**White Paper**

# Power over Ethernet (PoE) Midspan - The Smart Path to Providing Power for IP Telephony

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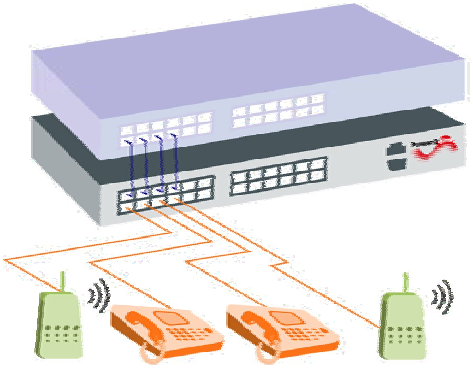

August 2005

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# Revision History

| Revision | Release Date | Details |
|---|---|---|
| 1.0 | August 2005 | First release |
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# 1 Executive Summary

IP telephony has been generating great interest in recent years, with cost-effective telephony driving an ever-increasing number of computer and handset VoIP users to trigger a worldwide surge that seems to be growing stronger with each passing day.

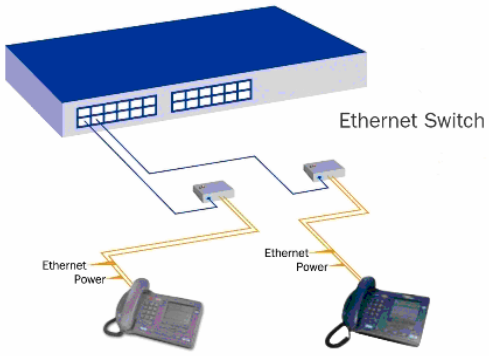
The approval of the IEEE 802.3af Power over Ethernet (PoE) standard in June 2003 effectively removed a significant barrier to the widespread adoption of IP telephony, in that it greatly reduced the challenge of providing power to VoIP devices. This standard enables electric power to be delivered along the same cables that transport Ethernet data, allowing PoE-enabled switches and Midspans to deliver power over standard Category 5 or 5E Ethernet cabling to remote PoE-enabled devices, such as IP phones, WLAN access points, security systems, and RFID scanners.

PoE simplifies deployment of literally any IP-based device, particularly in areas where it may be difficult or expensive to run separate power cabling.

As the need for IP telephony installations utilizing PoE rise, businesses are faced with the dilemma of choosing a method to deliver power over Ethernet:

1. They can either "rip out" existing network switches and replace them all with brand new PoE-enabled switches (see option A in Figure 1), or…
2. As shown in Figure 1 option B, they can purchase Midspan devices and add them to existing Ethernet switches, to enable delivery of both power and Ethernet data to PoE-enabled IP phones.

Option A – New PoE-enabled switches




Option B – Midspan added to existing switches


*Figure 1: Brand new PoE-enabled switch vs. Midspan added to existing network switch*

This white paper reviews different VoIP market business types, clarifies the role of Power over Ethernet within switched network infrastructure, and provides useful, business type-specific tips as to the smartest way to deliver the power required in your VoIP deployment.

## 1.1 Using Midspans to Minimize IP Telephony Deployment Costs

Numerous studies of VoIP business types clearly indicate that investment in PoE Midspans dramatically reduces businesses' Total Cost of Ownership (TCO), offering both purchase and installation cost savings, as well as long-lasting benefits derived from reduced support and maintenance costs and increased productivity achieved through decreased device downtime.

This white paper recommends a path that will enable businesses of any size and type to deploy the very latest in VoIP technology while saving a great deal of money.

While the cost savings estimates in the following sections relate to Cisco Catalyst switch owners, savings can be achieved by adding PoE Midspans not just to Cisco switches, but also to existing, non-PoE switching infrastructure from Nortel, HP and other vendors.

### 1.1.1 Benefits in Large Business IP Telephony Deployments

Are you considering deployment of IP telephony in a large corporation? You might want to consider the following:

- **Immediate purchase price savings through addition of PoE Midspans to existing network switches** – customers with Cisco Catalyst switches, for example, can achieve cost savings of 25%-40% by adding PoE Midspans to existing rack solutions, rather than replacing their infrastructure with new, PoE-enabled Cisco Catalyst switches.
- **Lower installation costs** - adding Midspans to your existing infrastructure instead of throwing it out altogether will also enable you to dramatically reduce overall costs. For example, you stand to reduce installation overhead approximately by 20% of IP telephony deployment costs simply by avoiding downtime and using your own IT personnel, rather than expensive networking consultants and electricians, for installation, configuration, etc.

This white paper will demonstrate how, all things considered, addition of PoE Midspans to existing Cisco, Nortel, HP or other non-PoE switching infrastructure will allow large corporations to cut overall costs by 60% to 80%.

### 1.1.2 Benefits in Medium-sized Business IP Telephony Deployments

Planning to deploy IP telephony in a medium-size company? Keep the following in mind:

- **Immediate purchase price savings through addition of PoE Midspans to existing network switches** – customers with Cisco Catalyst switches, for example, can achieve cost savings of 30%-35% by adding PoE Midspans to existing rack solutions, rather than replacing their infrastructure with new, PoE-enabled Cisco Catalyst switches.
- **Business productivity gains** – the fast installation cycles afforded by the use of PoE Midspans with existing switching infrastructure will enable an almost 20% reduction of business downtime, effectively increasing overall productivity.
- **Lower installation costs** - cut an additional 20% off total installation overhead by making cost-effective use of IT staff as opposed to expensive employment of external network experts and electricians on a sub-contractor basis.

This white paper will show how addition of PoE Midspans to existing Cisco, Nortel, HP or other non-PoE switching infrastructure will allow medium-size businesses to cut overall costs by 45% to 55%.

### 1.1.3 Benefits in Small/SOHO Business IP Telephony Deployments

Getting ready to deploy IP telephony in a small-size or home-based business? The following information should come in handy:

- **Immediate purchase price savings through addition of PoE Midspans to existing network switches** – customers with Cisco Catalyst switches, for example, can achieve cost savings of 20%-60% by adding PoE Midspans to existing rack solutions, rather than replacing their infrastructure with new, PoE-enabled Cisco Catalyst switches.
- **Business productivity gains** - fast installation of PoE Midspans alongside existing switching infrastructure will enable an almost 20% reduction of business downtime, effectively increasing overall productivity.

