

An ADTRAN White Paper



The Integrated Approach to Reducing Network TCO

The Integrated Approach to Reducing Network TCO

A New Approach

Although the economic slump in IT spending has ended, long term changes in purchasing behavior remain. IT budgets are more closely monitored than ever, and it is increasingly important to minimize Total Cost of Ownership (TCO) through cost-effective yet feature-rich purchasing decisions.

Total Cost of Ownership is a very useful tool for analyzing the direct and indirect costs of owning and using a networking device. This model takes into account the “big picture” of an equipment purchase, and includes factors such as capital costs, technical support costs, administration costs, and downtime. The result is an accurate representation of how much an equipment purchase is going to cost over the lifecycle of the product.

A traditional network defines a CSU/DSU, router, firewall, and switch as separate pieces of equipment. This proves to be a much more costly approach than integrating the functionality of multiple pieces of equipment in a single platform. For today’s networks, many vendors offer a CSU/DSU, router, and firewall in a single device, resulting in a much lower TCO.

Next generation Internetworking devices take this idea one step further. TCO is optimized by including a feature-rich 24 port managed switch, IP router, firewall, and modular WAN port with integrated CSU/DSU in a single, compact chassis. Functionality can be further enhanced through the addition of a VPN gateway, Power over Ethernet capabilities, dial-backup, voice drop-and-insert port, and Gigabit uplink. This provides an all-in-one approach to networking that is the most cost-effective solution available for LAN/WAN connectivity.

The benefits of taking an integrated approach towards a networking solution are apparent when the TCO model is used. Although the difference in initial pricing between individual components and a multi-function box may alone be enough to justify choosing an integrated approach, long-term savings through decreased support costs, administrative costs, and network downtime result in even greater savings. Fully integrated LAN/WAN connectivity results in a TCO that is better than multiple pieces of equipment could ever provide.

TCO Explained¹

TCO was originally developed in the late 1980s by the research firm Gartner to determine the cost of owning and deploying personal computers. Their initial findings, that PCs cost an enterprise nearly \$10,000 per year, caused quite a stir in the technology community and particularly among CFOs. Gartner’s methodology was carefully examined and, over the ensuing years, has been accepted as a standard way to evaluate total costs.

Simply stated, TCO consists of the costs, direct and indirect, incurred throughout the life cycle of an asset, including acquisition, deployment, operation, support and retirement. The Gartner TCO model utilizes two major categories to organize costs:

Direct costs: These costs generally cover the visible IT- and support-related investments and expenses, and include:

Hardware and software. This typically involves the initial purchase price. The costs of associated hardware (network equipment, option modules, etc.) is also included. Next, spare systems, spare parts, and the annual costs of needed supplies and materials are added. These costs can be divided by the expected life of the asset, in years, to get an annualized figure.

Operations. This includes all labor costs for technical operations, support, and help desk. Service and maintenance contracts can be included here as well. If personnel such as network administrators or software maintenance staff are required, their costs should also be included. Operations costs also typically include the facilities costs for the appropriate share of the floor space used, as well as furniture purchased for the project.

Administration. Sometimes IT planning costs are included here. However, a significant portion of this category is typically attributed to training costs incurred for those using the equipment.

Indirect costs: These costs are less visible and usually are dispersed across the organization. These are comprised of:

End user operations. Frequently, an IT investment requires ongoing end user support within the organization. This generally relates more toward end user devices such as personal computers. Internetworking equipment should, in most cases, be transparent to the user.

Downtime. This occurs when end users are interrupted from their regular work due to equipment malfunction or network issues. Regular maintenance can also cause downtime when, for example, a software update scheduled during work time takes 30 minutes, resulting in 30 minutes of lost productivity.

All of the direct and indirect costs are compiled, computed on an annual basis, and then totaled to provide the total cost of ownership. This exercise can produce some surprising results as studies regularly show that, even in today's world of PCs costing less than \$1,000, the TCO of a PC continues to average over \$5,000 per year. When the costs of LAN/WAN access equipment are calculated to include factors such as support, installation, configuration, and administration, the same pricing scenario applies. For each individual piece of equipment in the network, TCO is increased. By consolidating the functionality of multiple units into a single box, TCO is reduced substantially.

