



REPEATIT

RS/3 RADIO CONTROL SOFTWARE

User manual

Version 2.6

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1. Introduction

1.1 About RS/3 Radio Control Software

An RS/3 (Repeatit System 3) network usually consists of at least three parts: One or more RS/3 Base stations, RS/3 Client terminals and the RS/3 Radio Control Software (RCS). The RS/3 RCS is developed by Repeatit in order to administrate and configure base stations, terminals, clients and system users in the RS/3 system. This document is a detailed manual for the RCS and it describes how the different parts in the RS/3 system are interconnected.

The RS/3 system comes in two versions, the basic version that is available for free when buying Repeatit hardware, and the professional version that requires a yearly license fee. The RS/3 system is constantly under development, and new versions of the RCS are introduced regularly. New functions are added, and existing functions are subject to change.

1.1.1 Specifications

The parameters below describe the platform that the RS/3 Radio Control Software is built upon:

- Windows 2000/XP/Vista or Linux on AMD/Intel
- MySQL database server
- Java^(TM) 2 Platform, Standard Edition v1.6
- Apache Tomcat 5.5

To ensure communication between the RCS and the RS/3 Base stations, the base stations must be able to connect to the RCS on *TCP port 9999*¹ or 9998 for encrypted connections. Having the BS initiate the connection allows management of base stations located behind a NAT-router.

To be able to run RS/3 Radio Control Software without difficulties, Repeatit recommends the following minimum performance of the server²:

For a small network, 10-20 Bases and 50-100 clients:

- PC/Server
- Pentium 4
- 1 GB RAM or more
- 2 GB free hard drive space

Large networks demands significantly more of the server.

The RCS web interface must be viewed in recent web-browser. A resolution of 1280 x 1024 or higher is recommended.

¹ Configurable

² Requirements on the hardware might change with future versions of the RS/3 RCS

2. System presentation

Figure 1: System overview shows a typical configuration of an RS/3 system.

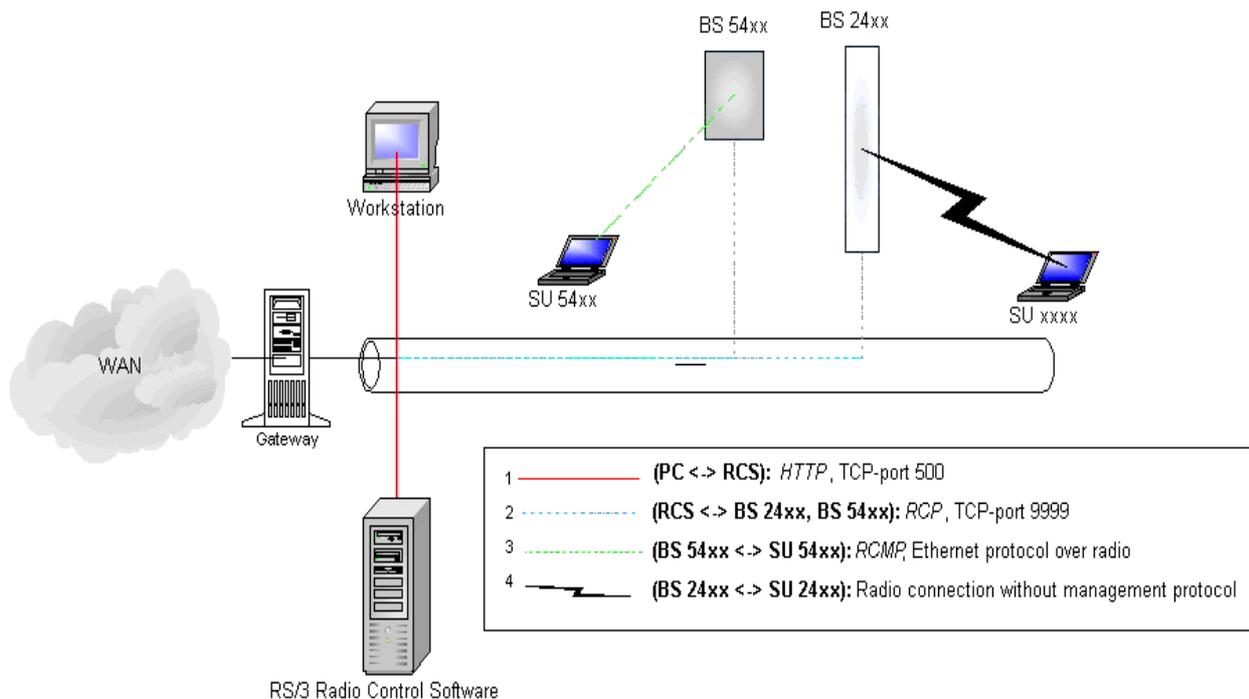


Figure 1: System overview

The RS/3 base station and the RCS are both connected to the operator's backbone through Ethernet connections. The RS/3 Client terminals are connected to the base stations over radio.

The communication between the management system (the RCS) and the base stations is based on a TCP-protocol called Radio Control Protocol (RCP), TCP port 9999, marked with a blue dotted line in Figure 1: System overview. A system user who wants to log on to the RCS server can do so through the web interface (usually TCP port 500), marked with a red line in the same figure.

The RCS can remotely administer clients through a protocol for communication between base stations and clients, RCMP. Features include; gathering statistics, remote upgrading and link quality reports.

Since the management server is web based, it is possible to connect from any computer with Internet Explorer.

The computer can be located in the operator's backbone, or on the Internet, depending on the operator's backbone configuration. An explanation of how you log on and operate the management server is given in further detail later in this manual.

3. Basic information

3.1 Abbreviations and acronyms

Abbreviations and acronyms that occur in the manual

RS/3	Repeatit System 3
RCS	Radio Control Software
Sync	Synchronization
CT	Client Terminal
BS	Base Station
Sector/WLAN	A radio interface
Standard BS	Base station that is only used for point-to-multipoint connections, i.e. to connect client terminals.
Master BS	Base station that has one or more slave base stations connected to one or several of its interfaces.
Slave BS	Base station that functions as a repeater. A slave base station connects to a master base station to gain network access.
RCP	RCP (Radio Control Protocol) is our protocol for communication between base stations and RCS.
RCMP	Is our protocol for communication with clients

3.2 Login

Since the RS/3 Radio Control Software supports browser login, the window below (Figure 2: Log in window) will appear when a user tries to log on to the management system. Type the user name and password. Default user name is *sysadm* and default password is *sadm999x*.



Figure 2: Log in window

3.3 Icons, colours and flags

	Network
	2400-series base station
	5400-series base station
	Radio interface
	Client terminal
	Client terminal user
	System user
	Trinity unit
	Client interface
	Remote Trinity unit

Table 1: Icons that appear in the RCS. The color of the icon indicates the current status.

	Ok / Online / Connected
	Failure / Offline / Not connected
	Warning
	Unknown status / Offline / Not connected

Table 2: The colours used to describe the status of an object.

	Updated information.
	Synchronization in progress
	Marked for synchronization
	Synchronization failed

Table 3: Flags showing additional object information.

3.4 Events & notes



Figure 3: Events & notes field

For most objects in the RCS (base stations, interfaces, client terminals etc.), an option to add a note is presented. This option can be used freely for any purpose. For example – if a system user is in contact with a client terminal user that needed help with troubleshooting, he might want to share that information with other system users. The system user then adds a note that will be visible to all system users that views the specific client terminal user.

