Asterisk Desktop Assistant (ADA)

Administrator Manual

Digium, Inc.   **Page 2**

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Chapter 1:   Overview

1.1   About ADA

The Asterisk Desktop Assistant (ADA) is a software application designed to make dialing and handling phone calls much faster and easier. This is accomplished by integrating with the software on your computer and making phone numbers easy to dial using a single click. A browser plug-in will automatically find and hyperlink phone numbers. All you have to do is click, and your call will be dialed.

ADA works by sending the phone number you wish to dial to your Asterisk server and initiating a call back to your phone. Once your phone rings and you pick it up, the call will be connected to the number you dialed. For Outlook users, the call pop-ups are tightly integrated with your contacts and will show their display name and picture (if available). ADA integrates with Microsoft Office (*i.e.* Outlook, Word, Excel, PowerPoint), Firefox, Thunderbird, and any TAPI (Telephony Application Programming Interface) enabled software such as ACT! and Goldmine. The browser plug-in automatically detects phone numbers contained within the application pages, and the user can dial a call with a single mouse click.

1.2   About This Manual

This document assumes a basic understanding of Asterisk, networking, and DNS (Domain Name Service). For additional information about Asterisk, we highly recommend reading the O'Reilly book titled *Asterisk: The Future of Telephony*. It is available online for free at *www.asteriskdocs.org*.

1.3 What is Asterisk®?

Asterisk is the world's leading open source telephony engine and tool kit. Offering flexibility unheard of in the world of proprietary communications, Asterisk empowers developers and integrators to create advanced communication solutions...for free. Asterisk is released as open source under the GNU General Public License (GPL), and it is available for download free of charge. Asterisk is the most popular open source software available, with the Asterisk Community being the top influencer in VoIP.

1.3.1 Asterisk as a Switch (PBX)

Asterisk can be configured as the core of an IP or hybrid PBX, switching calls, managing routes, enabling features, and connecting callers with the outside world over IP, analog (POTS), and digital (T1/E1) connections. Asterisk runs on a wide variety of operating systems including Linux, Mac OS X, OpenBSD, FreeBSD, and Sun Solaris. It provides all of the features you would expect from a PBX including many advanced features that are often associated with high end (and high cost) proprietary PBXs. Asterisk's architecture is designed for maximum flexibility and supports Voice over IP in many protocols, and can interoperate with almost all standards-based telephony equipment using relatively inexpensive hardware.

1.3.2 Asterisk as a Gateway

It can also be built out as the heart of a media gateway, bridging the legacy PSTN to the expanding world of IP telephony. Asterisk's modular architecture allows it to convert between a wide range of communications protocols and media codecs.

1.3.3 Asterisk as a Feature/Media Server

Need an IVR? Asterisk's got you covered. How about a conference bridge? Yep. It's in there. What about an automated attendant? Asterisk does that too. How about a replacement for your aging legacy voicemail system? Can do. Unified messaging? No problem. Need a telephony interface for your web site? Ok.

1.3.4 Asterisk in the Call Center

Asterisk has been adopted by call centers around the world based on its flexibility. Call center and contact center developers have built complete ACD systems based on Asterisk. Asterisk has also added new life to existing call center solutions by adding remote IP agent capabilities, advanced skills-based routing, predictive and bulk dialing, and more.

1.3.5   Asterisk in the Network

Internet Telephony Service Providers (ITSPs), competitive local exchange carriers (CLECS) and even first-tier incumbents have discovered the power of open source communications with Asterisk. Feature servers, hosted services clusters, voicemail systems, pre-paid calling solutions, all based on Asterisk have helped reduce costs and enabled flexibility.

1.3.6   Asterisk Everywhere

Asterisk has become the basis for thousands of communications solutions. If you need to communicate, Asterisk is your answer. For additional information on Asterisk, visit *http://www.asterisk.org* or *http://www.digium.com*.

Chapter 2: Preparing Asterisk

In order for ADA to function, an Asterisk account with manager access will need to be configured for each ADA user. In addition, your Asterisk dial plan will need to be configured to route calls which ADA sends to the ADA dial plan context.