The Traditional Network

A traditional network separates the functionality of a CSU/DSU, router, firewall, and switch into individual units. In figure 1, a branch office is terminating a T1 line, using a CSU/DSU with a drop-and-insert port to groom channels from the T1 into a PBX, and sending IP traffic through the router to a switch for end user network access. A firewall is placed inline between the router and switch for LAN security.

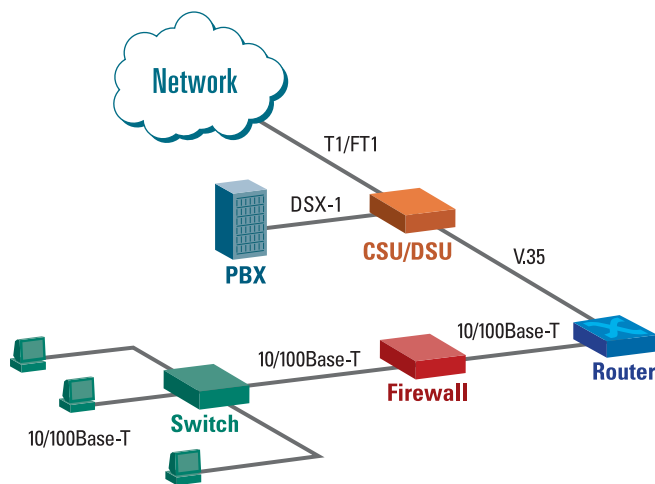


Figure 1

The following chart provides example pricing for this approach to networking:

Device Type	Model	List Price
CSU/DSU	Kentrox DataSMART 658	\$1,995
Router	Cisco 1841	\$1,395
WAN interface	Cisco serial interface expansion module	\$400
Firewall	Cisco PIX 501- unlimited users	\$995
Switch	Cisco Catalyst 2950 - 24 port	\$995
Total:		\$5,780

It is important to note that this total does not include cabling, which not only adds additional costs, but also another potential point of failure and another place for troubleshooting on the network. Multiple pieces of equipment also take more space than an integrated unit, which can be a problem in crowded equipment racks. Also, in mission critical networks with a need for extra units on hand, having a spare for each piece of equipment greatly increases initial pricing over an all-in-one approach.

Add-on Costs that increase TCO

Installation, configuration, and administration is also very costly in the traditional network. Each unit must be installed, configured, maintained, and, if necessary, upgraded. Complexity, and therefore costs, are greatly increased when compared to an integrated device.

Although ADTRAN provides free phone technical support and does not charge for new software releases, most vendors require additional purchases for even a basic level of support, maintenance and upgrades. If a maintenance contract is required, this adds a significant cost to the overall network. Below is example service pricing for a traditional branch office network. In this scenario, the customer requires technical support during normal business hours and access to firmware upgrades and bug fixes. The expected life of the branch office network equipment is five years, and cost is calculated by multiplying the annual cost of the service agreement by five. This results in costs of over \$2,300 on service alone.

Device	Service Type	List Price
Kentrox DataSMART 658	Shared care maintenance	\$150
Cisco 1841	8x5 support, Next day replacement	\$115
Cisco PIX 501	8x5 support, Next day replacement	\$143
Cisco Catalyst 2950	8x5 support, Next day replacement	\$55
Total:		\$463
5 year Total:		\$2,315

Even with a service contract, downtime can be a much bigger problem in a traditional network than with a converged solution. Time spent determining who is at fault, then troubleshooting the specific piece of equipment that is causing the problem, is a much bigger issue when multiple pieces of equipment are used for LAN/WAN access. The result is a much higher TCO resulting from costs that cannot be directly calculated

A Step in the Right Direction

A trend toward integrating the functionality of multiple devices into a single unit is now, in many cases, rendering the traditional network obsolete. Many vendors now include firewall and VPN functionality in routers, and WAN ports with built-in CSU/DSU's are often integrated into the router or provided as option modules. The initial cost savings, space savings, and simplified network administration of this approach all contribute toward a lower TCO and a drive toward an integrated solution. The diagrams below show examples of a modern network infrastructure:

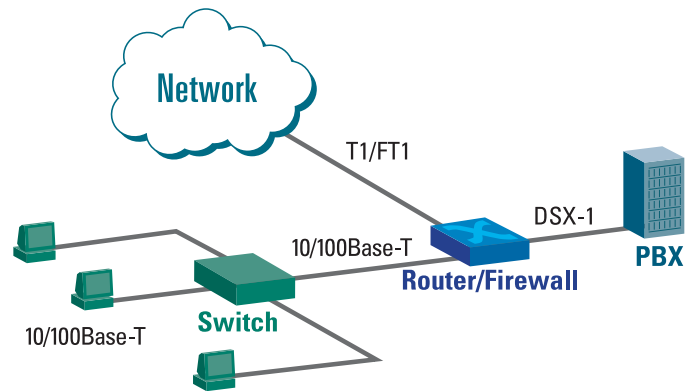


Figure 3

Figure 3 shows integration taken one step further with a T1 CSU/DSU option module placed in the router. Until recently, DSX-1 or dial backup required an external CSU/DSU. Now, several vendors provide this functionality in the form of network interface modules as well. Since this branch office application requires PBX connectivity, an included drop-and-insert port on the network module negates the need for an external CSU/DSU.

Pricing for the previous application is shown below:

Device	Model	List Price
T1 + DSX Module	Cisco 2-Port T1 w/ Drop & Insert	\$2,500
Router	Cisco 1841	\$1,395
Router Firewall Software	Cisco IOS Advanced Security	\$800
Switch	Cisco Catalyst 2950 – 24 port	\$995
Total:		\$5,690

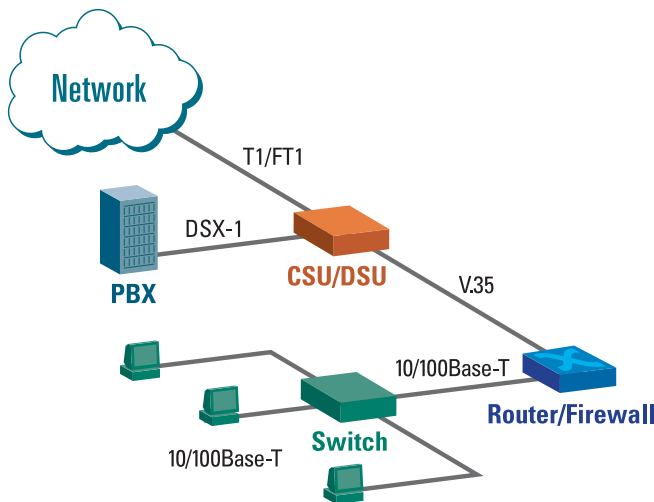


Figure 2

In figure 2 the functionality of a firewall is integrated into the router. This is generally less expensive, and also provides enhanced security over a firewall placed behind the router. This is because firewall protection can now be used on the router itself as well as the LAN behind it. Many equipment providers also include VPN functionality in the router, further reducing overall equipment costs.

By integrating functionality, there is an initial cost savings of about \$100. It should be noted that the difference would be greater if PBX connectivity was not required and a Cisco single port T1 Module, with a list price \$1000, could be used instead. In this instance, the real difference can be seen in pricing for service. Firmware updates and telephone support for the above application is priced as follows:

Device	Service Type	List Price
Cisco 1841 w/ Firewall	8x5 support, next day replacement	\$115
Cisco Catalyst 2950	8x5 support, next day replacement	\$55
Total:		\$170
5 year Total:		\$850

With no additional service fee for CSU or firewall, the five-year difference in service costs between the traditional approach and a partially converged approach changes from \$2,315 to \$850, a difference of almost \$1500. Additional costs such as training, installation, and downtime are also less, resulting in a much lower TCO without degrading functionality.

ADTRAN provides an even more cost effective solution to this partially converged approach to LAN/WAN connectivity. The NetVanta series of switches and routers provide advanced functionality and performance at a fraction of the price of comparable solutions. A high-performance stateful inspection firewall is integrated into ADTRAN's NetVanta routers at no extra cost, and a familiar CLI eliminates costly retraining. Furthermore, these units are backed by unlimited telephone support, free software updates, and an industry leading five-year warranty. With upgrades and software available for free and a familiar CLI and intuitive Web interface for simplified installation and configuration, service contracts are often unnecessary. The result is a dramatically lower TCO than competing solutions. However, in mission critical applications, competitively priced service contracts are available through ADTRAN's ACES program.

