

NETWORK REDUNDANCY AND RELIABILITY TO IMPROVE BUSINESS CONTINUITY AND PERFORMANCE

BY



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ABOUT FATPIPE NETWORKS

FatPipe Networks, Inc., founded as Ragula Systems Development Company in 1989, is a profitable privately held venture capital funded company, with U.S. offices (Utah, Arizona, and the Washington DC Area), and offices abroad (India, United Kingdom, Australia, Mexico, and Nigeria). FatPipe has partnerships with resellers and distributors around the globe. FatPipe's sales offices are supported by regional support centers to support our commitment to excellence and quality support for our customers worldwide.

FatPipe is the creator, inventor, and holds multiple patents in next generation Hybrid WAN solutions. It provides businesses and government entities the world's most advanced mission critical wide area network (WAN) reliability, redundancy and security appliances that ensures reliability exceeding 99.999988%.

FatPipe started shipping its router clustering products in early 2000 and has steadily grown in size and revenue. Among various accolades and awards, FatPipe was ranked the number one fastest growing Company in 2010 on the Deloitte Technology Fast50, and listed on the Deloitte Technology Fast500 Asia Pacific (No. 14 in 2010), and Deloitte Fast500 North America (No. 381 in 2006) a listing of the fastest growing technology, media, telecommunications and life sciences companies in those regions. FatPipe was listed on the Inc. 500 (No. 189 in 2004) as one of the fastest growing private companies in America and the 10th fastest growing company of the 16 Utah based businesses named on that list.

FatPipe has been issued eleven U.S. patents with over 180 technical claims.

- **US Patent 6,775,235** - *Tools and techniques for directing packets over disparate networks*
- **US Patent 6,493,341** - *Combining routers to increase concurrency and redundancy in external network access. Data packets are multiplexed between the routers using a variation on the standard SYN packet synchronization protocol and other components*
- **US Patent 6,295,276** - *Combining routers to increase concurrency and redundancy in external network access. Data packets are multiplexed between the routers using a variation on the standard address resolution protocol (ARP), and other components*
- **US Patent 6,253,247** - *System and method for transmitting a user's data packets concurrently over different telephone lines between two computer networks*
- **US Patent 7,269,143** - *Combining routers to increase concurrency and redundancy in external network access and fault tolerance of Wide Area Networks*
- **US Patent 7,406,048** - *Tools and techniques for directing packets over multiple parallel disparate networks based on address and other criteria*
- **US Patent 7,444,506** - *Methods, devices and systems for efficient secure parallel data transmission over disparate networks*
- **US Patent 7,877,510** - *Domain name resolution making IP address selections in response to connection status when multiple connections are present*
- **US Patent 8,356,346** - *VPN secure sessions with dynamic IP addresses*
- **US Patent 8,780,811** - *Flat Network failover control*
- **US Patent 8,995,252** - *VoIP Multiline failover*

Patented technology enables FatPipe to maintain leadership position. It allows us to introduce technical innovations faster. Products are stable and have large customer base.

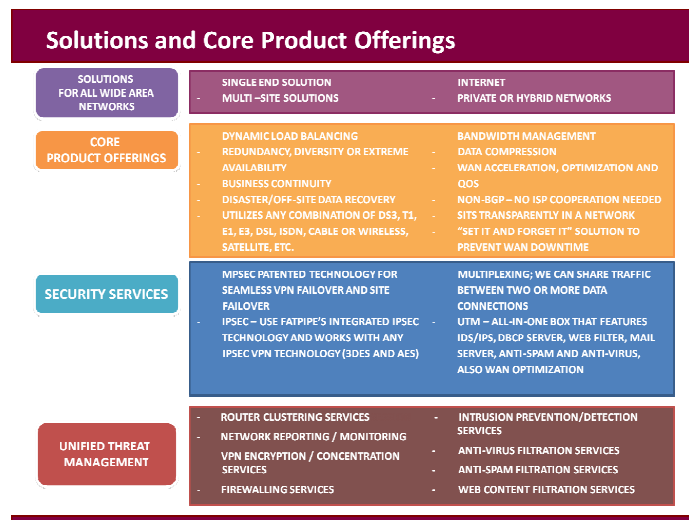
FatPipe distinguished list of thousands of customers include the US Presidential Inauguration (where FatPipe served over 1 million users simultaneously), The FBI, Department of Defense, numerous Fortune 1000 companies, and notable names such as Dale Carnegie, Allen Edmonds Shoes, Brooks Brothers, Hudson News, Julliard School of Music, Titleist, Acushnet Four Seasons Hotel, Hilton, Marriott, Westin, Dallas Cowboys, Green Bay Packers, and numerous other customers. Over 25 for the Top 100 law firms use FatPipe; Transportation companies (over 20) including Rockwell Transportation and C. R. England also use FatPipe.

THE FATPIPE SOLUTION

FatPipe technologies have been used in well known organizations and enterprises worldwide. With tens of thousands of installations and thousands customers, FatPipe technology has been accepted and implemented by some of the most demanding customers in the world. Most of these have been customers for life, integrating changing technologies with FatPipe in the mix. They all have experienced the ease with which it can be implemented.

Using FatPipe, customers can utilize multiple connections any type to create a simple software defined wide area network (SD-WAN). This help to reduce costs, increase speed, and improve network performance.

FatPipe has innovatively brought together technologies that improve WAN performance in a single device. A summary of these is given below.



THE HYPERCONVERGED HYBRID NETWORK

FatPipe technology is designed around the concept of simplicity. FatPipe technology is easy to use and can be implemented in the network with a minimum of disruption. From bandwidth capacity increases to addition of features, with FatPipe technology, it is a matter of licensing and remote upgrades. No need for replacing existing hardware. FatPipe has also strived to become the all encompassing technology unit at the interface of the LAN and WAN. The FatPipe device not only provides redundancy and load balancing but also can encrypt, act as a firewall, and a device for marrying public and private networks. FatPipe technology can also failover to a new site in the event of a site going dark; This ensures that if the primary site goes down a secondary site takes over and the outside world is none the wiser. Moving operations to the cloud, normally involves complex network

architecture. FatPipe technology simplifies it and gives an organization the ability to ensure cloud services can always be connected.

Investing in FatPipe technology today, has not only immediate returns, but also safeguards the future which is usually unpredictable.

ATTRIBUTES OF THE HYPERCONVERGED NETWORK

MULTIPLE LINE REDUNDANCY

FatPipe's industry leading first to market technology is designed to impart WAN redundancy. These devices work with any carrier and any type of data line and increases reliability to over 99.999988%. They are capable of auto failover of VoIP, VPN, and thin client sessions while dynamically balancing load across all connections. The technology is also designed to work with all industry standard firewalls and other CPE, and can handle both static and dynamic IP addresses.

HIGHLY RELIABLE

FatPipe technology imparts automatic enterprise wide redundancy and reliability and can failover to multiple designated sites should the primary site fail. Connectivity can be through landlines, 3G/4G wireless, or satellite. These can be aggregated with the prime aim being to failover should one or more of the connections fail thus giving "always up" connectivity. To handle SaaS and smaller offices, FatPipe also offers virtual systems.

