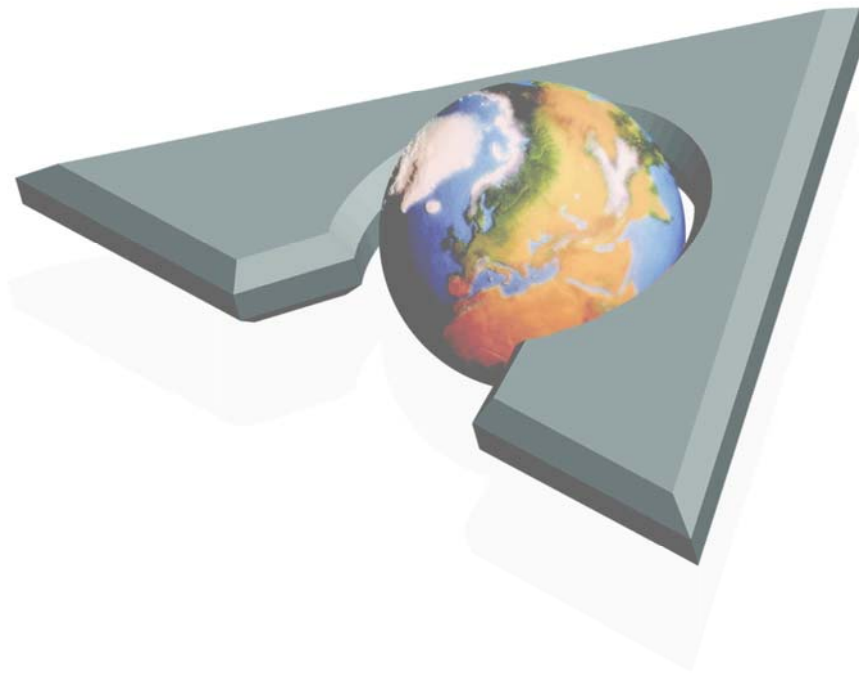


Castelle Network Fax Servers: The All-in-One Fax Solution for Business and Enterprise

## Automatic Routing of Inbound Faxes With Castelle Network Fax Servers

*Fractional T1, Full T1, Fractional E1, Full E1, ISDN, DID and PBX Integration*



**CASTELLE®**

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## Benefits of Automatic Fax Routing

Automatic routing of inbound faxes is one of the many advantages of computer-based, network faxing with Castelle network fax servers. Implementing automatic fax routing is like providing everyone in the office with a virtual fax machine, at a fraction of the cost.

With the necessary analog or digital telephone lines and equipment in place, Castelle network fax servers can be configured to route inbound faxes directly to groups' or individuals' fax or email boxes, shared network or archive folders, printers, or custom applications. Rather than queuing up at the office fax machine for inbound faxes, FaxPress and FaxPress Plus users can receive incoming faxes right at their desktops, from either a fax client interface or their email inbox. An optional alert feature can also be configured to automatically notify users whenever a new fax arrives.

*Note: FaxPress Plus refers to servers running the FaxPress Plus client, and includes all configurations of the FaxPress Premier, FaxPress Enterprise and FaxPress Enterprise Redundant line of servers. FaxPress Premier is for analog lines, and FaxPress Enterprise and FaxPress Enterprise Redundant are for digital lines.*

Castelle network fax servers support a wide range of the telephony services and equipment required for automatic fax routing. Digital line types like T1, E1, and ISDN BRI are supported, as are DID (Direct Inward Dialing) trunk lines, the standard analog trunk type required for automatic routing. Castelle network fax servers are also compatible with most Private Branch Exchange (PBX) systems, as well as VoIP voice servers and integrated access devices frequently used in integrating their network and phone system. The advantages of automatic fax routing include:

- **Confidentiality** – faxes are delivered directly to the user's email inbox or FaxPress/FaxPress Plus server mailbox. Faxes can be completely private from anyone else within the company.
- **Fast Delivery and Response Time** – faxes are delivered directly to the fax or email client, users are alerted to and can respond to incoming faxes immediately.
- **Cost Effectiveness** – with DID and T1, each trunk line can contain many fax numbers. Money is saved since faxes are received electronically rather than printed and manually routed.
- **Paperless Office** – faxes are delivered directly to the recipient electronically so you can be one step closer to the paperless office.
- **Elimination of lost and missing faxes**

In some cases, the benefits of automatic inbound routing extend beyond convenience and efficiency. The secure, automated fax distribution provided by automatic routing actually helps some organizations – such as law offices, health care organizations, medical offices and human resources departments – meet legal obligations to protect client, employee and patient privacy.