4. The RCS View

4.1 The Menu field, the Status field and the Information field

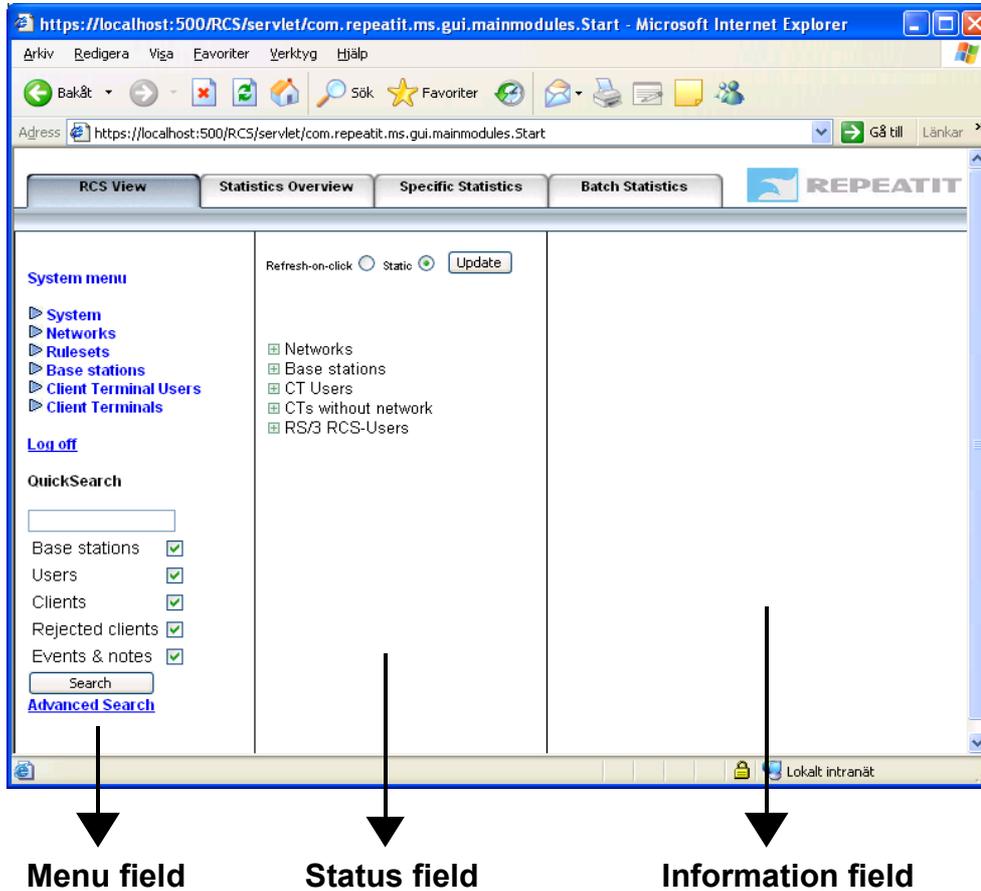


Figure 4: The different RCS fields

4.1.1 The Menu field

The *Menu field* (Figure 4) provides various functions such as adding/deleting users, terminals and base stations to the network. It is also possible to create or configure different rule sets (e.g. firewall rule sets, VLAN rule sets, encryption rule sets) in the *Menu field*. This field is described in further detail in Chapter 5.

4.2 The Status field

The *Status field* gives an overview of the status in the RS/3 network and provides the possibility to get a quick configuration overview. By clicking on an object in the *Status field*, the configuration of that object is shown in the *Information field*. If the “Refresh-on-click” option is selected at the top of the frame, the object information in the *Status field* is updated when a branch is collapsed/expanded by clicking the plus/minus sign. If the “Static” option is selected, the information is updated when the “Update”-button is clicked.

For more information about the sections in the status field, see chapter 7.

4.2.1 The Information field

In the *Information field*, the information or configuration of a specific object is shown. This is where configuration changes for base stations WLANs, clients etc. are made.

5. Tasks and options in the menu field

In this section, the different features in the System menu (the Menu field) are described.

5.1 System

5.1.1 System settings

When clicking *System Settings*, the *Information field* displays information about the following:

System information: RCS, Java and MySQL version numbers and configuration settings are displayed.

Synchronization: The time all flagged base stations will be synchronized (for more information about this, see Section 5.4.1). You can also choose to automatically remove any clients without an associated user after a predefined number of days without activity.

Radio Control Protocol: The TCP port RCS listens to for communication with the base stations.

Statistics: How often the RCS will fetch statistics from the base stations. And what time the daily statistics accumulation procedure should run (night time is recommended). The statistics accumulation reduces the footprint of the statistics database by reducing the resolution for older statistics. This compression is now optional but beware of the significant increase in database size.

License key: A valid license key is needed to use the full professional version of the RCS. This field gives information about the current license key. When the RCS is running in basic mode some features will be disabled. The license key consists of both the “Licensed to” and the “License Key” fields, make sure both are exactly as written in the key information you get from Repeatit.

Alarm settings: The RCS can send email alerts for certain events in the system, e.g. if a base is disconnected too long.

Mail (SMTP) settings: Configure email settings, e.g. for alarms.

5.1.2 Database maintenance

When clicking *Database maintenance*, the *Information field* provides access to the following:

Database information: Database version and some statistics.

Schedule regular backups: The RCS can make daily backups, these are kept daily for one week then weekly for a month and monthly there after.

Create database backup: Make a backup of the database.

Database backups: A list of backups of the RCS database. NB! These backups are kept on the same system as the RCS (and on windows versions will be purged when the RCS is upgraded).

Table status: Troubleshooting information.

5.1.3 Add new RS/3 RCS user

Here, a new RCS user can be added. For information of how to configure an RCS user see chapter 6.6.

System menu

- ▼ System
 - [System settings](#)
 - [Database maintenance](#)
 - [Add new RS/3 RCS User](#)
 - [Show system log](#)
 - [Remote logging](#)
- ▶ Networks
- ▶ Rulesets
- ▶ Base stations
- ▶ Client Terminal Users
- ▶ Client Terminals
- ▶ About

5.1.4 Show system log

Show the contents of the system log file. The system log mainly contains system level information and alerts.

5.1.5 Remote logging

Configure logging to a remote Syslog server. Parameters are the same as Syslog uses. Log-messages are the same as is placed in the System and BS logs.

5.2 Networks

In order to give users permission to connect to specific base stations and radio interfaces, the base stations and radio interfaces are grouped into networks. The client terminals are then registered as members of the different networks. The *Define networks* option lets the system user view, add, change or delete a network.

5.2.1 Define networks

Usually, one or more base stations are clustered into a logical network. A network can be a part of a bigger network, and a network can have other networks as members.

Name: The name of the network.

Clients: The number of client terminals belonging to the network.

Modified: The time the network was last modified.

Action: Press "Delete" in order to remove a network. **Note:** this action will implicitly disable all terminals belonging to the network since they no longer will be connected to an existing network. To avoid this type of problem, the terminals belonging to a network should be moved to another network before the network is removed.

Click on the network name to make changes to the network or on *New Network* to add one, see chapter 6.1 for information of how to configure a network.

5.3 Rule sets

Rule sets provide a central place to define settings that should be the same on several different base stations and/or clients.