CLOUD COMPUTING COMPATIBLE

The hot trend of cloud computing is now a reality with more and more companies putting their operations on the cloud. The number of Cloud Service Providers has also increased exponentially. In cloud computing, enterprises move their entire network operations to either their private cloud or that of a service provider. The advantage of this is that the enterprise system administrators do not have to constantly keep up with growth, be ahead of licensing issues, worry about network security etc. It is taken care of in the cloud by the service provider. The main drawback is that connectivity to the cloud is essential for operations to continue and there has to be a failure mechanism that allows for failure of the primary site. If connectivity becomes an issue, all users at a site will not be able to connect to the cloud and results in severe business disruption.

FatPipe technology is ideally suited to such environments. Load balancing and multiple connectivity to the WAN coupled with failover ensures that users can always connect to the cloud.

HIGHLY OPTIMIZED IN A SINGLE DEVICE

MULTIPATH QOS - FatPipe technology is unique in that a single device can handle multiple lines. And can impart QoS at both layer 3 and 7. A handy scheduler allows for QoS rules to automatically change by time and date and when failover occurs, the technology allows QoS policies to also be imposed on the line being failed over to. A combination of QoS and Policy Routes imparts the ability to control traffic at a very granular level.

TRUE WAN OPTIMIZATION WITH WAN REDUNDANCY - A single FatPipe device provides multi line optimization and WAN Redundancy. All applications are optimized and cached including Thin Client, FTP, TCP/UDP, email and others.

SATELLITE BOOSTER TECHNOLOGY - FatPipe has introduced major innovation in this sphere by providing the highest throughput for low speed, high latency lines working closely with Inmarsat. Multiple satellite connections can be handled simultaneously. The technology uses header/teleport multi-customer QoS to manage variability in upload/download speeds due to cloud cover. The technology optimizes bandwidth using traffic filtering, QoS and policy routing. FatPipe satellite technology also has customized algorithms that accelerate traffic on very high latency lines, compression technology for images and spill over capabilities to secondary link upon first line saturation. This is leading edge and very unique to the industry and shore to ship satellite connectivity providers are adapting this technology to provide better customer experience.

UNIFIED THREAT MANAGEMENT - A single device handles all UTM functionality for all the load balanced lines. It provides intrusion detection and prevention, web filtering, virus and spam control and allows system admin to control web access. DMZs are also handled and VPNs up to 1 Gbps can also be handled. FatPipe continues to innovate in this segment and periodically the throughput handling capability is revised upwards.

A Comprehensive, Reliable, High Speed, Fail-Proof Network

True WAN Optimization with Redundancy

- A single FatPipe device provides multi-line optimization and WAN redundancy
- Applications and protocols are optimized and cached, including Thin Client, FTP, TCP/UDP, email, etc.
- Up to 1 Gbps of compression on the WAN side in each unit.

Multiple-Line QoS in One Device

- One unit for multiple lines
- Layer 3 and 7 QoS
- Schedule QoS policies
- Failover QoS policies between lines
- Use QoS and policy routes for granular traffic control

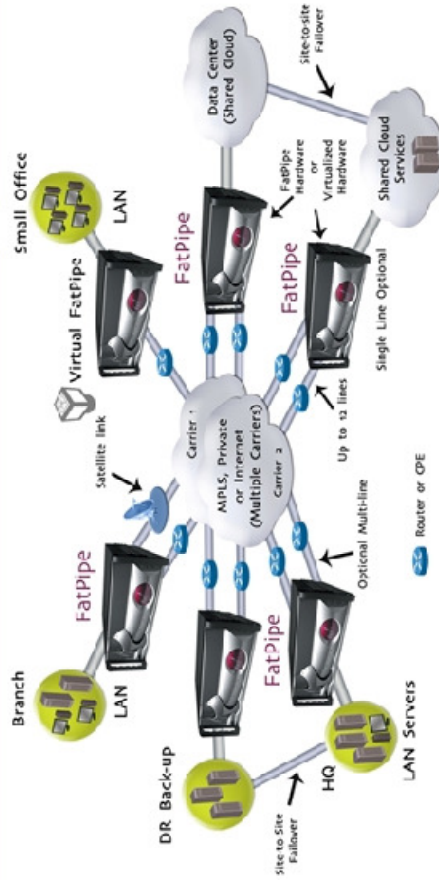


Attributes of FatPipe Technology

- SmartDNS for comprehensive inbound redundancy Instant failover of lines
- No need for propagation of new IP addresses over core routers
- ISP aggregation and failover between lines without BGP No ISP cooperation required
- Dynamic incoming/outgoing load balancing including A and MX records (mail)

Network Reliability

- Automatic enterprise-wide redundancy and network reliability
- Multi-site failover for disaster prevention
- Utilize landlines, 3G/4G/ wireless, and/or satellite for backup
- Virtual devices for SaaS models, small and medium sized offices



Multiple-Line Redundancy

- Works with any carrier and any data-line type
- Increases reliability of a WAN to 99.999983%
- Auto failover of VoIP, VPN and Thin Client sessions
- Multiple dynamic and static load balancing algorithms
- Works with static and dynamic IP
- Works with existing CPE and managed VPNs and firewalls

Unified Threat Management

- Single UTM for multiple, load balanced lines
- Intrusion detection / prevention
- Web filter, virus and spam control
- Internet access control
- All in one box for small branches
- DMZ
- VPN up to 2 Gbps

Satellite Booster Package

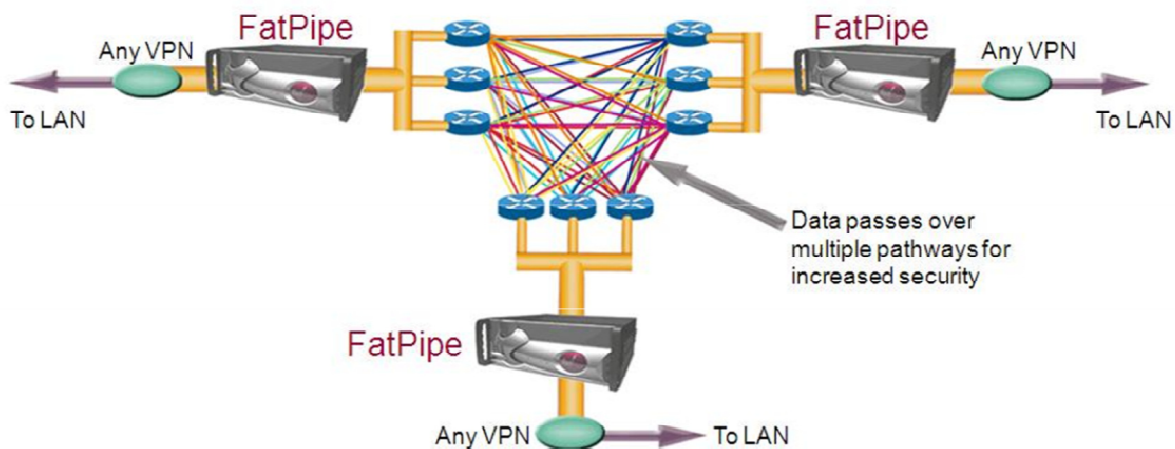
- Provides highest throughput for low speed, high latency lines Works with multiple satellite connections
- Low overhead, allows for 95% percent utilization of bandwidth
- Header/teletport multi-customer QoS to manage variability in upload/download speeds due to cloud cover Optimize bandwidth usage using traffic filtering, QoS and policy routing
- Customized algorithms to support high latency links
- Compression algorithm for images
- Spillover traffic to second link upon first line saturation

FATPIPE SOLUTION

The FatPipe solution is a multi-faceted approach within a single hardware platform. Below are listed features and benefits that are included in the proposed solution.

