White Paper

Intelligent Inbound Routing

Introduction to STR Software

STR Software develops and supports exceptional solutions in automated document delivery for a worldwide customer base. STR Software's industry leading solutions provide users the capability to email and fax any document you can print directly from any business application. In addition, STR Software offers a complete line of solutions for delivering documents across the internal and enterprise-wide network. By eliminating the need to manually fax or mail documents, our document delivery solutions save users time and money while increasing productivity.

Purpose of this Document

This document provides an overview of intelligent inbound routing methods, analog versus digital fax comparisons, and minimum requirements for digital line signaling.

What is a delivery server and how can intelligent inbound routing benefit companies?

STR Software delivery servers provide a streamlined approach to sending and receiving faxes by eliminating the need to maintain individual fax machines and costly telephone lines throughout your organization.

With Windows and Linux-based delivery servers capable of sending from 10 to over 40,000 pages on a daily basis, a centralized system can deliver your inbound documents to virtually any destination. Whether your users wish to receive their faxes to an email inbox, local network printers, or file destinations, intelligent inbound routing will meet your requirements.

Receiving and Electronically Delivering Faxes

The fax inbound routing feature allows delivery servers to receive multiple faxes simultaneously and route them electronically to a variety of destinations.
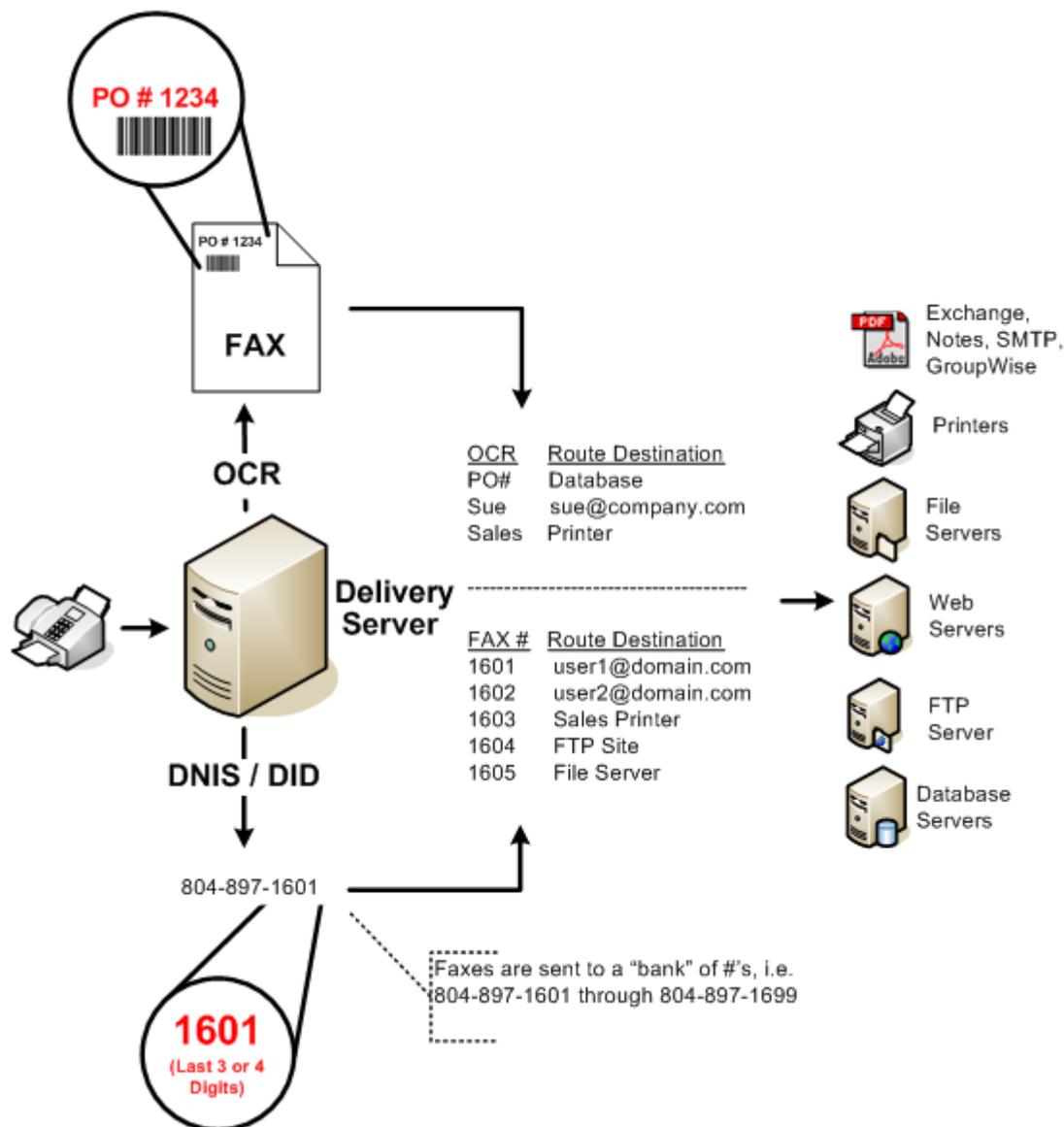
How does the OCR (Optical Character Recognition) Workflow Module Work?

