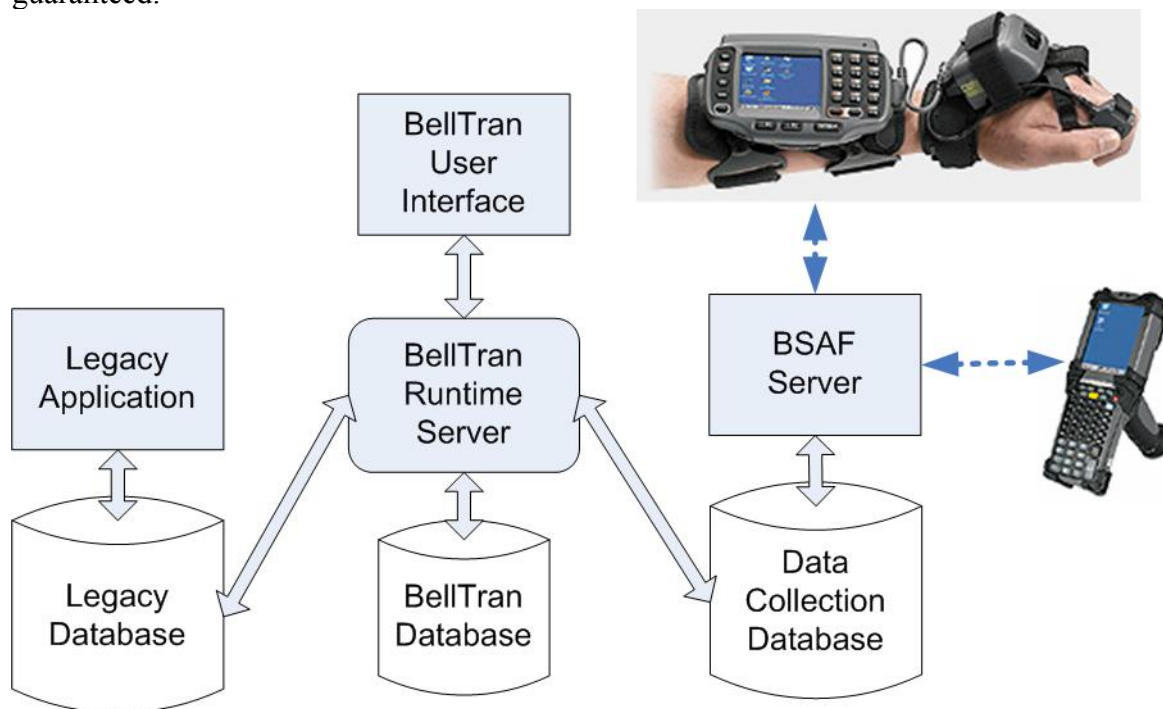




BSAF Overview

BellHawk Systems' BSAF™ (pronounced Be-Safe) store and forward technology provides true distributed computing in environments where there is unreliable or intermittent communications. It is used to exchange data between databases in wireless mobile data collection computers and a data collection database. This is typically used in conjunction with the BellTran™ data exchange server to create mobile data collection services for legacy systems. BSAF can also be used to provide reliable data exchange between databases over low-cost Internet VPN links and to transfer data between legacy applications to a central Webserver.

A primary use of BSAF is to provide reliable transfer of information between the data collection database and databases in each mobile device even when communications reliability cannot be guaranteed.



BSAF is appropriate for use in industrial applications where:

1. There is a large amount of metal that may interfere with or absorb radio waves. Examples of this include stock rooms and warehouse with metal racking or where floor stacked products are made of metal or contain conducting liquids or solids. It is very difficult in these environments to avoid blind spots in communications even after installing many expensive access points and antennas. With BSAF, it is only necessary to provide enough coverage so that users come into communications range as they move around their work environment.

2. There is heavy electrical machinery in the vicinity of the data collection device or nearby industrial processes such as welding that emit electrical "splash" noise that interfere with communications. With BSAF, transmissions are repeated until the data is successfully stored away at the destination.
3. Communications are not available at the point where data is to be collected. This includes many outdoor applications and data collection at locations where there is no wireless coverage. It also includes applications using data transmission over cell-phone data networks where coverage can be intermittent or non-existent in places.
4. Communications takes place over the Internet, possibly using low-cost VPN connections. BSAF is ideal for data collection in remote facilities as it does not require rapid response from the server over the Internet. With BSAF data is collected in the local database in the mobile computer and then relayed to the server at whatever speed and bandwidth is available.

BSAF uses its own packet protocol built on top of basic UDP services. All it requires is an IP address for each device and the server plus a common set of sockets. BSAF supports all security and encryption methods that are applicable to UDP packets.

The use of a local database and application in the mobile computer, which reliably and automatically exchanges data with a data collection server, opens up the possibility of much improved performance over Batch Mode operation and Terminal Services operation of mobile devices.

In batch mode, the scans used for data collection are saved in the mobile devices memory until it is placed in a cradle connected to a PC. Then the data is uploaded to the legacy application. The major problems with batch mode are:

1. There is little or no data validation at time of data capture. As a result bad data can easily be transferred to the legacy system, which can require extensive time for post data capture analysis and data correction. With BSAF, there can be extensive real-time data validation against data automatically uploaded into the local database as each data item is captured. This enables the user warned in real-time if they are about to make a data entry or operational mistake.
2. The scan sequences are fixed. There is no use made of knowledge about the data item scanned to simplify scanning. With BSAF, users can be directed to scan only the data needed based on the data scanned to date. This can simplify and speed data collection.
3. There is no real time coordination between data captured by different devices. Coordination only happens on the server after both devices are placed in their cradles. With BSAF data is relayed from one mobile computer to another through the BSAF server as soon as they come within communications range.
4. Operators must remember to frequently place their batch collection devices in a cradle and then must initiate data transfers. With BSAF, the data transfer is initiated automatically whenever the mobile device can communicate with the data collection server, without operator intervention.