2.1 users.conf

Modify the *users.conf* file located in the */etc/asterisk* directory to create an Asterisk account with manager access for each ADA user. The following is an example entry:

```
[johndoe]
fullname        = John Doe
hasvoicemail    = yes
secret          = abc123
vmsecret        = 1234
hassip          = yes
hasmanager      = yes       ;enables manager access
```

2.2 extensions.conf

The ADA dial plan context is used to direct and control calls originated by ADA. All calls are dropped into this context using the *Originate* command and the *Local* channel option.

The ADA dial plan context must include an extension for each ADA user. This is because a call originated by ADA will attempt to route through the ADA user's extension in the ADA dial plan context before dialing the selected phone number or extension. An ADA user's extension in the ADA dial plan context must match the username specified in the *users.conf* file located in the */etc/asterisk* directory for that ADA user.

An **include** statement which includes a context that has dial plan logic for routing to internal and/or external numbers must be placed in the ADA dial plan context.

> **Tip:** The ADA dial plan context is a great place to hook into calls before they are bridged by Asterisk (*e.g.* to add SIP headers or set Caller ID). Refer to the *Setting Your Phone to Auto Answer* section for additional information regarding this.

The following is an example entry from the *extensions.conf* file located in the */etc/asterisk* directory for an ADA user with the username of "*johndoe*". The "*default*" context which is included in the following example routes to all internal and/or external numbers permitted by the Asterisk server.

```
[ada]
include => default
exten => johndoe,1,Dial(SIP/johndoe)
```

> **Note:** Dial plan contexts are case-sensitive. Therefore, the ADA context must be specified in all lowercase. ADA will not function otherwise.

Chapter 3: Installing ADA

The following is a list of steps for installing the ADA application.

1. Download the ADA installer from *http://dl1.digium.com/ADA/ADAInstall.exe*.

2. Execute *ADAInstall.exe* to begin the ADA installation process.

3. Follow the step by step installation prompts presented by the ADA installer.

4. The ADA installer will automatically install all of the add-ins for Microsoft Office, Internet Explorer, and Firefox. If the .NET 2.0 framework is not already installed on your system, the ADA installer will automatically install it as well.

   > **Tip:** If ADA is to be installed on multiple PCs, you may save time by downloading and installing the redistributable .NET 2.0 framework package from the Microsoft website at *http://www.microsoft.com/downloads/details.aspx?FamilyID=0856eacb-4362-4b0d-8edd-aab15c5e04f5&displaylang=en*.

Once the installation is complete, ADA will start and prompt the user to log in. Refer to the *Configuring ADA* section for information on how to log in.

Chapter 4:   Configuring ADA

4.1   Settings Screen

The ⬜ icon will appear in the Windows system tray when ADA is started. Perform the following steps to configure ADA.

> **Note:** The system tray is located on the Windows Taskbar.

1. Right-click the ⬜ icon.

2. Click **Settings.** You will be presented with the following screen.
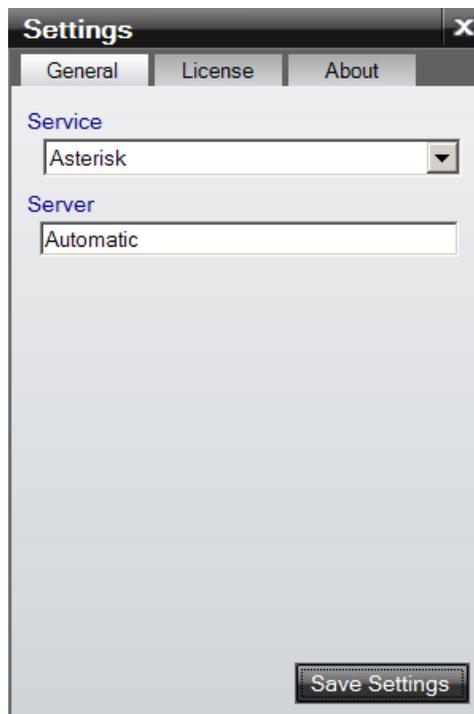
Figure 4.1: Settings Screen

3. The **Service** drop down menu includes *Asterisk*, *Asterisk (AA50)*, and *Switchvox*. At this time, only the selection of *Asterisk* is functional.

4. The **Server** field lists the Asterisk server that ADA will attempt to use. If the **Server** field is set to *Automatic*, ADA will attempt to automatically determine the server that should be used. Refer to the *Automatic Server Discovery* section for additional information regarding this.

