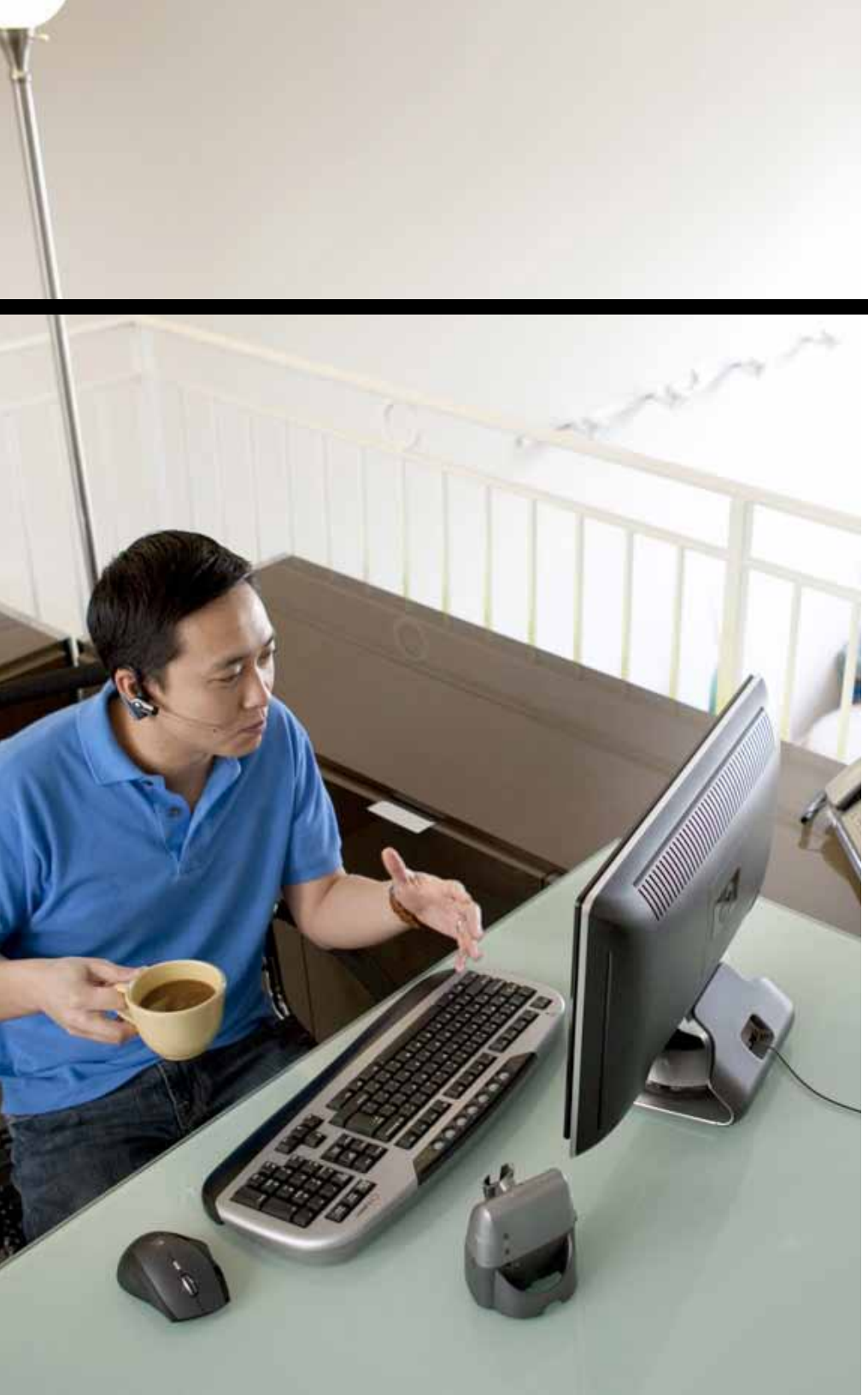

Aerohive NETWORKS

The Definitive Guide to Telework.

An Aerohive Networks eBook

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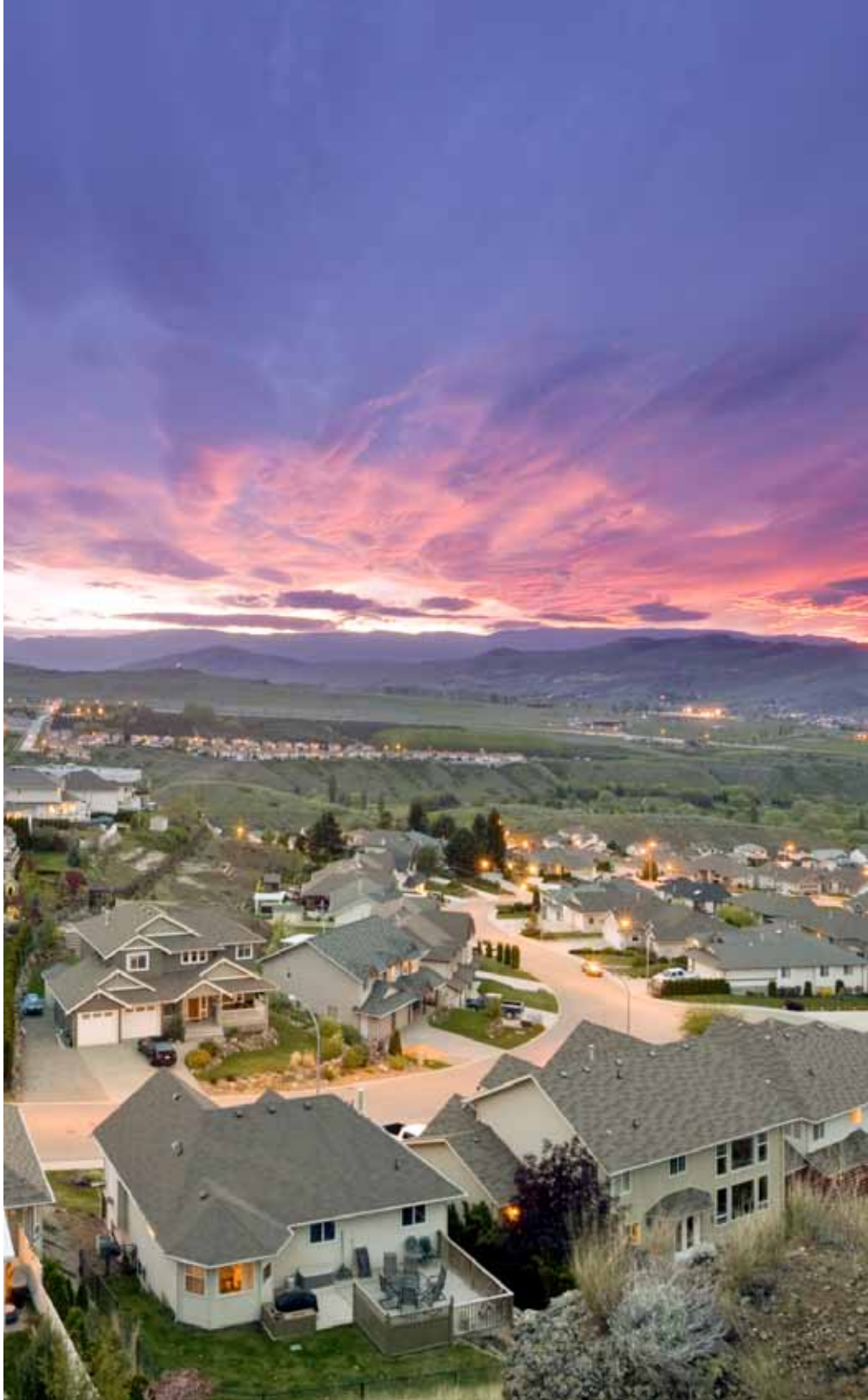