Automatic fax routing with Castelle network fax servers also means access to incoming faxes for offsite employees is just as secure and efficient as access from the office. With automatic fax routing, Castelle network fax servers automatically deliver incoming documents electronically to any email user, whether the user is in the office or on the road.

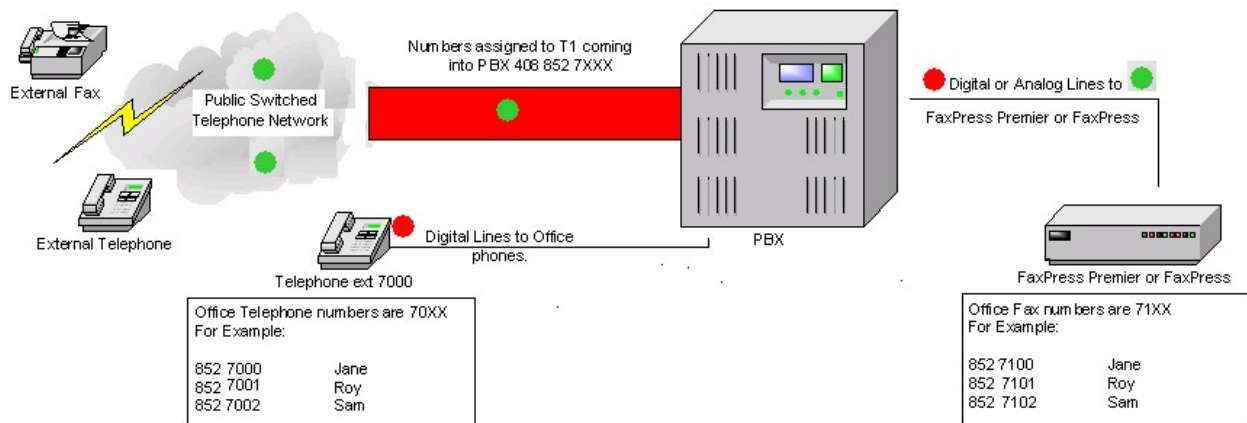
### About Automatic Fax Routing, DID, and DNIS

Automatic fax routing utilizes the same kinds of call routing services typically used for voice phone calls into PBX systems, where the last three or four digits of a telephone number dialed are used to identify the extension of the recipient. Provided by local phone companies, these call routing methods are available for both analog (DID trunk) line types and digital (fractional T1, T1, fractional E1, E1, ISDN BRI) line types, and enable callers to directly dial individual phone number extensions without having to go through an operator or automated call attendant.

The phone company can provide a block or blocks of consecutive phone numbers over one or more digital or analog lines, allowing organizations to have individual phone numbers for each employee without having to purchase a physical line for each possible connection.

### How Automatic Fax Routing Works

Whether DID (Direct Inward Dial) is being used over analog DID trunk lines, or DNIS (Dialed Number Identification Service, typically used with digital service) is being used over fractional T1, T1, fractional E1, E1 or ISDN BRI lines, the same kind of service is enabled: a single physical line is used to support multiple phone numbers that callers can directly dial to access an individual or an individual's FaxPress or FaxPress Plus server user mailbox.



DID and DNIS can be used for inbound faxing as well as for live voice connections, and the same general rules apply. With every network user or network device identified by a unique fax number, the FaxPress or FaxPress Plus server can automatically deliver incoming faxes over the local area network to individual fax recipients. Employees share

one Castelle network fax server, but customers can dial a different fax number for each person in the office.

DTMF tones are required for the FaxPress and FaxPress Premier to identify the extension of the dialed number with the recipient's FaxPress or FaxPress Premier mailbox ID. The DID conversion device stores the DID signals as DTMF tones and passes the DTMF tones to the FaxPress or FaxPress Premier.

The DID converter device used to translate the DID signals to DTMF tones can be:

- A PBX system capable of DID to DTMF conversion.
- An Exacom conversion device.
- An Adtran integrated access device (such as the Adtran Atlas 550/850 or Adtran Total Access 600 series).

The DID conversion device is used with the analog FaxPress and FaxPress Premier fax servers only. With DNIS service over digital (fractional T1, T1, fractional E1, E1 or ISDN) lines, the automatic fax routing process is similar.

