

# KSync

## Section I - Technical Overview

### 1 Executive Summary

KSync is a hardware and software solution for managing the flow of data and applications between server and handheld devices.

Communications between KSync servers and handheld clients uses an open, cross-platform protocol, unlike single-platform vendor provided solutions such as HotSync or ActiveSync.

The KSync software itself is designed as a set of layered subsystems, each of which can be customized to fit the specific business processes required by the customer.

Multiple KSync servers can be clustered to ensure high availability. The servers communicate with each other to keep data files in synch. Servers discover one another automatically—there is no need to reconfigure when a new server is added or removed.

Each KSync server contains a built-in web server, through which administrative personnel can view the connection history of users, create new accounts, maintain data files, and see a live snapshot of the server's connected users.

### 2 Introduction

In the typical client/server model of software there are client workstations connected to servers running middleware and database applications. These computers are connected by a network, and this network must be functional for the clients to do their job.

Handheld devices are not easy to fit into this model. Wireless network connections may not work in a particular area, users don't want to be tethered to modem cradles, and these devices may not have the memory, processing power, or screen real estate needed to run the same software as a full workstation client.

KSync is a hardware and software solution designed to solve these problems without requiring extensive on-site custom programming.

In a typical scenario, one or more KSync servers sit between the handheld clients and the existing infrastructure. These servers are loaded with one or more plug-ins, or "applications", which know how to translate the data on board the handheld device into the format expected by the back-end infrastructure.

KSync applications are written using an API defined by the server which presents a uniform interface across several different handheld operating systems. As new operating systems are released, once KSync clients are ported to them, little or no reprogramming of the applications will be required.

Additionally, KSync performs maintenance tasks on the handheld, such as ensuring synchronization of its on-board clock and updating software when new versions are released.

KSync is not a drop-in solution for a narrow range of problems, but rather a toolkit that can be used to fit into a wide range of business processes without continually reinventing the wheel.

KSync servers are capable of serving more than one handheld application, using a similar mechanism for each one. Each application the server has support for is requested by name. For example, a server may have the `assettrack`, `timetrack`, and `bugtrack` applications installed.

Behind each of these names is a software “plug-in” that is executed when a handheld device connects to the server using that name. This software will take whatever steps are necessary to pull and push data across to the handheld.

In addition to taking control of the handheld, the application software interacts with the existing business infrastructure. It may make calls to C and C++ library functions, perform database queries, or speak with application servers supporting CORBA or XML/RPC.

### 3 Application Example

As an example, here are the steps that a simple asset tracking application would perform when a handheld client connects to the server:

- Authenticate the client—each handheld supplies the server with the user’s login, password, and the application to run. If the client is unauthorized it is disconnected. The authentication process can be customized to run against an existing user database, or the KSync server can manage its own user list.
- Receive transactions from the handheld. Each action the user performs on the handheld generates a *transaction* —for example, a `MOVE` transaction might be generated when a piece of equipment is moved from one location to another.
- Each transaction is validated, then valid transactions are applied to the database, possibly by inserting into an Oracle table or passing the data to an application server. Transactions with errors are marked as such and reported to the user for correction.
- Update the handheld. Any software updates or changes to reference files are sent to the handheld if it does not have the latest version. The client’s clock is synchronized and other system-specific bookkeeping may be performed.

More complex applications may involve additional steps such as performing stored queries on the user’s behalf and sending back a list of results.

### 4 Customizability

The KSync server software is designed as a series of layered subsystems, each of which can customize the behavior of the underlying layers. This allows for a great deal of flexibility when tailoring the software to the specific needs of the customer. Customizable functionality ranges from large pieces of the system, such as user authentication policy, to small details, such as the name and customer-specific version of the product itself.

### 5 Cross-Platform

KSync is a cross-platform solution. For handhelds, Windows CE/Mobile and Palm OS are supported out of the box. Additionally, the KSync software itself is written in a portable ANSI-standard language, and runs on many flavors of UNIX (including Linux), Mac OS X, and could be ported to Windows Server with minimal effort. A key feature allowing the KSync software to work with many different handheld operating systems is our custom protocol, spoken by the KSync server software and a small client stub on the handheld.

