Redundancy White Paper

May 2009

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Executive Overview

Companies today rely heavily on the internet to conduct business. The risks and effects from unplanned downtime grow with each additional critical application, network enhancement or system upgrade. Most businesses that suffer catastrophic data loss, or an extended IT outage, go out of business. Executives are looking to their IT managers for assurances that information assets-data and applications – can remain available no matter what happens.

> *"Only 6 percent of companies suffering from a catastrophic data loss survive, while 43 percent never reopen and 51 percent close within two years." – University of Texas*

In the event of downtime, one or more productive resources are taken off-line from staff; computers, communications, facility, etc. A network failure could cripple an organization costing thousands of dollars in lost revenue. Companies need to understand what is the amount of equity that, if lost, would cause severe damage to the organization and put in place measures to minimize the risk of unplanned downtime.

Towerstream Overview

Towerstream is a leading fixed WiMAX service provider in the U.S., delivering high-speed Internet access to businesses in nine markets including New York City, Boston, Los Angeles, Chicago, the San Francisco Bay Area, Miami, Seattle, Dallas-Fort Worth, and the greater Providence area where the Company is based.

Towerstream delivers a truly redundant last mile solution. Unlike other internet service providers, Towerstream owns their last mile network and is not dependent on the local exchange carrier network of phone wires or cable offering a faster installation, seamlessly and securely, for much less cost than traditional internet providers.

Towerstream's guaranteed 99.99% uptime enables IT Managers to move what was once their top business concerns to bottom of their list.

The Towerstream Difference

Using WIMAX technology, Towerstream delivers a wide variety of features including:

- Speed and Scalability: With bandwidth options ranging anywhere between 0.512Mbps and 1Gbps Towerstream can create the customized broadband solution to meet your business's needs.
- Guaranteed 99.99% Reliability: Towerstream delivers a very reliable last mile solution. We are the first wireless broadband provider to offer the "Five 9's" Guarantee to our customers.
- Fast and Simple Installation: By completely bypassing the local phone company and using multiple broadcast sites in several major cities, service is often installed in 3-5 business days or less.

Towerstream's wireless broadband network supports VoIP, bandwidth on demand, wireless redundancy, VPNs, disaster recovery, bundled data and video services.

Cost of Downtime to Businesses

On April 9, 2009 Santa Clara County experienced its most extensive phone outage in recent history. Officials declared a local state of emergency after an underground fiber optic cable in south San Jose, which is owned by AT&T and leased out to Verizon, had been intentionally cut, causing widespread service outage covering southern Santa Clara and Santa Cruz counties. This outage affected land lines, cell phones, Internet access and caused severe disruption to local 911 emergency phone services.

Each year downtime costs our economy tens of billions of dollars.

> *"International Data Corp. estimates that companies lost an average of $84,000 for every hour of downtime. Strategic Research puts the figure closer to $90,000 an hour. Yet many enterprises put off implementing enterprise-wide DR plans unit it's too late." – SearchStorage.com*

Whether you're managing networks for a service provider, an enterprise, hospital, school or for a city/state/federal government agency, you are undoubtedly familiar with the importance of having business continuity procedures implemented and disaster recovery plans in place. Businesses cannot afford interruptions to their information technology and communications infrastructure or tolerate any downtime for sensitive applications caused by natural forces or man-made disasters.

Although productivity has increased in the past 10 years, businesses have become dependent upon these applications and the broadband networks upon which they run. When the network goes down applications are inaccessible resulting in a decrease in productivity and lost revenue.

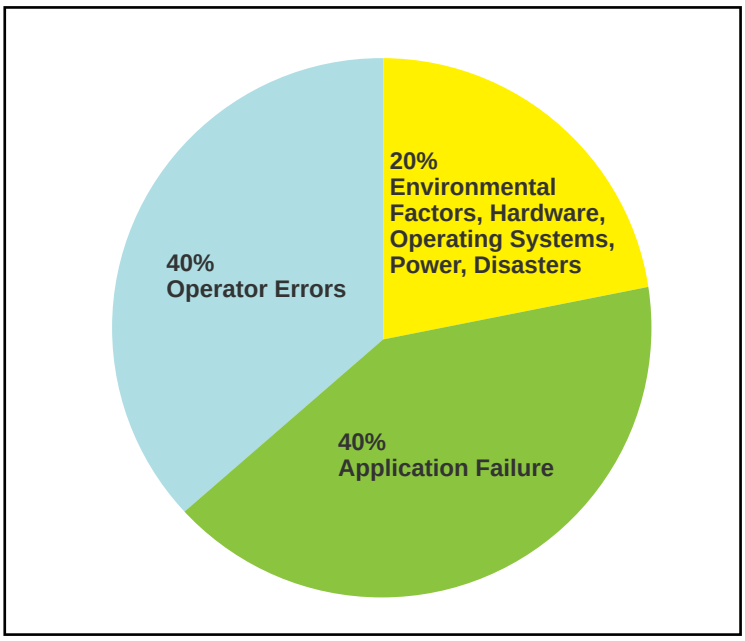
Network architecture must be equipped to support these demands for today and the future and provide a “fail safe” secondary network so that people can continue to have access to their critical applications, data, and communication in order to remain productive.