In the Face of Overwhelming Interest, Telework Adoption Has Been Slow

The U.S. Chamber of Commerce estimated that in 2006 there were 30 million full and part-time teleworkers in the US, a number they expected to grow to between 50 and 100 million by 2012. But the latest American Community Survey data found that just over 2% of the U.S. employee workforce (2.8 million people, not including the self employed or unpaid volunteers) actually considers home their primary place of work.1 This data point is re-enforced by a 2008 survey of government agencies, where less than a quarter of the states who responded said their branch employees had access to telecommuting capabilities; while up from 11 percent in 2005, these numbers hardly represent overwhelming adoption of a telework environment.[2]

This is quite surprising, given the interest and initiatives underway in both the private and public sectors to promote the adoption of teleworking, which can also be referred to as telecommuting or working from home. Most Fortune 1000 companies have stated their intent to adopt a telework environment. Both the House and Senate have bills designed to push government agencies to create formal telework programs and promote the use of telecommuting; the Obama administration has set more specific goals, targeting 150,000 federal employees to teleworkers by 2011, and 500,000 by 2014.

Why the Disconnect?

It's most likely a combination of technological and cultural barriers that have been holding teleworking back. Despite the cost and productivity benefits associated with telecommuting, getting a robust teleworking program up and running is very costly and complex, often requiring Herculean efforts on the part of the IT department. Organizations need to account for:

- **Large Capital Investments**—multiple networking and security devices needed to connect a remote site, plus management servers and storage required in the data center
- **Ongoing Operational Expenses**—all the labor-intensive, manual processes associated with keeping each and every site in the distributed network:
    - Running—provisioning and troubleshooting all the locations, which have little to no technical expertise on site
    - Updating—with appropriate technical updates applied and policies in force
    - Securing—with a real-time understanding of the overall security stance and effective risk mitigation capabilities
- **Compliance Requirements**—auditable records of all activity to meet regulatory needs; usually necessitates pulling from and correlating relevant logs and files from a variety of devices and management interfaces

At the same time, there has been some hesitancy on the part of organizations to make the necessary policy, processes and managerial changes needed to embrace a truly productive telecommuting culture. For starters, adjusting the mindset of managers long conditioned to associate face-time, rather than results, with productivity can require a seismic cultural shift. The combination of all these hurdles is often more than many organizations can bear, making it difficult for them to commit to large scale roll-outs.

1 Telework Research Network, Kate Lister, October 2009
2 The Pew Center on the States, Human Capital: Trends and Innovations

No Time Like the Present

The timing could finally be right for telework. Some new technologies and ways of thinking are starting to move the needle, enabling organizations to revisit their strategy and look at ways to reap all the benefits telework can offer. For instance, over the past couple of years, we have seen the maturity and growing acceptance of cloud services, which enables:

- **New Options for Deployment**—delivering cloud-based networking services that leverage the economies of the cloud to quickly scale to meet the changing needs of the organization
- **New Networking Business Models**—based on selling networking services versus networking hardware, significantly reducing, and sometimes even eliminating, the capital costs of the distributed network
- **Simplified, Centralized Management**—giving the organization real-time visibility and control over their network, from anywhere, at any time, to reduce operational complexity and support compliance needs

New technological options combined with the aforementioned stakes that private and public organizations have started to put in the ground around telework may accelerate its adoption. The ongoing economic recession may also be playing a role, spurring organizations already on the fence to try teleworking, both for its cost saving and employee retention benefits (particularly when they can't or don't want to raise salaries). This could explain why the number of Americans working remotely is growing faster than ever before—by nearly a percentage point between 2008 and 2009[3]. The confluence of these factors has finally made teleworking ripe for wide spread adoption.

This eBook looks at teleworking from all angles, examining what's driving and potentially hindering its adoption, the technical and cultural requirements to support teleworking, and the considerations enterprises should make to ensure they have what they need for an effective telework deployment in their workplace.

3 *"Telecommuting grows in Bend," High Five, 9/16/2010, http://www.oregonbusiness.com/high-five/10-high-five/4115-bend-oregon-trend-telecommuting*

There are a host of reasons organizations look at initiating a teleworking program, but the one most often cited relates to its potential operational savings. In aggregate, it's estimated that businesses could save between $15 billion to $30 billion through 20204 through telecommuting initiatives. A recent report compiled by Telework Research Network was even more aggressive, estimating a $400 billion savings could be realized by U.S. businesses alone if they were to employ a half-time workshifting policy.5 While it is clear these estimates are quantifying the scope of the savings differently, it is also clear that regardless of which number you look at, there is a pretty compelling case to be made for considering telework. In fact, any one of the benefits of telework—from cost reductions to business connectivity improvements—could be used to make a business case for the adoption of telework. Some of those are:

Reducing Operational Expenses

A large part of the operational savings attributed to telework can be garnered by reducing the office space needs of an organization. When workers work from home regularly they do not need a dedicated space in the office. Instead, companies can provision "hot offices," which are always-available areas for employees to use whenever they come into the office, and shared workspaces, to reduce the number of assigned private work spaces that are needed. There are also the follow-on savings of parking space reductions; in areas where land is at a premium, a reduction in the number of parking spots that need to be available and maintained can really add up.

In general, the more efficient use of space can enable companies to reduce their corporate real estate portfolio by as much as 40%-50%[6]. Of course, in reducing the real estate costs, you are also reducing the ongoing operational costs—less space, means there is less to power, light, and regulate, in terms of temperature, etc. The Telework Research Network estimated employers could save up to $10,000 a year in operating costs per employee with a telework program[7]. The U.S. General Services Administration[8], with analysis by the Telework Research Network, estimated that eligible federal employees that teleworked one day a week, could save more than $15B a year.