- **Lower installation costs** – easily knock an additional 20% off total installation overhead by making cost-effective use of your own IT staff rather than employing expensive external network experts and electricians on a sub-contractor basis.

This white paper will reveal how addition of PoE Midspans to existing Cisco, Nortel, HP or other non-PoE switching infrastructure will allow small-size or SOHO businesses to cut overall costs by as much as 80%.

Moreover, most IP installers in small businesses that already utilize the Cisco Catalyst 2950 switch family and are satisfied with their switches' performance and QoS functionality will find that providing power through the addition of PoE Midspans equipped with 24 or 48 ports can save them over 60% of the total VoIP solution costs.

# 2 The emerging deployment of IP Telephony

This section provides a glimpse of the rapidly emerging VoIP market and the incentives and key factors that drive migration to IP telephony and vary from one business type to another. In addition, it presents the fundamental concerns faced by each business type.

The facts and figures presented in this section are based on data provided by a number of leading worldwide market research providers.

## 2.1 VoIP Migration Factors

There are a number of factors that generally encourage migration to IP telephony and to adoption of VoIP infrastructure:

- **Greenfield deployments requiring brand new communications infrastructure** for new businesses opening shop, new sites established by existing businesses or the integration of a number of small branches into a larger corporate entity
- **Amortized legacy infrastructure that has to be replaced** at the end of its useful life
- **A growing number of telecommuters and road warriors** requiring cost-efficient access to corporate applications
- **The need to deploy productivity-enhancing applications** that require converged infrastructure or can be more cost-efficiently deployed over existing hardware platforms

As IP telephony gains growing customer awareness and its cost and productivity benefits achieve continued validation, it is becoming more likely that an increasing number of greenfield deployments will utilize next-generation services and solutions rather than legacy ones.

Similarly, businesses looking to replace an outdated PBX or an expired Centrex service will be largely inclined to deploy an IP PBX or a hosted IP telephony service rather than buy a new PBX or renew their TDM Centrex contract.

The primary drivers for migration to an IP telephony solution include less expensive moves, adds and changes (MACs), easier and less costly upgrades and scalability, and the ability to deploy a number of advanced applications and capabilities such as unified messaging, presence and "find me, follow me" services.

The greater complexity of converged systems and networks is likely to spur some demand for managed IP telephony services, as businesses with premise systems seek to outsource some IP telephony skills and competencies.

Even businesses that are still deploying traditional PBXs throughout the enterprise or migrating to IP PBXs and hosted IP telephony at some sites but not at others are likely to seek a certain degree of cost savings by converging their voice and data traffic over a corporate VPN.

Most businesses still own traditional PBXs and need to deploy an additional VoIP card or a gateway in order to converge traffic. As IP PBXs gain further penetration, an increasing number of businesses will be able to cost-efficiently deploy IP VPNs and demand for VoIP services will grow.

As depicted by the worldwide IP phone unit sales volumes in Figure 2, adoption of IP telephony is growing intensively.

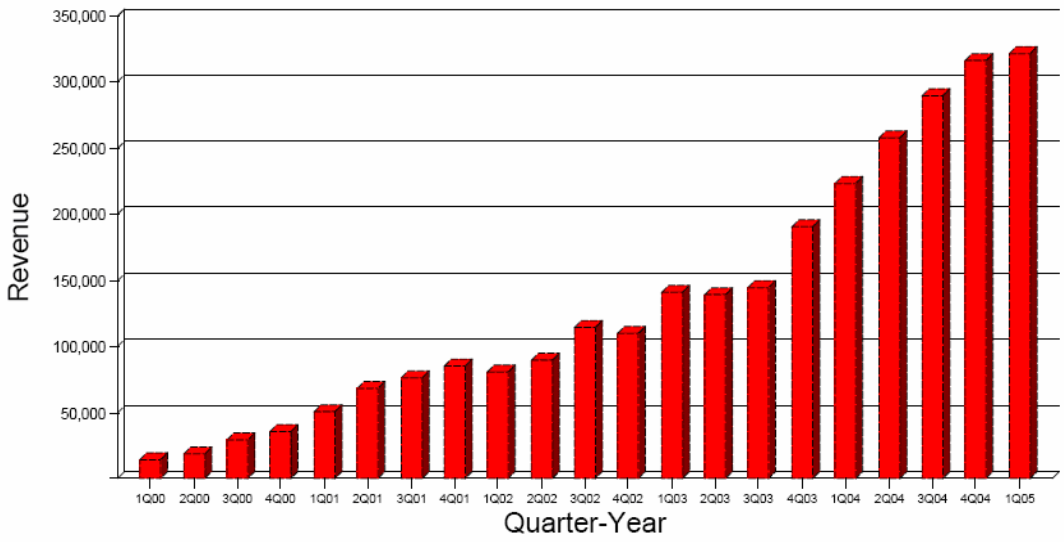



*Figure 2: Worldwide IP phone sales*

* $$ Revenue divided by 1,000 (source: SYNERGY RESEARCH GROUP, INC., May 2005)

Now, let's analyze the variety of concerns faced by different business types when approaching IP telephony deployment.

## 2.2 Large & Medium-size Business Considerations

Medium and large businesses share a number of common characteristics that determine their decision to migrate to IP telephony for the realization of next-generation services and solutions. These include the following:

- They have the in-house capabilities to manage their telecommunications solutions
- They are sophisticated buyers with relatively long sales and deployment cycles that take a large number of factors into consideration
- They are less concerned about cost savings as well as cost-efficiency. In other words, they are willing to make an investment if the solution will help them operate more efficiently
- They have a greater propensity to make an investment in productivity-enhancing and revenue-generating applications and capabilities, meaning that they are willing to invest in forward-looking yet reliable future support capabilities such as Power over Ethernet
- They take QoS and service-level agreements (SLAs) very seriously, so that reliability is a key factor in their considerations

Some of the features and capabilities that medium-size and large businesses are likely to demand (as reported in a 2005 VoIP market research by Frost & Sullivan) include:

- Seamless integration with data systems and applications
- Web-based management capabilities
- Integration with collaboration applications, e-mail systems and corporate address books
- “Find me, follow me” services
- Unified communications and virtual assistant; advanced (power) capabilities

As made evident in the sections below, despite these similarities, there are some differences within this category. For example, medium businesses are more cost conscious than larger ones. Additionally, single-site businesses act differently from multi-site businesses.

