



# **Fax Server**

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**The information/code contained in this document/product is based on the best information we have available. Although it has been tested successfully with other piece of signaling equipment, we cannot guarantee that it will conform to the usage of any particular switch in the field.**

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## 4 CONTENT OF THIS DOCUMENT

This document contains a summary of the configuration and behavior of the *fax server* application.

The user may find useful to also read the document “*tstreamserver API Reference Guide*” which contains much more detailed information on how this Fax server should be used by a developer that wants to use the stream server to terminate fax channels.



## 5 FAX SERVER OVERVIEW

The *fax server* application is used to terminate T.38 fax channels to/from image files. In itself it could only be useful in some cases where all incoming faxes are T.38. Used with a TB640 adapter (with a VOIP mezzanine) the fax server can also terminate T.30 faxes by channeling them through the adapter. The fax server can be used with the stream server to have only one database for all media files and simplify the API.

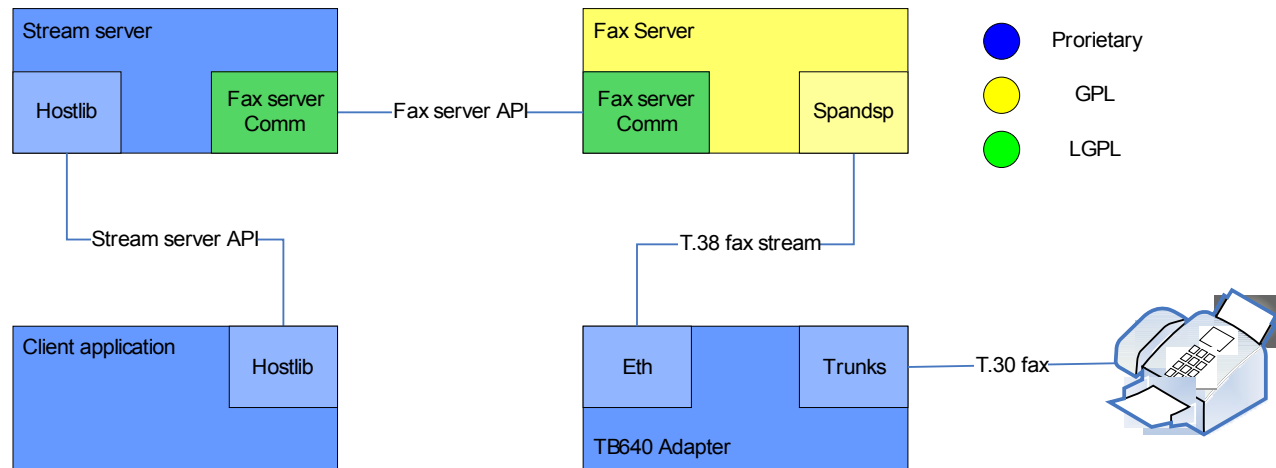


Figure 1: Fax server system

## 6 CAPABILITIES

- Send and receive g TIFF files (this format is ideal for fax).
- Support up to 500 concurrent channels on a single core Pentium 4 3 GHz with 1 Gb of ram.
- No limit on the number of fax servers in a system.
- Load will be distributed evenly on multi CPU machines.
- Works on all operating systems supported by Telcobridges.

## 7 EXTERNAL MODULES

A complete fax termination solution may only be achieved by using a combination of modules as described by figure 1. Each of these modules will be described in detail to help in designing fax terminating systems.

### 7.1 TB640 Adapter

To be able to terminate T.30 fax channels, the fax server needs a TB640 adapter to receive TDM audio and convert it to a T.38 stream. This means that a VOIP mezzanine is required on the adapter (refer to the VOIP wizard to know which version is appropriate).

The fax server is adapter agnostic since it is only given an IP address and port for each channel; this means that any number of adapters may be used by the fax server. It might not be useful to do that

since one VOIP mezzanine can handle about as much channels as the fax server is capable of handling.