The Store and Forward technology used by BSAF also provides an alternative to a Terminal Services approach. In a Terminal Services approach, a terminal emulation or web-browser based application communicates directly to an application running on the same server as the legacy application. This application program then interacts with the legacy database and also provides data validation services. This is better than Batch mode in that it does allow for real time data validation at time of entry but it still has a number of disadvantages:

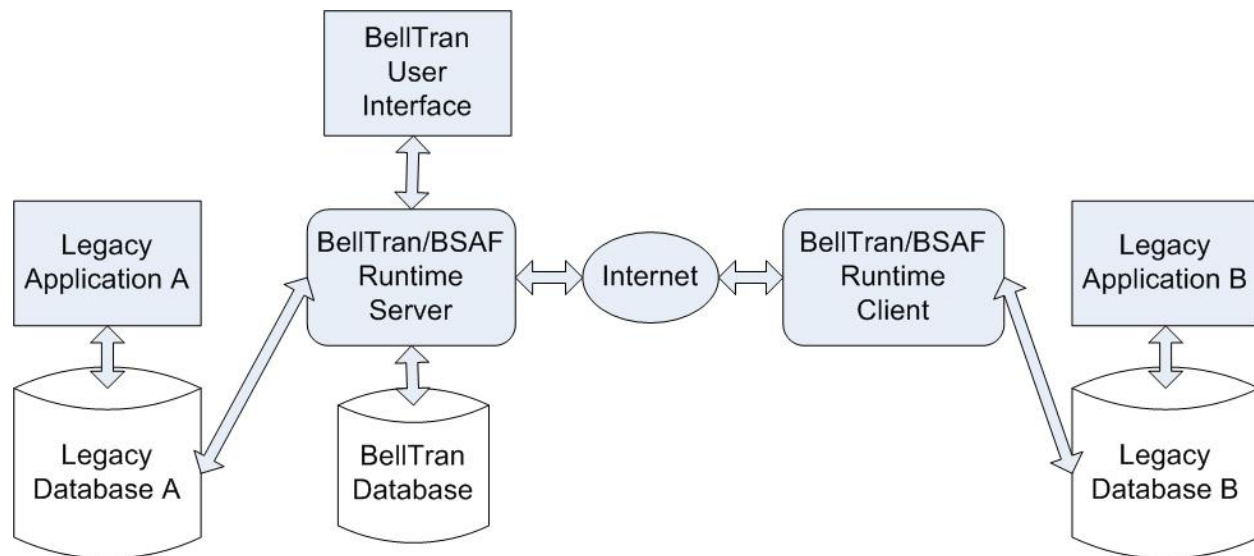
1. It requires continual data communications to work. If the mobile device cannot communicate or there is wireless communications interference, then data cannot be collected and any data collected is lost. With store and forward, data collection can be performed anywhere, anytime irrespective of whether the device can communicate at that time.
2. Any validation of data input has to be done on the server. This may result in substantial delays in response, similar to those experienced in web-browsing. With store and forward all data validation is done locally, just like on your desk-top PC.
3. It requires customization of the legacy systems to integrate database fields and tables not present in legacy systems but are required for data collection. With BSAF these capabilities are provided by the data collection database.
4. It requires the customization of the legacy system to synthesize data captured by multiple devices. With store and forward this data synthesis is performed by the data collection server, enabling data to be transferred to the legacy system in a format that is immediately useable without customization.
5. It requires the legacy system to be always up and running for data collection to occur. With store and forward, data collection can continue if the server is down.

Currently the BSAF wireless server runs on a Windows server computer and the BellHawk database is a SQL Server database. The BSAF client in the mobile computers is VB.Net based and runs in Windows Mobile and Windows .Net operating systems. It supports the SQL CE database in the mobile computers.

The BSAF technology can also be used in environments where the use of wireless communications is precluded for safety or security reasons. In this case the exchange of data between the database in the mobile computer and the data collection server automatically takes place when the mobile computer is placed in a cradle. While this may seem like a return to batch mode, all the benefits of data validation against the local database in the mobile device are retained. Also the devices can be operated in wireless mode where permitted and then, compatibly, in cradle mode when their wireless interfaces are turned off. Terminal Services cannot be operated in this mode as they require continuous wireless communications.

Another major benefit of BSAF is that there are a wide range of compatible pre-built BellHawk software modules that can be used to rapidly implement mobile material tracking and operations management solutions at much lower cost than relying on custom software development. For many applications, these modules can provide over 90% of the lines of code pre-built and pre-test for the application working "out-of-the-box". Then these modules can be customized to the exact needs of the specific business application.

The BSAF technology can also be used in conjunction with BellTran for transferring data over unreliable or low bandwidth links between legacy systems. Here the transfers of data are repeated until they can be successfully completed. The benefit is that the legacy applications do not need to be up and running all the time and neither do the communications.



Another application of the BellTran/BSAF server is reliably and securely exchanging data between legacy systems and LAMP (Linux, Apache, MySQL, PHP) based Webservers operating in a DMZ environment. In such an environment, the Webserver can run continuously and be fed data by legacy applications, when the data becomes available, by transferring it into the MySQL database. Similarly the data can be periodically retrieved from the MySQL database and distributed to the appropriate legacy databases by BellTran/BSAF.

BellHawk Systems implements BellTran and BSAF based data exchange interfaces directly for end clients and in collaboration with its Systems Integration partners. BellHawk Systems also integrates this technology into other organizations' application on a private label basis.