5.3.1 VLAN rule sets

Define VLAN

"Define VLANs" allows the user to add, remove and edit Virtual LANs that are registered in the database. A VLAN can be part of a VLAN rule set or be the "Native VLAN" for a base station. A VLAN is defined by a VLAN tag and a short description. "Native VLAN" defines which VLAN the base station network interface is located on (for further information, see the base station manual).

When a base station boots up and has a preconfigured VLAN as its "Native VLAN", this will automatically be entered in the RCS database with the name VLAN <VLAN-tag>. A Virtual LAN cannot be removed if it is a "Native VLAN" at any base station or if it is part of a VLAN rule set. The pre-defined VLAN "Untagged" cannot be removed either.

System menu

- ▶ System
- ▶ Networks
- ▼ Rulesets
 - [VLAN rulesets](#)
 - [Firewall rulesets](#)
 - [WEP rulesets](#)
 - [WPA rulesets](#)
 - [Bandwidth rulesets](#)
 - [SSID rulesets](#)
- ▶ Base stations
- ▶ Client Terminal Users
- ▶ Client Terminals

Add new rule set

“VLAN rule sets” allows the user to add, edit and remove registered VLAN rule sets. The rules in a VLAN rule set are applied to terminals where the VLAN rule set has been selected. A VLAN rule set can be set as a default rule set for a base station. This will make all terminals that have “BS-default” in the VLAN settings part of their configuration to use the base stations default VLAN rule set settings.

The parameters that can be set are:

Name: A short name that describes the rule set.

Set as default: When this checkbox is selected, the rule set will be the default rule set for all new base stations. Any terminals connecting to a base station that has “BS-default” as the default VLAN rule set, will get the default base station VLAN rule set.

Terminated VLAN: This indicates if the base station should remove the VLAN ID, from the Ethernet header, before transmitting the packet over the radio interface to the client terminal. This VLAN ID will correspondingly be added to the Ethernet header when packets are received from the client terminal. It also indicates that it will not accept any packets from the client terminal if the packets are tagged with the specific VLAN ID. To not terminate any VLAN, select the “None” option.

Description: a description of the rule set.

Pass through all VLANs: if checked the base station will bridge all virtual LANs.

Pass through specific VLAN: The base station will send the packets containing the VLAN tag to the clients unchanged. It will also accept tagged packets and bridge them to their destination (if the VLAN is defined in any of the VLAN rule sets).

Define VLAN rulesets

Name	Example
Set as default	<input type="checkbox"/>
Terminated VLAN	None
Description	[Enter description]
Pass through all VLANs	<input type="checkbox"/>
The "pass through all VLANs"-option is only effective on 5400-Series base stations with version 1.2.7.0 or higher.	
Pass through specific VLANs	
<input checked="" type="checkbox"/> data (11)	
<input type="checkbox"/> juju (2)	
<input type="checkbox"/> mgmt (10)	
Save	Back

Figure 5: Defining a VLAN rule set

Define firewall rulesets

Firewall ruleset settings	
Name	Example
Set as default	<input type="checkbox"/>
Description	
Allows two subnets. Some restrictions	
Allow inter-client communication: <input checked="" type="checkbox"/>	
Allow web servers: <input checked="" type="checkbox"/>	Allow FTP servers: <input checked="" type="checkbox"/>
Allow DHCP servers: <input checked="" type="checkbox"/>	Allow Netbios: <input type="checkbox"/>

Allowed subnets

192.168.0.1	/255.255.255.0	
Add new		

Allowed to connect to basestation

192.168.0.100	/255.255.255.255	
Add new		

Additional port rules

412	tcp	out	deny	
Add new				

Allowed Ethernet protocols

800,806	
Save	Back

Figure 6: Defining a Firewall rule set

Allow Web Servers: if checked, clients can set up their own Web servers. If not, port 80 and 443 are closed.

Allow FTP Servers: if checked, clients can set up their own FTP servers. . If not, port 21 is closed.

Allow NETBIOS: if checked, NETBIOS traffic is allowed. If not, ports 135-139, 445 and 512 are closed.

Allowed subnets: Traffic with source-addresses that differ from the specified subnets will be rejected. The source-subnets are configured by stating an IP address and a netmask.

Allowed to connect to base stations: Traffic (directed to base station) with source-addresses that differ from the specified subnets will be rejected. The source-subnets are configured by stating an IP address and a net mask.

5.3.2 Firewall rule sets

“Define Firewall rule set” allows the RCS user to add, edit and remove Firewall rule sets. The rules in a firewall rule set is applied on terminals that connect to base stations that have the firewall rule set as the current firewall rule set.

Name: The rule set can be saved with a given name.

Set as default: indicates that the firewall rule set will be the default rule set for all new base stations. Selecting this checkbox will make the current rule set the default rule set, and uncheck any other rule set that was selected as the default rule set before.

Description: Description of the rule set.

Parameter Description

Allow inter-client communication: If not checked, all inter-client communication will be dropped, and not switched through the base station.

Allow DHCP Servers: if checked, clients can set up their own DHCP-servers.

Additional port rules: Defines additional port rules. This allows for further configuration of the firewall rules. *IN* means all packets coming from a client terminal, *OUT* means packets to a client terminal except for inter client communication.

Allowed Ethernet protocols: Defines which protocols are allowed to pass through the base station. E.g.: If it is set to 800 and 806, only IP and ARP-traffic respectively will be bridged.

5.3.3 Encryption (WEP or WPA) rule sets

An encryption rule set is a number of parameters that defines the WEP-settings that a radio interface on a base station can use. When clicking on “Encryption rule sets”, the RCS-user is presented with a view where it is possible to add, edit and delete rule sets:

To create a new encryption rule set, select “Add new”. To edit a rule set, click on the rule sets name. The following parameters are included in a rule set:

WPA:

Name: Simply a name to identify the rule set.

Encryption: Which type of WPA encryption to use.

Cipher: How to exchange session keys.

Passphrase: The Pass phrase used to gain access to the encrypted WLAN.

Define WPA rule sets

Name	Encryption	Cipher	Passphrase	Action
Default WPA-settings	Disabled	TKIP	passphrase	Delete
New WPA rule set	WPA1 + WPA2	TKIP + CCMP/AES	passphrase2	Delete
avantitest	WPA2-PSK	CCMP/AES	phrase	Delete

Add new

Define WEP rulesets

Name	Auth type	Wep mode	Encrypt level	Action
Default WEP-settings	Open system	Optional	Disabled	Delete
New encryption rule set	Shared key	Mandatory	128bit	Delete

Add new

Figure 7: Encryption rule sets

WEP:

Name: Simply a name to identify the rule set.

Auth type: When a terminal is to be associated to a base station, the following options are available: *Open system* if the terminal is not to encode the packages when logging on. *Shared key* if the terminal must encode its packages when logging on, or both if it should be optional for

the terminal to encode its packages or not. Be aware: the “Encrypt level” must correspond – it must be set to ”off” when applying the open system, and ”on” when applying the shared key.

Encrypt level: Encryption strength - disabled/64 bit/128 bit.

WEP mode: Mandatory / optional. If it is set to mandatory, clients have to use WEP-encryption. If it is set to optional, they may choose.

WEP-key to use: Which of the four keys to use.

Key #0-4: Encryption key.

Click delete to delete a rule set. Note that a rule set cannot be deleted if it is in use by one or more interfaces.