FATPIPE MPSEC

FatPipe is equipped with a patented security feature that provides an additional layer of security called Multi-Path Security (MPSec™). Using MPsec can increase the security of data transmission by up to a factor of n (n being the number of lines). Essentially, MPsec breaks each data stream down to the packet level, sends the packets over multiple paths and reassembles the packets at the receiving end making it virtually impossible for hackers or intruders to trap data and decrypt confidential information.



In addition to increasing security, MPsec ensures that no single path failure will cause a session to fail. This results in additional benefits to a company using FatPipe MPsec.

AUTOMATIC VPN AND THIN CLIENT FAILOVER

Points on a WAN that are fortified with FatPipe MPsec will remain reachable as long as at least one path to that point is up. This means sessions that require constant connectivity such as VPNs and Thin Clients will not fail in the event of a path failure. FatPipe MPsec will reroute packets of that session across an available path allowing that session to stay up even in the event of a line failure. This can be configured to happen in less than 1 second. FatPipe MPsec can provide sub-second stateful fail over and fail back of WAN traffic across multiple links.

AUTOMATIC VOIP FAILOVER

FatPipe technology can ensure that Voice over Internet Protocol (VoIP) traffic is "always up" and available even when WAN lines or components fail. FatPipe can keep calls connected during a failover, avoiding interruptions and dropped calls. This means that calls will remain up at all times regardless of router, ISP, line, or backbone failures.

DYNAMIC MPSEC LOAD BALANCING

FatPipe appliances are actively testing the quality of the paths between them. FatPipe can be configured to route and load balance applications across multiple paths depending on current network conditions. Latency, Packet Loss, and Jitter are the most common parameters used to determine point-to-point link quality. FatPipe can use these along with other parameters to determine how to route traffic. FatPipe can reroute traffic in the network failure or a network brown out.

The screenshot displays the FATPIPE MPVPN configuration interface. The main window is titled "FATPIPE MPVPN - FATPIPE MPVPN" and shows the "Routing > MPSec" configuration page. The "Local VPN Name" is set to "192" and the "Local VPN IP" is "192.168.1.1". The "Polling Interval" is set to "3" seconds. The "Remote Location" table is as follows:

Index	Remote VPN Name	Remote VPN IP	Load Balancing Option	Load Balancing Typ
1	LAN172	192.168.1.2	Session	Static

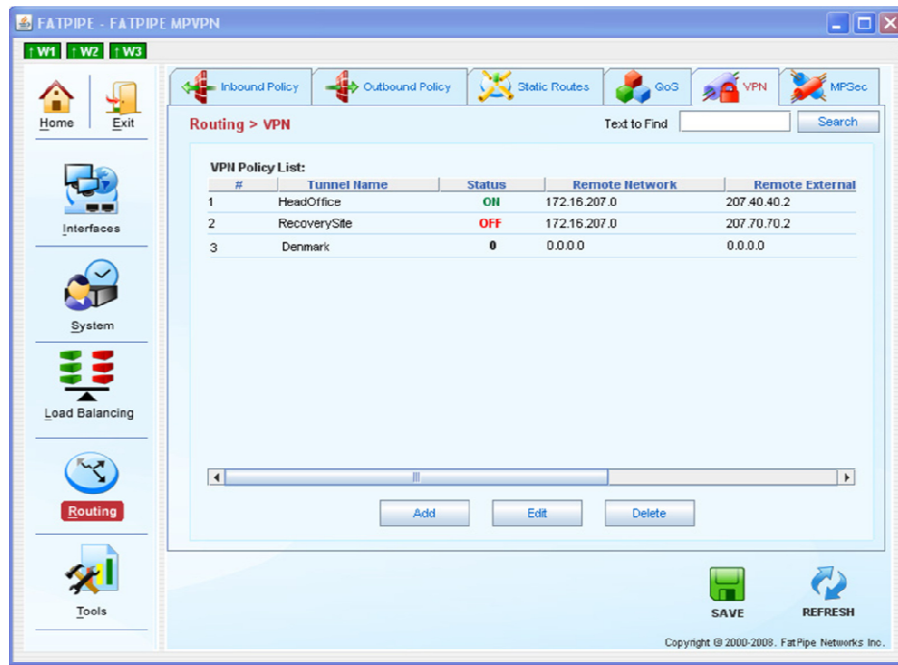
The "Edit Entry" dialog box is open, showing the configuration for the selected entry. The "Remote VPN name" is "LAN172" and the "Remote VPN IP" is "192.168.1.2". The "Load Balancing" section has "Session" selected. The "Dynamic Mpssec Load Balancing" section is checked, with the following settings:

- Use Available Bandwidth: Weight Reduce Factor: 1
- Use Latency: Threshold: 5000 ms, Weight Reduce Factor: 1
- Use Packet Loss: Threshold: 50 %, Weight Reduce Factor: 1
- Jitter: Threshold: 1000 %, Weight Reduce Factor: 1

The "Detect Bandwidth Every" is set to 1 Min. The "OK" and "Cancel" buttons are visible at the bottom of the dialog box.

FATPIPE IPSEC VPN

FatPipe can be setup as a VPN end-point by using the FatPipe VPN feature. This allows customers to achieve VPN site-to-site and remote user failover capabilities. FatPipe VPN allows you to configure VPN tunnels with any standard IPsec VPN peer or VPN client. The configuration of the FatPipe VPN component is very simple. It uses the standard VPN information. FatPipe VPN allows you to create and configure VPN tunnels between two or more remote networks (site-to-site VPNs) and with remote users using mobile VPN clients (sometimes referred to as Road Warriors).



DYNAMIC VPN

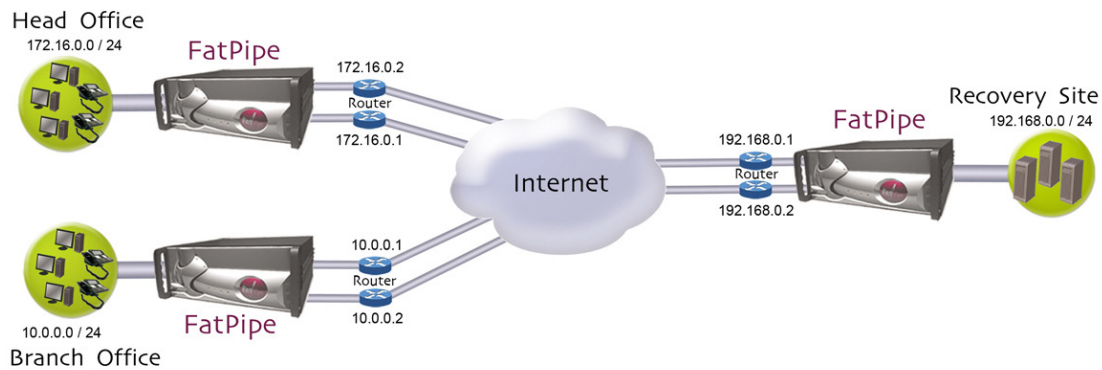
Coupling FatPipe VPN with MPsec allows for point-to-point VPNs to be compatible with dynamic IP addresses. If the IP address on a secondary link changes, the FatPipe will automatically update and use the new path.