### **Analog (DID) or Digital (Fractional T1, Full T1, E1, ISDN) Lines?**

Automatic fax routing requires ordering either DID trunk lines (analog) or fractional T1, Full T1, fractional E1, Full E1 or ISDN lines (digital) from your local phone company. If your organization requires fewer than four fax lines, consider ordering analog DID trunks. For four to eight fax lines, consider ordering a digital fractional T1 from your telephone company. If you think your organization requires more than eight fax lines to handle your fax volume, then consider ordering a digital T1 line (E1 in Europe). If incoming fax volume is relatively high, such as in sales or customer service departments, one DID trunk line or T1 channel should be provided for every eight to ten people.

If your organization's fax volume does not require a dedicated digital line for faxing, Adtran integrated access devices can be used to divide digital lines, allowing some of the digital line's channels to be allocated for voice calls and some for faxing.

### **FaxPress and FaxPress Premier Options for DID Trunk Lines**

With regard to equipment, the main consideration in integrating FaxPress and FaxPress Premier servers with a DID trunk line is making sure there's a device in place that will do the DID to DTMF conversion.



**DID Trunk and FaxPress or FaxPress Premier Integration**

For the FaxPress and the FaxPress Premier, these four basic equipment configuration options provide the required DID to DTMF conversion:

- A FaxPress Premier with a PBX capable of DID to DTMF conversion.
- A FaxPress Premier with an Exacom DID to DTMF converter.
- A FaxPress (2500, 5000) with a PBX capable of DID to DTMF conversion.
- A FaxPress (2500, 5000) with an Exacom DID to DTMF converter.

**FaxPress, FaxPress Premier and FaxPress Enterprise Options for Fractional T1, Full T1, Fractional E1, Full E1, and ISDN Lines**

The following configuration options provide the equipment required for digital lines:

A **FaxPress Enterprise** (Fractional T1, T1, Fractional E1, E1 or ISDN) with a **PBX**.



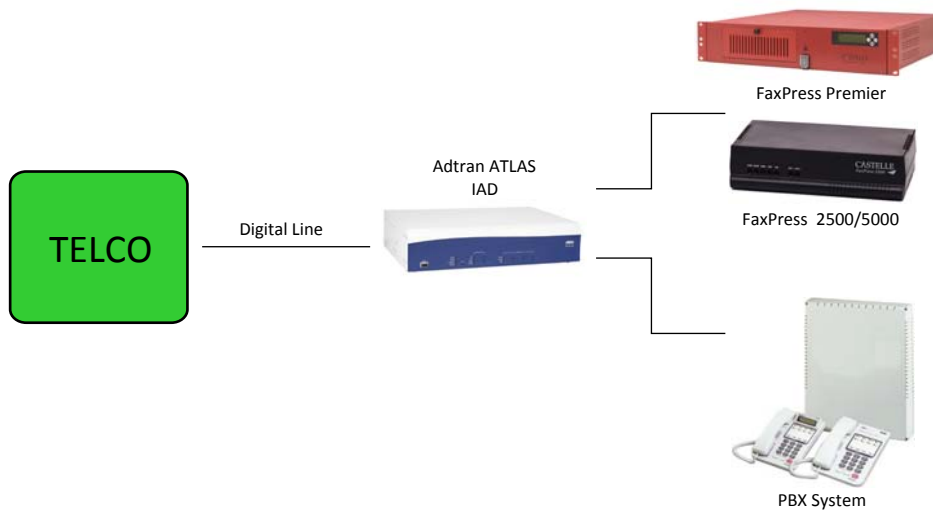
**Option 1: Digital Line and FaxPress Enterprise with PBX**

A **FaxPress Premier** or **FaxPress** (2500, 5000) with a **PBX** capable of both digital to analog conversion and DNIS to DTMF conversion.



**Option 2: Digital Line and FaxPress Premier or FaxPress with PBX Capable of Digital to Analog Conversion**

A **FaxPress Premier** or **FaxPress** (2500, 5000) with an **Adtran** integrated access device to split the digital line into digital channels for the PBX and analog lines for the analog Castelle fax server.