5. Click **Save Settings** to save your settings. Then the ADA Settings screen will close.

   Note: At this time, the fields on the License tab are optional and do not affect the functionality of ADA.

4.2 Login Screen

ADA will present you with the following screen when it is started.

Figure 4.2: Login Screen

- **Username** – Enter the username of your Asterisk account into the Username field. The value of the Username field can be as simple as "[*username*]" or as complex as "[*username*]@[*hostname*]:[*port*]". An example value is "*brandon@pbx.digium.com:5038*". "*brandon*" specifies the *[username]* section. "*pbx.digium.com*" specifies the *[hostname]* section. "*5038*" specifies the *[port]* section. This is the username, hostname, and port that ADA will use when attempting to connect to an Asterisk server.

Note: Some deployment settings for ADA can be configured from the server side. It is important to understand how ADA determines which Asterisk server to use. Refer to the *Automatic Server Discovery* section for additional information regarding this.

- **Password** – Enter the password associated with your Asterisk account into the Password field.

- **Remember Password** – If this is enabled, ADA will remember your password the next time you start it.

- **Automatically Login** – If this is enabled, ADA will bypass the login screen and automatically log you in using the last username and password which was specified.

  Note: The Remember Password option must be enabled in order for this option to be selectable.

- **Sign On** – Click this to sign on.

  Note: The icon in the Windows system tray will change to once ADA has successfully connected and authenticated to an Asterisk server.

4.3 Automatic Server Discovery

ADA supports SRV lookups to automatically discover the Asterisk server to use. SRV records can be added to the DNS server of a domain. DNS server configuration is beyond the scope of this manual.

It is important to understand how ADA determines which Asterisk server to use.

4.3.1 Hostname included in Username Field

The following describes how ADA determines which Asterisk server to use when the Username field on the ADA Login Screen includes a hostname. *Reference example: Username field entered as "*brandon@pbx.digium.com*:5038".*

- If the Server field on the ADA Settings Screen specifies a server, ADA will attempt to connect to the Asterisk server specified in the Server field.

  ◦ If the server specified in the **Server** field is not reachable, ADA will fail to connect and log in. A failure notification will be provided to the user.

- If the Server field on the ADA Settings Screen is set to *Automatic*, ADA will attempt to lookup the SRV record for "*_ADA-client._tcp.digium.com*" from the DNS server..

  ◦ If the SRV record is found by the DNS server, ADA will attempt to connect to the Asterisk server and port provided in the SRV record.

    ▪ If the server specified in the SRV record is not reachable, ADA will fail to connect and log in. A failure notification will be provided to the user.

  ◦ If the SRV record is not found by the DNS server, ADA will attempt to connect to the Asterisk server specified in the *[hostname]* section of the Username field.

    ▪ If the server specified in the *[hostname]* section of the Username field is not reachable, ADA will fail to connect and log in. A failure notification will be provided to the user.

  Note: The recommended method of specifying the username field is to include the hostname.

4.3.2 Hostname not included in Username Field

The following describes how ADA determines which Asterisk server to use when the Username field on the ADA Login Screen does not include a hostname. *Reference example: Username field entered as "brandon".*

- If the Server field on the ADA Settings Screen specifies a server, ADA will attempt to connect to the Asterisk server specified in the **Server** field.

  ◦ If the server specified in the **Server** field is not reachable, ADA will fail to connect and log in. A failure notification will be provided to the user.

- If the Server field on the ADA Settings Screen is set to *Automatic*, ADA will attempt to lookup the SRV record for "*_ADA-client._tcp.[dns_suffix]*" from the DNS server. The DNS suffix (*i.e. [dns_suffix]*) is provided to the computer running ADA through a DHCP lease.

  ◦ If the SRV record is found by the DNS server, ADA will attempt to connect to the Asterisk server and port provided in the SRV record.

    ▪ If the server specified in the SRV record is not reachable, ADA will fail to connect and log in. A failure notification will be provided to the user.

  ◦ If the SRV record is not found by the DNS server, ADA will fail to connect and log in. A failure notification will be provided to the user.