FatPipe selective encryption technology allows for improved performance in hybrid networks within a single appliance. FatPipe will make a packet by packet determination as to which need to be encrypted. This reduces the overhead of needlessly encrypting data on otherwise secured networks, such as an MPLS network, as well as eliminates the need for dedicated IPsec hardware at remote sites.

VPN SITE FAILOVER

VPN Site Failover provides failover for VPN traffic between branch office(s), the main office, and the disaster recovery site utilizing all lines available at each site.

Each branch office is setup with one tunnel to the main office and one tunnel to the disaster recovery site. VPN Site Failover determines the status of connectivity between sites dynamically using FatPipe's patented MPsec feature. At the branch offices, each VPN tunnel is given a priority and is part of a VPN Site Failover Group. The MPVPNs at the branch offices establish a VPN tunnel to the site that has the highest priority first. If connectivity to that site fails, then the VPN Site Failover will establish the VPN tunnel to the next Disaster Recovery site that has the next priority in the group. This allows for a multipath VPN network to mimic and participate in the disaster recovery routing that is available in an MPLS network with "higher cost routing."



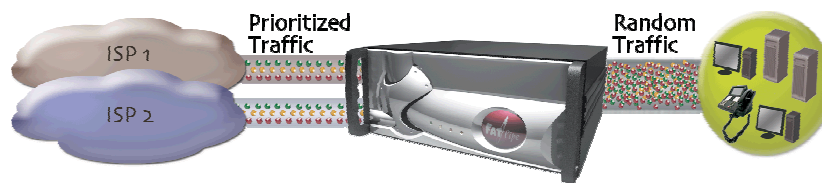
FATPIPE QOS

FatPipe's enhanced QoS gives you granular control over how IP traffic is transmitted across your network, and as a result, helps you control network costs. You can reduce bandwidth requirements and resolve bottlenecking issues when you allocate bandwidth for specific business applications.

FatPipe's enhanced QoS technology includes application layer QoS (layer 7) in addition to the networking layer where you can assign bandwidth by IP or port (layers 3 and 4). Application level QoS gives you the ability to create rules that guarantee bandwidth based on application such as VoIP and Citrix over other applications. Layer 7 QoS also allows you to restrict bandwidth for peer-to-peer traffic, such as Bit Torrent, instant messaging, and VoIP applications. FatPipe QoS also supports DSCP tagging; it can tag or read previous DSCP tags to identify traffic.

MULTILINE QOS

Unlike traditional QoS, FatPipe QoS is combined with link load balancing, which ensures that rules are applied to additional lines when a failure occurs to your primary connection, providing redundancy for your IP infrastructure data transmissions. FatPipe QoS rules are network aware and can be applied per link, traditional QoS does not have this layer of granularity. FatPipe QoS also has a feature for equal bandwidth distribution which guarantees fair use of bandwidth within a QoS rule.



The screenshot shows the configuration interface for a QoS rule. The 'Name' field is 'SSL', 'Protocol' is 'TCP', and 'DSCP' is '5'. There are checkboxes for 'Enable HTTP's Acceleration' and 'Enable WAN Optimization'. The 'Source IP Mask' is '0.0.0.0', 'Source Port' is '*', 'Destination IP Mask' is '0.0.0.0', and 'Destination Port' is '500'. The 'Action' is 'Allow' and 'Quality of Service' is 'None'. The 'Traffic Mode' is 'Interface Priority'. The 'Scheduler' grid shows a yellow background with a green bar from 12 to 24 on Monday.

Interface	NAT	Port NAT	NAT IP:Port
WAN1	YES	YES	0.0.0.0-0.0.0.0
WAN2	YES	YES	0.0.0.0-0.0.0.0
WAN3	YES	YES	0.0.0.0-0.0.0.0

QOS WITH MPSEC

FatPipe QoS for MPsec provides intelligent traffic shaping for Private data over multiple paths. Allocate bandwidth resources, set performance parameters, and assign priorities to different traffic flows to streamline performance for WAN communications. FatPipe MPsec with QoS provides for highly efficient, intelligent, self-healing connectivity between offices and the information resources they require.

FATPIPE SMARTDNS

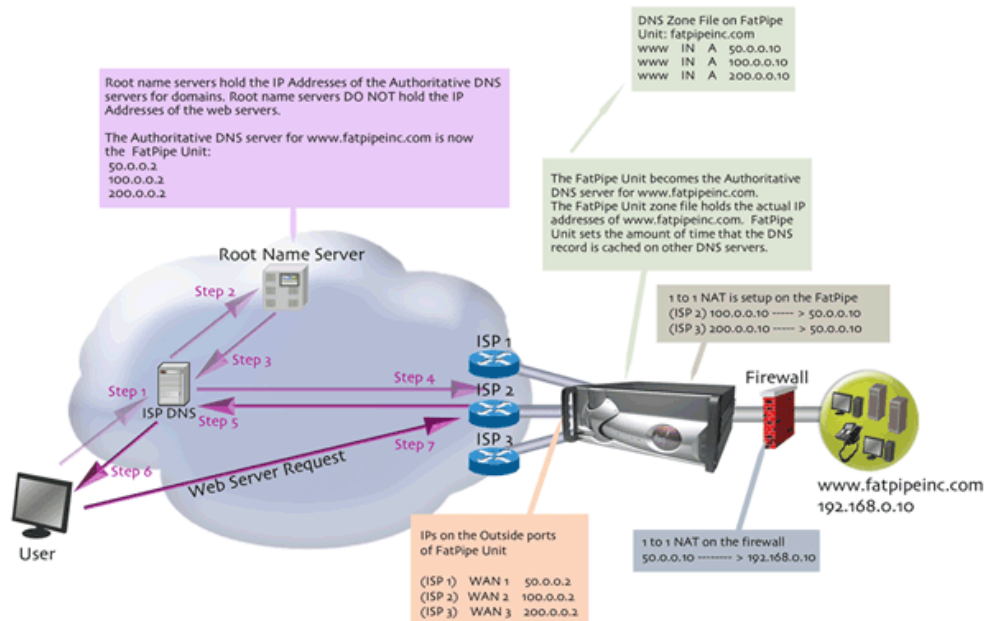
FatPipe Networks is well known for its patented and patent pending technology that provides redundancy, high reliability, and aggregate speed of WAN connections. Its core innovation for intelligent inbound load balancing and line failover is called SmartDNS. SmartDNS balances incoming IP traffic load, and provides redundancy by allowing the host on the LAN to be accessible through multiple connections. SmartDNS supports the hosting of internal servers including web, e-mail, firewall and load balancing servers.

BASIC FUNCTIONALITY OF FATPIPE'S SMARTDNS

LOAD BALANCING: SmartDNS balances load by allowing the host on the network to be accessible through multiple connections. The host appears to be a different IP address at different times, thus using all available lines. The IP addresses are resolved based on the selected load-balancing algorithm.