### Option 3: Digital Line and FaxPress Premier or FaxPress with Integrated Access Device

#### Digit Strings and FaxPress Plus Parsing Capability

FaxPress Plus server units come equipped with a configurable digit filter that provides advanced digit string parsing capability, allowing the FaxPress Premier to integrate easily with most PBX systems. The FaxPress Plus' digit filter can be configured to discard any unnecessary information and retain the digit information required to identify the users' FaxPress Plus server mailbox IDs. The FaxPress Plus server supports up to 7 digits for the mailbox ID, although mailbox IDs are more commonly 3 or 4 digits.

FaxPress (2500, 5000) units support 3 or 4 digit mailbox IDs. The FaxPress parsing capabilities provide support for over 40 different kinds of digit strings, including but not limited to the examples below.

For 4-digit mailbox IDs (e.g. a "7081" extension), the FaxPress can:

- From a 16 character set, strip 10 characters in front of the 4 digit mailbox ID, and 2 characters after the mailbox ID (e.g. xxxxxxxxxxx7081xx)
- From a 10 character set, remove 5 characters in front of the 4 digit mailbox ID, and 1 character after the mailbox ID (e.g. xxxxx7081x)
- From a 6 character set, remove 2 characters in front of the 4 digit mailbox ID (e.g. xx7081)
- From a 5 character set, remove a # sign before or after the 4 digit mailbox ID (e.g. x7081 or 7081x)

For 3-digit mailbox IDs (e.g. an "081" extension), the FaxPress can:

- From a 15 character set, strip 10 characters in front of the 3 digit mailbox ID, and 2 characters after the mailbox ID (e.g. xxxxxxxxxxx081xx)
- From a 9 character set, remove 5 characters in front of the 3 digit mailbox ID, and 1 character after the mailbox ID (e.g. xxxxx081x)
- From a 5 character set, remove 2 characters in front of the 3 digit mailbox ID (e.g. xx081)
- From a 4 character set, remove a # sign before or after the 3 digit mailbox ID (e.g. x081 or 081x)

### **Automatic Routing with DID Trunk Lines**

With a standard loop-start line, the phone company's central office equipment supplies the power. With analog DID trunk lines, however, the line is always dead by design; the customer premise equipment supplies power to the line.

Also, DID trunks do not support outgoing calls. To send faxes as well as receive them, the FaxPress or FaxPress Premier modems must also be connected to a regular phone line for outgoing calls in one of the following ways:

- Connect one of FaxPress or FaxPress Premier's modems to the DID Exacom or Adtran CSU/DSU for incoming faxes, and connect another modem to a regular (POTS) phone line for outgoing faxes. In this case, the fax line connected to the DID converter is configured for input only, while the fax line connected to the regular phone line is configured for outgoing faxes.
- Use a DID interface module with a dial out port (such as the Exacom DID-200SFT), and connect a regular phone line to the interface module's dial out port.

### **Required Information/Questions for the Phone Company**

There is some information the phone company can provide that will be required for configuring the FaxPress and FaxPress Premier for DID trunk line integration and automatic routing:

- When you order your DID trunk line from the phone company, make sure you know how many phone numbers you want on that trunk and the range of phone numbers assigned to the DID trunk. You'll configure the FaxPress or FaxPress Premier user accounts to map to the trunk group phone numbers provided by the phone company.
- Ask how many digits (typically 3 or 4, but sometimes as many as 7) will be passed from the central office equipment. The number of these digits determines the FaxPress or FaxPress Premier Mailbox ID. To configure the mailbox IDs, you'll need to know the number of digits being passed. FaxPress

and FaxPress Premier have a *dtmf.log* file diagnostic tool that can determine precise DID string information.

### **DID to DTMF Conversion Options**

Automatic fax routing using DID trunk lines and analog FaxPress and FaxPress Premier fax servers requires some kind of DID to DTMF conversion device. The Castelle FaxPress 2500, 5000 and FaxPress Premier are designed to work with standard loop start telephone lines rather than DID trunk lines. DID trunk lines cannot be connected directly to the FaxPress analog modems; this could cause damage to the FaxPress modems.

FaxPress and FaxPress Premier servers require either a DID to DTMF converter device or a PBX capable of DID to DTMF conversion. PBX systems that support loop start integration for voice mail, with configurable DTMF transmission, are ideal for FaxPress and FaxPress Premier fax servers.

