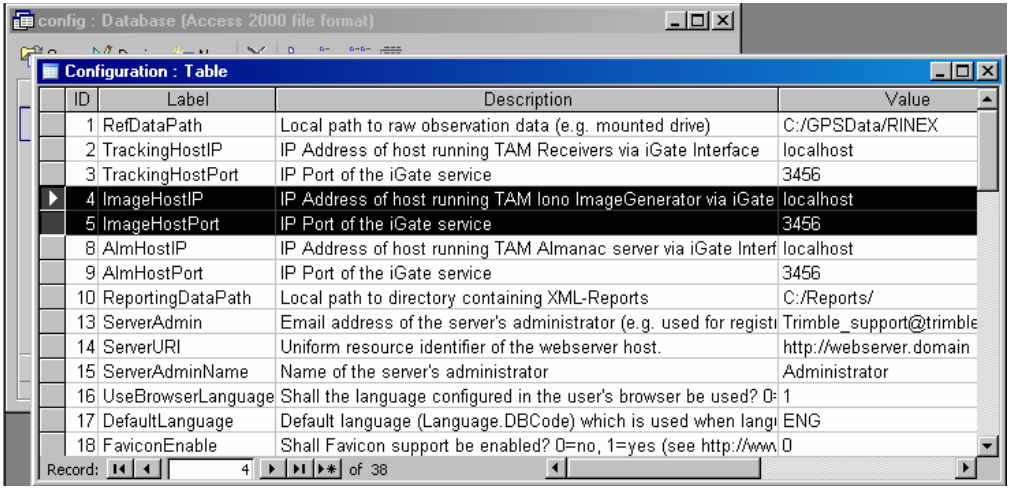
Config.mdb

The config.mdb database contains six tables and one link to an external table.

- *Configuration*
- *Language*
- *Layout*
- *Links*
- *NetworkImageMap*

- *Version*
- *StringTable:* Link to the *StringTable* table of the resource.mdb database

Configuration table

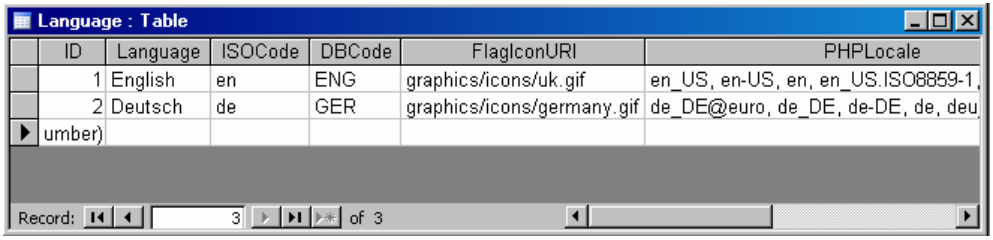


The *Configuration* table makes the connections to services known to the web server. With the default services and PHP scripts, you must edit the *Value* column to provide local path or IP addresses and ports of the hosts. Other entries let you modify default settings for GPSWeb services and the website layout. For details on the settings refer to the description of the services (Chapter 5) and the GPSWeb design (Chapter 3).

Warning – Do not change the entries in the *Label* column in the *Configuration* table. The default PHP scripts refer to the labels exactly as displayed in the default *Configuration* table.

Language and Layout tables

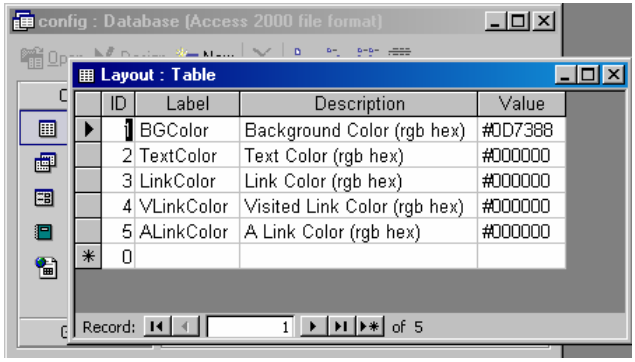
The *Language* table of the config.mdb database is used for automatic language detection and internal language code assignment. Use it to add or delete languages to or from the list. Assign for each language the ISO code (column *ISOCode*) to the database identifier (column *DBCode*). Each language can be represented by a flag icon in the default navigation bar.



By default, GPSWeb comes in two languages, English (U.S.) and German. For details, see Chapter 3, Section Language selection.