## 6 Web Based Administration

Each KSync server contains a small built-in web server, which provides an administrative interface to management for users, groups, handheld devices, reports, and the server itself.

This web interface is also highly customizable—the process of user management, for example, can be tailored to integrate with existing user databases or other systems.

User management tasks provided by the server include: adding new users (possibly importing them from an existing user database), modifying the attributes of users (full name, permissions, etc), putting users into one or more “groups”, and viewing the connection history for a user. This connection history displays the time and date of each connection, which application the user is running, and what the ultimate result of the connection was (successful sync, an error occurred, etc).

The interface also tracks the handheld devices that have connected to the server. Administrative personnel can record devices that are sent to the factory for repair, and pull reports on their fleet of devices.

Additional reports are provided including: a summary report of connection history over time, various user summaries, and any other custom reports necessary for the customer.

## 7 Clustering

Multiple KSync servers can be clustered to increase redundancy. The servers can be placed behind standard load balancing equipment, or schemes such as round-robin DNS can be used to redirect users to multiple servers.

KSync servers on the same physical network segment are able to discover one another automatically using an implementation of Multicast DNS released by Apple, branded as Rendezvous.

If installations at separate sites are desired, only the cross-site links need to be specified by an administrator—the servers at each site can still handle their internal discovery automatically.

When a KSync server starts up, it contacts all of the other servers in its cluster and downloads any updates that may have been received while the server was offline. Additionally, when any single server receives an update to an input file (such as a parts list), this change is automatically propagated to the other servers in the cluster. With a Rendezvous-enabled web browser, such as Apple’s Safari, each KSync server’s administration console shows up automatically in an administrator’s bookmarks (assuming he or she is on the same LAN).

# Section II - KSync Platform Characteristics

## 1 Hardware Requirements

### 1.1 Server

The Standard KSync Server runs on the Linux OS with the following minimum requirements. Hayton Systems supplies the server hardware.

- Kernel 2.6
- Memory 1GB
- Ethernet Interface
- Serial Port
- 2 - 40GB or larger HDDs in a RAID 1 configuration (mirrored)

- Ext3 – Journaling file system.

## 1.2 Serial Console and Power Management

Hayton Systems supplies a serial console and power management device, behind which the KSync Server(s) are installed.

- Baytech DS2-RPC (or equivalent)
  - Out-of-band console access
  - Ability to toggle power

The customer must supply power and the data paths to the KSync Server.

- Customer supplied UPS
- Customer supplied Switch

## 2 Software Requirements

Oracle Client is used for communications between the KSync Server and customer Oracle databases. The following software is installed on the Server by Hayton Systems.

- Oracle 7 or older – Client 9.0.1f
- Oracle 8 or newer – The latest client 10.0.2
- Nagios for downtime notifications
- Nightly status report scripts
- Failover scripts

## 3 Network Topology

The following list describes the network topology that must be supplied by the customer to enable communications between the KSync Server, remote handheld computers, and customer host application (s).

- Dial-up Pool (RAS) for connecting handheld computers to the network
- TCP/IP access to TCP Port 4040 on KSync Server
- TCP/IP from KSync to Oracle for COEP

## Section III - KSync Administration

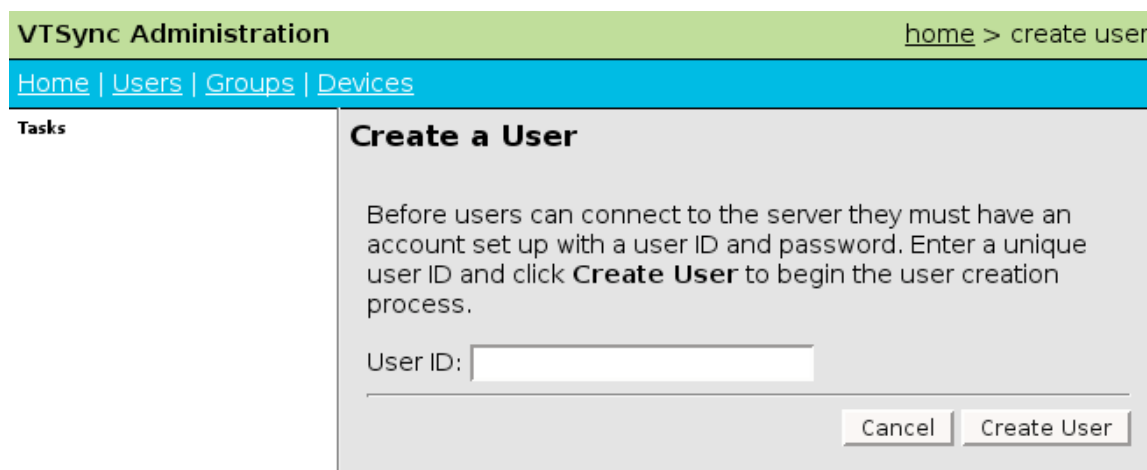
This section contains information needed by the KSync administrator. The KSync console provides the tools necessary to administer users, groups and devices.

