Dialogic®
Making Innovation Thrive™

White Paper

V.34 Fax - Making Improved Performance and Cost Savings Possible

V.34 Fax - Making Improved Performance and Cost Savings Possible

White Paper

Executive Summary

As fax technology continues to evolve, enterprises are faced with the decision of whether to upgrade their fax solution to V.34, which represents the latest in fax standards.

Nicknamed “V.Fast”, the V.34 fax standard is heralded as an important development in fax technology. Not only can it send fax data at more than twice the speed of V.17 (14.4 kbps), but it also supports fast handshaking, which can cut call setup and session-management time by one-third. Fax devices supporting the V.34 protocol also can deliver more reliable fax transmissions, requiring fewer resends, under a wider range of line conditions than those supporting older fax standards such as V.17 and 9.6 kbps.

This white paper discusses the V.34 fax standard, and how those choosing to adopt 33.6 kbps fax devices and use V.34 fax technology can position themselves for benefits such as increased cost savings.

Choosing a Media Gateway Appliance

White Paper
Media Gateways

Table of Contents

V.34 Fax - Making Improved Performance and Cost Savings Possible

White Paper

Introduction

Fax continues to be an important and cost-effective means for business-to-business and business-to-customer communications. It is estimated that more than 90% of U.S. businesses have fax machines in the office, and sales of fax machines in recent years have maintained a steady growth rate. Even with the popularity of email, more than 7.5 million fax machines were sold in 2002 alone. [Davidson]

Recent advancements in fax technology have resulted in a renewed interest in fax in the business environment. One such advancement is the introduction of the V.34 fax standard, which can help enable businesses to increase productivity and reduce costs.

This white paper discusses the V.34 fax standard features that can help enable improved performance and reliability, and how the adoption of 33.6 kbps fax devices can position enterprises that choose to use the latest in fax technology, V.34, to experience increased cost savings.

What Is the V.34 Fax Standard?

The V.34 fax standard was established by the International Telecommunications Union (ITU) as the standard for full-duplex modems sending and receiving data across phone lines at up to 33.6 kbps. Compared to the V.17 (14.4 kbps) standard and 9.6 kbps fax, V.34 allows faster transmission time per fax page, greater adaptability to varying line conditions, and a reduction in the number of resends per fax. These improvements can translate to cost savings, such as from reduced fax-related phone bills.

In order to understand the benefits offered by the V.34 standard, it is first necessary to understand how a fax call takes place. The first step is the "handshake" that determines several factors relating to how the fax call will be set up. In particular, the handshaking stage enables the sending and receiving fax device (such as a fax machine or fax server) to find a common speed at which the fax can be transmitted. With a 9.6 kbps or a V.17 modem, the handshaking is done at 300 bps. With V.34 fax, the handshaking is done at a much faster rate of 1200 bps. The result is that handshaking time is reduced from approximately 16 seconds with 9.6 kbps and V.17 to about seven seconds with V.34.

The next stage of a fax call is data transmission. V.34 provides what is currently the widest range of supported data transmission rates, allowing it to obtain more favorable speeds and reliability over a wider range of line conditions. With V.34, fax pages are transmitted at 33.6 kbps, which is more than twice the speed of V.17, which transmits at 14.4 kbps, and more than three times the speed of 9.6 kbps fax. After each page is transmitted in a V.34 system, a retraining or re-synchronizing process is done between each additional page until the fax call is completed.

V.34 also improves the handshake and connection process through a feature called "line probing". Line probing allows a V.34 device to intelligently choose operating parameters for any given connection. Following the handshaking stage, complex signals are transmitted that allow the distant receiver to analyze the characteristics of the connection before beginning the data transmission stage. The connected devices use this line analysis to choose several key operating parameters. Line probing is performed on every new connection, and can also be performed at selected times during the connection as part of the retraining process. As a result, V.34 allows devices not only to adapt to a broad range of different line types and distortions from call to call, but also to accommodate varying line conditions over long periods of time.

ROI of a V.34 Fax Server

The total cost savings that can be accrued by using V.34 fax versus V.17 and 9.6 kbps fax is relative to the total amount of time it takes to send a fax using each fax transmission. Table 1 shows the anatomy of an enterprise fax phone call, and compares the time each step in the process takes for each fax transmission rate.

For a fax being sent using V.34, once the handshaking is completed, the first page is transmitted at 33.6 kbps. This means that the first page of a typical four-page fax will transmit in seven seconds, versus 16 seconds with the older technology. For the example of the typical four-page fax transmission, the transmission time can vary from 166 seconds with a 9.6 kbps modem, to only 41 seconds using V.34 fax technology, saving more than two minutes per call.