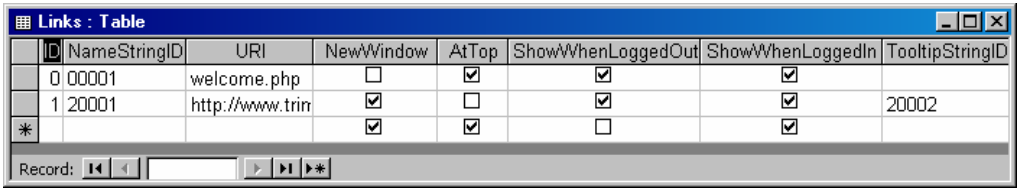
As a rule, you can change the color definition for texts and background at the web pages using the *Layout* table of the config.mdb. Values are hex-codes of RGB colors in the #RRGGBB format like in the HTML color description. #RRGGBB stands for values in red, green and blue. For example, #000000 is black, #FF0000 is 100% red, #FF8000 is 100% red and 50% green resulting in orange, and #FFFFFF is white.

***Note**: The general.css style sheet defines the layout for the RINEX Shop. It is located at <GPSWeb install Dir>\wwwroot\shop\ folder. If you offer a RINEX Shop at your website, make sure to use the same background color definition in the style sheet as for the BGColor value.*



Links table

The *Links* table lets you define the GPSWeb start page and the navigation area. By default, the table contains a link to the default GPSWeb start page (welcome.php) and a link to the Trimble homepage. Use the table to customize existing links, to add new ones or to delete links from the navigation bar. For a description of its contents, see Table 6.2.



Note *– Make sure that the top row (the row with the lowest ID number) contains the path to the GPSWeb start page as this page is automatically loaded the first time a user visits the website. Use this row to change the start page or its link on the navigation bar. See the section on the homepage in Chapter 3, Web Server General Concept.*

Table 6.2 Columns in the Links table

Service ID (Services table)	Contents from	Description
ID	System administrator	Unique hyperlink identification. The first link (the link with the lowest ID) will be automatically loaded on startup. Links follow each other in the order or the ID.
NameStringID	*StringTable* / System administrator	Drop-down list containing the ID of a localized string. This string previously must be defined in the *StringTable* table. It is displayed as the text of the link on the web page.
URI	System administrator	Relative or absolute path and name of the target file or web page the hyperlink points to.
NewWindow	System administrator	Check box. If selected, the target will open in a new window. Otherwise, it will open in the client area of the current page. Should not be selected for the start page URI.
AtTop	System administrator	Check box. If selected, the link will be shown at the top of the navigation bar (above the internal links). Otherwise, the link will be shown at the bottom (below the internal links), but above the Logout link.
ShowWhenLoggedOut	System administrator	Check box. If selected, the link to the target file shows up in the navigation bar, when users are ***logged out***.
ShowWhenLoggedIn	System administrator	Check box. If selected, the link to the target file shows up in the navigation bar, when users are ***logged in***.
TooltipStringID	*StringTable* / System administrator	Drop-down list containing the ID of a localized string which previously must be defined in the *StringTable* table. This string appears as tooltip, if user moves the mouse cursor over the link.

To make hyperlinks visible at the user's navigation bar, some text is required. To allow the selection of text strings in drop-down lists the config.mdb contains a link to the *StringTable* table of the resource.mdb. Changes done in the table using the link are

automatically saved in the origin, that is, the resource.mdb. Remember, GPSWeb automatically respects the user's language selection.

Note *– If you have added new language columns to the* StringTable *table, make sure that the drop-down lists also display the additional columns. For more instructions, refer to the Microsoft Access Help.*

NetworkImageMap table

Use the *NetworkImageMap* table if you want to define a clickable image map which overlays the GPSWeb network image with hyperlinks. The table is used in combination with the Map of Stations and the RINEX Shop services. Each row defines the location and shape of an image area, which allows clicking onto the map. What happens then depends on the service. In the case of the Map of Station service, a hyperlink to the specified URI opens a new web page, with the RINEX Shop service, clicking an area selects a reference station. For a detailed description of the *NetworkImageMap* table contents, see Table 6.3.

NetworkImageMap : Table

	ID	Coordinates	Shape	StationName	URI	Target	TooltipText
	1	260,363,10	circle	Hoehenkirchen	hoehinfo.html	_blank	Höhenkirchen
	2	269,347,348,358	rect	Hoehenkirchen	hoehinfo.html	_blank	Höhenkirchen
	3	248,259,10	circle	Neufahrn	neufinfo.html		Neufahrn
▶	4	257,243,309,254	rect	Neufahrn	neufinfo.html		Neufahrn
*	0		rect				

Record: 4 of 4

Version table

The *Version* table serves solely for information on the current database version. You should not edit the table, since any user change will be rejected with the next database update. Only Trimble will update the table, if the database has changed substantially with a new version. The *Version* table contains information on the update time, the database version and the GPSNet version, to which the database

belongs. A Comment field informs on the respective changes to the database.