Be Proactive To Ensure Redundancy

In order to ensure redundancy, a first step is for businesses to develop a Business Continuity Management (BCM) program. Today, only a minority of companies feel their BCM programs are very effective. Of those companies that do have established BCM programs, approximately 17% of respondents feel their program is very effective, 42% feel their program is effective, 32% feel it’s somewhat effective, and almost 8% feel it’s not effective at all.
- *Forrester.*

Small businesses to Enterprise customers should be proactive in planning a truly independent secondary connection. This can be accomplished by contracting with a different provider for data and voice connectivity. A business must carefully evaluate the providers to verify there is not a common point of failure. A common flaw in business continuity plans is to contract with providers that carry their traffic on similar if not identical data paths. This can be a difficult problem to overcome when choices are limited to strictly one technology such as traditional land lines.

Causes Of Unplanned Downtime



Source: Gartner Group, Inc.

Cost Of Not Having Redundancy

Regardless of how downtime happens it can impact and have expenses to your business. The following will give you a feel for the bottom-line impact that downtime can have in your environment.

OUTAGE EXPENSE AT LARGE COMPANIES	
1.76	Number of outages per month (Thierry Lammers/Infotechs)
90	Average outage in minutes (Thierry Lammers/Infotechs)
158.4	**Average minutes of outage per month**
$1,400	Average cost of downtime per minute (Oracle Survey/IDC Study)
$221,760	**Average cost of downtime per month**
$2,661,120	**Average cost of downtime per YEAR**

Source: Quest Software

OUTAGE EXPENSE AT SMALL COMPANIES	
2	Assumed number of outages per month
60	Assumed number outages in minutes
120	**Average minutes of outage per month**
$13,170	Average cost of downtime per hour (Digital V6 Corp.)
$26,340	**Average cost of downtime per month**

Source: Quest Software

Costs of downtime triggers a procession of direct and indirect costs:

Direct Costs	Indirect Costs
Lost revenue	Lost business opportunities
Lost wages	Loss of employees and/or employee morale
Lost inventory	Decrease in stock value
Remedial labor costs	Lost of customer/partner goodwill
Marketing cost	Brand damage
Backup fees	Driving business to competitor
Legal Penalties	Bad publicity/press

Source: Vision Solutions

Applications Today Demand for Bandwidth

Today's business applications are driving an increase in a demand for bandwidth. Below are just a few examples of applications that require more bandwidth.

- Email with large data/document attachments
- On-line Storage/Data backup(Storage of business information on remote servers is becoming a critical need for companies and requires very high uplink bandwidth)
- Critical Financial SAP
- VoIP
- Video-On-Demand
- Video-Conferencing
- Web Hosting
- Streaming Rich Media Content
- Peer-to-peer (P2P) applications

It can be prohibitively expensive to pay the local phone company for Alternate Routing Services (ARS). The advances in wireless technologies have made it a viable alternative for most companies. Wireless can now be deployed with high reliability and low cost.

Measures to Mitigate Downtime

There are three steps businesses can take to be better prepared for downtime and afford cost-justifiable benefits year-round. The first step is to have in place ready access to enough inventory of equipment needed in the recovery effort. This includes microwave bridges, antennas, mounting hardware and generators. Step 2 and 3 would be to replace or supplement landline communications and equip mobile command centers with microwave capabilities. These steps would provide benefits in normal times and during disaster recovery efforts.

A major advantage to permanent microwave installations over landline networks, whether copper or fiber based, is immunity to damage with faster recovery times. Wireless communications have nothing in between the end points that can be damaged or destroyed because there is no in between with wireless communications. Where as wire networks require full end-to-end continuity and can be complex with intermediate nodes, cross-connects, electronic switching or routing.

Microwave systems can't be beat when it comes to restoring critical communications, There is nothing but air between antennas and the deployment possibilities are limitless. Mobile command centers have full communications and first responders can be re-established almost immediately because there are no wires. Today, microwave communications deliver the lowest cost per megabit mile available in the industry compared to leased lines which have recuing monthly fees or trenching to lay fiber optic cable.

Redundant connections to multiple IP backbones are critical to providing superior levels of availability in a back-up network. Having redundant radios in the back-up network will do little good if the internet backbone provider servicing the backhaul network suffers a network outage. For that reason, the service provider should plan for multiple IP backbone service provider connections on their network.