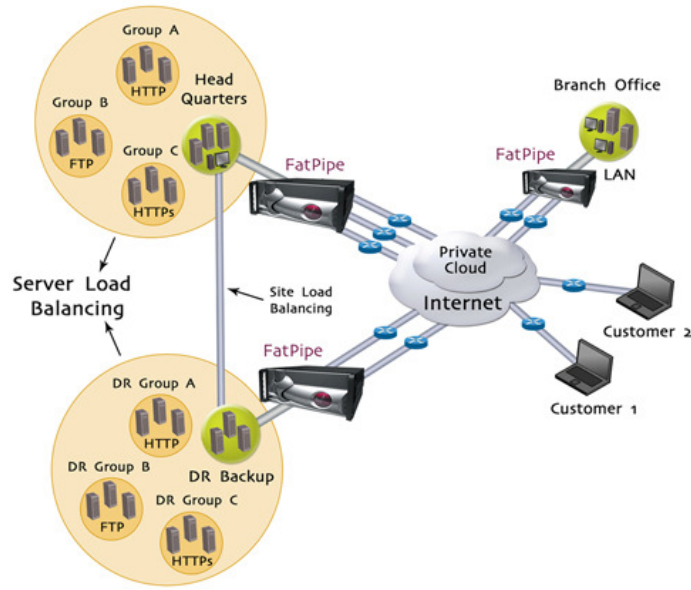
SPEED: Through load balancing, FatPipe's SmartDNS speeds up the delivery of inbound traffic.

FAILOVER: FatPipe's SmartDNS will intelligently sense when a failure occurs and will make adjustments to the DNS replies so it will not resolve host names to the IP addresses that are associated with the connection that is down or unavailable.



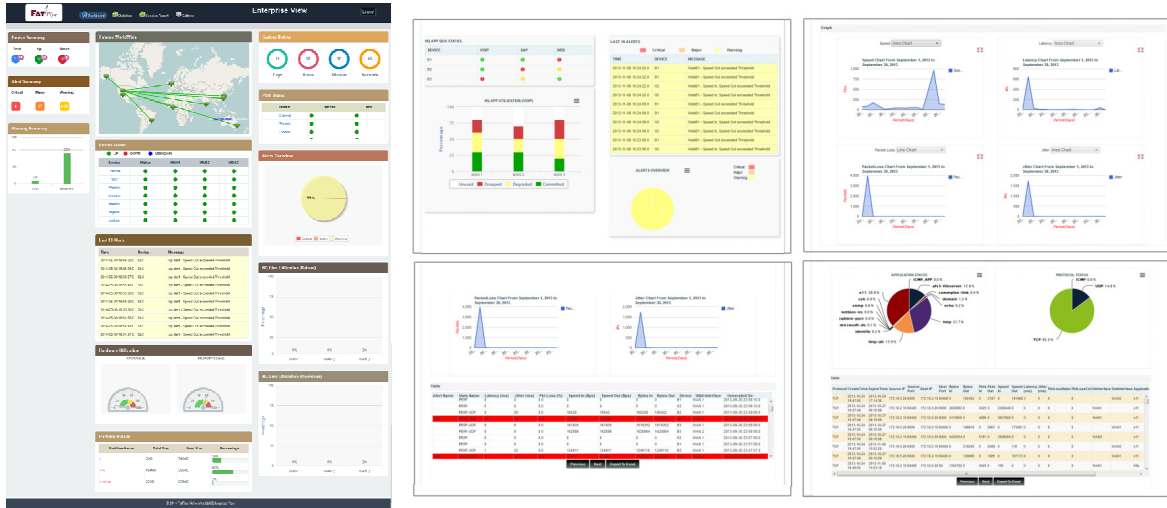
SITE LOAD BALANCING

FatPipe's Site Load Balancing solution combined with FatPipe's patented SmartDNS technology provides resiliency and continuity for businesses. It distributes traffic between two sites, utilizing all lines available at each site. Unlike traditional master/backup solutions, FatPipe Site Load Balancing utilizes both site's bandwidth and other resources.



FATPIPE ENTERPRISEVIEW

EnterpriseView is FatPipe's centralized management console in which administrators can see from a single interface the status of all FatPipe appliances and their connected networks. EnterpriseView is hosted on one of the FatPipe appliances, typically at the datacenter, and requires no additional hardware. And because EnterpriseView is hosted inside of the customer network no customer information is ever passed outside creating a potential security hole.



Features of EnterpriseView include:

- Manage all FatPipe devices from a central location
- Devices deployed and their health displayed in real time on a world map for easier viewing
- View the health of all devices in a single pane
- Drilldown to individual devices from the main pane
- View the health of inter-site connectivity including VPN and MPsec individually
- Monitor the flow of traffic through individual FatPipe devices
- Ability to create and monitor statistics for each device
- Ability to raise alerts when criteria cross the threshold
- Historical reporting – Ability to view reports for any given period
- Live reporting – Ability to view statistical information in real time
- Ability to export the reports to MS Excel format

CUSTOMER SUPPORT AND PROFESSIONAL SERVICES PROGRAM

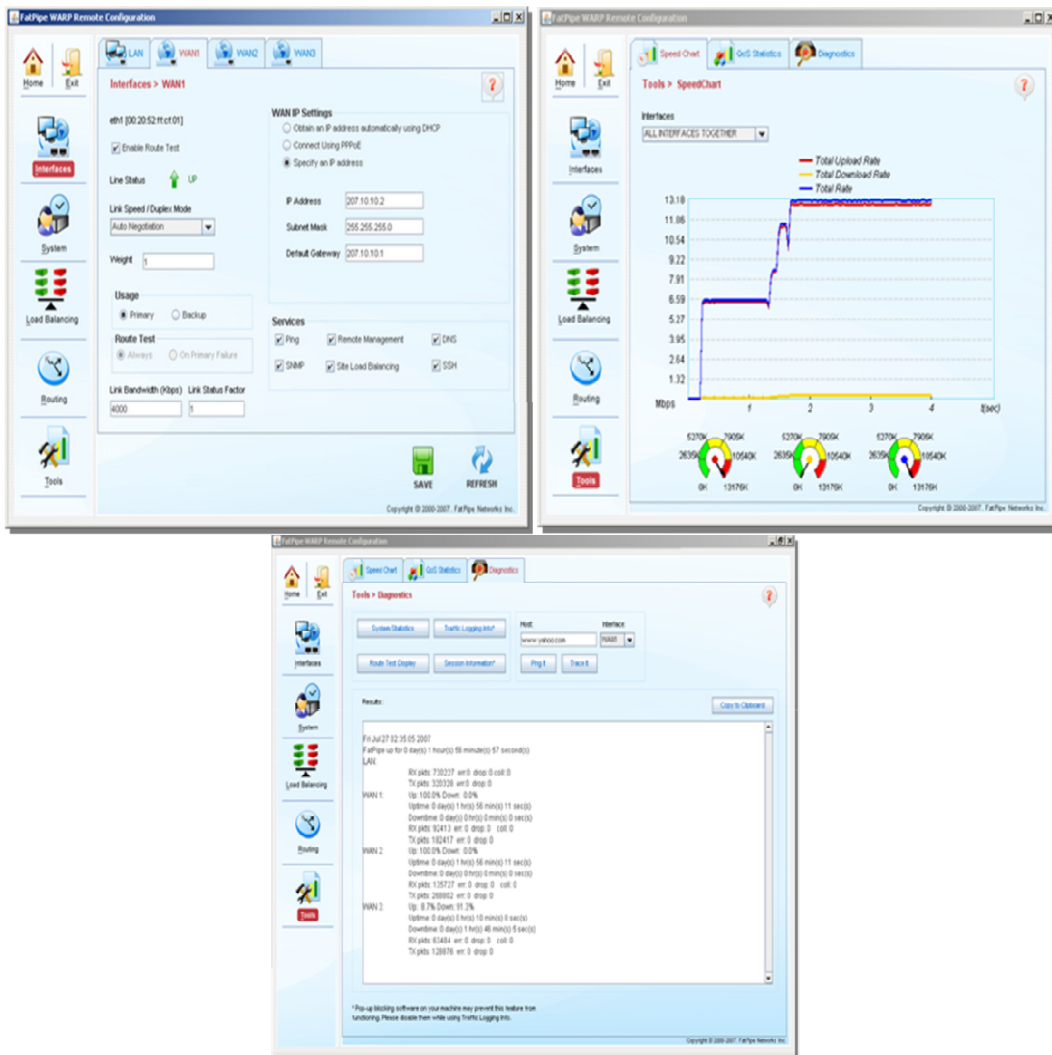
FatPipe provides world class customer and technical support. Our highly trained and skilled engineers are available 24/7/365 to support customers.