Table 6.3 Columns in the NetworkImageMap table

Column	Contents from	Description
ID	System administrator	Unique identification of the defined image area. Auto numbered.
Coordinates	System administrator	Coordinates to define the location of the defined image area on the map. Unit: pixel. Origin (0,0) in the upper left corner of the graphic file. Coordinates are separated by commas. For rectangles: x,y coordinates of the upper left and the lower right corner; For circles: x,y coordinates of the center, followed by the radius. For polygons: unlimited number of x,y coordinate pairs for each point.
Shape	System administrator	Shape of the defined image area. Rectangle, circle or polygon. System administrator edits arbitrary text or selects from predefined shapes: – rectangle (rect) – circle – polygon (poly). Note: The allowed values here and in the Coordinates column are the same as in the HTML tag <area>.
StationName	System administrator / RINEX file marker name	Applies to RINEX Shop only. Associates the reference station name to the defined image area. System administrator enters the marker name exactly as it is used in the RINEX observation file header. If the field is empty, the row isn't used in the RINEX Shop network map.

Column	Contents from	Description
URI	System administrator	Applies to Map of Stations service only. For example: Filename of the target the hyperlink points to; relative or absolute path may be added. If the field is empty, no hyperlink is created at the map.
Target	System administrator	Target window or frame, in which the URI will be displayed. System administrator edits arbitrary text or selects from predefined target: – Leave empty to replace the current frame (the map view). – new window (_blank) – replace current window (_top).
TooltipText	System administrator	Text displayed as tooltip, if the mouse cursor hovers over a defined image area.

Resource.mdb

The resource.mdb database contains the *Version* table (used just for version history, compare Section Version table) and the *StringTable* table. It is used for all localized text strings that appear at the website. Editing and extending the *StringTable* table lets you

- Translate the texts into any language.
- Change the contents of any page of your website by editing existing text strings, or adding new strings, if you change the respective PHP script.

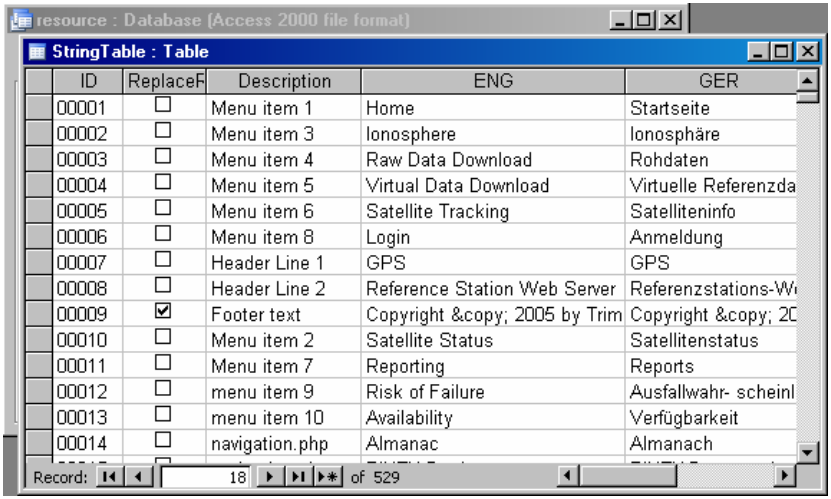
Warning – Trimble does ***not*** recommend changing the PHP scripts (with the possible exception of the welcome.php), since later updates of the software will automatically overwrite the existing scripts and manual merging of the changes would be very difficult.

The *StringTable* table contains 5 columns by default:

- The *ID* of the text string must be unique and should not be modified. If the ID is a number, it has 5 digits, for example 00001, 00245, 10031. If the ID is a string itself (which is true for all new IDs, for the RINEX Shop), it is, by default, composed following the rule: <website component>_ <web page>_<category>_<Characteristic StringName>. Possible categories are, for example, BTN (button), TXT (normal text), TOOLTIP (tool tip text).
- The *ReplaceRow* column is a flag defining how the content of this record is handled during a database update. Generally, the check box is cleared, and all user-defined entries are kept during database update. If, however, the update process detects that the *ReplaceRow* flag is selected for a row, the default columns of this row will be overwritten, even if user-defined entries exist. The flag only marks the content of the default language columns. User-added languages are not touched.
- The text in *Description* is purely informational. It helps you to find the calling PHP script or provides additional information.
- The following columns define the localized text string, where *ENG* contains English strings and *GER* the German ones. Strings may be pure text strings, but may also contain parameters (see Section Format of the string contents in resource.mdb) which are inserted dynamically at the moment the web page is displayed, such as numbers. They may also contain HTML code, like <b>.