The administrator connects to the console via browser on port 4041 of any one of the KSync servers.

### 1 Users

The following administrative functions are used to manage user accounts for the KSync server.

#### 1.1 To Create A User



The screenshot shows the VTSync Administration console interface. At the top, there is a green header bar with the text "VTSync Administration" on the left and "home > create user" on the right. Below this is a blue navigation bar with links for "Home", "Users", "Groups", and "Devices". On the left side, there is a "Tasks" panel. The main content area is titled "Create a User" and contains the following text: "Before users can connect to the server they must have an account set up with a user ID and password. Enter a unique user ID and click **Create User** to begin the user creation process." Below this text is a text input field labeled "User ID:". At the bottom right of the form, there are two buttons: "Cancel" and "Create User".

- Select the **Users** link in the navigation bar.
- Select **Create a User** from the left-hand Tasks panel.
- Enter the name of the new user and select **Create User**. This name must be unique and may need to pass installation-specific validations (such as company employee IDs). The user creation form may contain extra instructions or options for obtaining user information from an installation-specific database.
- Fill in the remaining details in the **User Edit** screen and select **Save Changes** to complete the user creation process.

## 1.2 Browse / Find User

VTSync Administration home > users

[Home](#) | [Users](#) | [Groups](#) | [Devices](#)

**Tasks**  
[Create a New User](#)

### Browse Users

ABCDEFGHIJKLMNOPQRSTUVWXYZ << Prev Next >>

Name	First Name	Last Name	Last Logon
<a href="#">ADMIN</a>	ADMIN	USER	Never
<a href="#">X000000</a>	JAMES	BIELMAN	2005-11-21 05:45:27.000000
<a href="#">X000001</a>	TEST	USER	Never
<a href="#">X000002</a>	ANOTHER	TESTGUY	Never
<a href="#">X000003</a>	SOME	PERSON	Never
<a href="#">X000004</a>	JOHN	USER	Never

- Click on a column header to sort the results by that field.
- Select the **Next** and **Prev** buttons to scroll through the results.
- Select the link containing the user's ID to edit that user.
- To search for a user, enter all or part of the user's first name, last name, or user name into the search box in the left-hand tasks panel and hit Return. A list of all users matching these criteria will be displayed.

## 1.3 Edit User

VTSync Administration home > users > X000000

Home | Users | Groups | Devices

**Tasks**  
[Delete this User](#)

### Edit User: X000000

**General**

First Name:  Created On: 2005-11-16 20:53:57.000000  
Last Name:  Last Seen On: 2005-11-21 05:45:27.000000  
Phone:  Supervisor:   
Description:

**Security**

Password:  Security Level:

**Group Membership**

To remove this user from a group, select one or more groups in the left list and click **Remove from group**. To add this user to groups, select one or more groups in the right list and click **Add to group**. To select multiple groups, click and drag the mouse while holding the control key.

**Current Groups:**

EVERYONE  
TEST GROUP 1  
TEST GROUP 2

**Add to Group:**

TEST GROUP 3

**Recent Connection History**

Server Name	Session ID	Device ID	IP Address	When	Duration
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- Select an ID from the user browser or search results page to edit that user.
- Change the user's **General** and **Security** attributes as necessary using the controls provided.
- To remove the user from a group, select one or more groups from the **Current Groups** list and select **Remove from Groups**.
- To add the user to one or more groups, select one or more groups from the **Available Groups** list and select **Add to Groups**.
- Selecting **Save Changes** will commit the changed user information to the database. Select **Cancel** to revert changes made in this screen.