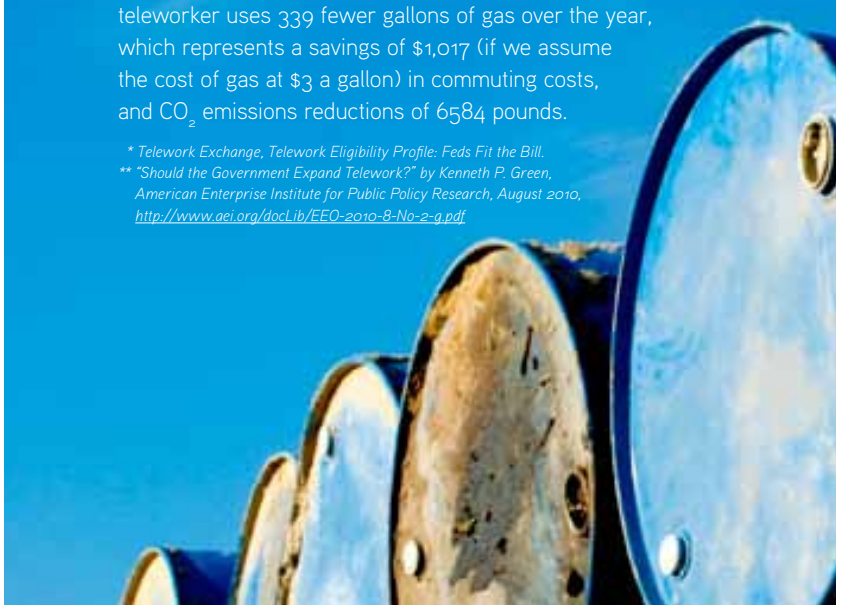
4 *"Smart2020 Report," by The Climate Group on behalf of the Global e-Sustainability Initiative (GeSI), with independent analysis by McKinsey & Company, 2008.*
5 *http://www.eweek.com/c/a/IT-Management/10-Myths-of-Telework-Why-You-Arent-Working-from-Home-200485/*
6 *http://img.en25.com/Web/CitrixOnline/FutureofWork.pdf*
7 *Kate Lister, see "Workshifting Benefits: The Bottom Line," from the Telework Research Network*
8 *Compiled by Booz Allen*

Individual Savings

Organizations aren't the only ones that feel some budgetary relief, the individual commuter can also benefit monetarily. As the price of gas goes up, many see teleworking as a way to reduce expenses and relieve some of the stresses in a family's already stretched budgets. The Telework Exchange calculates the average annual cost of commuting five days a week to be $9,796. By reducing that commute by just two days, the average cost could be cut down to $3,918, which is a savings of $5,878 a year.* Other estimates include:

- A report by TIAX LLC, commissioned by the Consumer Electronics Association, found 3.9 million teleworkers saved 840 million gallons of fuel annually—if fuel costs are approximately $3 per gallon, that savings represents a cumulative $2.25 billion, a little over $575 per commuter.
- The American Enterprise Institute for Public Policy Research (AEI)** uses statistics from the Bureau of Transportation and the U.S. Department of Education to predict that the average teleworker uses 339 fewer gallons of gas over the year, which represents a savings of $1,017 (if we assume the cost of gas at $3 a gallon) in commuting costs, and CO_2 emissions reductions of 6584 pounds.

** Telework Exchange, Telework Eligibility Profile: Feds Fit the Bill.*
*** "Should the Government Expand Telework?" by Kenneth P. Green, American Enterprise Institute for Public Policy Research, August 2010, http://www.aei.org/docLib/EEO-2010-8-No-2-g.pdf*



Managing Environmental Impacts

Operational savings are often tied to reductions in environmental impacts. The Consumer Electronics Association found that telecommuting in the U.S. reduces gasoline consumption by 840 million gallons a year. That represents a savings of nine to fourteen billion kilowatt hours of electricity, and the abatement of close to 14 million tons of carbon emissions (up to 190,000 terajoules of energy). Those commute emissions represent indirect emissions that companies need to include in their carbon reporting[9], so for organizations looking to better manage carbon in their extended operations and value chain, telework initiatives represent a way to address their environmental impacts and reduce their carbon footprint.

Government policies around the world have indicated a future is coming where companies will need to account for their carbon emissions more explicitly, perhaps through carbon taxes or a cap and trade system. If, or rather, when this happens, organizations that have carbon management programs in place and have adopted reduction tactics, such as telework, will be better prepared to protect their bottom line.

Enabling Business

While telecommuting can be good for the bottom line and good for the environment, it is also a business enabler. For starters, businesses can go where the talent is; they can use telework to support employees, partners and customers with the resources they need, regardless of where they are located around the globe. In an increasingly connected, global economy, the ability to tap into talent and resources wherever they are located can be a huge competitive differentiator, delivering the agility organizations need to leverage local knowledge, uncover trends and preferences, seize market opportunities, and drive gains.

As organizations strive to support the career aspirations of their employees to develop and hold onto top talent, the ability to telework can be a key enabler. The flexibility provided by the ability to telecommute can reduce stress levels, increase job satisfaction, and support employee recruitment and retention objectives. A Sloan Center on Aging study showed that more than 75% of workers felt flexibility contributed to their success as an employee, while 48% of older Gen X'ers thought it greatly improved job success.[10]

Increasing Productivity

It makes sense that a workforce that is empowered to contribute to the business from wherever they are, whenever they need to is going to be more productive overall. Estimates from the Center for Urban Transportation Research[11] place productivity gains that can be achieved through a good telecommuting program at up to 30%. This is a number echoed by the Telework Research Network[12], which found a 27% increase in productivity from employees on their telework days. Productivity gains can be attributed to a variety of things: decreased absenteeism, time spent working that would have normally been dedicated to commuting, and a happier, more dedicated work force.

> When polled, almost all (93%) employees in a federal survey said that telecommuting would make a job more desirable, citing the benefits (in order of the number of respondents) of saving time, improving quality of life, reducing carbon footprint, saving money, boosting productivity, and more time with their families.*
>
> * mobileoffice.about.com/b/2010/09/10/93-of-federal-employees-are-in-favor-of-telecommuting.htm

9 *For example, 2,500 organizations in more than 60 countries around the world measure and disclose their greenhouse gas emissions and climate change strategies through the Carbon Disclosure Project (CDP), www.cdproject.net, acting on behalf of 475 institutional investors, holding $55 trillion in assets under management and some 60 purchasing organizations such as Cadbury, PepsiCo and Walmart.*

10 *"Workplace Flexibility: Findings from the Age and Generations Study," Sloan Center, 2009.*

11 *http://www.cutr.usf.edu/index.shtml*

12 *"Workshifting Benefits: The Bottom Line," Telework Research Network, May 2010, http://www.workshifting.com/downloads/downloads/Workshifting%20Benefits-The%20Bottom%20Line.pdf*

One report showed that 75 percent of managers believe remote workers are more productive.[13] According to a Kelly Global Workforce Index, more than 75 percent of employees feel that mobile technologies (mobile phones, PDAs and laptops) increase their productivity.[14]

Attracting and Retaining Top Talent

The general impact telecommuting can have on the workforce should not be underestimated. The ability to work regularly from home can help employees achieve a better work-life balance that can lead to improved overall morale. BLR, a compensation and compliance services vendor, tried to quantify the results, finding that of the companies they interviewed with telework programs, 64 percent confirmed they had seen improvements in morale.