Tip – If the GPSWeb installation overwrites a record, the check box of the *ReplaceRow* value is selected. If you have added a new language, the old translation for this language will still be available, until you change the translation, too.

Trimble recommends that you use string IDs between 20000 and 29999, when you add your own text strings to the table.



To display (or to perform any other action with) a text string, the PHP script interpreter identifies the ID in the *StringTable* table.

Tip – If your GPSWeb installation uses different or more than the default languages, make sure to add, after an update of your GPSWeb installation, missing translations to new strings. You can use the Access Queries function to search the *StringTable* table for new strings with missing entries.

Format of the string contents in resource.mdb

The localized strings themselves should contain at most one line or paragraph, no line breaks (that means, no CR/LF characters).
They may contain HTML code like or ". Actually, special characters which have a special meaning in HTML must not be used and have to be replaced by their HTML equivalents. For example:

- ampersand symbol (&) &
- double-quotes (") "
- less-than (<) <

- greater-than (>) >
- line breaks (CR/LF)

Strings may contain parameters which are inserted dynamically at the moment the web page is displayed, such as numbers. These parameters are written as %s in the string. There may be no more %s in the string than there are actual parameters for that string.

If there are multiple parameters and they should be swapped, for example, because a translation in a different language requires putting some words in a different order, write %1$s, %2$s, %3$s instead of 3 times %s.

Normal percent signs (%) in parameterized strings must be doubled, that means written as %%.

An exception to the parameterized strings are the strings used for the subject and the body of an e-mail (OLS_MAIL_*). Because of the high number of variables, named tokens are used instead of %s. See the valid tokens in Table 6.4, which will be replaced by their runtime values.

Table 6.4 Tokens for e-mail strings and their meaning

Token	Meaning
%Username%	User name of the user receiving the mail
%Date%	Creation date of the order
%Time%	Creation time of the order
%URI%	URI of the GPSWeb server, set in config.mdb
%RINEXShop%	Title of the RINEX Shop web page, set in the resource.mdb in COMMON_RINEX_Shop
%Order%	User-relative order number
%AdminName%	Name of the web server administrator, as set in config.mdb

Another exception with e-mail strings is that here no <br /> should be used for line breaks. Instead \n should be used here.

Strings where a part of the ID is DATE_FMT or TIME_FMT are special format strings used for localizing date and time. Besides normal text and HTML code, there is a bunch of format specifiers allowed. See the examples in Table 6.5.

Table 6.5 Date and time formats

Token	Meaning
%d	Day of the month as decimal number (01 to 31)
%m	Month as a decimal number (01 to 12)
%y	Year as a decimal number without a century (00 to 99)
%H	Hour as a decimal number using a 24-hour clock (00 to 23)
%I	Hour as a decimal number using a 12-hour clock (01 to 12)
%M	Minute as a decimal number
%S	Second as a decimal number

See www.php.net/manual/function.strftime.php for a complete list.

Users.mdb

The users.mdb database contains six tables that are closely connected with each other.

- *Groups*
- *Passwd*
- *AccessPrivileges*
- *Registration*
- *Services*
- *Users*

When a new user is added to the *Passwd* and *User* tables, the user will be assigned to a group. All members of a group get the same privileges; that means they have access to the same services. Several

groups are predefined and services are assigned to them; however, you can change both at any time.

Registration table

The *Registration* table is used for temporary entries. It is automatically filled in when users submit the registration form on the start page. Use this information to add new users to the *Passwd* and *Users* tables.

Passwd table

Use this table for user identification. The *UserID* is used at many other locations, for example to assign the user to a group (which in turn assigns services to group members), for accounting, for RINEX Shop. See Table 6.6.

This table lets you administrate access rights for multiple tasks:

- ***The web server system acts as a user*** under the default name "Webserver". Only the user "Webserver" has the access right to the iGate module.
- ***For customer identification***, for example if customers are to be charged for using web server services, the users.mdb must contain information on the users' identities and access rights.
- ***If you run the Trimble NTRIP Caster software*** and offer mount points to reference station receivers communicating using the Ntrip 1.0 protocol (mount points of the NtripServer type), you must provide each mount point as a registered user. Make sure, no passwords are provided, since the receivers encrypt the passwords in their Ntrip message. If your Password table requests a password, you can edit the table properties: Select the *View / Design View* command.

The *Enable* field allows disabling registered users from accessing the services. For example, if the payment of bills is delayed and you want

to exclude a specific customer temporarily from service access, the system administrator removes the selection from the *Enable* field.