## 2.3 Small Business Considerations

Unlike medium-size and large businesses, small businesses typically display the following characteristics (market information resource: VoIP market research, Frost & Sullivan, 2005):

- They are very cost conscious - in terms of both near-term investments and future costs
- They have traditionally been neglected by the larger Telcos and few solutions have ever been custom-developed to suit their needs. Therefore, they have typically had to trade off features for cost savings.
- They do not employ in-house support staff and prefer to focus on their core activities. Therefore, they tend to save on value-added networking services or are more likely to outsource telephony services, system management and upgrades.

In light of the above characteristics, very small businesses are more likely to adopt hosted IP telephony services. They have no internal capabilities to manage premise-based systems and are more likely to try and avoid the initial capital investment.

Small businesses typically buy packages that bundle voice and data services, allowing them to save costs while missing out on some of the more advanced productivity-enhancing capabilities. Currently, high-end IP PBX penetration among small businesses is practically insignificant due to the high costs of these solutions (see Figure 3 for a summary of IP PBX adoption according to business type). Small businesses also tend to attempt to avoid commitments to large recurring charges. They typically outsource system maintenance on a time and materials basis.

Although cost is the single most decisive factor in small businesses' choice of next-generation solutions, some features and capabilities may prove compelling enough to some of them to override cost considerations. For example, some customers may appreciate Power over Ethernet capability as a differentiator for their current switched environment.

To sum things up, vendors and service providers need realize that most small businesses would pay a little bit extra for an advanced feature if the complete package is priced reasonably and proves less expensive than the sum total of the same capabilities, previously purchased as standalone services.

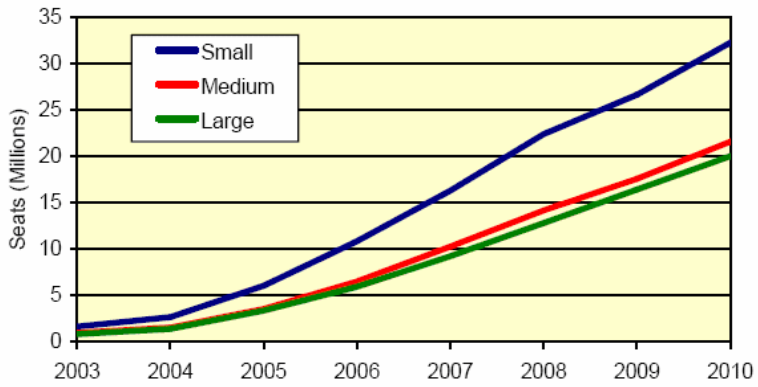



*Figure 3: IP-PBX annual shipped by business size*

* In millions (source: IP telephony, ABIresearch, 2005)

# 3 Powering IP Telephony

As networks serve a wider range of IP devices, notably IP telephones, WiFi access points, IP-enabled security cameras and RFID scanners, delivering power to these devices becomes a growing challenge.

Before the introduction of PoE, these devices required separate power cabling, AC outlets and wall warts, a considerable barrier and an extremely expensive proposition for initial deployments. Cabling and outlets also required ongoing support and maintenance.

PoE solved all of that by eliminating the need for AC outlet installations, cutting maintenance and support costs and decreasing the cost of running power to devices.

The following section highlights a few basic facts about PoE, as well as cost advantages associated with its use.

## 3.1 PoE Implementation

To evaluate PoE cost benefits for each type of organization, a few parameters need be defined to serve as a basis for comparison. These include both complementary PoE Midspan and brand new PoE switch:

- Total solution purchase price (i.e. existing infrastructure investment + incorporation of Midspan for PoE functionality)
- Total solution installation costs
- Maintenance & support costs
- Downtime caused to the entire organization by the installation/configuration of the solution in the business network

## 3.2 Power over Ethernet Options

Businesses have invested billions of dollars in their existing IP architecture, which includes high speed switching, security capabilities and guarantied QoS features that are critical to VoIP implementation, yet do not necessarily adhere to PoE standards.

When approaching deployment, IP telephony installers face the following two alternative PoE implementation options:

- One calls for the replacement of the entire network switch infrastructure with new PoE switches
- The second involves preservation of the current investment (i.e. the existing switch infrastructure) and the addition of external power injectors in the form of PoE Midspans. A PoE Midspan is a power hub installed between an existing Ethernet switch and powered devices, which enables the simultaneous delivery of power and Ethernet data to these devices

Figure 4 illustrates a typical installation utilizing a PoE Midspan. 10/100/1000Base-T data is routed via a standard RJ45 cable from the Ethernet switch to the PoE Midspan, and the PoE Midspan injects power into the unused cable pairs (only if PoE-compliant devices are detected on the cable end). Appropriate cable management and installation practices need be implemented to route these "powered' Ethernet cables, as critical voice and data traffic is transmitted over them.