The OCR recognition software extracts information from the incoming fax image and then routes them via workflow rules that are defined in the software. Incoming faxes can be captured and routed to a variety of destinations. These destinations include mail servers, printers, file and network servers, web servers, FTP and sFTP (secure) servers, databases, and more. Using OCR to route faxes to their destination is less expensive than buying hardware technology to route the document. Hardware technology such as DID or DNIS is also limited in the routing rules that can be defined because the rules are based off of the fax number that is being dialed.

Intelligent Inbound Routing

Route inbound faxes to any destination

Intelligent inbound routing enables your organization to centralize the receipt of your inbound fax transmissions to be delivered to virtually any inbound destination (i.e. email inbox, network printer, file folder).

How does DNIS and DID work?

Each "destination" that receives faxes can be given its own unique number from the bank ordered from your telephone company. With DID (Analog) or DNIS (Digital), one line can send faxes to many designations. Each employee can have their own fax number without having a phone line for each of them.

For example, your bank of numbers may be 804-897-1601 through 804-897-1699. The fax server will strip off the last three or four digits (typically the first three are the same) and pass the digits along with the fax. The server then routes the document to its final destinations based on a configuration table within the software or by looking up user information in Microsoft Active Directory, LDAP directories, and/or Notes databases.

How many lines will be required?

In order to keep busy signals to a minimum, companies need to determine how many faxes will need to be received simultaneously. This rule of thumb is typically the best way to determine the number of DID lines or lines needed in a digital line.

Analog vs. Digital Fax Boards

There are three clear advantages to using a T1 line over analog loop start or DID lines: *cost, inbound routing flexibility*, and *channel density*.

1) ## Cost

T1 lines become more cost effective than multiple analog loop start lines when more than four lines are required. The specific number of lines where T1 becomes less costly depends upon the volume of calls you make over the lines and how the T1 is tariffed (priced) by your phone company or long distance provider. A T1 line can support less than the full 24 channels, which means you don't pay for all 24 channels if you need less. This is referred to as a "fractional T1 line" (which Brooktrout T1 boards will work with). Your T1 service provider can help you determine the cost effectiveness of T1 for your fax requirements. Make sure the phone company details all the options and costs, including installation and any special equipment, such as a Channel Service Unit (CSU). Most phone companies will require that you place a CSU between the T1 network and the fax/voice system to recondition the T1 line and also provide diagnostic and loop-back capabilities.

2) ## Inbound routing flexibility

T1 service can also be used to support inbound routing of fax messages on LANs, which is typically accomplished on an analog line with DID telephone service. The T1 equivalent to DID service is called DNIS (**Dialed Number Identification Service**).
DNIS offers two distinct advantages over **DID** service:

a) DID lines are expensive, and difficult to support through corporate PBX systems. This means that DID lines used for inbound faxing typically circumvent the PBX and its goal of centralized telecommunications management; in contrast, T1 is supported through most of today's large PBX systems.

b) DID lines are restricted to inbound calls therefore separate loop start lines are required for outbound transmissions. Alternatively, T1 lines may support inbound routing with DNIS and perform outbound transmissions on the same channel; however the same channel can't be used simultaneously for an inbound and an outbound call; one needs to end the call before the other can begin.

3) ## Channel density

The cost and number of server PCI slots required can be reduced by using digital phone lines when configuring systems requiring more than 8 to 12 channels. This results from the greater maximum channel density of digital boards (up to 24 channels per board) versus analog boards (up to 4 channels per board). However an 8, 12, 16, or 24 channel digital board has significantly greater cooling requirements than a 4-channel analog board, thereby requiring an enclosure with greater airflow than a typical "tower" enclosure provides. This is a significant reason why we recommend that our boards, particularly our digital boards, be put in "servers" rather than "PCs".

Digital Line Signaling Requirements

T1

Each FAXCOM turnkey delivery server is factory-configured prior to shipping. Following is a summary of system options and factory defaults.

CUSTOMER OPTION	POSSIBLE CHOICES	FACTORY DEFAULT	NOTE
Signaling Mode	Robbed-bit	Robbed-bit	Robbed-bit only
Signaling Type	E&M Wink or E&M Immediate*	E&M Wink	FAXCOM does not support Ground
Receive channels with DID (DNIS) digits?	None, All, or Some (1-24)	All	PBX or CO switch configuration
How many DID digits?	0-10	4	PBX or CO switch configuration
Distance, in feet, from FAXCOM to network	0-110, 110-220, 221-330, 331-440, or 441-550	0-110	A Channel Service Unit (CSU) is recommended (see below)
Source of T1 clock signal	FAXCOM or network	Network	Network supplies clock
T1 Framing Type	Super Frame (SF) or Extended Super Frame (ESF)	ESF	Most networks support either
T1 Line Coding	B8ZS or AMI	B8ZS	Most networks support either
Network supplies dial tone?	Yes or No	Yes	FAXCOM must blind dial if no dial tone is provided