Table 6.6 Columns in the Passwd table

Column	Contents from	Description
UserID	Auto numbered	Unique user identification.
Username	System administrator	Short user name that is used for logon. Must be unique.
Password	System administrator	Password that is used for logon. Case sensitive.
Enable	System administrator / TryCount	Is user allowed to logon? Selected = yes Not selected = no. Will be set to *no* automatically, if the user failed to enter the correct password for 3 times.
TryCount	Logon Service	Counts how often a user has tried to enter a password and has failed. Maximum: 3 times.
Group	*Groups* table / System administrator	Drop-down list. System administrator selects from the groups.
MaxNtrip-Conn	System administrator	For NtripClients only: Maximum number of simultaneously allowed connections for this user. 0 = unlimited simultaneous connections 1 = one connection allowed (default) ≥2 = match the number of allowed connections. Not required. If this field is empty, the system uses the default value.

In combination with the *TryCount* field, customers can also be disabled automatically, thus preventing hacks. After the third attempt to log in with an erroneous password for the user, the *Enable* field is automatically set to not selected. If this happens, only the system

administrator can manually re-enable the user and reset the *TryCount* number to zero.

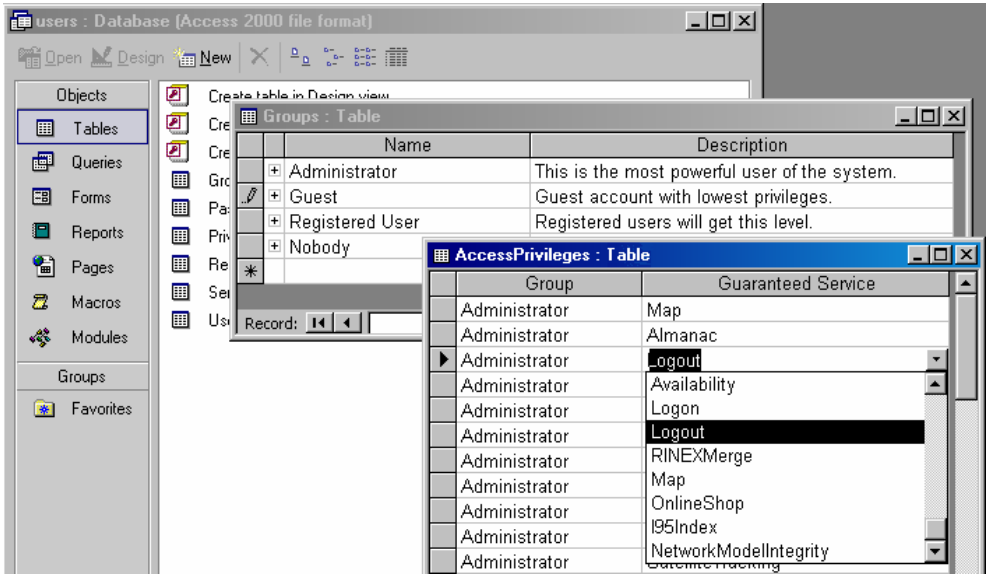
Users table

The *Users* table assigns postal addresses, phone numbers, e-mail and addresses to the users. The *UserID* field is a selection field whose content is fed in by the *Passwd* table. All other fields are editable fields.

Groups table

All users are members of a specific group. The *Groups* table lets you define group names and add a short description to the name. Several groups are predefined; you can delete them or add new groups. This table is used in combination with the *AccessPrivileges* table, where rights are assigned to the groups.

AccessPrivileges table

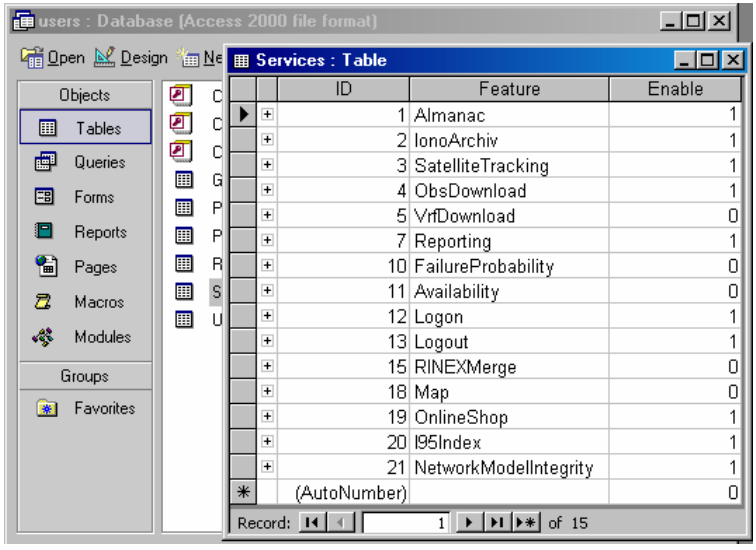


This is the table, where you assign to the group members the right to access specific services. All groups defined in the *Groups* table are available as selection in the *Group* field. The *Guaranteed Service* fields let you select from all Services, whether enabled or not. Services are defined in the *Services* table. Each row assigns one service to one group.