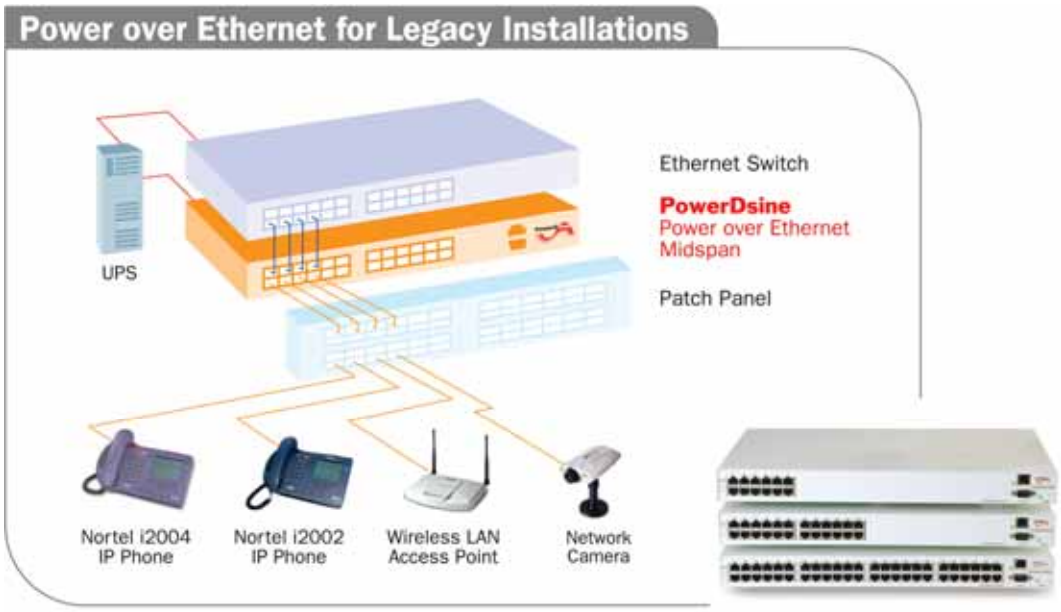



*Figure 4: Implementation of a PoE Midspan within the network installation*

A PoE Midspan offers significant financial benefits when compared to upgrading existing Ethernet switches or replacing them with new, PoE-compliant switches. These benefits include:

- **Lower total cost of ownership**- Installing a PoE Midspan costs less than upgrading to new PoE switches and is certainly more cost-effective than buying brand new ones. Moreover, Midspans can be installed more easily (Plug & Play RJ45 connections) and installation is sure to prove less expensive (e.g. less money spend on engineering efforts due to shorter installation cycles)
- **No downtime**- PoE Midspans enable higher productivity due to the fact that their addition to the network involves practically negligible downtime (typically less than a single day of work)
- **Ease of installation/Simplicity**- PoE Midspans requires less effort on IT engineers' part (as opposed to the massive network engineer efforts required to upgrade or install new PoE switches), also require less support and maintenance (only an IT engineer is needed to install it)
- **High compatibility**- PoE Midspans are generally compatible with any and all kinds of Ethernet switches and terminals
- **Effective power management**- PoE Midspans include SNMP power modules and enable Web-based power management, as well as other advanced and flexible power management features
- **Provide power to variety of products-** PoE Midspans is the first system on the market to supply reliable, uninterrupted power to IP phones, wireless LAN access points, Network Security, and other ethernet devices using existing LAN cable infrastructure.

# 4 A Cost Analysis of VoIP Infrastructure Power Options

## 4.1 Addition of PoE Midspans vs. Replacement with New PoE Switches

This section will provide a cost analysis comparison of total VoIP solutions. The comparison will focus on the addition of Midspan and PoE support to existing VoIP infrastructure vs. the implementation of new VoIP solutions based on new PoE-enabled switches from several vendors.

The parameters provided regarding PoE usage fall into two main categories: one-time benefits and recurring benefits.

One-time benefits include:

- Lower acquisition costs
- Lower installation costs

Recurring benefits include:

- Lower annual support costs
- Productivity benefits

In addition, the following basic assumptions are made:

- A large organization = 240 ports and up
- A medium-size organization = 48- 96 ports
- A small/SOHO organization = 6- 24 ports

## 4.2 Large Business Analysis

When assessing the advantages of adding PoE Midspans to large enterprises' existing non-PoE switches, it becomes apparent that the biggest benefits are derived from:

- **Savings purchase price** – our comparison shows that the total solution cost associated with adding the power delta (i.e. PoE Midspan) to existing Cisco switches is significantly lower than that of a total solution based on brand new PoE-enabled switches
- **Lower installation costs** – the addition of PoE Midspans to existing Cisco switches requires less effort on IT engineers' part (as opposed to the massive network engineer efforts required to upgrade or install new PoE switches), and exposes the entire organization to less downtime

### 4.2.1 Large Business Facts & Figures

Figure 5 presents the estimated cost of replacing large businesses' existing switching infrastructure with new, PoE-enabled switches from a number of vendors, compared with the significantly lower cost that can be achieved by adding PoE Midspans to these very same vendors' existing, non-PoE switching solutions. Two types of Cisco switch upgrades and upgrades of Nortel and HP switch-based infrastructure are featured.

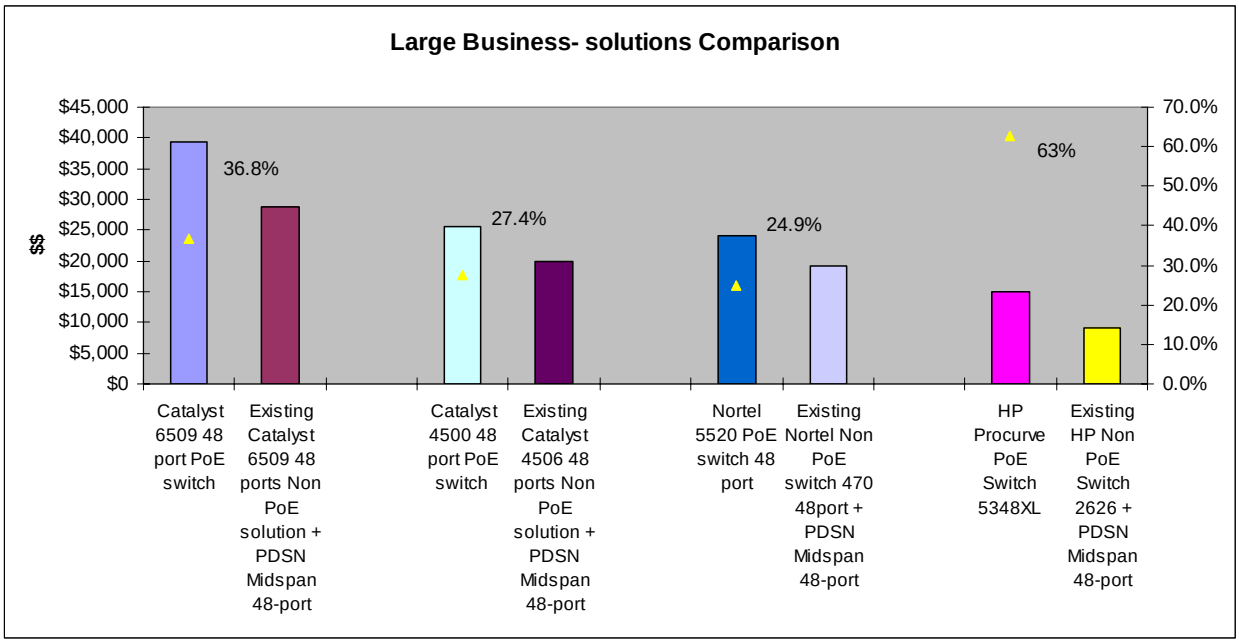



*Figure 5: PoE switch installation vs. addition of PoE Midspan to existing switches in large businesses*

* Switch price source: Cnet Shopper, June 2005 (cross reference: CDW, August 2005)

Figure 5 highlights a number of major facts related to the addition of power to IP telephony solutions:

- **Adding Midspans to existing Cisco rack switch solutions (e.g. 65xx, 45xx) reduces total solution costs by 27.4%-36.8% compared with new PoE-based switch solutions.**

  In addition, when choosing to replace existing infrastructure with PoE-enabled switches, the IP telephony installer needs to consider approximately 20% additional costs to cover all of the installation/configuration overhead (e.g. business downtime, installation initiation costs, configuration difficulties, expert network personnel, etc.).