5.3.4 Bandwidth rule sets

A bandwidth rule set is a number of parameters that defines how much bandwidth a client may use. The bandwidth rule set can be assigned to a base station, as a “default bandwidth rule set”, which clients with “BS-default” bandwidth settings will use. It can also be assigned to a client that is not supposed to use the default settings. When clicking on “Bandwidth rule sets”, the RCS-user is presented with a view where it is possible to add, edit and delete rule sets:

Define bandwidth rulesets

Name	Download	Borrow	Upload	Borrow	Action
0 Admin	10 Mbps	No	10 Mbps	No	Delete
1 Gold	5 Mbps	No	2,5 Mbps	No	Delete
2 Silver	1024 kbps	No	512 kbps	No	Delete
3 Bronze	256 kbps	No	128 kbps	No	Delete

Add new

Figure 8: Bandwidth rule sets

To create a new bandwidth rule set, select “Add new”. To edit a rule set, click on the name of the rule set. The following parameters are included in a rule set:

Name: A name to identify the rule set.

Download rate: The maximum download speed the rule set allows.

May borrow download capacity: This feature is not available on BS54-series base stations. If this is set to yes, a client may exceed the maximum download rate when there is unused capacity.

Upload rate: The maximum upload speed the rule set allows.

May borrow upload capacity: This feature is not available on BS54-series base stations. If this is set to yes, a client may exceed the maximum upload rate when there is unused capacity.

To delete a rule set, click delete.

5.3.5 SSID rule sets

An SSID rule set defines common properties for access-points.

Name: A name to identify the rule set.

Description: Your notes about how and when to use the ruleset.

SSID: The SSID that is transmitted on the air.

SSID in broadcast: Should the SSID be visible on a site scan, if this box is unchecked a site scan will show that someone is sending beacons on that channel but not the name to connect to.

WEP / WPA rule set: What kind of encryption should be used.

VLAN rule set: Which VLAN rule set a client that connects to an interface configured with this SSID rule set should get. Clients that have been configured with a specific VLAN rule set that applies on this network will use their own configuration unless “override” is checked. (You probably do want to keep this unchecked.)

To delete a rule set, click delete.

5.4 Base stations

How a base station is configured is described in Section 6.2.

5.4.1 Synchronize

Synchronizing a base station means updating it with the configuration that is stored in the RCS database. If the synchronization shall be performed immediately on one or more base stations, click "Synchronize" in the *Menu field*. The base stations marked for synchronization will then be updated with new configuration generated from the RCS.

5.4.2 Upload firmware

To upload new BS software, a new software release must first be downloaded from our website (www.repeatit.se). New versions are distributed regularly.

5.4.3 Upgrade base stations

To upgrade the firmware in one or more base stations, press "Upgrade base stations". A new window presenting all registered software will be opened.

Version	Type	Comment	Reg. date	Use	Delete
2400-Series					
2.2.10.8	2400-Series	23 mars 2005	2005-03-23 09:13:54	Use	Delete
2.2.10.4	2400-Series	26 jan 2005	2005-02-12 12:23:37	Use	Delete
2.2.10.3	2400-Series	17 jan 2005	2005-01-17 12:25:14	Use	Delete
2.2.10.2	2400-Series	22 dec 2004	2004-12-22 13:58:55	Use	Delete
2.2.10.1	2400-Series	17 dec 2004	2004-12-17 16:31:10	Use	Delete
2.2.9.2	2400-Series	2 dec 2004	2004-12-14 17:18:27	Use	Delete
2.2.8.3	2400-Series	5 oct 2004	2004-12-01 09:55:58	Use	Delete

Figure 9: Upgrading a base station

Choose the software version you wish to use by clicking "Use". The next screen will show base stations that are available for upgrading. Only base stations that are connected can be upgraded.

Mark the base stations that should be upgraded and press "Upgrade selected base stations" to start the upgrading process. *When upgrading base station software, the selected base station will reboot and be off-line for 120-180 seconds.*

Always read all documentation regarding the base station software that might be included before attempting to upgrade a base station. Some software versions might require specific actions.

5.4.4 Show upgrade status

Show upgrades in progress and results of previous upgrades.

System menu

- ▶ System
- ▶ Networks
- ▶ Rulesets
- ▼ Base stations
 - [Synchronize](#)
 - [Upload firmware](#)
 - [Upgrade base stations](#)
 - [Show upgrade status](#)
- ▶ Client Terminal Users
- ▶ Client Terminals
- ▶ About

5.5 Client Terminal users

5.5.1 Add new CT-user

Click on "Add new CT-User" in the menu. In the *Information field* you will see an empty form. The fields are described in chapter 6.5 Client terminal users. Fill in the form and click on "Save new user".

5.6 Client Terminals

5.6.1 Add new CT

Before adding a new Client Terminal to any network, the user who is connected to the terminal should be added (see chapter 6.5 Client terminal users).

Click on "Add new CT" in the *Menu field*. In the *Information field* you will then see a form with default values. The form is described in chapter 6.4 Client terminal. Fill out the form and press "Save this CT".

System menu

- ▶ System
- ▶ Networks
- ▶ Rulesets
- ▶ Base stations
- ▶ Client Terminal Users
- ▼ Client Terminals
 - [Add new CT](#)
 - [Terminal types](#)
 - [Upload / delete client firmware](#)
 - [Show upgrade status](#)
 - [Rejected clients](#)
- ▶ About

5.6.2 Terminal types

The terminal type list is now editable allowing you to add your own types for non-repeatit clients.

5.6.3 Upload / delete client firmware

To upload new Client terminal firmware, a new software release must first be downloaded from our website (www.repeatit.se). New versions are distributed regularly.

5.6.4 Show upgrade status

Shows a table with the status of all requested client terminal upgrades.

5.6.5 Rejected clients

Shows a table with all clients that has tried to connect to a base station and not been allowed to connect, in reverse chronological order.

5.7 About

The about sub-menu gives access to release notes and change log for this version of the RCS and to the latest change log online.

5.8 Log off

Lets the system user log off and closes the RCS window.

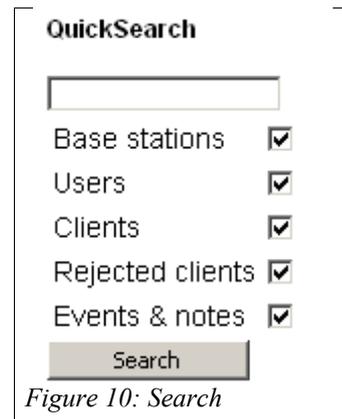
5.9 Search

An easy way to find an object is to use the Quick Search function. The Quick Search is located at the bottom of the *Menu field*. To perform a search – check the boxes that tell what kind of objects to find. Enter a search string in the input box and click "Search". The search string must be at least two characters; it may not contain spaces or wildcards. For base stations the search function

tries to match the search string with the base station location, MAC-address, IP-address and serial number. For user the string is matched with user name, street, phone, city and country. For clients the string is matched with the clients MAC-address.

There is also an “Advanced Client search” that allows more discriminating searches and presents more information about the clients found.

When the search is completed a list with the found objects is presented. An objects configuration can be presented in the *Information field* by clicking on the object.



6. The object types in the status field

6.1 Networks

When clicking a network, the network is displayed in the information field. The parameters of the network are:

Name: The name of the network. This name will be displayed in the *Status field* etc.