FatPipe Professional Services offers a variety of support programs designed to get you the support you need and when you need it. We recognize that your WAN connectivity is mission-critical and we are committed to the very finest in customer service and satisfaction. We boast a team of talented technical and support engineers, second to none, with a level of expertise and dedication that is truly “Best of Breed.” FatPipe provides hardware and software support, feature and version upgrades, and unlimited customer technical support.

ADDITIONAL BENEFITS OF FATPIPE

EASY SETUP AND MONITORING

FatPipe knows that IT staffs do not have the time to learn a new technology due to their busy schedules. That is why we designed FatPipe to be easy to implement and manage. FatPipe's technology is sophisticated and complex, but its Graphical User Interface (GUI) is elegant and easy to use.



MONITORING AND MANAGEMENT TOOLS

FatPipe also provides easy to use, but powerful, tools that empower an organization to have full control over traffic flowing in and out of its network.

FatPipe offers a secure networking environment that lends flexibility and control to help Administrators accomplish their tasks. FatPipe's web-based management tools allow Administrators access the network, view routers, the speed meter and speed chart, and the status of connections from any remote location. FatPipe

router clustering products also come with paging and e-mail alert software that can be installed on any computer on the LAN to notify Administrators of ISP, router, line, or backbone failures. FatPipe also offers the ability to send SNMP traps to select SNMP manager stations. FatPipe is also compatible with NetFlow and can report system logs to a logging server.

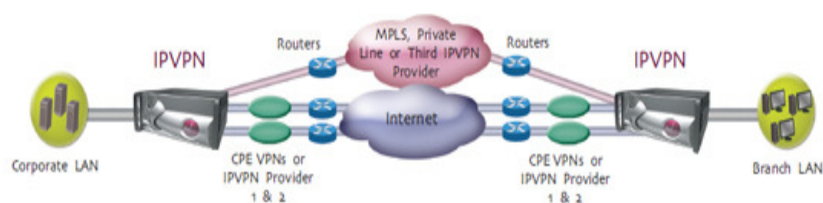


WAN REDUNDANCY AND RELIABILITY

FatPipe Networks, the inventor and multiple patent holder of router clustering technology provides the highest level of redundancy, WAN optimization, speed and security for all types of Wide Area Networks (WANs).

FatPipe technology helps our customers strengthen their network by using multiple WAN links to create a fast and highly reliable Wide Area Network (WAN). FatPipe router clustering devices aggregate two or more (up to 24) data lines to provide the highest level of automatic WAN failover due to intermittent and unpredictable line, component, or service failures. Using FatPipe's patented Redundant Array of Independent Lines (RAIL) technology, FatPipe provides dynamic and automatic line failover easily. There are no complicated router tables to configure, no need for the cooperation of the Internet Service Providers (ISPs), and BGP programming is not required.

FatPipe can aggregate disparate lines; Fiber, Copper, or Wireless (3G/4G/LTE/Satellite); Broadband or Leased; Public or Private, and is agnostic to the Provider. This gives it the power and flexibility to be adaptable to local conditions.



ENHANCED SPEED BY AGGREGATION

As mentioned previously, FatPipe achieves reliability, speed and optimization of WANs by combining two or more connections of the same or disparate speeds and types. FatPipe aggregates any combination of connections to create a virtual fat pipe, allowing for dynamic and full utilization of all lines. The data connections can come from different ISPs, without the need to either configure equipment or require cooperation.

FatPipe can possibly lower your monthly recurring costs due to high bandwidth expenditures by giving you the ability to utilize lower costing data line connections, such as multiple broadband circuits, for their combined speed while creating alternate paths for failover purposes.

FUTURE PROOF AND COMPATIBLE WITH CURRENT INFRASTRUCTURE

FatPipe allows for full utilization of your current and future WAN infrastructure, providing a greater Return on Investment (ROI) to support growing and changing networking needs. FatPipe is very flexible, expandable and easy to use. FatPipe works seamlessly with any type of router, firewall, caching and server load balancing devices. It works with all WAN technologies and all operating systems and platforms. Since FatPipe is technology and application independent, it does not matter what type of hardware or software technology is used in the LAN.

Most likely a FatPipe customer will not need to conduct any updates or upgrades to current systems to integrate FatPipe router clustering devices. FatPipe also makes it easy for a customer to make changes to network settings and conduct upgrades. Current WAN equipment and software can be used. Data connection types can be interchanged for any type of hardware or software. FatPipe products are malleable and future proof to meet the ever changing needs of the WAN infrastructure.

FatPipe products are also compatible with local technology and available data lines, providing an organization greater freedom using FatPipe's dynamic and intelligent technology.

MULTIFUNCTIONAL DEVICES

FatPipe devices are designed to be multi-functional. For example, in addition to load balancing and failover, FatPipe also has encryption and WAN Optimization. This negates the need for separate encryption and WAN Optimization devices. FatPipe is the "one-stop-shop" for WAN reliability, flexibility, speed, WAN Optimization and Security.

OTHER AVAILABLE FATPIPE FEATURES

WAN OPTIMIZATION

WAN Optimization has become a consideration in most wide area networks. FatPipe has incorporated several WAN Optimization techniques and made them available as an add-on feature.

COMPONENTS OF FATPIPE WAN OPTIMIZATION TECHNOLOGY

WAN REDUNDANCY

A single connection WAN is susceptible to failure leading to non-availability to the WAN. If the single line connection is down, no matter how good acceleration techniques you use, it will be a non-starter. A vital part of multiline WAN Optimization is having multiple connections to the WAN and the ability to failover in case a line outage. FatPipe technology allows multiple connections to the WAN and thus eliminates unavailability of the WAN due to a single line failure.