  **The bottom line:** IP telephony installers in large organizations that wish to retain their existing Cisco switch infrastructure and simply add *PoE Midspans can save up to 56.8% of total VoIP solution costs*.

- **Adding Midspans to existing Nortel rack switch solutions (e.g. 5520) reduces total solution costs by 24.9% compared with new PoE-based switch solutions.**

  In addition, when choosing to replace existing infrastructure with PoE-enabled switches, the IP telephony installer needs to consider approximately 20% additional costs to cover all of the installation/configuration overhead (e.g. business downtime, installation initiation costs, configuration difficulties, expert network personnel, etc.).

  **The bottom line:** IP telephony installers in large organizations that wish to retain their existing Nortel switch infrastructure and simply add *PoE Midspans can save up to 44.9% of total VoIP solution costs*.

- **Adding Midspans to existing HP switch solutions (e.g. 5348XL) reduces total solution costs by 63% compared with new PoE-enabled switch solutions.**

  In addition, when choosing to replace existing infrastructure with PoE-enabled switches, the IP telephony installer needs to consider approximately 20% additional costs to cover all of the installation/configuration overhead (e.g. business downtime, installation initiation costs, configuration difficulties, expert network personnel, etc.).

  **The bottom line:** IP telephony installers in large organizations that wish to retain their existing HP switch infrastructure and simply add *PoE Midspans can save up to 83% of total VoIP solution costs*.

### 4.2.2 PoE Midspans are the Smart Choice for Large Business IP Telephony

If a switch vendor offers you a discount of 40%, for example, on upgrading your infrastructure to brand new, PoE-enabled switches…

**Stop and consider your options:**

Adding PoE Midspans to your existing infrastructure represents 24.9%-63% cost savings compared with the acquisition of new PoE switches. Add to that approximately 20% savings in productivity (for total savings of up to 83%) and ask yourself:

**Is the replacement of existing switches with brand new ones justified?**

All things considered, complementing your existing Cisco, Nortel, HP or other non-PoE switching infrastructure with PoE Midspans could provide you with a 44.9% (if using Nortel switches) to 83% savings (if using HP switches) on total VoIP solution costs.

## 4.3 Medium-size Business Analysis

When assessing the advantages of adding PoE Midspans to medium-size enterprises' existing non-PoE switches, it becomes apparent that the biggest benefits are derived from:

- **Productivity gains** – medium-size businesses, like small businesses, stand to benefit from reduced downtime during the addition of Midspans to existing switch infrastructure, as opposed to the extended downtime associated with upgrading to new PoE switches (due to prolonged configuration, installation, support and maintenance)
- **Lower acquisition costs** – in comparing the addition of the power delta (i.e. PoE Midspan) to existing switches with the acquisition of new PoE-enabled switches, we found that the PoE Midspan price-per-port is significantly lower than that of brand new PoE-enabled switches
- **Lower installation costs** - the addition of PoE Midspans to existing switches requires less effort on IT engineers' part (as opposed to significant network engineer efforts required to upgrade or install new PoE switches), and exposes the entire organization to less downtime

### 4.3.1 Medium-size Business Facts & Figures

Figure 6 presents the estimated cost of replacing medium-size businesses' existing switching infrastructure with new, PoE-enabled switches from a number of vendors, compared with the significantly lower cost that can be achieved by adding PoE Midspans to these very same vendors' existing, non-PoE switching solutions. Two types of Cisco switch upgrades and upgrades of Nortel and HP switch-based infrastructure are featured.

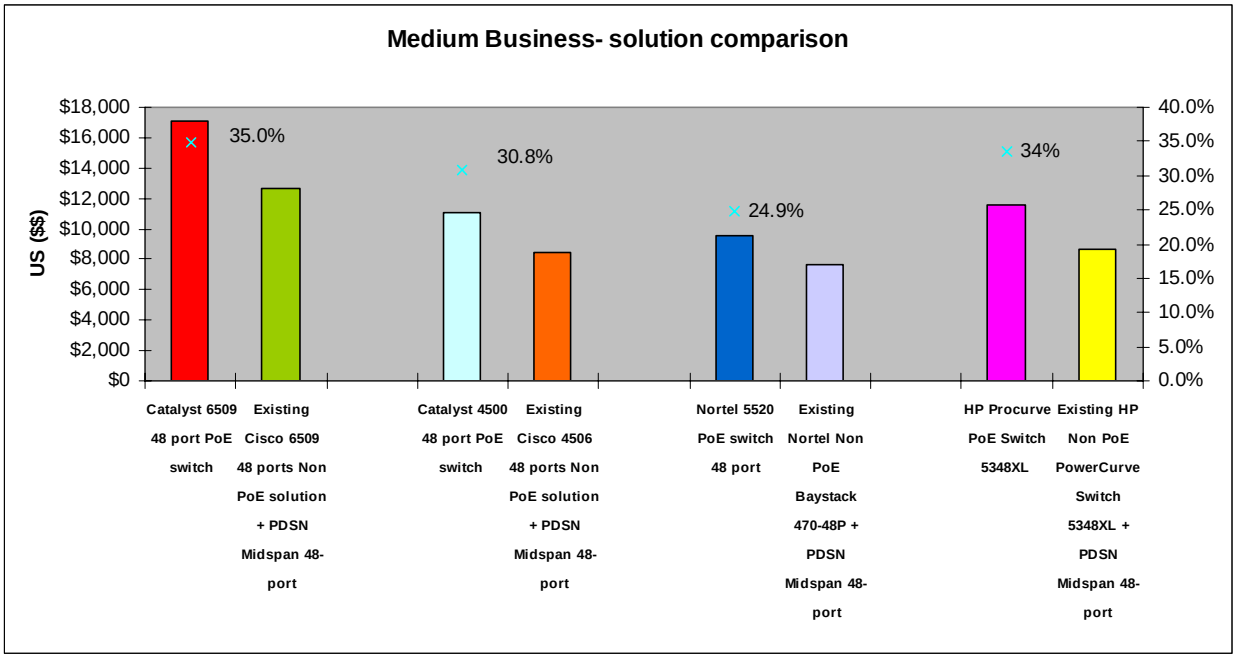



*Figure 6: PoE switch installation vs. addition of PoE Midspan to existing switches in medium-size businesses*