The client application is responsible for resource allocation on the adapter since the fax server is not aware of adapters. This may be done through the TB640 API or the connctrl library.

## 7.2 Spandsp

The *spandsp* library is used by the fax server to terminate fax channels; it handles/builds T.38 packets from/to TIFF images. The library is under the GPL license so the sources are provided in the package (refer to the sources to identify which version is used). There is no need to install the library since it may be built in the package tree.

## 7.3 Fax server communication

The *fax server communication* library provides simple TCP based message exchange. Unfortunately it does not support network redundancy and it only establishes point to point communication. The library is under the LGPL license so the sources are provided in the package. It is used by the Fax server API to provide fax server control.

## 7.4 Stream Server

The *stream server* application may control one or multiple fax servers. The stream server stores the fax images in its database so fax server load balancing can be achieved by the clients by selecting alternating fax servers for fax channels.

The stream server API flow did not change for fax termination. Only the file path format changed to add additional parameters:

*[fax\_server\_ip\_address:local\_channel\_port/]file\_path*

Parameter	Description
fax_server_ip_address	IP address of the fax server to use
local_channel_port	Port to be used for receiving T.38 data on the fax server.
file_path	Image file path only TIFF file are supported).

**Table 1: Stream server new file path parameters**

For further information please refer to “*tbstreamserver API Reference Guide*”.

## 8 CONFIGURATION

The configuration file is in xml format. Here is an explanation of its parameters:

Element	Field	Description
channels	max	Maximum number of concurrent fax channels.
spandsp	log_level	Log level (0-9) of the library.
	ident	Ident used for CSI/TSI T.30 frames (usually a number but a string is permitted).
	dis_dcs_len	DIS/DCS T.30 frame size may vary (Faxlab 4 does not handle well having one over 80 bits). For now only 80 and 128 bits are permitted. 80 bits for Faxlab 4 compatibility and 128 bits is the spandsp default.
comm	faxserver_comm_port	Port to listen on for fax server clients. <b>Important:</b> When using the stream server this port must be set to the TBX GW PORT.
	traceserver_level	Trace level for trace server.
	traceserver_ip	IP address to send traces to (sent directly in UDP packets).
	traceserver_port	Port to send traces to.
transfer	window_size	Maximum number of read/write requests to send without response.
	chunk_size_kb	Size in kilobytes of chunks to use for read/write requests.

Table 2: Fax server configuration

## 9 FAX SERVER API

The API to control the fax server is message based and relatively simple. Since this API is wrapped by the stream server, we do not recommend using it directly. For in depth information on the API please check the auto documentation, it goes in the details of every message and their parameters.

There is a library to simplify integration of the fax server API for those who wish to do so. It is called "faxserver" and is included in the package. It is used by the stream server but was not included in figure 1 for simplicity.