Chapter 5:   Tips and Tricks

5.1   Setting Your Phone to Auto Answer

You can cause your phone to auto answer phone calls originated by ADA by modifying the Asterisk dial plan to include a special SIP header before your phone is called. This is done by using the ADA context to hook into the call flow. The Asterisk dial plan is located in the *extensions.conf* file in the */etc/asterisk* directory.

> **Note:** The specific SIP header that must be added will vary depending on the requirements of the phone you are using.

Reference example: Call initiated by an ADA user with the username of "johndoe".

```
[ada]
include => default
exten => johndoe,1,SIPAddHeader("ALERT_INFO=info=alert-autoanswer")
exten => johndoe,n,Dial(SIP/johndoe)
```

5.1.1   Aastra Phones

Auto answer SIP header for Aastra phones:

```
"ALERT_INFO=info=alert-autoanswer"
```

5.1.2   Polycom Phones

Auto answer SIP header for Polycom phones:

```
"Alert-Info:Ring Answer"
```

You may need to modify "alertInfo" and "RING_ANSWER" in the Polycom phone's sip.cfg file:

```
<alertInfo voIpProt.SIP.alertInfo.1.value="Ring Answer"
```

```
voIpProt.SIP.alertInfo.1.class="4"/>
```

And:

```
<RING_ANSWER se.rt.4.name="Ring Answer" se.rt.4.type="ring-answer"
se.rt.4.timeout="10" se.rt.4.ringer="2" se.rt.4.callWait="6"
se.rt.4.mod="1"/>
```

> **Tip:** Verify your XML syntax to ensure a well formed sip.cfg file.

5.1.3   SPA942 Phone

Auto answer SIP header for the SPA942 phone:

```
"Call-Info: <sip:192.168.0.2>\;answer-after=0"
```

> **Note:** Replace 192.168.0.2 with the IP address of your Asterisk server.

5.1.4   GXP-2000 Phone

Auto answer SIP header for the GXP-2000 phone:

```
"Call-Info: Answer-after=0"
```

5.2 Accessing the Database

You may be interested in accessing the local database that ADA uses to script changes to the settings. The settings for ADA are stored in *ADA.db* and *Service.db*. These database files are located in the *%appdata%\Digium\ADA* directory on the system running ADA.

The database engine used used by ADA is SQLite. In order to explore the database, you will need a basic understanding of command line tools and SQL. The *sqlite.exe* command line tool found at *http://www.sqlite.org/download.html* is used to open and modify the ADA database files. The easiest way to open the database is to drag and drop one of the *.db* file onto the *sqlite.exe* file in Microsoft Windows.

> **Note:** Additional information regarding SQLite can be found at *www.sqlite.org*.

Chapter 6: Troubleshooting

Multiple resources are available to obtain additional information about Digium products. These resources are listed on page *21*.

If you are having trouble connecting ADA to your Asterisk server, this could be caused by several different issues. Start by verifying that a firewall is not blocking traffic to and from the Asterisk server. Some anti-virus software applications have been known to silently block ADA from connecting to an Asterisk server.

Analyzing the ADA logs may be helpful in troubleshooting various issues. The *ADA.log* and *Service.log* are ADA log files which are located in the *%appdata%\Digium\ADA directory* in Microsoft Windows.

It may be helpful to log in to the Asterisk console to watch for output of any login errors when debugging connection issues.

> **Note:** The *displayconnects* option in the general section of the *manager.conf* file located in the */etc/asterisk* directory must be set to yes in order for login attempts to be displayed in the Asterisk console output.

6.1 Microsoft Office Integration

Applies to: Outlook, Word, Excel, and PowerPoint

If the ADA add-in is not loading in Microsoft Office, verify that all Microsoft Windows service packs are installed and that the system has been restarted.

Verify that the ADA add-ins are installed and enabled using the following list of steps:

Microsoft Office 2007

1. Open Word.

2. Click on the application icon at the top left of the program's window.

3. Click **Word Options**.

4. Click **Add-ins**.

5. Verify that **ADA (ADASmartTags)** and **ADAOffice** are listed in the Add-ins list.

6. Next to Manage, select **COM Add-ins**.

7. Click **Go**.

8. Verify that **ADAOffice** is enabled.

9. Click **OK**.

Where can I find answers to additional questions?