* Switch price source: Cnet Shopper, June 2005 (cross reference: CDW, August 2005)

Figure 6 highlights a number of major facts related to the addition of power to IP telephony solutions:

- **Adding Midspans to existing Cisco rack switch solutions (e.g. 65xx, 45xx) reduces total solution costs by 30.8%-35% compared with new PoE switch solutions.**

  In addition, when choosing to replace existing infrastructure with PoE-enabled switches, the IP telephony installer needs to consider approximately 20% additional costs to cover all of the installation/configuration overhead (e.g. business downtime, installation initiation costs, configuration difficulties, expert network personnel, etc.).

  **The bottom line:** IP telephony installers in medium-size organizations that wish to retain their existing Cisco switch infrastructure and simply add *PoE Midspans can save up to 55% of total VoIP solution costs*.

- **Adding Midspans to existing Nortel rack switch solutions (e.g. 5520) reduces total solution costs by 24.9% compared with new PoE switch solutions.**

  In addition, when choosing to replace existing infrastructure with PoE-enabled switches, the IP telephony installer needs to consider approximately 20% additional costs to cover all of the installation/configuration overhead (e.g. business downtime, installation initiation costs, configuration difficulties, expert network personnel, etc.).

  **The bottom line:** IP telephony installers in medium-size organizations that wish to retain their existing Nortel switch infrastructure and simply add *PoE Midspans can save up to 44.9% of total VoIP solution costs*.

- **Adding Midspans to existing HP switch solutions (e.g. 5348XL) reduces total solution costs by 34% compared with new PoE switch solutions.**

  In addition, when choosing to replace existing infrastructure with PoE-enabled switches, the IP telephony installer needs to consider approximately 20% additional costs to cover all of the installation/configuration overhead (e.g. business downtime, installation initiation costs, configuration difficulties, expert network personnel, etc.).

  **The bottom line:** IP telephony installers in medium-size organizations that wish to retain their existing HP switch infrastructure and simply add *PoE Midspans can save up to 54% of total VoIP solution costs*.

### 4.3.2 PoE Midspans are the Smart Choice for Medium-size Business IP Telephony

If a switch vendor offers you a discount of 40%, for example, on upgrading your infrastructure to brand new, PoE-enabled switches…

**Stop and consider your options:**

Adding PoE Midspans to your existing infrastructure represents 24.9%-35% cost savings compared with the acquisition of new PoE switches. Add to that approximately 20% savings in productivity (for total savings of up to 55%) and ask yourself:

**Is the replacement of existing switches with brand new ones justified?**

All things considered, complementing your existing Cisco, Nortel, HP or other non-PoE switching infrastructure with PoE Midspans could provide you with a 44.9% (if using Nortel switches) to 55% savings (if using Cisco switches) on total VoIP solution costs.

## 4.4 Small Business Analysis

Similar to medium-size organizations, when assessing the advantages of adding PoE Midspans to small businesses' existing non-PoE switches, it becomes apparent that the biggest benefits are derived from:

- **Productivity gains** – small businesses stand to benefit from reduced downtime during the addition of Midspans to existing switch infrastructure, as opposed to the extended downtime associated with upgrading to new PoE switches (due to prolonged configuration, installation, support and maintenance)
- **Lower acquisition costs** – in comparing the addition of the power delta (i.e. PoE Midspan) to existing switches with the acquisition of new PoE-enabled switches, we found that the PoE Midspan price-per-port is significantly lower than that of brand new PoE-enabled switches
- **Lower installation costs** - the addition of PoE Midspans to existing switches requires less effort on IT engineers' part (as opposed to significant network engineer efforts required to upgrade or install new PoE switches), and exposes the entire organization to less downtime

### 4.4.1 Small Business Facts & Figures

Figure 7 presents the estimated cost of replacing large businesses' existing switching infrastructure with new, PoE-enabled switches from a number of vendors, compared with the significantly lower cost that can be achieved by adding PoE Midspans to these very same vendors' existing, non-PoE switching solutions. Two types of Cisco switch upgrades and upgrades of Nortel and HP switch-based infrastructure are featured.