Furthermore, ADTRAN offers a wide selection of options and upgrades for this application, including a wide variety of network interface modules, VPN, dial backup, and stackable switches. All these features are priced significantly lower than other leading vendors equipment.

The table below demonstrates the cost savings when ADTRAN's NetVanta units are implemented:

Device Type	Model	List Price
T1 + DSX Module	NetVanta T1/FT1 + DSX-1 NIM	\$450
Router/Firewall	NetVanta 3200	\$695
Switch	NetVanta 1224 - 24 port	\$795
Total:		\$1,940

With total costs under \$2,000, this LAN/WAN connectivity solution is available for about one third the cost of a comparable Cisco solution. Since other vendors require maintenance agreements for firmware updates and technical support, savings grow even more. Over a five year period, with service contracts included, a single branch office saves over \$4,600.

Compared to a traditional network, savings are greater still. Savings of \$6,155 are possible on equipment and service costs alone over the example provided for a traditional network approach.

Fully Integrated LAN/WAN Connectivity

While the partially integrated solution is rapidly replacing the traditional standalone CSU/DSU, router, and firewall in today's networks, the ADTRAN NetVanta 1224R looks to the future by integrating switch functionality as well. By converging functionality of a managed Ethernet switch, modular IP router, firewall, and CSU/DSU in a single 1U platform, a fully integrated LAN/WAN connectivity solution is provided. Functionality is further enhanced with options such as Power over Ethernet VPN, dial back-up, and a Gigabit uplink. Recognized by the Tolly group as the first enterprise-class switch/router², the ADTRAN NetVanta 1224R provides a truly converged solution for LAN/WAN access.

Figure 4 demonstrates the simplicity of the fully integrated platform:

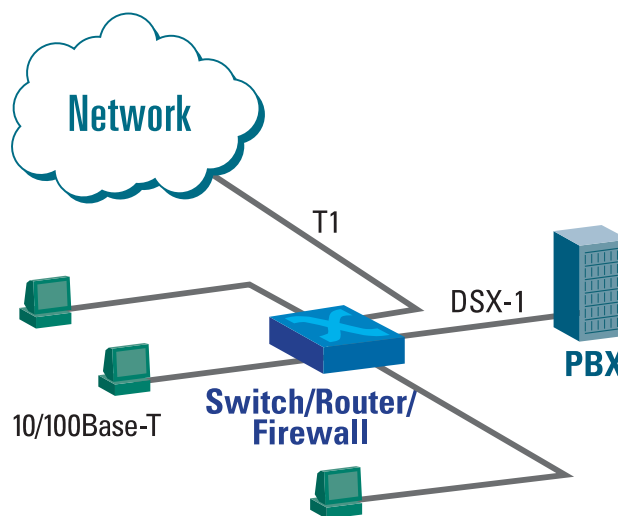


Fig. 4

By simplifying network administration, reducing configuration, conserving rack space, and minimizing downtime, the value of the NetVanta 1224R continues to reduce TCO long after the initial purchase price. However, the price of this application is still much less than completing multi-box solutions. The table below shows initial costs for the LAN/WAN connectivity in the diagram above:

Device Type	Model	List Price
T1 + DSX Module	NetVanta T1/FT1 + DSX-1 NIM	\$450
Router/FW/Switch	NetVanta 1224R	\$1,195
Total:		\$1,645

With a list price of less than \$1200, a wide variety of low cost option modules, and simplified configuration, administration, and troubleshooting, this all-in-one approach to LAN/WAN connectivity reduces TCO by thousands of dollars compared to many traditional and partially converged approaches.

Low TCO, High Performance and Reliability

Although the fully integrated NetVanta 1224R provides a significant cost advantage and a space saving platform, routing performance still meets or exceeds most comparable business class router and switch alternatives. In fact, the Tolly group has declared the NetVanta 1224R “up to spec” certified, and shows that the 1224R outperforms a multi-box Cisco solution².

In mission critical networks, a concern of the choosing the converged approach may be a single point of failure. However, with a NetVanta solution, this is a benefit as opposed to a drawback. In the event of a network problem, time is not spent trying to isolate the unit on the network that is creating the issue. This results in reduced downtime and a quicker resolution to network problems. Also, optional PPP dial backup can automatically establish an analog or ISDN backup connection, providing access to applications even when the main network is down. For a higher bandwidth solution, an Ethernet port can be used for as a primary interface and an ADSL module can be used for backup. Furthermore, with a price lower than many enterprise-class routers with a switch, a spare unit is a cost-effective investment.