Description: A short description of the network.

Subnet members: A network can have another network as a member. This allows a client that is a member of network X, which has network Y as a subnet member, to connect to a sector that is included in network Y even if it is not included in network X.

Sector members: The sectors included in a network will allow the clients that are members of the network to connect to them. Check the sectors that should be included.

To save the settings, click the "Save" button. The network will thereafter be visible in the Status field and client terminals can be registered as members of the network. Under "Not yet connected CTs" any terminals that belong to the network but have not yet connected to any sector can be found.

6.2 Base stations

When selecting a base station in the *Status field*, the base stations configuration is presented in the *Information field*.

6.2.1 Parameters

Type: The model number of the base station.

MAC-address(mandatory): The base station MAC-address is a number on the form 01:23:45:67:89:ab (12 Hexadecimal numbers in pair separated by colons).

IP-address: The base stations IP-address.

Native VLAN: This indicates the VLAN the base station is a member of.

Location (mandatory): The name of the base station location. This data will be presented in the *Status field*.

Serial number: The base station's serial number.

Status: The current status of the base station.

Software: Base station software version. If you have RCS Professional you can upgrade the BS from here.

Regdate: The date and time when the base station was registered in the system.

Change date: The date and time when the base station settings were changed.

Changed by: The RS/3-RCS-user who last made changes on the base station.

Connected through: If the base station is back-to-back connected to a client terminal that is registered in the system, click the “change”-button and select the client terminal from the list.

Default VLAN rule-set: Setting that decides which VLAN rules apply to terminals that connect to the base station if the clients VLAN rule set is set to BS-default. This is **not** to be confused with NATIVE VLAN (described above).

Firewall rule-set: Which firewall rule set that should be applied to the base station.

Default bandwidth rule-set: Indicates which bandwidth connecting clients will use as default.

Default network: Tells which network a client, who is auto-registered when connecting to the base station, should be assigned to.

Action if RCS is unreachable when client connects: Tells which action to perform when the connection to the RCS is unavailable at the time a client connects to the base station.

Action if an unregistered client connects: Tells which action to perform when a client that is not registered in the RCS connects to the base station.

6.2.2 Buttons

Save and flag for sync: Flags the base for synchronization. Observe that you have to choose to synchronize flagged base stations for the changes to take effect immediately. If you choose to flag a base station for synchronization when it is offline, it will automatically be synchronized when it comes online.

Save and synchronize: Saves the changes to the database and synchronizes the base station.

View BS log file: Shows the base station log file. The log file contains recent important events in reversed chronological order.

Delete base station: Deletes the base station from the system. A window will pop up and require confirmation before the base station is deleted. Note that when a base station has been deleted, it cannot be restored.

6.3 Radio interfaces

When selecting a radio interface in the *Status field*, the configuration of the interface is presented in the *Information field*.

6.3.1 Parameters

Type: The radio card type and which WLAN standards supported it supports.

MAC-address: MAC-address of the WLAN-interface.

Status: Status of the interface (started/stopped).

Changdate: Tells when the settings were changed for the WLAN interface.

Changed by: The RS/3-RCS-user who last made changes to the WLAN settings.

Channel: Tells which channel the current interface should be using. For 5400-series base stations, a button, “Show radar detection settings” will also be available. Click the button to

configure which channels should be used if detecting radar on the primary channel (only necessary when operating in 802.11a mode).

Radar detection settings: This button shows or hides settings that only apply to radar detection:

- **Antenna gain:** How sensitive the units antenna is, a very sensitive antenna can pick up a lot of noise thus the calculations need to be adjusted.
- **Radar roam settings:** Channels that the basestation should not use when roaming after detecting radar.

Current channel: Indicates which channel the interface is currently using (may differ from selected channel if detecting radar, or the basestation has not yet been synchronized) .

Transmit power: Transmit output power for the interface radio card.

Tx Rate: Radio rate the interface should use.

RTS/CTS: Limit for RTS/CTS (Ready To Send/Clear To Send).

Frag: Limit for Fragmentation Threshold. This value decides how large a packet can be before fragmentation.

SSID settings, these settings are grey because they will be overridden by any SSID rule set chosen:

- **SSID:** The WLAN-interface SSID is the label that is visible to the client when the client makes a "site survey" (that is, "scanning" the air for base stations and access points).
- **SSID in broadcast:** Turn on/off SSID broadcasting. If this is set to "off" - clients will not see the SSID of this sector when they perform a "site survey".
- **WEP rule set:** Tells if WEP encryption should be used and which rules the interface should use.
- **WPA rule set:** Tells if WPA encryption should be used and which rules the interface should use.

SSID Rule set: Select a rule set, "off", or use the "interface defaults" that is grey above. With BS5400-series base stations above v. 1.4 you may configure more than one virtual access point per radio, this is not available in RCS Basic.

6.3.2 Buttons

Save changes (to DB): Save changes to the database.

Save and apply changes: Save changes to the database and apply them immediately.

Scan: Performs a site survey from the sector. *Note: While the interface is scanning the radio functionality is disabled, and connected clients may notice an interruption. The scan usually takes 5-20 seconds. The latest scan result (after the RCS kernel started) is shown above.*

Site survey history: The RCS saves sitesurvey information in the DB, this button shows all known sitesurveys on a separate page.

6.4 Client terminal

When selecting a client terminal in the *Status field*, the configuration for the client is presented in the *Information field*.

6.4.1 Parameters

Network: Indicates which network the terminal belongs to.

Mac-address: The terminals MAC-address in the form 11:22:33:44:55:66 (hexadecimal number).

Serial number: The serial number of the terminal.

User: Shows the user associated to the terminal. Click “Change user” to change user.

Network settings: The tree contains settings for all networks defined in the system. If a network is listed as “Not registered” the client will be allowed or not depending on the basestations policy for unregistered clients.

- **Enabled:** Indicates if the terminal is allowed to connect to base stations in this network.
- **VLAN rule set:** Indicates which VLAN rules (see Section 5.3.1) that apply to the terminal.
- **Bandwidth rule set:** Indicates which bandwidth rule set that will be applied to the client.

Terminal type: Indicates what kind of client terminal this client uses. Most Repeatit clients provides this information through RCMP and this field is not shown for them.

Current status: The current status of the terminal.

Reg. date: The date when the client was added to the RCS.

Change date: The time when the settings was last changed for the CT.

Changed by: The RS/3-RCS-user who last made changes on the CT settings.

Model: (if the unit is RCMP-enabled, see 3.1) The auto-detected client model.

Firmware version: (if RCMP-enabled) The auto-detected version of the clients firmware. A button, “Upgrade this client” is also available. Click this button and select firmware (see 5.6.3) and upgrade mode to initiate upgrade, if you have RCS Professional.

6.4.2 Buttons

Save changes (to DB): Saves changes to the database. This means that changes that have been made, for example changes regarding the bandwidth limitation, will only be saved to the local database, and not be implemented on the base stations in the network to which it belongs. For a change to take effect on the base station, it must first be saved to the database, and then the base stations must be synchronized.

Save and apply changes: Applies any changes made to all base stations in the network to which the terminal belongs.