*FAXCOM supports only E&M Wink or E&M Immediate. T1 Connector

An RJ48C adapter is provided by the FAXCOM. Pinout is as follows:

Signal Name & Direction	RJ48C Pin
Transmit data: output from EA24 (tip)	5
Transmit data: output from EA24 (ring)	4
Received data: input to EA24 (tip)	2
Received data: input to EA24 (ring)	1

STR Software strongly recommends using a Channel Service Unit (CSU) for those installations connecting directly (not through a PBX) to the phone company. This recommendation avoids a situation whereby the phone company takes down the line because it detects the errors generated by the FAXCOM being powered off. In addition, an EA24 board in the FAXCOM server connected to the network without a CSU may not function properly. A CSU may not be needed If the T1 circuit is local, meaning less than 500 feet from the origin to the termination point and not a direct connection to the network. However, when the distance is greater than 500 feet, or if the EA24 is connected directly to the network, a CSU is technically mandatory. This may be legally mandatory depending on your specific phone company.

Primary Rate ISDN (PRI)

Use the following table as a guide to ordering the correct PRI line.

CUSTOMER OPTION	POSSIBLE CHOICES	FACTORY DEFAULT	NOTE
Signaling Mode	Primary Rate ISDN (PRI)	PRI	If PRI, FAXCOM does not support tagging calls for local, long distance or international
CO Switch Type	AT&T #4 E55 AT&T #5 E55 Northern Telecom DMS-100 Northern Telecom DMS-250 Ericsson MD-110 Siemens Other	AT&T #4 E55	Consult your telephone company.
Receive channels with DID (Called Party Number) digits?	None, All, or Some (1-24)	All	CO switch configuration
How many DID digits?	0-10	4	Normally sends entire called party number
Distance, in feet, from FAXCOM to network	0-110, 110-220, 221-330, 331-440, or 441-550	0-100	A Channel Service Unit (CSU) is recommended (see below)
Source of T1 clock signal	FAXCOM or network	Network	Network usually supplies clock
ISDN Variant	National ISDN #2 or Nortel NIS A211-1	National ISDN #2	National ISDN #1 is not supported

T1 Connector

An RJ48C adapter is provided by the FAXCOM. Pinout is as follows:

Signal Name & Direction	RJ48C Pin
Transmit Data: output from FAXCOM (tip)	5
Transmit Data: output from FAXCOM (ring)	4
Receive Data: input from FAXCOM (tip)	2
Receive Data: input from FAXCOM (ring)	1

Channel Service Unit

A FAXCOM connected to the network without a CSU may not function properly. If the T1 circuit is local less than 550 feet, and not a direct connection to the network, a CSU may not be needed. However, when the distance is greater than 550 feet or if the FAXCOM is connected directly to the network, a CSU is mandatory. This mandatory requirement is set forth by telephone companies since CSU's provide a number of features including signal amplification, test access and loop-back, battery backup and isolation.

E1

Use the following table as a guide to ordering the correct E1 line.

Product Manufacturer:	Brooktrout Technology
Product Name:	Brooktrout TR1034+PxH-E1 card (where 'x' denotes the number of channels active on the card, ie: 8, 10, 16, 20, 30)
Type of line:	Primary Rate, aka PRI, PRA, E1, S2m, T2, ISDN30e
Signal protocol/Variant:	EuroISDN, aka CTR-3, DSS1, Q.931, I.421, ETSI; *not* 1TR6, DASS2 or DPNSS
Clock Master/ Emulation:	We *highly* recommend that the network side be configured as an "NT", and provide the clock.
Framing:	CRC-4 multi-framing recommended
Line coding:	HDB-3
Physical Interface:	120 Ohm or 75 Ohm (aka unbalanced coax); if your interface is an RJ48, then it's 120 Ohm, if a coax connection it's 75 Ohm (Brooktrout supplies a 75 to 120 Ohm converter if your network termination is 75 Ohm)
B Channel Provisioning:	Circuit-Switched Voice
Channel Service:	64Kbps clear channel service end-to-end for every call
Call Distribution:	Linear starting from B1 recommended
Datalink protocol:	*Must* be point-to-point; the telco specification on E1 service doesn't allow any other datalink protocol
B Channel ID for Outgoing Calls:	The Brooktrout board exclusively decides which B channel an outgoing call will proceed on
Compatible Switch Types:	Generic ITU-T compliant
In case you need Inbound Routing :	Inform the teleco company the fax server will be receiving a called party number. In order to receive the digits, you will typically have the following Brooktrout callctrl.cfg settings: - reject_incomplete FALSE - max_did_digits 20 - did_timeout 5
Additional Information	Preferably, you want layers 1 and 2 kept active Please do not specify a specific HLC, eg "telephony"