There are several places to inquire for additional information about Digium products:

Digium Technical Support (+1.256.428.6161), or Toll Free in the U.S. (1.877.344.4861), is available 7am-8pm Central Time (GMT -6), Monday - Friday.

Asterisk users mailing list (asterisk.org/lists.digium.com)

IRC channel **#asterisk** on (irc.freenode.net)

Subscription Services Program

Digium is dedicated to supporting your Asterisk system by offering full technical support through our Subscription Services Program. Through this program, you can be at ease knowing that your business will always have access to the Asterisk experts. Pricing on Subscription Services may be obtained from your nearest reseller or you may call Digium Sales for referral to your nearest reseller at +1.256.428.6000 or e-mail sales@digium.com.

Appendix A: Glossary and Acronyms

ANSI   *American National Standards Institute*

An organization which proposes and establishes standards for international communications.

asynchronous

Not synchronized; not timed to an outside clock source. Transmission is controlled by start bits at the beginning and stop bits at the end of each character. Asynchronous communications are often found in internet access and remote office applications.

attenuation

The dissipation of a transmitted signal's power as it travels over a wire.

bandwidth

The capacity to carry traffic. Higher bandwidth indicates the ability to transfer more data in a given time period.

bit

The smallest element of information in a digital system. A bit can be either a zero or a one.

bps   *bits per second*

A measurement of transmission speed across a data connection.

broadband

Broadband transmission shares the bandwidth of a particular medium (copper or fiber optic) to integrate multiple signals. The channels take up different frequencies on the cable, integrating voice, data, and video over one line.

channel

A generic term for an individual data stream. Service providers can use multiplexing techniques to transmit multiple channels over a common medium.

Cat5

Category of Performance for wiring and cabling. Cat 5 cabling support applications up to 100 MHz.

Cat5E

Category of Performance for wiring and cabling. Category 5 Enhanced wiring supports signal rates up to 100 MHz but adheres to stricter quality specifications.

CLEC   *competitive local exchange carrier*

A term for telephone companies established after the Telecommunications Act of 1996 deregulated the LECs. CLECs compete with ILECs to offer local service. See also LEC and ILEC.

CO   *central office*

The CO houses local switching equipment. All local access lines in a particular geographic area terminate at this facility (which is usually owned and operated by an ILEC).

CPE   *customer premises equipment*

Terminal equipment which is connected to the telecommunications network and which resides within the home or office of the customer. This includes telephones, modems, terminals, routers, and television set-top boxes.

DAHDI   *Digium Asterisk Hardware Device Interface*

A telephony project dedicated to implementing a reasonable and affordable computer telephony platform into the world marketplace. Also, the collective name for the Digium-provided drivers for Digium telephony interface products.

DS0   *Digital Signal, Level 0*

A voice grade channel of 64 Kbps. The worldwide standard speed for digitizing voice conversation using PCM (Pulse Code Modulation).

DS1   *Digital Signal, Level 1*

1.544 Mbps in North America (T1) and Japan (J1) -up to 24 voice channels (DS0s), 2.048 Mbps in Europe (E1) - up to 32 voice channels (DS0s). DS1/T1/E1 lines are part of the PSTN.

DS3   *Digital Signal, Level 3*

T3 in North America and Japan, E3 in Europe. Up to 672 voice channels (DS0s). DS3/T3/E3 lines are not part of the PSTN

DTMF   *Dual Tone Multi-Frequency*

Push-button or touch tone dialing.

E1

The European equivalent of North American T1, transmits data at 2.048 Mbps, up to 32 voice channels (DS0s).

E3

The European equivalent of North American T3, transmits data at 34.368 Mbps, up to 512 voice channels (DS0s). Equivalent to 16 E1 lines.

ECM   *Error Correction Mode*

EMI   *Electromagnetic Interference*

Unwanted electrical noise present on a power line.

Ethernet

Ethernet is a family of frame-based computer networking technologies for local area networks (LANs). It defines a number of wiring and signaling standards for the Physical Layer of the OSI networking model, through means of network access at the Media Access Control (MAC) / Data Link Layer, and a common addressing format.

full duplex

Data transmission in two directions simultaneously.

FXO   *Foreign Exchange Office*

Receives the ringing voltage from an FXS device.

FXS   *Foreign Exchange Station*

Initiates and sends ringing voltage.