With ADTRAN’s proven reliability, an industry-leading five-year warranty, and free best-in-class phone support for the life of the product, the NetVanta 1224R reduces TCO while maintaining the reliability and functionality expected of a mission critical network.

The NetVanta 1224R is prepared for the future as well. As with any NetVanta solution, all major firmware releases are available free of charge, keeping the NetVanta unit reliable and future-proof for years to come at no additional cost. Even if a base chassis is initially purchased, additional upgrades including VPN support, dial back-up, and a wide variety of network option modules with bandwidth ranging from 56k to dual T1 are available for future growth. The NetVanta 1224STR is also available, adding Gigabit uplink capability for stacking multiple units together. For even more functionality, Power over Ethernet versions of the 1224R and 1224STR are available as well.

In larger networks where managability becomes a problem, ADTRAN offers n-Command, a feature-rich Network Management platform at an unbeatable price. n-Command provides an intuitive scalable network management solution for all NetVanta-based networks. The system aids IT administrators in daily network operation and configuration, allowing them to quickly adapt to networking changes, make better use of limited resources, and further reduce TCO by saving even more time and money. n-Command Internetworking Essentials, with support for up to 15 devices, is available free of

charge. The Enterprise Edition provides additional functionality and is available for larger organizations.³

Overall, the 1224R, and 1224STR are truly scalable, functional, and cost-effective, providing a complete connectivity solution in a single platform. The NetVanta 1224R provides a TCO that is a fraction of comparable solutions, while performance, functionality, and reliability are not compromised.

¹ *Excerpts regarding the calculation of TCO taken from question 74 in Business Driven Information Technology, edited by David Laube and Raymond Zammuto Laube, (c) 2003 by the Board of Trustees of the Leland Stanford Jr. University. All rights reserved. Further reproduction, distribution or any use is prohibited without the written permission of the publisher.*

² *Download the complete test report and one-sheet highlights at <http://www.adtran.com/switch>*

³ *Download n-Command, view a flash demo, and learn more about the product at <http://www.adtran.com/n-command>*

ADTRAN, Inc.

Attn: Enterprise Networks
901 Explorer Boulevard
Huntsville, AL 35806

P.O. Box 140000
Huntsville, AL 35814-4000

256 963-8000 voice
256 963-8699 fax

**About ADTRAN**

ADTRAN, Inc. is one of the world's most successful network access equipment suppliers, with a 17-year history of profitability and a portfolio of more than 1,300 solutions for use in the last mile of today's telecommunications networks. Widely deployed by carriers and enterprises, ADTRAN solutions enable voice, data, video, and Internet communications across copper, fiber, and wireless network infrastructures. ADTRAN solutions are currently in use by every major domestic service provider and many international ones, as well as by thousands of public, private and governmental organizations worldwide.

ADTRAN, Inc.
901 Explorer Boulevard
Huntsville, Alabama 35806
P.O. Box 140000
Huntsville, Alabama 35814-4000

256 963-8000 voice
256 963-8004 fax
256 963-8200 fax back
info@adtran.com e-mail
www.adtran.com website

Copyright © 2005 ADTRAN, Inc.

EN706A

All rights reserved. ADTRAN is a registered trademark of ADTRAN, Inc. All other trademarks and registered trademarks are the property of their respective owners.

General Information

800 9ADTRAN
info@adtran.com
www.adtran.com

Pre-Sales

Technical Support
800 615-1176 toll-free
application.engineer@adtran.com
www.adtran.com/support

Where to Buy

877 280-8416 toll-free
channel.sales@adtran.com
www.adtran.com/where2buy

Post-Sales

Technical Support
888 423-8726
support@adtran.com
www.adtran.com/support

ACES Installation & Maintenance Service

888 874-ACES
aces@adtran.com
www.adtran.com/support

International Inquiries

256 963 8000 voice
256 963-6300 fax
international@adtran.com
www.adtran.com/international

For the regional office nearest you, visit:

www.adtran.com/where2buy



ADTRAN is an ISO 9001:2000 certified supplier.



ADTRAN is a TL 9000 3.0 certified supplier.