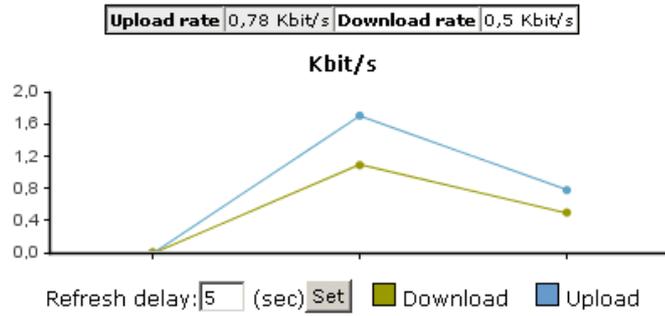
Delete Client: Deletes the client from the RCS database. A confirmation window will appear. If the action is confirmed the client will be deleted and if it connected to a base station it will not be authenticated.

Show CT statistics: Opens The “Specific Statistics” for this client in a new window and shows real-time statistics for the current terminal if it is online. The field “Refresh time” indicates the delay (in seconds) between the updates of the CT’s statistics. Note that the information is shown from the base stations “point of view”, i.e. Upload rate shows the speed used to send data from the *base station* to the CT.

The parameters are split into two groups, **CPE transmission:** that shows what the BS has received from the CPE and **BS transmission:** that shows what the BS has sent to the CPE.

- **Bytes** tells the amount of transmitted data.

- **DataPacketsOk** shows how many packets that has been successfully sent.
- **DataPacketsError** shows how many packets have been corrupted while being sent. This value is retrieved from the CPE and set to zero if unavailable.
- **RxDataPacketsError** shows how many packets that have been corrupted upon reception from CT.
- **Rate counters** shows how many packets that has been transmitted at each rate, both totally and as a percentage. The rate used for the latest packet sent is highlighted in pale yellow.
- **Current values** shows the current data rate and RSSI values.



Session statistics for 00:05:4e:45:d3:73 at Kontoret_Soek_55			
SessionID 66255739			
CPE transmission		BS transmission	
Bytes	271182	Bytes	192873
DataPacketsOk	1886	DataPacketsOK	1889
DataPacketsError	0 (0%)	DataPacketsError	0 (0%)
Rate counters			
54Mbit	330 (17,5%)	54Mbit	1061 (56,17%)
48Mbit	468 (24,81%)	48Mbit	815 (43,14%)
36Mbit	900 (47,72%)	36Mbit	10 (0,53%)
24Mbit	174 (9,23%)	24Mbit	0 (0%)
18Mbit	14 (0,74%)	18Mbit	0 (0%)
2Mbit	0 (0%)	2Mbit	1 (0,05%)
1Mbit	0 (0%)	1Mbit	2 (0,11%)
Current values			
Rate	48Mbit	Rate	54Mbit
RSSI@CPE	38	RSSI@BS	49

Figure 11: Real-time throughput

There is also a chart that will display the clients' current throughput (measured in Kbit/s).

The refresh rate of the chart is 5 seconds at default but can be set to 1 second as lowest. The chart shows up to 20 measuring points before it starts discarding the oldest one.

6.5 Client terminal users

When selecting a client terminal user in the *Status field*, information about the user is presented in the *Information field*. This information includes a list of clients registered to that user.

6.5.1 Parameters

User ID: User ID (billing number for example)

First name:

Last name:

Street:

Zip code:

City:

Country:

Phone number:

Email:

Reg. date: The time when the terminal user was added to the RS/3-RCS.

Change date: The time when user data was changed.

Changed by: The RS/3-RCS-user who most lately made changes to the.

6.5.2 Buttons

Save changes (to DB): Saves the changes to database.

Delete User: Deletes the user. A confirmation window will appear before the user is deleted.

Delete User and Client(s): Deletes the user and all clients that the user is registered with.

6.6 RS/3 RCS users

Fill out the form and press "Save new user" to add an RCS user.

6.6.1 Parameters

Username: The users login name.

Password: (If new RCS User)Password.

Confirm: (If new RCS User)Password confirmation.

Role: If the role *System Administrator* is chosen, the user will get access to all functions (add/remove base stations, customers, networks and rule sets). If the role *Callcenter* is chosen, the user is able to monitor the system, but not able to change any configuration.

First name:

Last name:

Phone number:

Email: The time when the system user was added to RS/3-RCS.

Change date: The time when information about the system user was changed.

Changed by: The system user who latest made changes about the current system user.

6.6.2 Buttons

Change password: Allows the system user to change the login password. If the password gets lost it can be changed by someone that logs in locally on the machine running the RCS.

Save: Saves the given information to the database.

Delete: Deletes the system user.

7. Sections in the status field

The sections in the status field are described below.

7.1 Networks

The network section in the status field shows all networks in the system. Each network can be expanded to show the subnets, base stations, sectors and users that are associated with the network. In the network section is the relationship between a master base station and base stations in client mode (point-to-point links) not shown. Neither is the relation between a client terminal and a base station that is back-to-back connected to it. To see the structure of base stations that are connected using those method, refer to the base station section. If a base station is configured with multiple virtual access points, all defined SSID will be shown as a sub layer below the radio interface, the clients show up under the SSID they are connected to.



Figure 12: Example network view

7.2 Base stations

The base station section shows all base stations in the system. If a base station is connected as a client to a master base station, the client base station is located under the sector that it is connected to. If a base station is back-to-back connected to a client terminal the base station is found as a branch under the client terminal which is displayed separately under the sector that it is connected to. If the base station icon is green, the base station is connected to the RCS.

7.3 CT Users

In the CT Users section, all users registered in the system are presented under alphabetic categories. Each user can be expanded to display the clients that are registered with the user. If the user icon is green, the user is online.

7.4 CTs without network

This section shows all client terminals that are not registered with any network. These client terminals will only be allowed to connect to base stations that has the “Register and use basstaion default” policy for unknown clients.

7.5 RS/3 RCS-Users

Shows the system users. If the icon of the system user is green, the user is logged in.

8. Statistics

The RCS is continuously collecting statistics from the base stations. The collected statistics are then stored to the database. To make sure the database does not become too large, statistics are accumulated in steps when records in the database reach a certain age. This accumulation can be disabled on the System settings page.

8.1 Statistics overview

Statistics overview helps you to get a quick view of the quality in your network.

At the top of this view there is a drop down menu that lets you select which time period to fetch statistics from. Below the period select menu, a table of information is shown. By choosing among the column headers, the table can be sorted. To reverse the sort order – click again. Using the drop-down menus under the column headers can also filter the table.

When a time period has been selected, the statistics for that

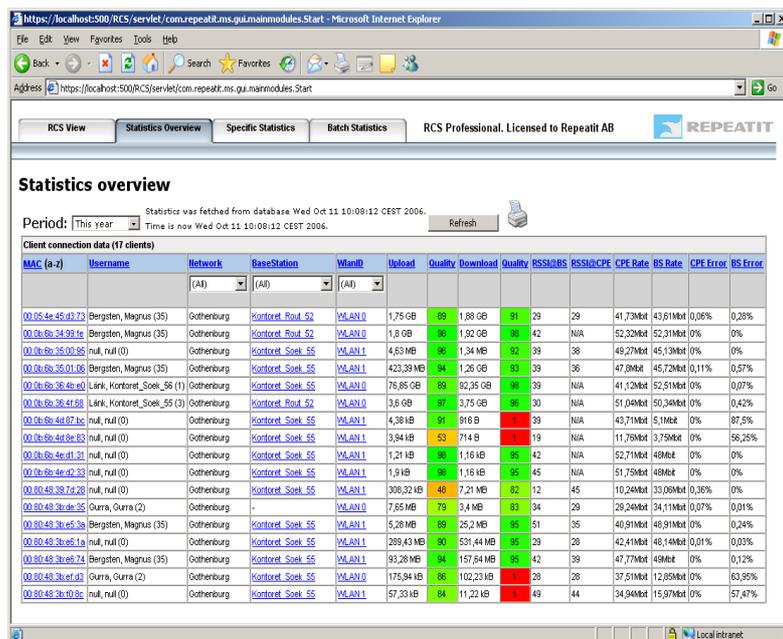


Figure 13: Statistics overview

period is cached (to reduce database load). To refresh the statistics from the selected period, press the “Refresh statistics” button.