Services table

Use the *Services* table to add new services and to enable the services for display at the website. Disabled services will not be displayed. For detailed information on the default services see Chapter 5, Services.

By default, the table lists all services that are available using the default PHP scripts. You may add others manually. The *ID* fields are numbered automatically. The *Feature* fields are edit fields. See Table 6.7.



The Ntrip service lets you charge users for data streams, if the streaming source is known at the database. At the iGate module side, the streaming source is identified by the *Mount Point* (see Chapter 4, Trimble GPServer, Section iGate). In the *Services* table, enter the

Mount Point as a new service in the *Feature* field and set the Enable status to 1 (enabled). Make sure that the entries at both sides are identical.

Table 6.7 Columns in the Services table

Column	Contents from	Description
ID	Auto numbered	Unique Service identification.
Feature	System administrator	Service name. Must not be changed.
Enable	System administrator	Is service enabled, for example, for the display at the website's navigation bar? 0 = no 1 = yes.

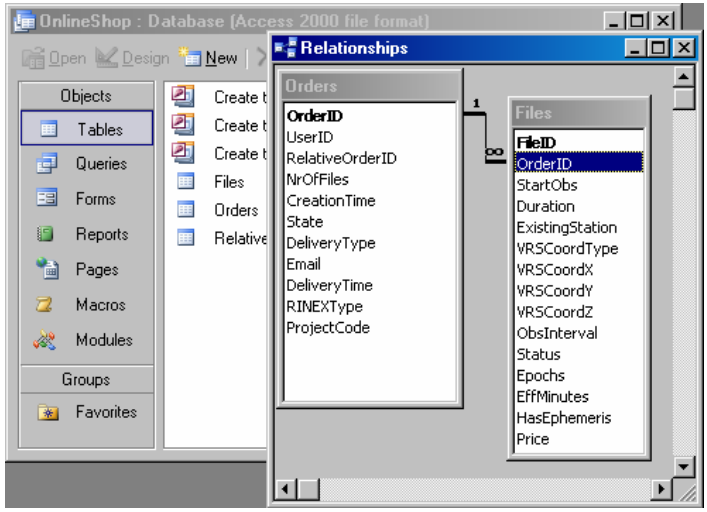
Warning – Do not delete or rename the default services In this case, the scripts would not find the service and correct function is not guaranteed.

Onlineshop.mdb

The onlineshop.mdb database contains two tables that are used for the RINEX Shop.

- *Orders*
- *Files*
- *RelativeOrderID*

See the database's *Relationships* view for connections between the tables. *OrderID* and *FileID* are unique and autonumbered values.



The *Orders* and the *Files* tables are growing considerably with user actions. GPSWeb lets you reduce the size of the tables automatically. By default, all orders older than 90 days and their related file requests are deleted automatically. To increase or decrease that value, go to the config.mdb / *Configuration* table and edit the DaysToKeepDBEntries entry. Make sure, that this value is considerably larger than the Disk Watch maximum age setting at the GPServer computer, thus allowing accounting after the last possible download. See Chapter 5, Section RINEX Shop.

Warning – The ***automatic data deletion is irreversible***.
For accounting purposes make sure to previously finish your accounting tasks or to store the data at another location. Alternatively, you may also consider setting the DaysToKeepDBEntries entry to 0, thus disabling the automatic data deletion.

Orders table

The *Orders* table assigns orders to users. It is filled in automatically, if customers create an order.

The unique OrderID identifies an order. One order can have multiple files. Order IDs must be unique in the GPSWeb system. On the other side, users want to see continuously increasing order numbers. Therefore, there must be two sets of order numbers – the internal one (OrderID) and the user-related one (RelativeOrderID) – whose relation must be well-defined; see Table 6.8 and Section RelativeOrderIDs table.

One or more file requests are associated to each order. To quickly view the ID of the related files to an order (when using a Microsoft® Access® data base), click the plus-shaped button left of its OrderID. Thus you will see a detail of the *Files* table, just displaying the related files.