DYNAMIC LOAD BALANCING ON MULTIPLE LINES

An essential component of multiline WAN Optimization is FatPipe's dynamic load balancing. FatPipe's dynamic load balancing allows the load to be distributed on WAN connection per a variety of algorithms ranging from simple round robin load balancing to complex load balancing that determines the least number of hops from start to destination.

MULTILINE QUALITY OF SERVICE

FatPipe QoS allows granular control of traffic to the WAN. For example, bandwidth can be reserved for important traffic such as VoIP. This will ensure that VoIP calls will always get priority and have the bandwidth needed for completion of calls. Other traffic would be transmitted on a best effort basis.

DATA COMPRESSION

Data that can be compressed can be transmitted at a far greater rate than uncompressed data. If dynamic load balancing is superimposed on this across multiple lines, then data can be transferred at much faster speeds. FatPipe data compression technology has shown the potential of compressing data by a factor of up to 8.

DE-DUPLICATION

FatPipe's de-duplication technology looks for duplication of data in large datasets and eliminates them. By doing so, data is not transmitted twice and the load on the network is reduced

DYNAMIC TCP CONGESTION CONTROL AND ACCELERATION

TCP acceleration is one of the most important components of WAN Optimization. TCP/IP is sensitive to latency. The higher the latency the slower the transfer of data because TCP assumes the slow acknowledgement of transmitted data by destination is due to congestion and dials back the speed at which it sends data. In networks that have significant latency, data transfer is slow, not because of congestion, but TCP's assumption of congestion.

Several algorithms have been developed to minimize the effect of latency. These algorithms have been developed for various network conditions. Most WAN acceleration technology in the market, that only accelerates a single connection, assumes a static latency and applies a single algorithm. This is fixed. Thus when conditions change, the algorithm may not be optimal.

On the other hand, Multiline WAN Optimization introduced by FatPipe Networks is very different. FatPipe has combined WAN redundancy, load balancing and acceleration into a single device and as a result have a comprehensive solution. This solution ensures that the WAN is always up, loads evenly balanced and most significantly, this technology applies WAN Acceleration algorithms to each line by session. The technology determines the conditions prevailing at the initiation of each session and applies the correct algorithm on each line. This is true multiline WAN Optimization. The rest should be defined as line acceleration.

CACHING

By caching local copies of transmitted data, FatPipe technology reduces the strain on network resources. When changes are made to the original data transmitted, the system only sends the differences.

BENEFITS OF FATPIPE WAN OPTIMIZATION TECHNOLOGY

HIGH PERFORMANCE

Achieve faster results compared to other WAN Optimization products– FatPipe offers the benefit of storing the data in fast read/write memory as well as on disk, giving bigger storage and better performance.

HIGH COMPRESSION RATIOS

Get an average of eight times compression and up to twenty times compression ratios.

IMPROVED BANDWIDTH UTILIZATION

Significantly increase bandwidth utilization of current WAN lines with FatPipe’s caching/compression and application acceleration tools.

APPLICATION/DATA INDEPENDENCE

Faster WAN caching than technologies that cache only at the file level – FatPipe provides the benefit of storage at the byte level – no stale data.

REAL TIME CHARTS

FatPipe WAN Optimization comes with a Real Time Chart that provides information about original, un-optimized data per site and after statistics after optimization.

WAN OPTIMIZATION WITH WAN REDUNDANCY

FatPipe is the only product that provides WAN Optimization over multiple networks AND the highest level of WAN reliability using FatPipe Router-Clustering technology.

INSTANT IMPLEMENTATION

FatPipe WAN Optimization is transparent and easy to install.

AUTO-SYNCHRONIZATION AND OUT-OF-DATE DATA MANAGEMENT

In a distributed environment between sites, it is likely that data will be lost or corrupted during transmission. With usage of FatPipe's auto-synch technology, you have zero chance of data being out-of-sync corrupted between remote ends.

WORKS WITH SINGLE AND MULTIPLE LINES

Use FatPipe WAN Optimization at locations with single lines, or locations with two or more lines aggregated through a FatPipe router clustering device with WAN Optimization for the ultimate reliable, redundant, efficient, optimized and secure WAN.

FATPIPE LEADING EDGE WAN OPTIMIZATION TECHNOLOGY VERSUS LEGACY WAN OPTIMIZATION

Legacy Systems do optimization on the LAN side and needs multiple devices for algorithm switching. This is a very large drawback because multiple devices are needed if a network has multiple WAN connections. FatPipe leveraging its strengths on the WAN redundancy and reliability router clustering technology has changed WAN Optimization by concentrating on the WAN side. FatPipe does optimization on the WAN side and does session based dynamic algorithm switching on a single device.

Further examples of the suitability of FatPipe's WAN Optimization technology is evidenced in an application involving the back-up of data. In the following example, backing up data using legacy systems requires multiple devices so that various algorithms can be applied to each connection. Since the lines are not aggregated, if a line fails, there will be loss of data because failover is not automatic. However, with FatPipe technology, a single device handles the failover, aggregation and optimization. Automatic failover occurs when a line goes down, thus ensuring no loss of data. In addition, FatPipe WAN Optimization technology is conducted on each session on each line, thus leading to much higher throughputs with an all in one device.

UNIFIED THREAT MANAGEMENT

As businesses have become increasingly networked, their network infrastructure has become much more business critical and complex. A modern business network may include the following security features:

- Firewalling Services
- Intrusion Prevention/Detection Services
- Anti-Virus Filtration Services
- Anti-Spam Filtration Services
- Web Content Filtration Services
- Web Application Security Services
- VPN Encryption / Concentration Services
- Network Reporting / Monitoring

Many of these services require discrete/separate hardware and service/support contracts to run. This increases companies overhead cost for their infrastructure with physical space, power consumption, and manpower needed to maintain these.

Corporate offices often encounter network originated threats such as Spam, Phishing, and DoS attacks. These threats can result in financial and productivity losses due to server and network down time. Additionally, these threats can also result in loss of and/or compromised sensitive corporate business data. Controlled Internet access helps improve productivity and limits disruption to proper work flow. Access to unauthorized websites can invite unwanted network threats. A file downloaded from an illegal website may contain a virus or a Trojan thus exposing the corporate LAN to hackers.

FatPipe Super UTM provides corporations protection from these threats. Web Content Filter for web based traffic filtering, IDS/IPS for intrusion detection and prevention against network originated threats and mail server with anti-spam capability.

Existing as well as future FatPipe customers can use FatPipe's router clustering with Super UTM, which can be added on to existing FatPipe devices. While some capabilities are feature sets that can be added on, some are based on subscription services.

The Super UTM add-on feature includes:

- Standard firewall
- DHCP server
- IPSec VPN encryption
- MPsec VPN management
- One year comprehensive subscription to FatPipe's subscription services. Starting the second year, these services are renewable by paid subscription.

FatPipe subscription services include:

- Intrusion detection systems/Intrusion prevention systems(IPS/IDS)
- Web-Filtering
- Anti-Virus Protection
- Anti-Spam filtration

FatPipe Super UTM is a unique offering in the IT marketplace. There is no other single piece of equipment that can offer the feature set that Super UTM does and do it so elegantly with a simple user interface. Not only does it offer the patented technology of FatPipe traffic load balancing on multiple data lines but it complements these features with a fully loaded UTM feature set.