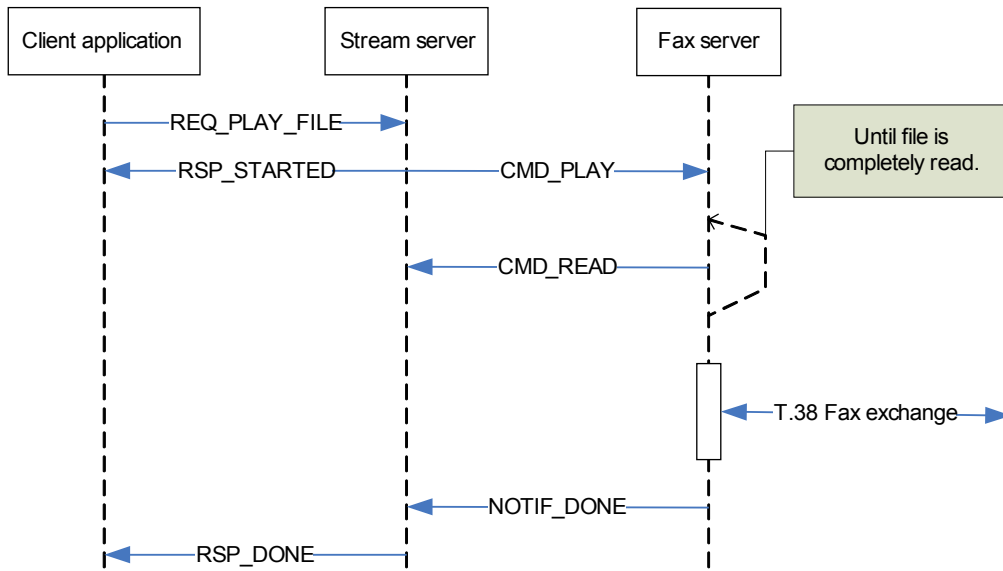


Figure 2: Play fax call flow

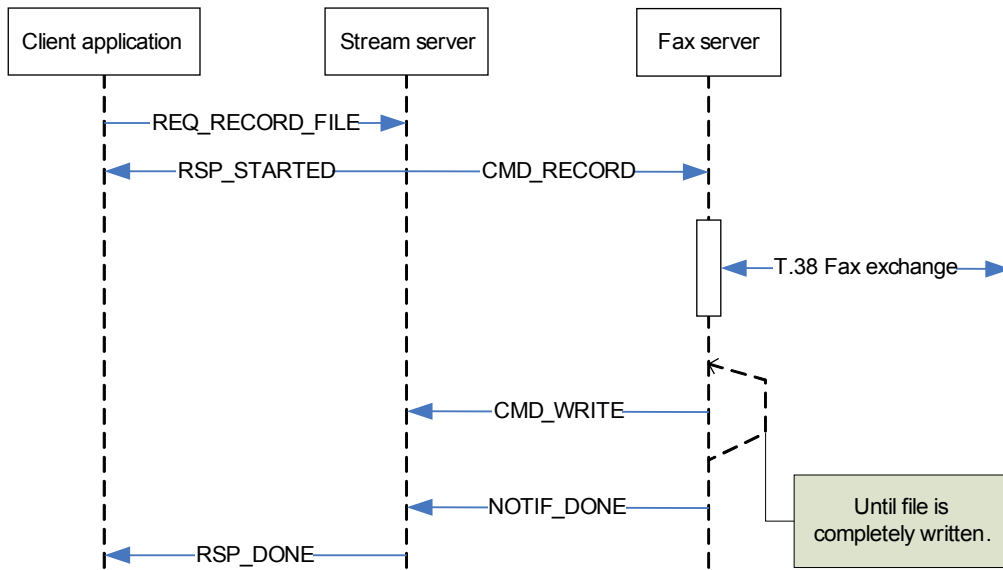


Figure 3: Record fax call flow

## 10 FAX FILE FORMAT

The only supported file format is a group3 tiff file. The faxserver uses libtiff for reading fax files and is compatible with libtiff versions: 3.5.7, 3.6.0, 3.7.1 and 3.8.2. For more information on libtiff see: <http://www.remotesensing.org/libtiff/>

### 10.1 Image requirements

The following TIFF tag values are required:

ImageWidth	1728
BitsPerSample	1
Compression	3 Fax (aka CCITT FAX3)
Photometric	MinIsWhite
SamplesPerPixel	1
XResolution	204
YResolution	98
ResolutionUnit	Inch

We recommend using tiffdump to check a tiff file's attributes.

### 10.2 Prepare your image

1. Re-scale the image width to 1728 pixel
2. Re-sample the XYresolution to 204 dpi per 98 dpi
3. Convert the image to Black and White (1 BitsPerSample, 1 SamplesPerPixel). The libtiff tools may be used to convert from color or grayscale to b&w image in two steps:
  - a. Convert a color image to grayscale:  
tiff2bw ColorImage.tif GrayImage.tif
  - b. Convert a grayscale image to b&w with CCITT Group3 compression:  
tiffdither -i -c g3:1d:fill GrayImage.tif BWimage.tif