A survey by Regus[15] found that a fifth of commuters around the world have considered quitting their jobs because of the time it takes them to travel into the office. According to Phil Montero of The Anywhere Office, 72% of U.S. employees say that flexible work arrangements would cause them to choose one job over another[16], while a study by The Polling Company found respondents valued the ability to work remotely more than stock options and onsite child care.[17] A survey[18] by World at Work confirmed this value, with more than a third of those with virtual work-compatible jobs saying they would take a pay cut in exchange for the ability to telework just two days a week.

The U.S. federal government is trying to lead by example, mandating a 28% total reduction in carbon emissions from its facilities by 2020—a goal they have said relies on reducing operational costs and decreasing real estate to achieve.*

Indirect emissions—such as those caused by employee business travel and commuting to work—must be cut 13%.**

** Executive Order 13514, Oct. 2009 https://www1.eere.energy.gov/femp/regulations/eo13514.html*
*** "Growing agencies struggle to shrink carbon footprints," Federaltimes, http://www.carbonoffsetsdaily.com/news-channels/usa/growing-agencies-struggle-to-shrink-carbon-footprints-42044.htm*

13 *Report commissioned by City & Guilds and the Institute of Leadership & Management (ILM).*
14 *2009 Index as reported in "IT Management: 10 Myths of Telework: Why You Aren't Working from Home," eWeek Staff, Sept. 17, 2010, http://www.eweek.com/c/a/IT-Management/10-Myths-of-Telework-Why-You-Arent-Working-from-Home-200485/*
15 *http://www.economist.com/daily/news/displaystory.cfm?story_id=15106202&fsrc=nwl*
16 *As reported in his recent white paper and post on the workshifting.com blog, "Work Unchained: The Competitive Edge of the Anywhere Office." Primary source of data: The Edge Report—Robert Half International Survey, 2008*
17 *WorldatWork; The Telework Coalition*
18 *2009, World at Work*

Ensuring Business Continuity & Accelerated Disaster Recovery

Telework offers an answer to the business and government problem surrounding continuity of operations. It can help organizations operate in times of stress and minimize inevitable disruptions stemming from natural disasters, pandemics, or conflicts (acts of war or terrorism) that can cripple normal operations and cause irreparable damage.

The World Health Organization (WHO) estimated H1N1 would affect 16% of the workforce (in addition to normal levels of absenteeism due to other illnesses.);
Gartner was a little more aggressive, estimating 40% absenteeism due to H1N1. While the wide variance in these estimations highlights the general difficulty associated with predicting the exact timing, duration, and impact of a pandemic or other event, the significant disruption they represent to the organization's operations is the same.
These disruptions can cause millions of dollars in lost productivity. Just take the back-to-back winter storms that paralyzed the east coast last year, the United States Office of Management and Budget estimated that one day during those 2010 snowstorms cost $70 million in lost productivity.

Ongoing adoption of telework ensures organizations are practiced and prepared to work in a more distributed manner, so that when disasters do hit, the impact to operations can be minimized. Some governments have taken the arguments a step further, citing teleworking as a way to reduce our dependency on oil and hence our dependency on the countries that supply it, which can have political and national security implications.

When an illness, childcare or other emergency makes it impossible for an employee to be in the office, telecommuting ensures employees can stay connected and productive, ultimately reducing the number of absences. According to the findings of the 17th annual CCH Unscheduled Absence Survey, the largest employers in the U.S. "estimate that unscheduled absenteeism costs their businesses more than $760,000 per year in direct payroll costs, and even more when lower productivity, lost revenue and the effects of poor morale are considered." The most effective programs cited for reducing these absences are alternative work arrangements, followed by telecommuting.*

** CCH is a leading provider of human resources and employment law information and services and part of Wolters Kluwer Law & Business (hr.cch.com).*

Telework offers organizations a way to improve productivity, lower energy and real estate costs, and support business continuity and disaster recovery initiatives. It has also been shown to improve employee morale and retention and reduce carbon emissions; all of which should have organizations rushing to adopt robust telecommuting programs. But after a decade of testing and studying its potential benefits, very few organizations have truly embraced teleworking.

Only a little over 2% of the U.S. employee workforce[19] uses their home as their primary office; only a little over half of the government agencies in the U.S., who are supposed to be integrating telework into their continuity of operations (COOP) planning, have yet to deploy it.[20] Why aren't more organizations leveraging telework to take advantage of all these benefits? Often it comes down to complexity and budget.

> Access to necessary technology and company documents were the top reasons holding staff back from working from home, according to a survey by oneDrum.com.*
>
> ** "HR departments fail to bridge the gap between flexible working policy and practice," by David Woods, HR Magazine, Jan. 18, 2010, http://www.hrmagazine.co.uk/News/MostEmailed/977941/HR-departments-fail-bridge-gap-flexible-working-policy-practice/ survey of 1,200 small and medium-sized businesses in the U.K*

First Comes the Commitment

It's fairly easy for someone to work on occasion from home—these "day extenders" can usually do what they need with a PC, a little software, and Internet connectivity *(See SSL VPNs in the Chapter on Deployment Options)*—but to regularly work at home requires the organization commit to provisioning a secure, home office that will enable them to work seamlessly with all their colleagues.

This commitment has budget, technology, policy and process implications; all of which must be considered to ensure an effective telework solution. With a commitment to telework, organizations can maximize all its benefits and strengthen their security stance; without it, the organization can put itself at risk. The Telework Exchange,[21] found that " 94 percent of federal information security officers say teleworkers in an official program are not a data security concern. Concerns include employees working at home on nights/weekends outside an official telework program, lack of appropriate data security tools and technologies, as well as insufficient data security training for all employees."

Drilling into the Complexity

The reality is the commitment to a robust teleworking program can be extremely costly and complex. It can be operationally difficult for organizations to roll out all the networked resources users require to be productive at all the geographically distributed locations they need; it's one reason U.S. government agencies reported "office coverage," as one of the largest barriers to implementation.[22]

According to Forrester there are no less than nine services (made up of a set of technologies, services and infrastructure) required for a remote office to truly operate independently of the central office.[23]At minimum, it requires some sort of network device, possibly a wireless router, a printer/scanner, voice handset, maybe a telepresence terminal, etc. The complexity then multiplies when you think of all the varied users, and all the data, voice and video applications they each require to be productive. That's a lot to deploy and manage for an already overstressed IT team and budget.

For starters, each device presents technical, management and reporting challenges. Each needs to be provisioned, deployed and managed at the remote site, which often has no technical expertise on premise. You need to ensure each device works and interoperates with all the necessary devices and systems that need to be in place to support an at home work experience similar to that which the user would have in the office. Then, when something happens, you need to be able to diagnose and troubleshoot the issue fast; depending on the issue and level of escalation, it could require on-site technical expertise, resulting in expensive travel and down time.

When dealing with multiple point products, you have multiple management interfaces, which makes it challenging to get comprehensive visibility into what's going on in that extended network. In turn, information contained in each of these devices is silo'd, making it more difficult to interpret and extract value. As a result, it is an extremely labor-intensive process to correlate information to achieve a relevant contextual picture of what's going on to ensure appropriate controls can be put in place for accountability and oversight.