These benefits allow IT professionals to lower capital expenditures by having only one unit, preserve rack space and reduce maintenance costs by consolidating services with a single, industry leading vendor who is committed to innovation and customer service.

FLAT NETWORK REDUNDANCY

A flat network design typically aims to reduce cost, maintenance, and administration. Flat networks are designed to reduce the number of routers and switches on a computer network by connecting the devices to a single switch instead of separate switches, or by using network hubs rather than switches to connect devices to each other. The topology of a flat network is not segmented or separated into different broadcast areas by using routers and switches. Generally, all devices on the network are a part of the same broadcast area.

Typically flat networks do not allow for redundancy between office locations because the network is not segmented into routable segments. FatPipe is the only product available that supports multiple path redundancy for flat networks.

CONCLUSION

FatPipe technology is very versatile and comprehensive and is an essential element to designing a network that is robust, fast, efficient and optimized. With 10 United States patents and with over 180 technological innovations we provide the latest in technology designed to make the job of the network manager a little easier. Our support is unparalleled. We stand by to serve your network needs.

APPENDIX 1: CASE STUDIES

A CALL CENTER USES FATPIPE IPVPN FOR SUB-SECOND FAILOVER OF VOIP CALLS

A leading outsourcing call center of customer care and back-office processes uses Voice over IP (VoIP) over an MPLS network to connect customers to its 100+ sites worldwide. The company was challenged by intermittent VoIP service disruptions and degradations that many times resulted in calls being dropped. Jitters, line degradation and local loop/last mile failures caused major disruptions, exacerbated when the main phone switches lost connectivity when a line failed or when it perceived a line was down due to the latency issues.

SOLUTION OVERVIEW

SITUATION

The call center was losing hundreds of thousands of dollars due to intermittent failures of its VoIP system. The system took up to 30 minutes to restore at locations that experienced line degradation or failure, halting phone activity between customers and agents.

SOLUTION

Installed IPVPN with GRE encapsulation at multiple sites across the globe to achieve automatic and intelligent line failure, keeping calls connected even when lines failed without dropping calls or shutting down IP telephones.

BENEFITS

FatPipe IPVPN assured connectivity to all calls. The agents and customers were not stranded on “deadlines,” losing business and halting productivity. Also, the system did not have to be replaced.

The IP phones at any location experiencing degradation of services such as jitters, high latency or a service outage, were disconnected from the VoIP system. The call center would have to re-register with the main switch - a process that took up to 30 minutes to restore. The staff, meanwhile, could not work; they had to wait for the phone system to come up.

The company lost over 21,000 hours in productivity, resulting in paying hundreds of thousands of dollars in total paid hours to agents that could not take or make calls. The company needed an alternative solution to purchasing and installing new switches, which would cost millions of dollars. The call center found the answer with FatPipe IPVPN with GRE encapsulation.

FatPipe was installed at various locations in five different countries around the world to intelligently and automatically failover calls to alternative connections when disruptions or line failures occurred. FatPipe boasts a sub-second failover of VoIP calls, for superior failover capabilities.

FatPipe IPVPN used GRE encapsulation and FatPipe’s patented MPsec VPN tunneling between devices for failover. Calls remained up with no interruption if there was an available line, and held if both lines were down. The switch did not have to re-register IP phones.

FatPipe is a non-BGP application, making installation and management easy. The company increased its productivity exponentially, increased customer satisfaction, and agents regained confidence in the system. Lastly, since FatPipe works with any type of router, the company did not have to replace its older routers or switches saving millions of dollars.

A BANK IMPLEMENTS MPVPN SOLUTION FOR COMPLETE LINK REDUNDANCY TO SUPPORT ITS MISSION CRITICAL VIRTUAL PRIVATE NETWORK

One of the leading private-sector banks is servicing roughly 6 million customers worldwide. Concentrated primarily in Europe, it also operates in key international markets including the United States. The offices in the US recently initiated a new policy in regard to supporting their mission critical VPN traffic that required failover “pipe” functionality.

The bank initiated a solution that would provide the link redundancy it was looking for. All applications ran across the VPN connections. Domain controllers and application servers reside at the headquarters. The bank needed complete link redundancy for each of its US branch offices to its US headquarters at the World Financial Trade Center, and a site-to-site failover from its headquarters to its disaster recovery site.

SOLUTION OVERVIEW

SITUATION

The bank needed a cost sensitive solution that provided Internet failover functionality for its headquarters and branch offices and site-to-site redundancy from its headquarters to its disaster recovery site.

SOLUTION

The bank installed 8 MPVPN units at 5 locations to support its VPN and thin client network. MPVPN auto—detects connection failures, and reroutes all VPN traffic to available lines.

BENEFITS

FatPipe MPVPN provides dynamic failover from downed data lines without breaking the branch offices’ VPN connections. Has site-to-site failover from all data lines going to the US headquarters to failover from the headquarters to the disaster recovery location via MPVPN.

The IT department chose to implement FatPipe’s MPVPN technology over a BGP solution because FatPipe was able to address their need for redundancy at a low cost without having to make major changes to its current network. Seamless integration, along with easy installation and adaptation into its network, as well as achieving dynamic load balancing of VPN traffic over multiple VPN tunnels, and the flexibility to use any type of data line connectivity were the main deciding factors.

The IT department introduced two large MPVPN units – one at the headquarters and one at the disaster recovery site along with six smaller units at three branch office locations to accomplish their objective. Each branch office has two units for failover purposes. Broadband connections were aggregated at each branch office, and a combination of Fiber and other connections at the headquarters and disaster recovery sites.

The bank was happy with the results. One of its managers commented, “When one of the two broadband lines went offline (at any of the US branch offices), FatPipe MPVPN equipment was able to auto-detect and route all VPN traffic to the next line and not affect the branch office VPN connections.”

Its implementation of MPVPN for link redundancy is consistent with the bank’s overall IT strategy. All application servers are replicated and synchronized between the two sites. MPVPN ensures that applications and servers are accessible to all users at all times.

APPENDIX 2: FATPIPE CUSTOMER COMMENTS

“Using FatPipe has resulted in a significant increase in productivity and business continuity.”

- Paul Erickson, IT Director

“MPVPN has been flawless for us; we have not had any WAN downtime since the product has been installed. In addition, the Technical Support staff is terrific.”

- Brandon Green, IS Manager

“FatPipe’s team of professionals undoubtedly is a superb compliment to its excellent networking device products. I cannot say enough good things regarding the products and the support I received from FatPipe.”

- Larry M. McConnell, Information Technology Manager

“It is critical for our customers to have a stable and reliable connection to us via the Internet. FatPipe provides a no-fail, redundant and reliable solution for our e-commerce services.”

- Cody Becker, MIS Manager

“The equipment is perfect for seamlessly integrating into our network to handle our growth.”

- Matthew Stevenson, MIS Manager

“I think FatPipe is the only company that we deal with that actually connects customers to a very knowledgeable support staff the first time...this is a very good thing and unfortunately becoming a rarity. Awesome job, guys!”

- Sheldon Wolf, MCP, Sr. Network Administrator