G.711

A recommendation by the Telecommunication Standardization Sector (ITU-T) for an algorithm designed to transmit and receive mulaw PCM voice and A-law at a digital bit rate of 64 Kbps. This algorithm is used for digital telephone sets on digital PBX.

G.723.1

A recommendation by the Telecommunication Standardization Sector (ITU-T) for an algorithm designed to transmit and receive audio over telephone lines at 6.3 Kbps or 5.3 Kbps.

G.729a

A recommendation by the Telecommunication Standardization Sector (ITU-T) for an algorithm designed to transmit and receive audio over telephone lines at 8 Kbps.

H.323

A recommendation by the Telecommunication Standardization Sector (ITU-T) for multimedia communications over packet-based networks.

half duplex

Data transmission in only one direction at a time.

IAX   *Inter-Asterisk eXchange*

The native VoIP protocol used by Asterisk. It is an IETF standard used to enable VoIP connections between Asterisk servers, and between servers and clients that also use the IAX protocol.

ILBC   *internet Low Bitrate Codec*

A free speech codec used for voice over IP. It is designed for narrow band speech with a payload bitrate of 13.33 kbps (frame length = 30ms) and 15.2 kbps (frame length = 20 ms).

ILEC   *incumbent local exchange carrier*

The LECs that were the original carriers in the market prior to the entry of competition and therefore have the dominant position in the market.

interface

A point of contact between two systems, networks, or devices.

ISO   *International Standards Organization*

LED   *light-emitting diode*

Linux

A robust, feature-packed open source operating system based on Unix that remains freely available on the internet. It boasts dependability and offers a wide range of compatibility with hardware and software. Asterisk is supported exclusively on Linux.

loopback

A state in which the transmit signal is reversed back as the receive signal, typically by a far end network element.

MAC address   *Media Access Control address*

A quasi-unique identifier assigned to most network adapters or network interface cards (NICs) by the manufacturer for identification.

MGCP   *Media Gateway Control Protocol*

multiplexing

Transmitting multiple signals over a single line or channel. FDM (frequency division multiplexing) and TDM (time division multiplexing) are the two most common methods. FDM separates signals by dividing the data onto different carrier frequencies, and TDM separates signals by interleaving bits one after the other.

MUX   *multiplexer*

A device which transmits multiple signals over a single communications line or channel. See multiplexing.

open source

Software distributed as source code under licenses guaranteeing anybody rights to freely use, modify, and redistribute the code.

OSI Reference Model   *Open Systems Interconnection Reference Model*

An abstract description for layered communications and computer network protocol design.

packet

A formatted unit of data carried by a packet mode computer network.

PBX   *private branch exchange*

A smaller version of a phone company's large central switching office. Example: Asterisk.

PCI   *peripheral component interconnect*

A standard bus used in most computers to connect peripheral devices.

PDF   *Portable Document Format*

A file format created by Adobe Systems Incorporated for document exchange. PDF is used for representing two-dimensional documents in a manner independent of the application software, hardware, and operating system.

POP   *point of presence*

The physical connection point between a network and a telephone network. A POP is usually a network node serving as the equivalent of a CO to a network service provider or an interexchange carrier.

POTS   *plain old telephone service*

Standard phone service over the public switched telephone network (PSTN). This service provides analog bandwidth of less than 4 kHz.

PPP   *point-to-point protocol*

Type of communications link that connects a single device to another single device, such as a remote terminal to a host computer.

PSTN   *public switched telephone network*

The public switched telephone network (PSTN) is the network of the world's public circuit-switched telephone networks. Originally a network of fixed-line analog telephone systems, the PSTN is now almost entirely digital, and now includes mobile as well as fixed telephones.

QoS   *quality of service*

A measure of telephone service, as specified by the Public Service Commission.

RJ11

A six-pin jack typically used for connecting telephones, modems, and fax machines in residential and business settings to PBX or the local telephone CO.

SIP   *Session Initiation Protocol*

An IETF standard for setting up sessions between one or more clients. It is currently the leading signaling protocol for Voice over IP, gradually replacing H.323.

source code

Any collection of statements or declarations written in some human-readable computer programming language.

T.30

A recommendation by the Telecommunication Standardization Sector (ITU-T) for Group 3 fax machines that specifies the handshaking, protocols, and error correction. T.4 and T.30 make up the complete standard for Group 3 fax.