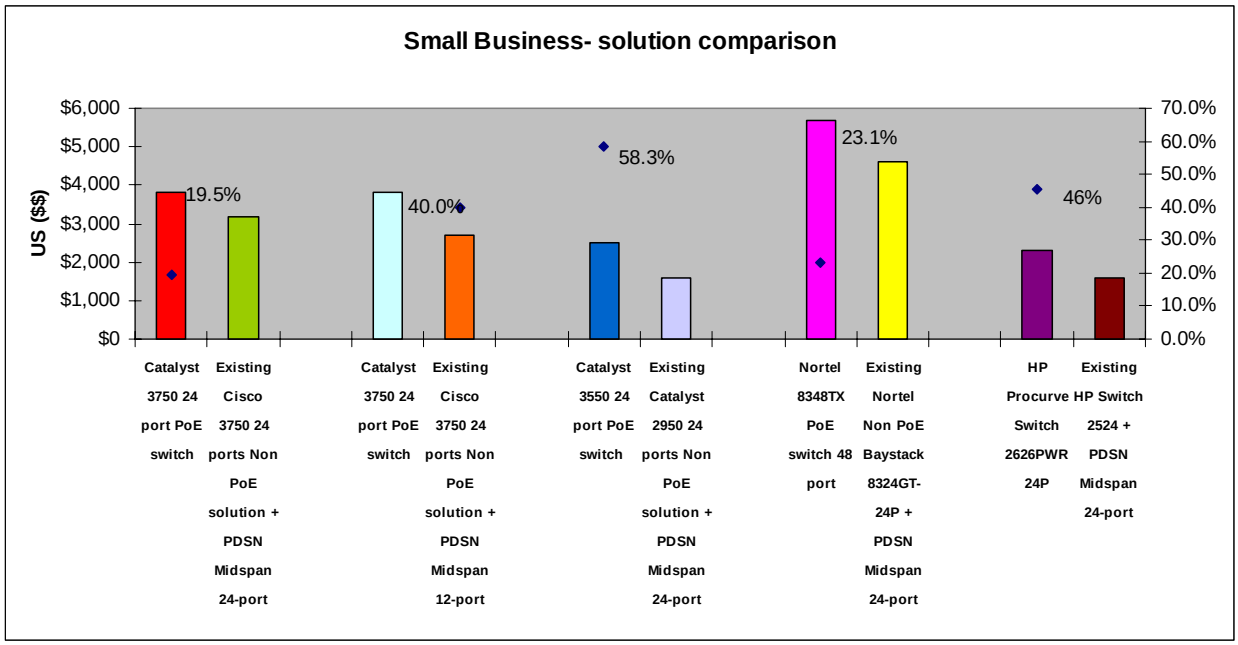



*Figure 7: PoE switch installation vs. addition of PoE Midspan to existing switches in small businesses*

* Switch price source: Cnet Shopper, June 2005 (cross reference: CDW, August 2005)

Figure 7 highlights a number of major facts related to the addition of power to IP telephony solutions:

- **Adding Midspans to existing Cisco stack switch solutions (e.g. 3750, 3550) reduces total solution costs by 19.5%-58.3% compared with new PoE switch solutions.**

  Moreover, a comparison of the acquisition of a new Cisco catalyst 3750 with the addition of a 12-port PoE Midspan to an existing Catalyst 3750 in even smaller SOHO environments shows a 40% reduction of total solution costs.

  In addition, when choosing to replace existing infrastructure with PoE-enabled switches, the IP telephony installer needs to consider approximately 20% additional costs to cover all of the installation/configuration overhead (e.g. business downtime, installation initiation costs, configuration difficulties, expert network personnel, etc.).

  **The bottom line:** IP telephony installers in small organizations that wish to retain their existing Cisco switch infrastructure and simply add *PoE Midspans can save up to 60% of total VoIP solution costs (when adding a 12-port PoE Midspan to existing Cisco Catalyst 3750 switches)*.

  Moreover, most IP telephony installers in small businesses already utilize the Cisco Catalyst 2950 switch family with excellent QoS and satisfactory performance. Adding power support through installation of *24 or 48 port Midspans can save them over 78.3% of total VoIP solution costs (when adding PoE Midspans to existing Cisco Catalyst 2950 or 3550 switches)*.

- **Adding Midspans to existing Nortel switch solutions (e.g. 8348XL) reduces total solution costs by 23.1% compared with new PoE switch solutions.**

  In addition, when choosing to replace existing infrastructure with PoE-enabled switches, the IP telephony installer needs to consider approximately 20% additional costs to cover all of the installation/configuration overhead (e.g. business downtime, installation initiation costs, configuration difficulties, expert network personnel, etc.).

  **The bottom line:** IP telephony installers in small organizations that wish to retain their existing Nortel switch infrastructure and simply add *PoE Midspans can save up to 43.1% of total VoIP solution costs*.

- **Adding Midspans to existing HP SOHO switch solutions (e.g. 2626) reduces total solution costs by 46% compared with new PoE switch solutions.**

  In addition, when choosing to replace existing infrastructure with PoE-enabled switches, the IP telephony installer needs to consider approximately 20% additional costs to cover all of the installation/configuration overhead (e.g. business downtime, installation initiation costs, configuration difficulties, expert network personnel, etc.).

  **The bottom line:** IP telephony installers in small organizations that wish to retain their existing HP switch infrastructure and simply add *PoE Midspans can save up to 66% of total VoIP solution costs*.

### 4.4.2 PoE Midspans are the Smart Choice for Small Business IP Telephony

If a switch vendor offers you a discount of 40%, for example, on upgrading your infrastructure to brand new, PoE-enabled switches…

**Stop and consider your options:**

Adding PoE Midspans to your existing infrastructure represents 19.5%-58.3% cost savings compared with the acquisition of new PoE switches. Add to that approximately 20% savings in productivity (for total savings of up to 78.3%) and ask yourself:

**Is the replacement of existing switches with brand new ones justified?**

All things considered, complementing your existing Cisco, Nortel, HP or other non-PoE switching infrastructure with PoE Midspans could provide you with savings as high as 78.3% on total VoIP solution costs.

# 5 Solutions to Common IP Telephony Installer Dilemmas

This section provides tips and practical guidance for IP telephony installers facing difficult dilemmas regarding their existing and potential infrastructure investments.

The following answers to common dilemmas should help you reach the right decision every time.

## 5.1 IP Telephony Installer Dilemma I

**"I just bought switch sets of Catalyst 2950 & 3750 without PoE. Should I throw them away???"**

The answer is – no. If your new Cisco switches comply with all of your IP telephony requirements (i.e. QoS, enhanced intelligent services, security, manageability, etc.), do not throw this excellent equipment out just for lack of PoE.

Simply complement it with a cost-effective PoE Midspan, which fully complies with PoE standard IEEE 802.3af, and deliver power to devices without any effect whatsoever on data transport. This requires no switch configuration, downtime, expensive installation or support costs, and presents a reliable solution that ensures complete separation of data from power through restricted isolation of data and power lines.

## 5.2 IP Telephony Installer Dilemma II

**"Cisco is promoting its PoE switches with 40% discounts on list price. Should I go ahead and upgrade my non-PoE switches?"**

As demonstrated earlier in this white paper, you need to evaluate your options from a practical standpoint. When you choose to stick with your existing infrastructure, your potential savings can reach 80% compared with buying new PoE switches (actual savings depend on the size of your business). Additionally, you stand to benefit from a 20% reduction on the total overhead required by new switch infrastructure installation by avoiding such inconveniences as installation-related downtime, and by employing your own IT personal rather than expensive networking experts.