Table 6.8 Columns in the Orders table

Column	Contents from	Description
OrderID	Auto numbered	Unique order identifier created automatically each time an order is created by a user.
UserID	Users.mdb / *Passwd* / *UserID*	User identification.
Relative OrderID	Orders.mdb / *Relative OrderID*	When a new order is created, this value is taken from the user-related NextRelOrderID entry. This ID appears on the RINEX Shop website.
NrOfFiles	Orders.mdb / *Files*	Number of file requests placed for the order.
CreationTime	Server clock	Date and time the order was submitted
State	RINEX Shop Service	The current state of the order: 1 = user can still edit and modify 2 = the order is in run mode (data being generated) 3 = order is successfully finished 4 = order is finished, but errors occurred.

Column	Contents from	Description
DeliveryType	RINEX Shop Service	Mode of data delivery: 0 = HTTP download 1 = e-mail, all files at once. 2 = multiple e-mails, one for each RINEX file/station.
E-mail	Entered by user	E-mail address for data delivery or notification.
DeliveryTime	Server clock	Date and time the order was deliverd to the user, either by e-mail or by user HTTP download.
RINEXType	RINEX Shop Service	Type of RINEX data requested: 1 = RINEX 2 = Compact RINEX (Hatanaka)
ProjectCode	Entered by user	Optional project code that can be used for accounting.

Files table

The *Files* table is filled in automatically, if customers are logged on and request data for an order. It subsumes all file-related information nedded for user accounting.

Table 6.9 Columns in the Files table

Column	Contents from	Description
FileID	Auto numbered	Unique file identifier, created automatically when user adds files to an order.
OrderID	Orders.mdb / Orders / OrderID	Each file belongs to a particular order. This field assigns the file to the order.
StartObs	Entered by user	Start date and time of observation period.
Duration	Entered by user	Period, for which data was requested. In seconds.

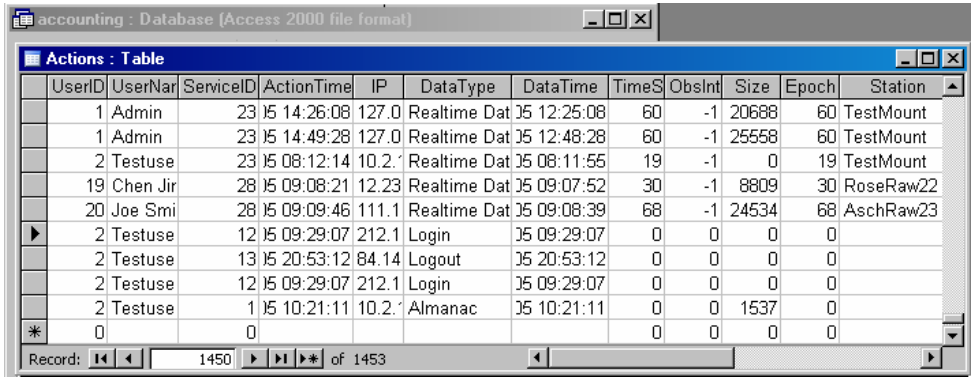
Column	Contents from	Description
Existing Station	Entered by user	Reference station (CORS) name. Empty for virtual reference data.
VRSCoord Type	Entered by user	Only for VRS data: Type of coordinates: 0 = geographical coordinates (radiant) 1 = Cartesian coordinates (in meters)
VRSCoordX	Entered by user	Radiant of latitude or X coordinate. (Only used for virtual files)
VRSCoordY	Entered by user	Radiant of longitude or Y coordinate. (Only used for virtual files)
VRSCoordZ	Entered by user	Elevation in meters or Z coordinate. (Only used for virtual files)
ObsInterval	Entered by user	Requested observation interval in seconds.
Status	iGate	Status info: Status of file request, where 0 = not started, 100 = successfully finished. A value less than zero indicates an error.
Epochs	iGate	Status info: Available number of epochs in generated file.
EffMinutes	iGate	Status info:Number of effective (that is accounted) minutes.
HasEphem-eris	Entered by user	Yes = Ephemeris was requested for the file No = Ephemeris was not requested.
Price	RINEX Shop Service	Price for this file, respecting missing epochs. The price results from the price settings in the config.mdb (including the currency) and the effective minutes or epochs. A price of 0.0 indictes that no RINEX file could be generated, for example, because no data are available for the requested observation period, or that accounting is deactivated. Is empty, if the price is not yet calculated.

RelativeOrderIDs table

The *RelativeOrderIDs* table is filled in automatically, if customers are logged on and generate a new order. It provides for each registered user (*UserID* column) a number for the next relative OrderID (see *Orders* table). The value in NextRelOrderID, therefore, is always the value of the last RelOrderID +1.