**Note:** Portions of the **Security** section may not be available depending on the privileges of the user logged into the administration console.

## 1.4 Delete User

- From the **Edit User** page, select **Delete this User** from the left-hand tasks panel.
- Select **Yes** from the confirmation dialog to complete the user deletion.

## 2 Groups

The following administrative functions are used to create a hierarchy of groups. Groups may be contained within other groups, and operations on a group will apply to users in that group directly, as well as in subgroups of the original group.

### 2.1 Create Group

VTSync Administration [home > create group](#)

[Home](#) | [Users](#) | [Groups](#) | [Devices](#)

**Tasks**

### Create a Group

Enter a unique name for the new group to begin the group creation process.

Group Name:

- Select the **Groups** link in the navigation bar.
- Select **Create a Group** from the left-hand Tasks panel.
- Enter the name of the new group and select **Create Group**.
- Fill in the remaining details in the **Group Edit** screen and select **Save Changes** to complete the group creation process.

### 2.2 Browse / Find Group

VTSync Administration [home > groups](#)

[Home](#) | [Users](#) | [Groups](#) | [Devices](#)

**Tasks**

[Create a New Group](#)

### Browse Groups

[A](#) [B](#) [C](#) [D](#) [E](#) [F](#) [G](#) [H](#) [I](#) [J](#) [K](#) [L](#) [M](#) [N](#) [O](#) [P](#) [Q](#) [R](#) [S](#) [T](#) [U](#) [V](#) [W](#) [X](#) [Y](#) [Z](#)

Name	Description	Parent Group	Creation Time
<a href="#">EVERYONE</a>	ROOT GROUP	(none)	2005-11-10 00:01:24.000000
<a href="#">TEST GROUP 1</a>	JAMESJBS TEST GROUP	<a href="#">EVERYONE</a>	2005-11-19 04:57:08.000000
<a href="#">TEST GROUP 2</a>	SOME OTHER TEST GROUP	<a href="#">EVERYONE</a>	2005-11-19 05:01:30.000000
<a href="#">TEST GROUP 3</a>	ANOTHER TEST GROUP	<a href="#">EVERYONE</a>	2005-11-20 04:48:38.000000

- Click on a column header to sort the results by that field.
- Select the **Next** and **Prev** buttons to scroll through the results.
- Select the link containing the group's name to edit that group.
- To search for a group, enter all or part of the group's name into the search box in the left-hand tasks panel and hit Return. A list of all groups matching these criteria will be displayed.

### 2.3 Edit Group

VTSync Administration home > groups > TEST GROUP 1

Home | Users | Groups | Devices

**Tasks**  
[Delete this Group](#)

**Edit Group: TEST GROUP 1**

**General**

Name:  Created On: 2005-11-19 04:57:08.000000  
 Description:   
 Parent Group:

**Group Membership**

To remove users from a group, select one or more users in the left list and click **Remove users**. To add users to this group, enter user IDs separated by newlines, spaces, commas, or other punctuation in the edit box on the right and select **Add users**.

Click the **Quick user search** button to pop up a second window for looking up user IDs.

**Users in this Group:** **Add Users to Group:**

<input type="text" value="ADMIN (ADMIN USER)"/> <input type="text" value="X000000 (JAMES BIELMAN)"/>	<input type="text"/> <input type="text"/>
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- Select an ID from the group browser or search results page to edit that group.
- Change the group's **General** attributes as necessary using the controls provided.
- To remove users from the group, select one or more users from the **Users in this Group** list and select **Remove Users**.
- To add users to this group, enter one or more user IDs into the **Add to Group** text field, separated by new lines, commas, or other punctuation, then select **Add Users**.
- Selecting **Save Changes** will commit the changed group information to the database. Select **Cancel** to revert changes made in this screen.