19 Telework Research Network, Kate Lister, October 2009
20 Status of Telework in the Federal Government: Report to Congress," United States Office of Personnel Management, August 2009, http://www.telework.gov/Reports_and_Studies/Annual_Reports/2009teleworkreport.pdf.
21 2007 Report
22 Status of Telework in the Federal Government: Report to Congress," United States Office of Personnel Management, August 2009, http://www.telework.gov/Reports_and_Studies/Annual_Reports/2009teleworkreport.pdf.
23 TechRadar™ for IT Infrastructure and Operations Professionals: Branch Office Technologies, Q2 2009," by Chris Silva, with Simon Yates and Ben Echols, Forrester Research, May 26, 2009.

Which brings us to the security implications of all these remote sites; they represent entry points to the network that can pose quite a risk to an organization's intellectual assets if they aren't adequately secured. Maintaining the risk profile and security stance of the organization is a prerequisite for extending intellectual capital and corporate resources to users. You must have the ability to maintain control over exactly what can be done at that remote site; security policies must remain in force and protect the organization from risks to combat security threats and comply with industry regulations.

Requirements for an Effective Telework Solution

Unfortunately, many traditional remote access solutions have been unable to address these technical, management and reporting challenges, which is why we have only seen smaller-scale remote office deployments and stalled teleworking initiatives. In order to embrace teleworking and start reaping all its benefits, you need to be able to quickly roll out secure remote users, wherever they may be, around the globe. You need a telework solution that is:

- **Simple to Provision—**Most teleworkers are not IT professionals, so bringing their virtual workplace up and keeping it running shouldn't require any technical expertise at the location; it also can't burden an already overworked IT department. Rather it should be very easy to deploy and serve to reduce the management overhead and management infrastructure traditionally required to support teleworkers.
- **Easy to Control—**There must be comprehensive visibility into what is going on at the teleworker's site, such as the performance of all the applications they accessed, with the ability to lock down and protect access to ensure security is never in question and compliance is never compromised. A single, centralized way to manage every aspect of the distributed network is optimal, from provisioning and access to security policy enforcement and troubleshooting.
- **Cost-Effective—**Budgets are very often strained or spoken for, so the business case for teleworking needs to be compelling for it to make the cut. While the benefits are there, the initial capital investment (hardware) can often be too big a hurdle for enterprises to take in order to realize future cost savings. Ideally, little to no up-front capital investments would be required to roll out a teleworker's virtual workplace.
- **Scalable—**Leading companies must be agile and their teleworking capabilities must adjust accordingly. This means they must be able to rapidly scale up or down sites as their requirements change and deliver a predictable experience, regardless of where in the world the teleworker is located.
- **Seamless—**Enabling teleworkers to have the same experience at home that they would in a corporate facility.

One Size Doesn't Fit All—
Segmenting the Remote Access Population

Many organizations are starting to rethink the way they classify their remote users to ensure the technology solutions they have in place truly meet the particular needs and expectations of those different users. Often, you can break down the extended user population into:

Day Extenders—employees who log in every once in awhile from home to check on something or do a little extra work at night. They often use their own machines to access the most basic of services (such as email or a job-specific application) to just get something done.

Road Warriors—folks who need to stay connected while they are on the go. These frequent travelers (sales reps, executives, etc.) need access to basic services from wherever they are—airport, café, hotel—relying on mobile devices and whatever connection is available to get/make updates.

Teleworkers—employees who regularly work from home, at least once or twice a week. They anticipate an "office-like" experience at home, with access to all the same services and all the same amenities (such as "four-digit" phone numbers (VoIP), or print services) to ensure maximum productivity.

On-site Teams (an extension of the remote workforce)—employees who are working at a remote location for a period of time (consultants working at a client's site; temporary clinic set up during flu season, etc.). They too need an "office-like" experience, with access to all the same services they would have access to in the office.

Each of these remote users has different expectations and requirements, which require potentially different technology solutions to address.

Options for Deployment

There are a variety of technologies that can be used to roll out a teleworking solution, each with its own benefits and drawbacks. Let's take a look at these traditional technology options, as well as some new entries to the market, to better understand the choices enterprises face today when looking to create an IT infrastructure that can support their telework initiatives.

First There Were Private Networks...

In what seems like ancient times from a technology stand point, the only option open to organizations a decade ago were the dedicated, physical connections they could pay their service provider to roll out to each of their remote locations. These point-to-point lines, as they were named, were then leased by the enterprise for the duration of their use. While highly reliable and secure (unless physically breached), these private lines often proved too costly to provision and maintain. For example, relying on the provider to lay and check the physical links between locations (the points) made changes very laborious, often taking weeks to accomplish. These point-to-point solutions quickly became impractical for today's fast-paced enterprises—paying and waiting for a truck roll to be completed at each possible location was simply not scalable.

Circuit-switched lines (you may have heard of Frame-Relay or ATM solutions) offered some improvement, allowing enterprises to share the cost of the private line. It was easier for organizations to add sites; as long as the wire to that destination (point) already existed, the enterprise could simply lease a part of the line. This reduced the cost, allowing enterprises to pay just for the bandwidth they used, not the whole line itself, however, service level agreements (SLA) to guarantee the availability of the bandwidth they needed were typically cost prohibitive. As a result, enterprises often chose to go without an SLA, suffering reduced performance whenever the lines were under load. For today's multi-media apps, circuit-switched solutions very often are unable to provide sufficient performance to enterprises at a reasonable cost.

...Then Came Virtual Private Networks

Virtual private networks (VPNs) entered the picture to enable enterprises to leverage the cost-effective and ubiquitous connectivity of the Internet to transport their private data in a secure manner. Basically, VPNs overlay a private network on top of the Internet infrastructure to create a "virtual" topology that allows the enterprise to quickly extend secure connectivity across geographically distributed locations.

An organization's VPN gateway, which is deployed right in the organization's network, encapsulates the private data and sends it across the Internet to a "peer" gateway via a tunnel that is set up for the exclusive transport of this data. Because an organization can forward traffic through these tunnels with internal IP addresses, VPNs enable enterprises to connect remote offices and remote workers without having to reconfigure their IP addresses or pay for the dedicated IP addresses that are required for Internet transmission. This allows an enterprise to support lots of users with one VPN solution.

The two most common VPN technologies used by enterprises to connect remote users are the IP Security Protocol (IPSec) and Secure Socket Layer (SSL).

> Multi-Protocol Label Switching (MPLS) VPNs focus on how traffic is routed, forwarded, or switched, and is primarily used by service providers who are trying to efficiently manage different kinds of data streams based on their priority and the customer's plan.

Hardware-Based IPSec VPNs

IPSec VPNs are network-layer VPNs delivered by a box that is physically deployed at the remote location. As a result, the network handles the traffic from the VPN gateway the same as if it came from a user within the LAN itself and provides the user with the "same" continuous, secure access to the network they would have if connecting from headquarters.

These devices require an up-front capital investment, which is non-trivial, when considering the number of remote locations that need to be connected to the enterprise network. Typically, enterprises try to consolidate as much functionality as they can in a single box—perhaps you have heard of BOB (branch-office-in-a-box) or some of the other "catchy" names for this category—to try to manage the investment and footprint they need at each remote location.