The columns of the statistics overview table are:

Table 4 – Statistic overview window

MAC	The MAC-address of the client terminal You may click on the MAC-address to see more detailed information.
Username	The name of the user that the client terminal belongs to.
Network	The name of the network that the client terminal is a member of.
Base station	The name of the base station that the client terminal is connected to. You may click on the base station name to see the total statistics for the base station.
WlanID	The sector that the client terminal is connected to. You may click on the WlanID to see statistics for the sector.
Upload	Tells how much data the client has uploaded during the selected time period.
Quality	Presents a rating of the clients uplink quality if available.
Download	Tells how much data the client has downloaded during the selected time period.
Quality	Presents a rating of the clients downlink quality if available.
RSSI@BS	The average RSSI at the base station during the period
RSSI@CPE	The average RSSI at the client during the period
CPE Rate	The clients average transmission speed during the period.
BS Rate	The base stations average transmission speed during the period.
CPE Error	Number of erroneous packets received by the client.
BS Error	Number of erroneous packets received by the base station

Table 5 - How the quality value should be translated.

100-75	The connection is good. Most packets are transmitted successfully at 11Mbps rate.
75-40	The connection is not optimal. The customer should mount the antenna differently to obtain better radio performance. If the customer cannot improve the radio connection, he/she should be given a lower bandwidth to avoid too much congestion in the radio network.
40-1	The connection is bad. If the customer cannot improve the radio connection, he/she should either be disabled from the network or be assigned a reduced bandwidth. Our recommendation is to disable clients with connection like this. Otherwise, the network will not perform in a pleasant way.

8.1.1 Statistics for an object

This window opens when clicking an object in the statistics overview.

The line chart shows how the average bit rate, RSSI and error percentage for the client (CPE) and the base station (BS) has changed over time.

Below the line chart there is a bar chart that shows how much data has been uploaded and downloaded during the selected period.

See Table 4 for more information about these parameters.

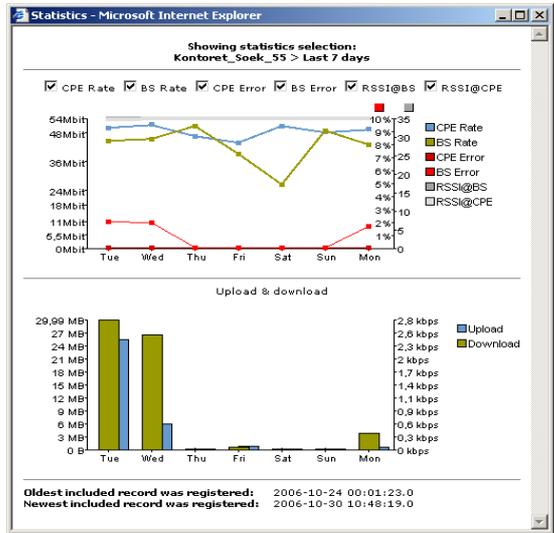


Figure 14: Object statistics

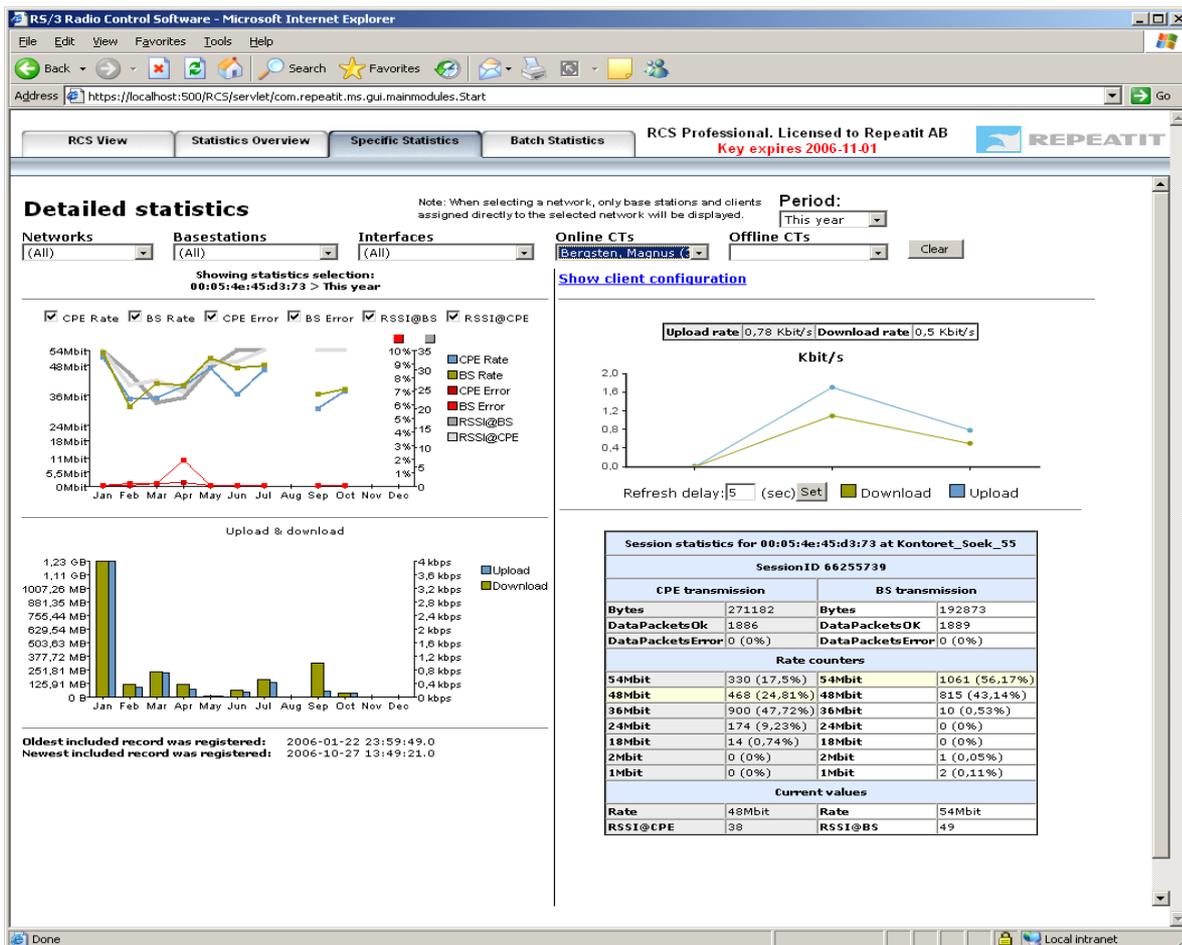


Figure 15: Specific statistics

8.2 Specific statistics

The specific statistics view shows statistics for any object in the network. When you click “Specific statistics”, the following view is presented (Figure 15):

At the top left of the screen, there are five selection boxes. The selection boxes let you select any object in the network. When selecting an object, the statistics, at the right side of the screen, is updated to show statistics for the selection and the more specific select boxes are updated to show only the objects that belongs to the selected network, base station or interface.