### **Automatic Routing with Fractional T1, Full T1, Fractional E1, Full E1 and ISDN Lines**

The FaxPress Enterprise or Enterprise Redundant supports fractional T1, T1, fractional E1, E1 and ISDN carrier formats. The FaxPress Enterprise/Enterprise Redundant Fractional T1 and FaxPress Enterprise/Enterprise Redundant T1 support high-speed digital transmission in the North American market and in Japan, while the FaxPress Enterprise/Enterprise Redundant Fractional E1, FaxPress Enterprise/Enterprise Redundant E1, and FaxPress Enterprise/Enterprise Redundant ISDN support high-speed digital transmission in the European and major portions of the Asian market. Integrated access devices are available that will let you allocate some of your digital line's channels for voice calls and others for faxing if your organization doesn't require a dedicated T1 (or fractional T1, E1 or ISDN) line for faxing.

Digital lines, unlike DID trunks, are bi-directional and can be used for outbound as well as inbound calls and routing. Automatic fax routing can be provided to your company via a T1 or ISDN PRI. These connection methods use DNIS. The FaxPress does not have a digital interface; therefore, the digital connection is used in conjunction with your corporate PBX. Most organizations employ a PBX with this functionality built-in. It is usually just a question of assigning a block of numbers to be used for faxing capabilities and configuring the PBX.

### **FaxPress Enterprise Models**

The FaxPress Enterprise models are designed to integrate with high-capacity digital lines in large-scale, enterprise environments. If your fax volume is high enough to require a dedicated digital line for faxing, the FaxPress Enterprise models are ideal. If your organization doesn't require a dedicated T1 (or fractional T1, fractional E1, E1 or ISDN) line for faxing, the Adtran integrated access devices will allow some of your digital line's channels to be allocated for voice calls and some for faxing. The FaxPress Enterprise T1, FaxPress Enterprise E1 and FaxPress Enterprise ISDN require no conversion devices, but do require a CSU/DSU or a device that will perform CSU/DSU functions.

The FaxPress Enterprise models include the FaxPress Enterprise Fractional T1 and FaxPress Enterprise T1 for North American markets, and the FaxPress Enterprise Fractional E1, FaxPress Enterprise E1 and ISDN for European markets. The FaxPress Enterprise Fractional T1 supports 8 T1 fax channels. The FaxPress Enterprise T1 supports 24 fax channels across a single T1 line, with upgrade packages enabling scalable support for up to 72 fax channels across 3 full T1 boards. For European markets, the FaxPress Enterprise E1 supports 30 fax channels across a single EuroISDN E1 line. Upgrade packages enable scalable support for up to 90 fax channels across three EuroISDN E1 lines. The FaxPress Enterprise Fractional E1 supports 8 E1 fax channels. The FaxPress Enterprise ISDN supports 4 fax channels across 2 ISDN lines. Upgrade packages enable the FaxPress Enterprise ISDN to provide scalable support for up to 12 fax channels across 6 ISDN lines.

Details on the FaxPress Enterprise models are as follows:

FaxPress Enterprise Fractional T1 and FaxPress Enterprise T1 support the two T1 line types typically found in US domestic areas: T1 CAS (also referred to sometimes as T1 or T1 robbed bit) and T1 ISDN-PRI (sometimes referred to as T1 ISDN, T1 PRI, PRI, Primary Rate Access or 23B+D.)

The FaxPress Enterprise's default fax board configuration supports wink start T1 CAS with E&M signaling protocol, line coding type B8ZS and framing type ESF. The default FaxPress Premier board configuration can, however, be modified to support other T1 CAS signaling protocols, line coding and framing types. The board can also be configured to support the T1 ISDN-PRI protocol and its signaling protocol (4ESS, 5ESS, DMS or NI2), line coding and framing types.

The FaxPress Enterprise T1 provides scalable support for up to 72 inbound and outbound fax channels. Four different FaxPress Enterprise T1 configurations are offered:

- Connected with a Fractional T1 line, 8 fax channels (8B+1D if PRI-ISDN signaling protocol)
- Connected with 1 T1 line, 24 fax channels (23B+1D if PRI-ISDN signaling protocol)
- Connected with 2 T1 lines, 48 fax channels (46B+2D if PRI-ISDN signaling protocol)
- Connected with 3 T1 lines, 72 fax channels (70B+3D if PRI-ISDN signaling protocol)

The FaxPress Enterprise's default setting is T1 with Signaling Protocol CAS E&M, Line Coding B8ZS, and Framing ESF, but the FaxPress Enterprise's default digital board configuration can be modified to match your T1 line's configuration. Note: For FaxPress Enterprise to support PRI-ISDN, all D channels must be configured as primary.