While enabling the organization to extend their infrastructure, including the investments they made in voice and VDI, these deployments tend to be highly complex and subsequently operationally expensive to manage. This is because the enterprise, more specifically their IT staff, is responsible for all the provisioning, managing and maintaining of all the functionality and connectivity provided at these remote locations, which often have no IT expertise, by these devices.

Hardware-Based IPSec VPNs

Ideal use case: Large remote offices that need a dedicated, always on secure connection.

Pros: Deliver a user experience in line with what the employee would receive at corporate headquarters.

Cons: Very complex, with very little visibility into what's going on in the extended network:

- Convoluted management—often requires multiple consoles and interfaces to manage the different aspects of the device, such as the VPN, routing, security, etc.
- No granularity—provides all or nothing access, with very little granular control over exactly what the user can do once they are inside the network.
- Connectivity challenges—home networks often have trouble dealing with IPSec.

Software-Based SSL VPNs

SSL VPNs are application-layer VPNs that use SSL/HTTPS as a secure transport mechanism. SSL VPNs are available wherever there is a standard web browser and can be dynamically provisioned by the user to provide secure access on the fly. SSL VPNs operate independent of the underlying operating system of the device, which opens the possibilities up to a large variety of computing devices, such as smartphones. In addition, they deliver policy-based management, which gives enterprises granular control over exactly what resources and applications a user can access. For example, your administrator can designate the URL, the files, and the server applications that you can access using the SSL VPN, thus mitigating the risks that an unprotected endpoint, untrusted network, or unauthorized user could introduce. Once a policy is set, there is, however, very little visibility into the actual traffic by that remote user and no history of the performance of the network, which makes troubleshooting a challenge.

Software-Based SSL VPNs

Ideal use case: Mobile users, who are not connecting from a fixed location and don't have high-performance requirements for their access.

Pros: It is very user friendly, with nothing to configure or download on the device prior to it being used to access corporate resources.

Cons: Performance is limited, making it difficult to support rich-media applications:

- Latency—voice and video may simply stop working due to latency and lag times.
- Compatibility issues—there are often issues with desktop and OS compatibility; upgrades or changes to the desktop often force upgrades to the SSL VPN infrastructure, which can complicate ongoing management.
- Little granular control—once the user is inside the network there is very little control over what they are doing.
- Limited investment protection—It is difficult to extend investments you have made in voice, VDI, etc. infrastructure to remote sites.

The New Cloud-based Networking Model

Recently, a new option has emerged; one that offers the performance of an IPSec VPN with the ease of use and management of an SSL VPN. This new model leverages the cloud to deliver networking as an application. Cloud services are something that more and more enterprises are toying with; in 2009, the number of virtual machines exceeded the number of physical servers deployed[24], marking a real tipping point in the way enterprises think about their IT infrastructure and laying the groundwork for the adoption of cloud computing.

The extended network is a perfect location because it represents a lot of opportunities for savings, and consists of a wide variety of users in globally dispersed locations that would benefit from the ubiquity, flexibility and scalability of a cloud delivery model. The U.S. National Institute of Standards and Technology outlines cloud attributes as:

- on-demand self service
- ubiquitous network access
- pay for use
- elastic scale
- and resource pooling.

For organizations considering cloud initiatives, cloud-based distributed networking can be a low risk way for enterprises to roll out and test cloud-based services; for those already using cloud-based services, it can be a good way to leverage their investments and extend their cloud based services to their remote users.

Cloud-based Networking

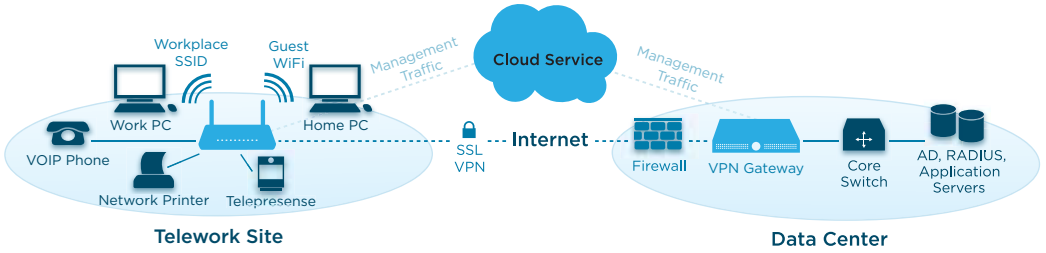
Ideal use case: Small branch offices, teleworkers, retail sites and kiosks, temporary networks.

Pros: It is very user friendly, with intelligent automation and remote troubleshooting capabilities that means there is no need for on-site technical expertise.

- Leverages the economies of the cloud to reduce the Capital and operational costs of the extended network.
- Provides comprehensive visibility and granular control, with real-time, centralized policy management and reporting.
- Enables organizations to easily extend voice, VDI, etc. investments to the remote site and deliver an experience in line with what a user would receive in the office.

Cons: Cloud-based services are still evolving.

24 *"VMware CEO: Cloud Now Unstoppable Even Without VMware," by Joseph F. Kovar, CRN, Sept. 1, 2010, http://www.crn.com/news/cloud/227200147/vmware-ceo-cloud-now-unstoppable-even-without-vmware.htm.*



How Cloud-based Networking Services Work

The data traverses the network through a VPN tunnel, just as it would with a traditional IPSec VPN solution, however, all the complexity of managing that VPN, as well as all the other networking features and functionality, is abstracted and centralized in the cloud to provide the same ease of use and granular control offered by an SSL VPN solution.

A cloud-based networking solution should have a multi-tenant, globally distributed architecture to be able to deliver all the scale, geographic dispersion and capital efficiencies typically associated with cloud computing. This architecture enables organizations to essentially lease (through subscriptions) rather than buy and build the infrastructure needed to effectively support their global workforce. The ubiquity and redundancy of the cloud, ensures the performance of these services is predictable and highly available. Plus, the organization can securely log into the service and manage their extended network from anywhere.

A cloud service gives organizations complete control over the relatively small footprint device deployed at the remote location. It ensures the services required by that user are available and supported in a way that maximizes their effectiveness (including investments an organization may have made in voice or VDI infrastructures). It ensures appropriate policies are in force for the user, updates can be easily managed and applied (patches, security, features), and centralized visibility and control for all network activity.

The Managed Services Option

Organizations that do not want to directly manage their extended network can offload the operational activities to a managed service provider. As defined by IDC, a managed service provides enterprises "a 'help-me-do-it' or 'do-it-for-me' approach to the operation, monitoring and performance optimization of network and/or IT functions." A third-party provider can leverage any of the aforementioned options to provide secure remote connectivity for enterprise users, managing all aspects from provisioning and deployment to maintenance and support, even including reporting. Note, for organizations that need to maintain direct control over their network, due to regulatory or security requirements, a managed service may not be a viable option.