T.38

A recommendation by the Telecommunication Standardization Sector (ITU-T) to permit faxes to be transported across IP networks between existing Group 3 fax terminals in real time.

T.4

A recommendation by the Telecommunication Standardization Sector (ITU-T) for Group 3 fax machines that specifies the page dimensions, resolutions, and compression scheme. T.4 and T.30 make up the complete standard for Group 3 fax.

T1

A dedicated digital carrier facility which transmits up to 24 voice channels (DS0s) and transmits data at 1.544 Mbps. Commonly used to carry traffic to and from private business networks and ISPs.

T3

A dedicated digital carrier facility which consists of 28 T1 lines and transmits data at 44.736 Mbps. Equivalent to 672 voice channels (DS0s).

TDM   *time division multiplexer*

A device that supports simultaneous transmission of multiple data streams into a single high-speed data stream. TDM separates signals by interleaving bits one after the other.

telco

A generic name which refers to the telephone companies throughout the world, including RBOCs, LECs, and PTTs.

TIFF   *Tagged Image File Format*

A file format for storing images.

tip and ring

The standard termination on the two conductors of a telephone circuit; named after the physical appearance of the contact areas on the jack plug.

twisted pair

Two copper wires commonly used for telephony and data communications. The wires are wrapped loosely around each other to minimize radio frequency interference or interference from other pairs in the same bundle.

V   *volts*

V.17

A recommendation by the Telecommunication Standardization Sector (ITU-T) that uses TCM modulation at 12,000 and 14,400 bps for Group 3 fax transmissions. It adds TCM to the V.29 standard at 7,200 and 9,600 bps to allow transmission over noisier lines.

V.21

A recommendation by the Telecommunication Standardization Sector (ITU-T) for asynchronous full-duplex communication between two analog dial-up modems using audio frequency-shift keying modulation (FSK) at 300 baud to carry digital data at 300 bit/s. It is a variant of the original Bell 103 modulation format.

V.27ter

A recommendation by the Telecommunication Standardization Sector (ITU-T) for synchronous 2,400 and 4,800 bps half-duplex modems using DPSK modulation on dial-up lines. It includes an optional 75 bps back channel. V.27ter is used in Group 3 fax transmission without the back channel.

V.29

A recommendation by the Telecommunication Standardization Sector (ITU-T) for full-duplex modems allowing synchronous 4,800, 7,200, and 9,600 bps transfer modes (PSK and QAM modulations). It has been adapted for Group 3 fax transmission over dial-up lines at 9,600 and 7,200 bps.

VoIP *Voice over IP*

Technology used for transmitting voice traffic over a data network using the Internet Protocol.

Appendix B: DIGIUM END-USER PURCHASE AND LICENSE AGREEMENT

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IMPORTANT - PLEASE READ CAREFULLY

1. This Digium End-User Purchase and License Agreement (the "Agreement") is a legal agreement between Digium and its Affiliates (collectively referred to as "Digium") and the licensee, purchaser and end user respectively (hereinafter, "you", "You" or "your") of the Digium distribution media, software and related documentation (the "Software"), Digium services ("Services"), and any Digium computer electronics ("Hardware"), entitlements granted pursuant to a Subscription Agreement, and related manuals (collectively the "Products"). Affiliates means an entity which is (a) directly or indirectly controlling Digium; or (b) which is directly or indirectly owned or controlled by Digium. By downloading or installing the Software or installing the Hardware, you agree to and accept the terms and conditions of this Agreement. If you do not accept, or are not authorized to accept the terms and conditions of this Agreement, then you should not install the Software or Hardware and should remove any installed Software and Hardware from your computer.

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Skype for Asterisk
G.729 for Asterisk
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13. ENTIRE AGREEMENT. This Agreement constitutes the entire understanding between the parties relating to the subject matter hereof and supersede all prior writings, negotiations or understandings with respect thereto. The provisions of this Agreement shall take precedence over any conflicting terms in any subsequent purchase order, documentation or collateral. The parties agree that this Agreement may be executed electronically and that electronic copies of this Agreement shall be binding upon the parties. If any provision of this EULA is held to be void, invalid, unenforceable or illegal, the other provisions shall continue in full force and effect.

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