FaxPress Enterprise Fractional E1 and FaxPress Enterprise Digital E1 support the E1 line type based on ISDN PRI signaling protocol. FaxPress Enterprise E1 can connect up to 3 E1 lines and support up to 90 fax channels (30 fax channels per each E1 line).

Four different FaxPress Enterprise E1 configurations are offered:

- Connected with a Fractional E1 line, 8 fax channels
- Connected with 1 E1 line, 30 fax channels
- Connected with 2 E1 lines, 60 fax channels
- Connected with 3 E1 lines, 90 fax channels

FaxPress Enterprise ISDN supports the European ISDN BRI line type. FaxPress Enterprise ISDN can connect up to 6 ISDN BRI lines and support up to 12 fax channels (2 fax channels per each ISDN BRI line).

Three different FaxPress Enterprise ISDN configurations are offered:

- Connected with 2 ISDN BRI lines, 4 fax channels
- Connected with 4 ISDN BRI lines, 8 fax channels
- Connected with 6 ISDN BRI lines, 12 fax channels

In addition to the FaxPress Enterprise, Castelle offers the FaxPress Enterprise Redundant models, which offer unsurpassed reliability and uptime in situations where fax server access is of supreme importance. FaxPress Enterprise Redundant offers the same line type choices as the FaxPress Enterprise fax servers, as described above, but feature redundant, hot-swappable power supplies, cooling fans, network cards and hard drives.

#### **Required Third Party Hardware: CSU/DSU**

The Federal Communications Commission (FCC) requires that an FCC part 68 appropriately certified Channel Service Unit/Data Service Unit (CSU/DSU) or PBX be in place before attaching FaxPress Enterprise to the public telephone network. Although the FaxPress Enterprise can, technically, be connected directly to the T1 line, the FCC requires a CSU/DSU be implemented between the FaxPress Enterprise and the T1.

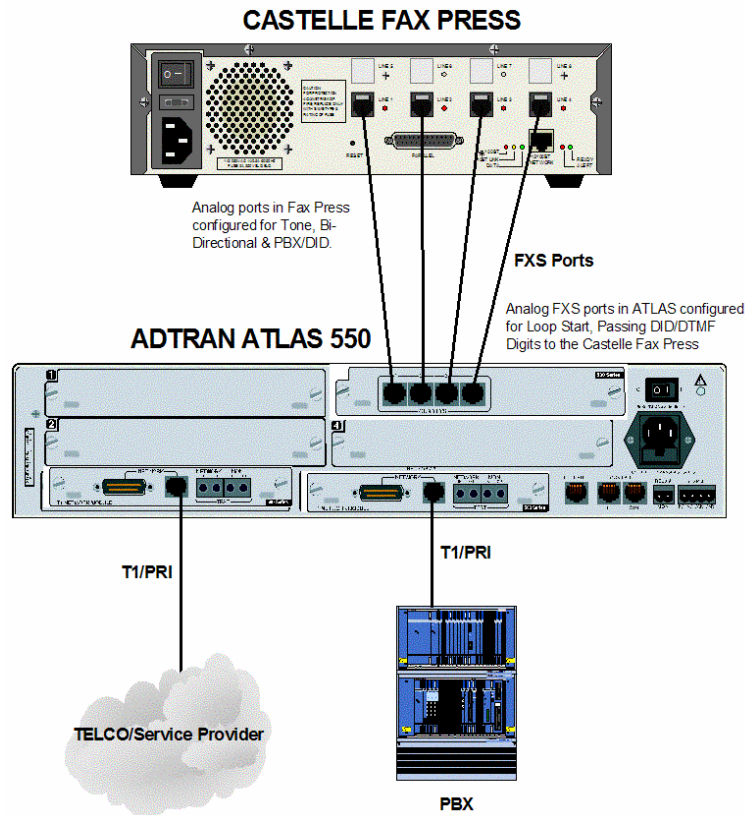
CSU/DSUs are also useful troubleshooting devices, providing line conditioning, loopback and diagnostic capabilities. The signals present on a T1 are susceptible to distortion as loop length increases and various types of interferences are encountered. The CSU/DSU reinforces these signals, keeps track of errors, and provides test modes to help resolve line issues. Many CSU/DSUs also provide an especially useful "keep alive" feature. The "keep alive" feature will keep the T1 link up even if your network interface device goes down. Your T1 line's activation is determined by customer premises equipment. That is, your carrier will turn off your T1 if the central office detects the network interface inactivity on your end. Having a CSU/DSU in place helps to avoid calls to your carrier to ask them to re-enable a T1 shutdown when equipment inactivity on your end is detected.