The best technology in the world cannot help an organization that is ill-equipped to use it. It would be a mistake to underestimate the influence that culture can have on whether telework is fully embraced or left to languish as an option only for special cases; it may be that the biggest commitment an organization needs to make on behalf of telework is less about technology and more about a dedication to make any necessary cultural shifts.

A report[25] from the U.S. Office of Personnel Management cites management resistance (49%) and organizational culture (46%) as the major obstacles to the growth of telework, highlighting just how important it is to lay the cultural foundation to smooth widespread adoption. The key is to ensure the culture truly recognizes telework as an enabling practice that offers compelling benefits for both the business and the individual. It requires not only the right mindset, at all levels, but also the right set of policies, processes and incentives to ensure the ultimate success of any telework initiative.

25 *"Status of Telework in the Federal Government: Report to Congress," United States Office of Personnel Management, August 2009, http://www.telework.gov/Reports_and_Studies/Annual_Reports/2009teleworkreport.pdf.*

Make It Strategic

Teleworking initiatives that operate as one-offs are not going to garner the results you are looking for; in fact, this can create an environment where it is seen as a privilege or perk that can make other's resentful or suspicious. It should be company-wide and strategic, with input from everyone and the policies and procedures to back up its adoption. It shouldn't be driven by one department, nor should one department be able to opt out entirely. Everyone musts be able to clearly identify the ties that telework has to supporting business-wide objectives (such as cost-cutting measures or collaboration initiatives) to ensure it can be easily integrated into the very core of the business.

It also needs to have the full support of the executive team. They should not only embrace it, but they also need to become its biggest advocates. Executives who travel and telecommute regularly should set an example and be among the first to exchange their private office for a shared workspace to promote acceptance, reduce resistance and maximize benefits.

Create a Policy So Everyone Knows What to Expect

It starts with creating a formal telework work program and policy that will support geographic expansion planning and management. It should provide a framework for the program that includes:

- What work can and cannot be done at home
- Who is and who is not eligible
- Acceptable and prohibited behavior/use/etiquette
- Commitments required from the users
- The level of support pledged by the organization

It's very true that some things are best done in person and others cannot be done away from the office. The point is to put a policy in place that defines the criteria for eligibility and the expectations of exactly how a telework arrangement should work. A World at Work survey found 38 percent of employees felt at least part of their job could be performed at home. A third of that group felt they could do virtual work more than 60 percent of the time.[26]

The problem is most employers are not providing clear boundaries or commitments around telework, instead they tend to support it in an ad hoc manner. Another study by World at Work and the Work Design Collaboration found that 44% of companies surveyed did not have a formal selection process in place to determine eligibility for telework; 39% did not utilize formal employer-employee contracts regarding flexible work arrangements; and 44% did not evaluate technology effectiveness.[27] Assuming these stats are indicative of most organizations, it's easy to see why there is a lot of uncertainty around telework.

26 *2009 survey, www.worldatwork.org*

27 *"Flexible Work Arrangements for Nonexempt Employees," study by WorldatWork and the Work Design Collaboration, July 2009, http://www.workingfromanywhere.org/s*

Results Must Matter More Than Being Seen

The attitude that if you are not seen, you are not doing work can undermine the success of any telework initiative. The perception that "working from home" equates to sitting around eating bonbons or playing hooky does telework no favors. To combat, organizations need a results-oriented environment; one that rewards outcomes, measures deliverables and clearly links an individual's activities to business goals and objectives.

Ensure work is transparent, so there is no question about what people are doing, how they are doing it and the results of their activity—remove nebulous activity and you can take away much of the distrust. Time and attendance should become irrelevant, since telework enables employees to do their job from wherever, whenever. It's true the lines may blur more between work and personal lives, but as long as people understand what's expected from them and are held accountable, it shouldn't matter that someone left to pick up their child at school and then logged back on at night to prepare for the next day's meeting.

Develop Good Performance Managers

A results-oriented culture only works if managers can manage to the results. As reported in Federal Computing Week, the biggest barrier to telework may be that managers have learn how to be good performance managers. Micromanagement will not work in this environment; rather managers will have to learn to lead their employees and get results based on clear and measurable goals.

Managers may need to make adjustments, such as:

- Transitioning away from relying on visual cues—to focusing on other indicators (work product, participation in collaborative projects, etc.) to determine an employee's satisfaction, engagement and effectiveness
- Making no assumptions—ensuring managers are explicit about what they need and, if necessary, how they expect it to get done.

Ensuring employees have a sense of purpose and understand the role they play in the overall success of the group, department and business is important to ground them in their objectives. For some time, setting and measuring goals has been espoused as the crux of unlocking an employee's potential. We have seen lots of frameworks—such as Peter Drucker's Management-By-Objectives or Six Sigma—that pay attention to the process of managing the performance of employees. Regardless of which approach you adhere to, some of the foundational managerial traits are the same:

- Good planning
- Focus on communications
- Establish measurable performance objectives

Make the Most of the Opportunity to Work from Anywhere

Those companies that really benefit from telework, see it as an opportunity to open up and change the way a company looks at doing business. It's a way to leverage talent from anywhere, ensure the right resources are being applied to the right problems, accelerate innovation, improve regional knowledge to better address customer preferences, and enhance collaboration.

For example, given that the female labor force is outpacing the growth of the male labor force [28] in some parts of the world (women are the primary or co-breadwinners in two-thirds of American households[29]), business are looking at ways to adapt their work environments to accommodate the unique needs of their evolving workforce. Telework can become the enabling technology that gives women the flexibility they need to achieve a work-life balance. Rather than forcing a choice between family and work, telework can provide an alternative that enables them to contribute to the success of the company in a manner that is more commiserate with their terms—this goes for any employee that may be struggling with juggling personal obligations and work.

To maximize the benefits of telework, you need to ensure there is some flexibility built into the program to support a department, team or individual's needs. Make sure employees are able do their work whenever and wherever they are. As we have noted in earlier chapters (See Drivers), the research shows that teleworkers are at least, if not more, productive than non-teleworkers.[30] Research[31] has shown that virtual workers were able to work 19 hours longer than office-based employees before they felt it interfered with their personal and family life.