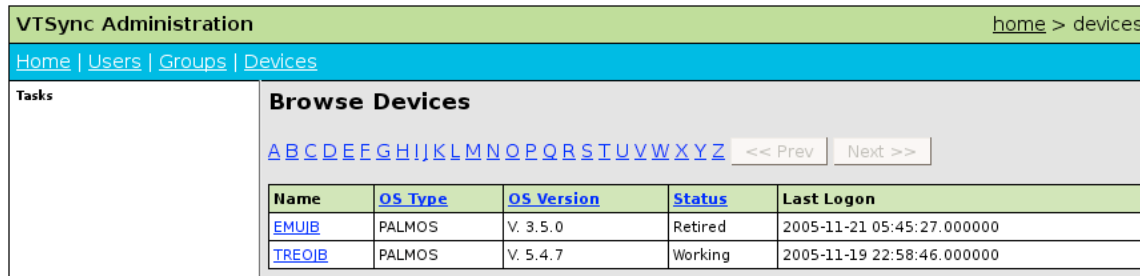
## 2.4 Delete Group

- From the **Edit Group** page, select **Delete this Group** from the left-hand tasks panel.
- Select **Yes** from the confirmation dialog to complete the user deletion.

## 3 Devices

The following administrative functions are used to manage the fleet of devices that have connected to the KSync server. Device entries are created and updated automatically as they connect to the server.

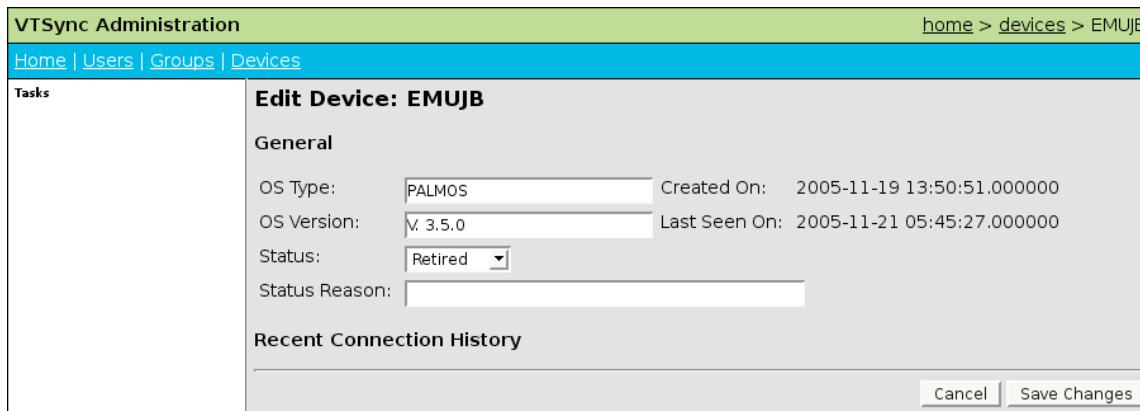
### 3.1 Browse / Find Device



Name	OS Type	OS Version	Status	Last Logon
<a href="#">EMUJB</a>	PALMOS	V. 3.5.0	Retired	2005-11-21 05:45:27.000000
<a href="#">TREOJB</a>	PALMOS	V. 5.4.7	Working	2005-11-19 22:58:46.000000

- Click on a column header to sort the results by that field.
- Select the **Next** and **Prev** buttons to scroll through the results.
- Select the link containing the device's ID to edit that device.
- To search for a device, enter all or part of the device's ID into the search box in the left-hand tasks panel and hit Return. A list of all devices matching these criteria will be displayed.

### 3.2 Edit Device



- Select an ID from the device browser or search results page to edit that device.
- Change the device attributes as necessary using the controls provided.
- Selecting **Save Changes** will commit the changed device information to the database. Select **Cancel** to revert changes made in this screen.

## 4 Other

### 4.1 Reports

In a forthcoming version of the administration software, this screen contains reports on KSync users, groups, and devices.

### 4.2 Server Administration

In a forthcoming version of the administration software, this screen contains functions for updating the reference files on the server, starting/stopping the KSync software, and other administrative tasks.

### 4.3 Send Message

#### Send a Message

Send a text message to one or more users, groups, and devices. To add additional recipients, enter usernames, group names, and device IDs in the **To** field, separated by commas.

From: JAMES BIELMAN

To:

Subject:

This screen is used to send messages to one or more users, groups, and devices. Enter the recipient names, subject, and message body in the text boxes provided, and the messages will be sent during the next handheld connection.