CSU/DSU devices recommended by Castelle include:

- Adtran T1 ESF CSU ACE P/N: 1204025L1
- Adtran TSU 120 P/N: 1202129L2
- Adtran Atlas 550 and Adtran Total Access 604/608/850

### Subdividing Digital Lines with Integrated Access Devices

If your organization doesn't require a dedicated T1 (or fractional T1, fractional E1, E1 or ISDN) line for faxing, the Adtran integrated access devices will allow some of your digital line's channels to be allocated for voice calls and some for faxing.



### Subdividing a Digital Line with an Adtran Integrated Access Device

#### Integrating PBX Systems with a FaxPress Plus Server

Using your existing corporate PBX in enabling automatic fax routing makes a lot of sense. A PBX used in integrating a FaxPress Plus server with fractional T1, T1, fractional E1, E1 or ISDN lines eliminates the need for a CSU/DSU device. A PBX used in integrating a FaxPress Plus server with DID trunks can also potentially eliminate the need for a DID to DTMF conversion device for the FaxPress or FaxPress Premier, or for a CSU/DSU device for the FaxPress Enterprise or Enterprise Redundant.

FaxPress Plus servers typically work well with PBX systems that can be programmed to translate DID or DNIS signals to DTMF tones and output a relatively common digit string. The FaxPress Plus servers provide a customizable digit filter feature that can be configured

to work with any kind of digit string. These units can also be configured to support up to 7 digits for the mailbox ID.

The FaxPress 2500 and 5000 fax servers can accommodate a wide variety of known digit strings, but do not offer the same flexibility with regard to digit strings provided by the FaxPress Plus server line's configurable digit filter. The FaxPress units support 3 or 4 digit mailbox IDs, rather than the FaxPress Plus server's 7-digit mailbox IDs.

### **Compatible PBX Systems**

Castelle's FaxPress and FaxPress Plus fax servers support a wide variety of PBX systems from a large number of manufacturers.

For a current list of specific PBX systems known to work with the FaxPress and FaxPress Premier, please visit the Castelle web site at <http://www.castelle.com/products/pbx.htm>.

### **Third Party Devices and Converters: Contact Information**

For more information on the PBX systems, DID to DTMF converters and integrated access devices mentioned in this white paper, you can contact these companies:

EXACOM  
DID to DTMF Converters  
99 Airport Road  
Concord, NH 03301  
Phone (603) 228-0706  
Fax (603) 228-0254  
<http://www.exacom.com>

ADTRAN, Inc.  
Integrated Access Devices  
[info@ADTRAN.com](mailto:info@ADTRAN.com)  
901 Explorer Boulevard  
Huntsville, AL 35806  
(256) 963-8000 (Voice)  
(256) 963-8030 (Fax)  
<http://www.adtran.com>

### **Additional Information and Pre-Sales Support**

Additional technical details, integration tips and configuration can be found on the Castelle Support site at <http://www.castelle.com/support>. If you need additional information to determine exactly which automatic fax routing configuration will work for you, feel free to contact Castelle Sales at (800) 289-7555 or email [sales@castelle.com](mailto:sales@castelle.com). Castelle Sales is available to answer technical questions you may have regarding the Castelle fax server products or questions regarding fax server trade-in options. For more information on the FaxPress Premier and FaxPress product lines, please refer to the additional Castelle white papers at <http://www.castelle.com/products/whitepapers.htm>.

For pricing details on DID trunks and T1, E1 and ISDN lines, contact your local phone company.

# CASTELLE®

Founded in 1987 and headquartered in Morgan Hill, California, Castelle develops office automation systems that allow organizations to easily implement faxing over local area networks and the Internet. Whether it's a small business or a large enterprise, Castelle network fax servers are tailored to meet the needs of any organization. Castelle products are easy to use and maintain, and provide an economical way for companies to share resources over the network. Our products are used by Fortune 1000 companies and small to medium-sized businesses, and are available through a worldwide network of distributors, value-added resellers, systems integrators and e-commerce retailers.

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