Still think the 40% discounts are worth your while?

As shown above, *you can almost double your savings and cut costs by almost 80%* if you retain your existing Cisco, Nortel, HP or other non-PoE switching infrastructure and simply enhance it with PoE Midspans.

## 5.3 IP Telephony Installer Dilemma III

**"I plan to deploy 500 Cisco IP phones in a multi-site organization, and expand the deployment later on. Can PoE Midspans manage my power needs?"**

Yes, leading PoE Midspans, such as PowerDsine's family of Midspan hubs, offer SNMP-based Power Network Management software packages, a valuable tool for power management in communication control centers that collects power consumption information on the network.

The power management tool provides easy control and monitoring of each IP phone from any PC connected to the network. Even better, it creates a completely secure environment by allowing powered devices, such as wireless LAN access points, to be remotely shut down after business hours. Alerts regarding changes in IP phone status (e.g. a fall in power consumption, disappearance and malfunction) are also supported.

## 5.4 IP Telephony Installer Dilemma IV

**"We run a small business using Cisco's non-PoE Catalyst 2950 and 3550 switches. Can a Midspan provide these switches with PoE support?"**

Yes. PowerDsine PoE Midspans, for example, all present a complementary PoE solution that supports the IEEE 802.3af standard, as well as Cisco's own inline power detection mechanism to provide PoE support for Cisco Catalyst 2950 and 3550 switches.

Moreover, data presented earlier in this white paper indicates that the addition of PoE Midspans to existing Cisco stack switch solutions (e.g. 3750, 3550) reduces total solution costs by 20%-60% compared with new PoE switch solutions.

## 5.5 IP Telephony Installer Dilemma V

**"I just bought Cisco's new, non-PoE Catalyst 3550G and 3750G 1000Base-T switches. Can a Midspan provide PoE support for 1000Base-T, and particularly for Cisco switches?**

Yes. PowerDsine, for one, offers 24, 12 and 6-port PoE Midspans that support existing 10/100/1000Base-T switches, including Cisco's Catalyst level 2/3 switches.

# 6 Introducing PowerDsine

PowerDsine is a pioneer and a leader in Power over Ethernet technology, which enables the delivery of both power and data over the same network cabling infrastructure. The company first developed Power over Ethernet technology in 1998 and has since assumed the major role of shaping the market.

PowerDsine offers its converged power and data solutions to corporate users via the company's own PoE product line and through OEM agreements with leading communications equipment manufacturers in the Telecom and Datacom industries.

PowerDsine's product line comprises a variety of Power over Ethernet midspan devices, as well as integrated solutions embedded directly into Ethernet switches. A founding member of the

IEEE 802.3af Task Force, PowerDsine serves as a continuous driving force and is setting the standard for delivering power over common Ethernet cables. The company dominates the market through its own branded product offering, as well as embedded Power over Ethernet solutions.

## 6.1 PowerDsine's Midspan Solutions

### 6.1.1 Medium & Large VoIP offering- The 6000 Family

PowerDsine's 6006, 6012, 6024 and 6548 are Power over Ethernet Midspans (with 6, 12, 24 and 48 ports, respectively), which enable unified delivery of data, voice, video and power through a single access point. These PoE hubs provide power over standard Category 5 twisted pair cables, effectively eliminating the need for bulky AC adapters and enhancing the operating reliability of such Ethernet devices as IP telephones, wireless LAN access points and Web-cameras.

In addition to the general benefits attributed to PoE Midspans earlier in this white paper, the most important benefit to consider is that PowerDsine Midspans provide IT managers and IP phone users with the same level of availability they have come to expect from traditional PBX telephony systems.

PowerDsine offers an advanced and secure power management software kit, with dual support of SNMP MIB commands and Web-based remote management capabilities, which enables remote control of Midspan ports and the IP hones connected to them. The kit enables centralized control of multi-site or multi-building installations with support for immediate alert (e.g. E911) and response in case of IP phones status changes.

Advanced, full IEEE 802.3af and Cisco legacy inline power compliant detection mechanisms guarantee PowerDsine Midspan product interoperability with most IP phone sets, both standard and pre-standard.

*Figure 8: The PowerDsine 6024 Power over Ethernet Midspan*

The PowerDsine 6024 PoE Midspan shown in Figure 8, for example, may be deployed alongside an existing Ethernet or Fast Ethernet switch and connected to standard Category 5 (or higher) cabling infrastructure to enable PoE provision. This architecture enables customers to protect and maximize the usefulness of their investments in both cabling infrastructure and Ethernet switch equipment.

The PowerDsine 6548 Power over Ethernet shown in Figure 9 provides safe power over standard Ethernet cabling to 48 terminals simultaneously, without replacing the existing Ethernet switches.

The PowerDsine 6548 Midspan is the optimal solution for powering IP phones in large installations, offering a revolutionary approach that provides twice the port density in a 19'' rack mountable, 1U device.

*Figure 9: The PowerDsine 6548 Power over Ethernet Midspan*

### 6.1.2 Small PoE for VoIP offering- The 3000 Family

PowerDsine 3012 and 3006 are cost-effective Power over Ethernet hubs that enable unified supply of data, voice, video and power through a single access point. The Midspans deliver power over standard Category 5 (or higher) twisted pair cable. Eliminating the need for bulky AC adapters, these Power over Ethernet hubs enhance the reliability of Ethernet devices, such as IP telephones, wireless LAN access points and network security appliances.

*Figure 10: PowerDsine's 3012 and 3006 Power over Ethernet Midspans*

For more information on PowerDsine and its state-of-the-art PoE offerings, please visit www.powerdsine.com.

## About PowerDsine

PowerDsine is a leading vendor of PoE solutions. The company first developed PoE products in 1998 and has since assumed the major role in shaping the market.

A founding member of the IEEE 802.3af Task Force, PowerDsine serves as a continuous driving force in setting the standard for delivering power over common Ethernet cables.

PowerDsine offers its solutions to corporate users via the company's own PoE product line and through OEM agreements with leading communications equipment manufacturers in the Data Communications industry.

PowerDsine's product line comprises a variety of PoE Midspan devices, as well as integrated solutions embedded directly into Endspan (Ethernet switch).

For more information on PowerDsine and its state-of-the-art PoE products, please visit http://www.powerdsine.com