Networks: Lets you select a specific network.

Base stations: Lets you select a specific base station.

Interfaces: Lets you select a specific interface. Either a radio or a virtual AP.

Online: Lets you select a client that are currently online.

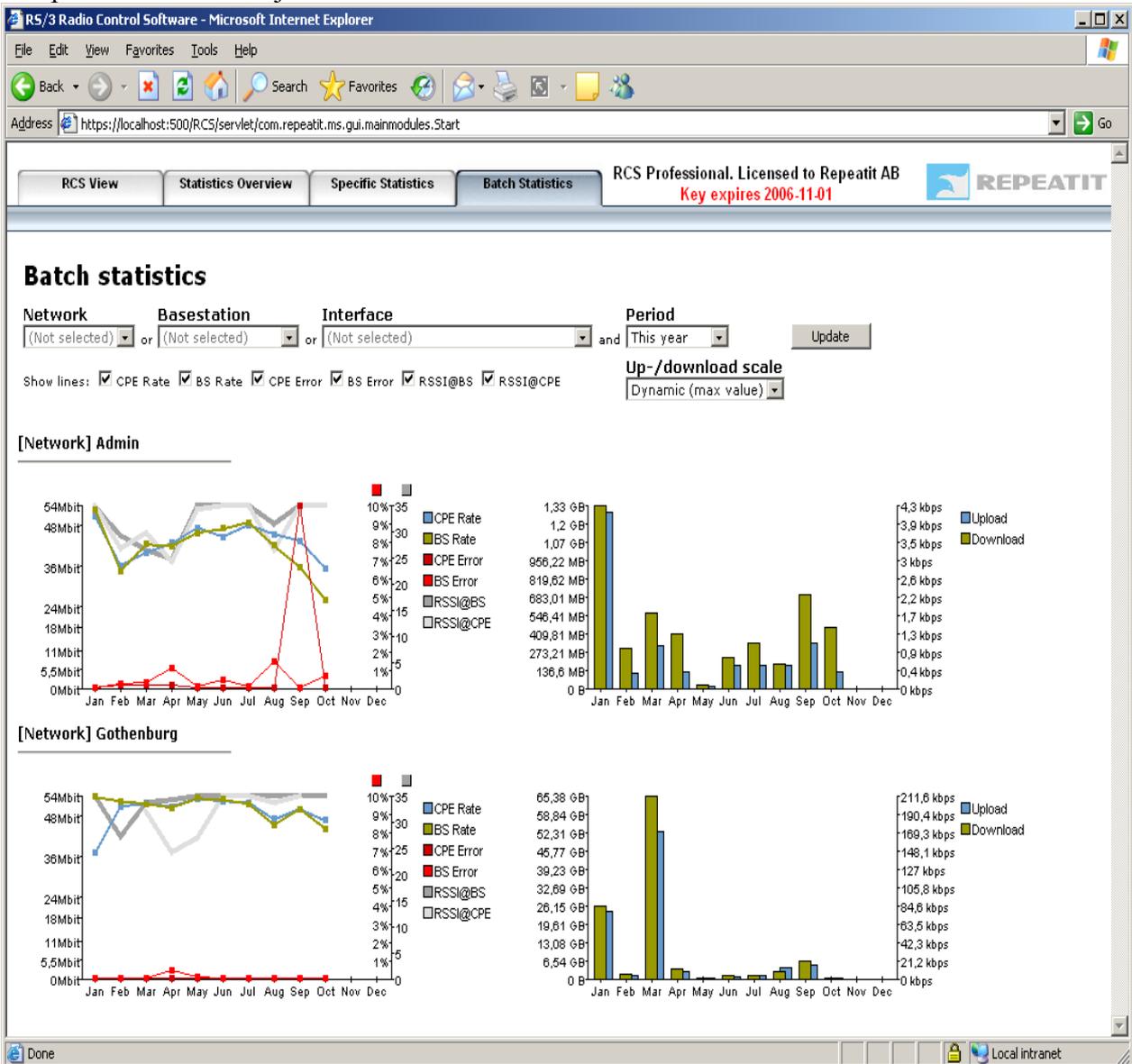
Offline: Lets you select a client that are currently offline.

The “Clear” button clears the selection from all select boxes.

The drop down menu “Period” gives you the option to select from which time period information is based. The statistics frame shows statistics for the selected object. The information shown is the same as described in Figure 14: Object statistics and if an online client is selected the diagram from Figure 11: Real-time throughput is also shown.

8.3 Batch statistics

Lets you retrieve statistics for all networks or objects directly associated with a network, base station or interface. The diagrams shown are the same as in Figure 14:Object statistics. The drop down menu “Period” gives you the option to select from which time period information is based. The drop down menu “Up-/download scale” allows you to choose a fixed scale for easy comparison between objects.



9. Troubleshooting

Problem description

RCS is installed and can be accessed through web browser but the base station configured to connect to RCS does not appear.

Error message “Connection refused to host: [IP-address]; nested exception is: java.net.ConnectException: Connection timed out...” is displayed in RCS middle frame.

Error message “Exception creating connection to: 192.168.10.92; nested exception is: java.net.NoRouteToHostException...” is displayed in RCS middle frame.

Accessing RCS through web browser does not work. Error message “The page can not be displayed...” appears.

Various error messages related to database appear.

Selecting tabs in RCS does not work and some pages look strange.

RCS cannot be accessed through web interface from another computer.

Suggested solution

Verify that the RCS IP-address in the base station configuration is correct. Also verify that no firewall is blocking connections to TCP port 9999 or 9998 on RCS (including windows built-in firewall).

The RCS Kernel is not running, start it. On Windows, open Windows Services console (Control panel > Administrative Tools > Services). Locate service RCSKernel. Right-click the service and select “restart” (or “start” if it’s not started).

The server machine has changed it’s IP and the RCS Kernel is registered on the old IP, restart the RCS Kernel.

On Windows, open Windows Services console (Control panel > Administrative Tools > Services). Locate service RCSKernel. Right-click the service and select “restart”.

The webapplication is probably not running, start it.

On Windows, open Windows Services console (Control panel > Administrative Tools > Services). Locate service RCSWebApp. Right-click the service and select “restart” (or “start” if it’s not started).

1. Make sure the MySQL server is running and the “mysql” command is accessible on the path. On Windows, open Windows Services console (Control panel > Administrative Tools > Services). Right-click the MySQL service and select “restart” (or “start” if it’s not started).
2. Open “System”-menu in RCS and click “Database maintenance”. Click “Update table status”. If any defect tables are found – click “Attempt repair”.

Make sure you are running a compatible web browser. (Most modern browsers should work, we use Internet Explorer 7 & 8, Firefox and Opera).

Check the URL. By default the URL would be <https://x.x.x.x:500> (where x.x.x.x is the IP-address of the computer running the RCS server). Also verify that there are no firewalls blocking connections to TCP port 500 on RCS (including RCS local windows firewall).