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28 According to statistics from the U.S. Department of Education on the percentages of college-educated and post-graduate degrees earned by women each year

29 Shriver Report, Oct. 2009, http://www.shriverreport.com/awn/index.php

30 http://www.opm.gov/studies/FINAL-TELEWRK.htm

31 by Brigham Young University

This brings us to another point—just as important as setting expectations around what you want to see from employees is to set boundaries around that work. Make sure people know when it's okay and how to shut down or "unplug" from work. Diminishing returns can occur when people feel they can never stop working; you want to foster an environment that promotes work-life balance, not a sense you are chained to a desk.[32]

Don't Forget the Tools and Processes

Ensure the right mix of tools is available to support your telework policies and maximize the effectiveness of the communications and collaboration amongst geographically distanced employees. In a telework environment, any shortcomings in a business can be exasperated and amplified; as many experts have said, "telework does not create management problems… it simply makes existing problems more apparent." [33] Broken processes will become even more obvious in a distributed environment because people can't necessarily walk over and talk to someone to take care of something—so ensuring your processes facilitate the progression of work is critical to a telecommuting environment's success. For example, ensure:

- It is easy to sign up for teleconferencing capabilities and a Web conferencing account
- Processes are paperless to support digital information flow and access to information by everyone, from wherever they are located

- There is effective team building and staff development programs in place to support collaboration and smooth interactions between geographically dispersed teams
- Regular communications are scheduled to ensure ongoing touch-points and team cohesiveness
- Mechanisms exist (presence-based technologies) to help employees let others know when they are available or engaged—to substitute for the visual cues team members would get when they are in the office (where they can see someone is on the phone or in a closed door meeting)
- Incentives are in place to promote telework (e.g. rewarding those who give up personal office for a shared workspace)
- Success can be shared and replicated—give employees a way to tout savings and provide concrete examples of how the business has benefited from teleworking to build momentum and spur ongoing success (chats/forums/internal articles)

Another key element of any telework program is training. Starting with the basics, training should be available to ensure employees understand how to use all the tools (smartphone, laptop, wireless network, VoIP, web conferencing, event scheduling tools, social networking applications) available to them to maximize their effectiveness. Training programs should also include curriculum that help managers and individual contributors develop the skills they need to be productive in a remote environment. For example, a leadership course could help managers develop the skills to set measurable objectives or determine the productivity of an employee; or a course on interpersonal relationships could help employees develop skills to manage projects, collaborate or problem solve with a distributed team.

Ensuring users have the skills they need, as well as enough time to work with the tools and feel comfortable with them before they are required to use them to get their job done will take a lot of the anxiety out of the remote work place and ensure everyone can visualize the future workplace and understand how it is going to work.

Top 10 IT Requirements for IT to consider

There are quite a few technical considerations you need to make to ensure the telework solution meets your needs and delivers a productive, "office-like" experience:

1. Instant, hassle-free deployment
2. Support for Wired & Wi-Fi connectivity
3. Robust network security
4. Rock-solid voice and video support
5. Remote network printing & integration with other VDI capabilities
6. Access to on-premise and SaaS applications
7. Efficient use of bandwidth
8. On-demand, remote troubleshooting
9. Visibility into network activity
10. Robust reporting

Gathering Requirements

To understand the capabilities of any telework solution to deliver on these technical requirements, ask yourself:

1. How many remote locations do you have to provision? How easy is it to scale the solution?
2. How much IT expertise is available at these sites? How easy is it to provision a site? How easy is it to troubleshoot?
3. What is your budget?
4. What kind of remote users do you have at these locations—day extenders, road warriors, teleworkers, on-site workers?
5. What kind of connectivity do they require?
6. What kinds of services do your remote users need? Rich-media requires higher performance than pure data apps, such as email or spreadsheets, can the solution provide the satisfactory experience your users are expecting?
7. What does downtime mean for your productivity?
8. What kinds of existing investments do you have in infrastructure? (Do you have legacy devices on premise—if so, where are they on your depreciation cycle? Is it time for a refresh?; What security investments do you want to leverage?; Are you looking to extend your voice infrastructures?; Do you want to support a virtual desktop infrastructure? Are you trying to expand existing Cloud services?)
9. What are your regulatory requirements? Are there any policies or guidelines you need to be mindful of when making decisions about how to extend your network? PCI, HIPAA, Gramm-Leach Biley, Sarbanes-Oxley, and others are regulations you need to adhere to can affect the type of information you need to collect, store and report. For instance, in the U.S. government there are several initiatives, such as the Standards Acceleration to Jumpstart Adoption of Cloud Computing (SAJACC) and the Federal Risk and Authorization Management Program (FedRAMP), you may need to consider.
10. What kinds of reports will you need to generate? Does the solution make it easy to generate these reports? Can they be customized for your needs? Are they auditable?
11. What security requirements do you have? How easy is it to integrate existing security policies to ensure consistent application and reduced risk? What kind of authentication do you require—is it supported by the solution?
12. How easy is it to apply a patch (or a feature upgrade, for that matter)?
13. Do you have the visibility you need to ensure policies are in force?

The Top 10 Requirements for the Business to Consider

Technology is not the only requirement for a successful telework program, the culture of the organization also plays a vital role in its ultimate success. You need:

1. A Global Telework Policy
2. Company-wide support, particularly executive endorsements/commitments
3. Ties to larger business objectives
4. Results-oriented environment
5. Performance-based managers
6. Transparency
7. Processes that support distributed work
8. Tools to enable communication and collaboration
9. Training and education to prepare employees to make the most of the environment
10. Incentives to promote change

Gathering Requirements

To understand whether your culture is ready to support a telework initiative, ask:

1. Do you have a Corporate-Wide Policy that explains what work can and cannot be done at home, who is and who is not eligible, what is acceptable and prohibited behavior/use/etiquette, the commitments required from the users, and the level of support pledged by the organization?
2. Does everyone in the company understand the role telework plays in meeting your business objectives? (Cost cutting, operational efficiencies, carbon emission reductions, employee retention, morale improvement, etc.)
3. Do you have executive support? Are they setting an example? Can they be counted on as advocates?
4. Does your organization reward outcomes? How are objectives set? How do you measure deliverables and hold people accountable?
5. How transparent is your environment—does everyone understand what their colleagues are doing and what's expected of them? Does everyone understand the role they place in the organization's collective success?
6. How do managers evaluate an employee's satisfaction, engagement and effectiveness? Are managers prepared to be explicit about what they need and expect from their employees? Do they have the skills to manage a distributed team?
7. What tools do you have in place to facilitate communication? How do you enable collaboration? (such as smartphones, a laptop, wireless network, VoIP, web conferencing, event scheduling tools, social networking applications, etc.); Is it easy to sign-up for tele- and/or Web conferencing capabilities?; What mechanisms exist (presence-based technologies) to help employees let others know when they are available or engaged?; Are there ways for information to be disseminated or shared?
8. Do your processes support work flows in a distributed environment? Are they paperless? Are there central repositories? What about change management?
9. What kind of training or education do you have available to help prepare your employees to telework? Do you ensure they know how to use all the technologies and tools available to them?; Do you help managers develop the managerial skills they need to get the most out of their employees, regardless of location?; Do you help employees develop the knowledge and inter-personal skills needed to be effective in a distributed environment?
10. What kinds of incentives are in place to promote telework? Are there benefits to giving up a personal office? Are there perks in place when employees share a workspace? Is there a way for employees to share their experiences or offer best practices to encourage their peers to adopt telework?

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About Aerohive

Aerohive Networks unleashes the potential of enterprise Wi-Fi, enabling customers to stop buying copper, move applications to the air, and maximize workforce productivity. The company's award-winning cooperative control architecture eliminates costly controllers, saving money and providing unprecedented resiliency, up to 10X better application performance, and an opportunity to start small and expand without limitations. Aerohive was founded in 2006 and is headquartered in Santa Clara, California. The company's investors include Kliner Perkins, Caufield & Byers, Lightspeed Venture Partners, and Northern Light Venture Capital.

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