Accounting.mdb

The accounting.mdb data base contains the *Actions* and the *Version* tables. The *Actions* table is automatically filled in if customers are logged on and download data of any kind, with exception of the RINEX Shop. Your system administrator uses this information to account for other services. It is used in combination with users.mdb.


accounting : Database (Access 2000 file format)

Actions : Table

UserID	UserNar	ServiceID	ActionTime	IP	DataType	DataTime	TimeS	ObsInt	Size	Epoch	Station
1	Admin	23	)5 14:26:08	127.0	Realtime Dat	)5 12:25:08	60	-1	20688	60	TestMount
1	Admin	23	)5 14:49:28	127.0	Realtime Dat	)5 12:48:28	60	-1	25558	60	TestMount
2	Testuse	23	)5 08:12:14	10.2.'	Realtime Dat	)5 08:11:55	19	-1	0	19	TestMount
19	Chen Jir	28	)5 09:08:21	12.23	Realtime Dat	)5 09:07:52	30	-1	8809	30	RoseRaw22
20	Joe Smi	28	)5 09:09:46	111.1	Realtime Dat	)5 09:08:39	68	-1	24534	68	AschRaw23
2	Testuse	12	)5 09:29:07	212.1	Login	)5 09:29:07	0	0	0	0	
2	Testuse	13	)5 20:53:12	84.14	Logout	)5 20:53:12	0	0	0	0	
2	Testuse	12	)5 09:29:07	212.1	Login	)5 09:29:07	0	0	0	0	
2	Testuse	1	)5 10:21:11	10.2.'	Almanac	)5 10:21:11	0	0	1537	0	
0		0					0	0	0	0	

Record: 1450 of 1453

When users access requested data, an entry is written into the *Actions* table. The system administrator or operator can do any type of query for the entries, most typical for billing purposes.

Note - *This table will grow considerably, the more users you have and the more actions are performed. Consider backups of the table in predefined periods.*

For the description of the *Actions* table columns, see Table 6.10.

Table 6.10 Columns in the Actions table

Column	Contents from	Description
UserID	Users.mdb / *Passwd* / *UserID*	User identification
UserName	Users.mdb / *Passwd* / *Username*	User name
ServiceID	Users.mdb / *Services* / *ID*	Selected service (type of data)
ActionTime	Server clock	Date and time of access to service. Local time
IP	HTTP data stream	The user's IP address
DataType	Data generating module	Type of action or type of data requested.
DataTime	Service host clock	Date and time of requested data. GPS time
TimeSpan	Service host clock	Period, for which data was generated.
ObsInterval	~	Not used anymore
Size	Server	Size of generated / downloaded file (bytes).
Epochs	Services	Number of epochs, for which data was generated.
Station	Entered by user	Reference station name. If virtual reference data was generated, the entry is *Virtual*.

Abbreviations

This section explains some of the terms and abbreviations used in this manual.

ACU	Attachable Control Unit
CGI	Common Gateway Interface
CU	Control Unit
DB	Database
DGPS	Differential GPS
DSN	Data Source Names (System DSN, User DSN)
FTP	File Transfer Protocol
GGA	Global Position System Fix Data
GNSS	Global Navigation Satellite Systems
GPRS	General Packet Radio Service
GPS	Global Positioning System
GSM	Global System for Mobile communication
HTML	HyperText Markup Language
HTTP	HyperText Transfer Protocol

IANA	Internet Assigned Numbers Authority
ID	Identification
IIS	Microsoft Internet Information Services
IE	Microsoft Internet Explorer
IP	Internet Protocol
ISO	International Standardization Organization
LAN	Local Area Network
NMEA	National Marine Electronics Association
Ntrip	Network Transport of RTCM via Internet Protocol. An open, non-proprietary protocol by the German Federal Agency for Cartography and Geodesy (BKG)
OBS	Trimble Terrasat's Observation File Format
ODBC	Open Database Connectivity
PDA	Personal Digital Assistant
PDF	Portable Document Format.
PHP	PHP HyperText Preprocessor (recursive acronym)
PRN	Pseudo Random Noise, identifies the satellite
RINEX	Receiver Independent Exchange Format
RTCM	Radio Technical Commission For Maritime Services
RTCM Protocol	Internationally standardized data format for the broadcast of corrective data for DGPS
RTK	Real-Time Kinematic

SMTP	Simple Mail Transfer Protocol
SQL	Structured Query Language
TAM	Terrasat Application Model
TCP/IP	Transfer Control Protocol/Internet Protocol
TOW	Time of Week
UMTS	Universal Mobile Telecommunication Service
URA	User Range Accuracy
URI	Uniform Resource Identifier
USB	Universal Serial Bus
UTC	Universal Time Coordinated (world time)
VRS	Virtual Reference Station
WAN	Wide Area Network

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