### 10.3 Interesting libtiff tools

bmp2tiff	Convert BMP images to TIFF.
fax2ps	Convert a Group 3- or Group 4- compressed TIFF to PostScript that is significantly more compressed than is generated by tiff2ps. (unless tiff2ps writes PS Level II)
fax2tiff	Convert raw Group 3 or Group 4 facsimile data to TIFF.
gif2tiff	A quick hack that converts GIF 87a format images to TIFF.
tiff2bw	A simple program to convert a color image to grayscale.
tiff2pdf	Convert TIFF images to PDF.
tiff2ps	Convert TIFF images to PostScript.
tiffcp	Copy, concatenate, and convert TIFF images. (e.g. switching from Compression=5 to Compression=1)
tiffdither	Dither a b&w image into a bilevel image. (suitable for use in creating fax files)
tiffdump	Display the verbatim contents of the TIFF directory in a file. (it's very useful for debugging bogus files that you may get from someone that claims they support TIFF)
tiffinfo	Display information about one or more TIFF files.

An extensive list may be found at: <http://www.remotesensing.org/libtiff/tools.html>

## 11 ERRORS

Fax transfer is not always successful since there can be noise on the line that can lead to errors. There could also be an incompatibility between the fax machine and the TB640 adapter which could cause errors in the T.30 <-> T.38 conversion (see TBFaxRelayTestReport for more information on the subject). It is possible that a fax transfer fails in the middle of a document; in that case the received image file will have all the pages before the failure.

Sending tiff file that are not group 3 is a common mistake that will lead to errors. Clients should make sure that the files they send are group 3 files. With Windows OS this can be done as follows:

- Install the Fax service and you'll find the Fax printer driver install. Print the file (e.g. doc, pdf, pictures, etc) to fax and before sending it, preview the file and make a copy. The output file will be a Group 4 Tiff image (CCITT T.6), which is accepted by the fax server, but may not work well with the T.38 on the TB640.
- To convert the Group 4 Tiff image into a Group 3 image, we can use the tool provided free (under a BSD like license) by libtiff. One of the ready-made tool is called tiffcp, e.g.:

```
$tiffcp -c g3:1d G4.tiff G3.tiff
```

In the above example, the input file G4.tiff will be converted to Group 3 format G3.tiff file. The tool is also available in Linux and should be easy to find it out from the Internet (it is also common in most Linux distributions). Another tool called tiffinfo (also provided by libtiff) can be used to tell the format of the file.

Since libtiff is open source, it is possible for clients to integrate the tools functionalities in their application to check the tiff file and convert if needed. The only thing the libtiff's license demand is that the disclaimer is provided to the clients.

## 12 LICENSING

Because the spandsp library is under the GPL license we distribute the fax server as such to respect the license. Here are a few guidelines to insure the GPL is respected:

- Distribution of the fax server must be done with the sources included.
- Only modules having GPL compatible licenses may be incorporated to the fax server (GPL and LGPL are compatible).

Here is an exhaustive list of modules used by the faxserver application. Source code of the version used with modifications is included in the package.

- spandsp (GPL).
- libtiff.
- libghthash (GPL).
- faxserver\_comm (LGPL).
- utils (LGPL).

## 13 MANAGEMENT

The user interface of the fax server is pretty much non-existent. It is not possible to control the fax server from the interface and most traces are sent to the trace server. But there are local traces for the following events:

- Communication with client established/lost.
- Error occurred in the fax server itself.

The reason for such a simple interface is that the fax server should be used as a service. The client application should provide the user interface.

## 14 REVISION HISTORY

### ***14.1 Changed in revision 9010-00060-1A***

- ✓ Created document.

### ***14.2 Changed in revision 9010-00060-1B***

- ✓ Added reference to open source libraries used.

### ***14.3 Changed in revision 9010-00060-1C***

- ✓ Added documentation for group 3 requirements.

### ***14.4 Changed in revision 9010-00060-1D***

- ✓ Added documentation for tiff file format requirements.

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End of the document

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