	9.6 kbps 4-Page Fax (in seconds)	V.17 4-Page Fax (in seconds)	V.34 4-Page Fax (in seconds)
Handshake	16	16	7
Page 1 (3%)	18	12	5
Retraining	6	6	0.25
Page 2 (6%)	27	18	7
Retraining	6	6	0.25
Page 3 (6%)	27	18	7
Retraining	6	6	0.25
Page 4 (12%)	54	36	14
Retraining	6	6	0.25
TOTAL	**166 seconds**	**124 seconds**	**41 seconds**

Table 1. Average Fax Trasmission Times [Davidson]

V.34 fax can save users thousands of dollars when compared to V.17 and 9.6 kbps fax. Table 1 shows the time savings accrued per fax using V.34 fax, compared with the slower 9.6 kbps and V.17 fax transmissions. The long-term cost savings over a five-year period is calculated in Table 2 by multiplying the average fax transmission times by V.34 traffic rates and average per minute phone costs.

For Table 2, the following assumptions are used:

- The time required to transmit a four-page V.34, V.17, and 9.6 kbps fax are 41 seconds, 124 seconds, and 166 seconds, respectively (see Table 1).
- Daily fax usage by a typical enterprise customer is assumed to be 1,250 four-page faxes, which equates to 5,000 pages per day.
- A weighted average of $.07 per minute phone charge is used, based upon the assumption that 25% of faxes are free (for example, to a local area code), 62.5% are long distance ($.07 per minute), and 12.5% are overseas ($.20 per minute).
- 20% of faxing in enterprises is intra-company, meaning to and from people or systems in the same company. This type of faxing is under the control of the corporation and can be made to conform to V.34 at both ends of the sending and receiving fax devices. For this model, it is assumed that both the sending and receiving fax machines or servers within the same corporation for intra-company faxing are V.34.
- Assumptions as to the percentage of fax traffic transmitted at V.34 speeds are conservative estimates.

Taking the time-savings per day from Table 1 for 9.6 kbps and V.17 fax transmissions and multiplying those by V.34 traffic rates, one can calculate the ROI of V.34 in an enterprise fax implementation using two scenarios.

The first scenario in Table 2 shows V.34 fax savings in the case of a corporation that sends 80% of daily fax traffic to other corporations or corporate lists and sends the remaining 20% of daily fax traffic as intra-company faxes. The total cost savings accrued in just one year represent $19,906 when compared to 9.6 kbps fax and $13,218 when compared to V.17 fax. In this scenario, more faxes can be sent faster and the savings can accrue more quickly with V.34 fax because it is assumed that in “other companies” the rate of adoption of V.34 would be faster than in the “general installed based” of fax machines described in scenario 2.

The second scenario in Table 2 is the case of a corporation that sends 80% of daily fax traffic to the "general installed base" of fax machines and sends the remaining 20% of fax traffic as intra-company faxes. The total savings accrued in one year represent $13,271 when compared to 9.6 kbps fax and $8,812 when compared to V.17 fax. In this scenario, more faxes are sent at a slower speed and the savings cannot accrue as quickly because it is assumed that the adoption of V.34 would not happen as fast in the "general installed base" as it does in "other corporations," described in scenario 1.

	2001	2002	2003	2004	2005
Percent of Overall Installed Base 33.6 kbps Traffic	8%	13%	15%	16%	19%
Percent of Corporate 33.6 Traffic	14%	24%	33%	42%	51%
Percent of Intra-Company Faxing	20%	20%	20%	20%	20%
Scenario 1: Corporate + Intra-Company V.34 Fax Savings					
V.34 Savings Compared to 9.6 kbps Fax	$19,906	$27,016	$32,229	$36,969	$42,656
V.34 Savings Compared to V.17 Fax	$13,218	$17,938	$21,400	$24,547	$28,324
Scenario 2: General Installed Base + Intra-Company V.34 Fax Savings					
V.34 Savings Compared to 9.6 kbps Fax	$13,271	$15,641	$16,589	$17,063	$18,484
V.34 Savings Compared to V.17 fax	$8,812	$10,385	$11,015	$11,330	$12,274

Table 2. Sample ROI of V.34 Fax [Davidson]

The result is that a typical enterprise company can save thousands of dollars in the first year alone from V.34 fax. As 33.6 kbps fax traffic increases, the resultant cost savings also increases year over year. This savings can easily reach the tens of thousands of dollars over the course of just a few years.

Summary

V.34 is an important development in fax technology, not only because it can send fax data more than twice the speed of the older fax standards, but also because it supports fast handshaking, which can cut call setup and session-management time by one-third. Fax devices supporting the V.34 protocol also can deliver more reliable fax transmissions, and require fewer resends, under a wider range of line conditions. The V.34 protocol is highly adaptive, automatically and intelligently applying a tailored combination of modulation methods and impairment-compensation techniques for each fax call. These can translate to faster fax transmissions and significant cost savings over time.

References

[Davidson] Davidson Consulting, 2003

Dialogic®
Making Innovation Thrive™

www.dialogic.com

Dialogic Corporation
9800 Cavendish Blvd., 5th floor
Montreal, Quebec
CANADA H4M 2V9

07/08 10877-01