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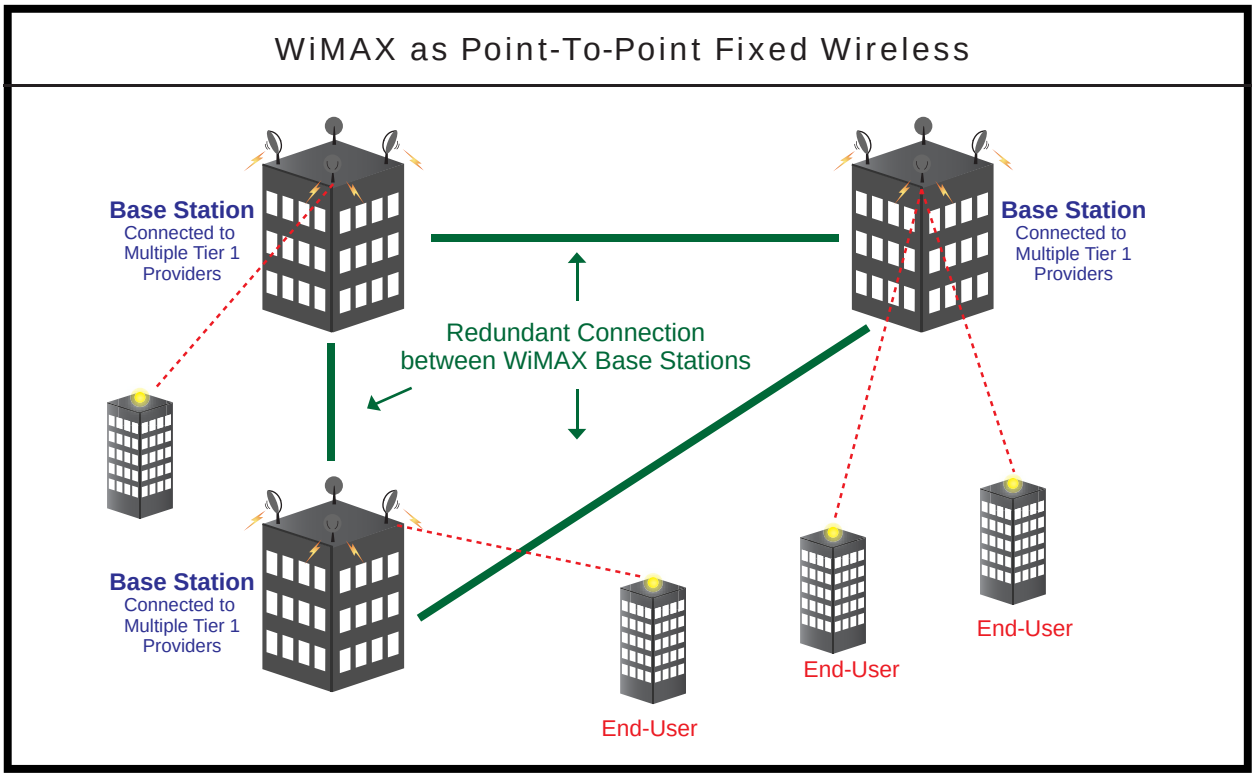
Microwave Technology: A Viable Back-up



In the event of an outage all voice and data communications can be lost. Microwave back-up is the preferred technology capable of restoring communications quickly compared to landline communications which can take days due to the heavy construction equipment required and length of time to find and fix the damage. Businesses with the foresight to deploy a wireless network option can continue to have access to their applications with no downtime.

Microwave back-up provides the extended range of high bandwidth capable of supporting voice and broadband data and the equipment is straightforward to install and configure and, without dependencies on physical infrastructure, there are no obstacles to deployment.

Wireless broadband providers can achieve 100% up time in their core network relying on N+1 redundancy for their entire core network. For customers who want N+1 redundancy, the same dual radio architecture can be deployed at their location (s). This solution provides seamless failover in the event of hardware or even facility failure.

Summary

A network-wide outage can seriously jeopardize the success of a business, impacting revenue streams and even inflicting long term damage to a corporate brand. The best response to any downtime or disaster is to combine several disparate risk management strategies into a single, integrated strategy that will allow an organization to adapt and respond rapidly.

Hence, the benefits of redundancy in a wireless network for business service providers can be summarized as below:

- High uptime guaranteed according to the Service Level Agreement (SLA)
- Low investment for maintenance of network
- Increased revenue
- Increased customer confidence

An IT infrastructure must be designed to ensure the continuity of business operations in the event of an unexpected disruption and to secure data integrity and integrate risk strategies to reduce costs. Reacting inappropriately or too slowly could cause organizations to lose competitive ground.