COMNET Conference & Expo

Doing More with Less: Bandwidth Optimization During Budget Meltdown

Session 15

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Michael Kennedy, Ph.D.

Co-founder & Managing Partner

Network Strategy Partners

mkennedy@nspllc.com

www.nspllc.com

NETWORK STRATEGY PARTNERS

Agenda

Bandwidth Optimization – Operations Management Perspective

- Stake Holder Driven Optimization
- Gap Analysis
- Management Processes
- Tool Selection
- Aligning the Organization
- Conclusions

Bandwidth Optimization – What is Needed?

- Focus on managing from the business perspective
- Reporting metrics that matter to business managers and end-users
- Correlated performance management of network elements, systems and applications
- End-to-end service perspective

Building the Bandwidth Optimization Program

The High Performance Business:

Sets its strategy by:

Listening actively to its stakeholders
Measuring their satisfaction
Resolving or balancing conflicts among stakeholders' needs

Focuses its process improvement efforts by:

Selecting business processes that are critical to strategy
Setting targets for improvement
Implementing incremental, redesign, or rethink approaches to improvement

Aligns its organization by:

Modifying structure to support key processes
Establishing policies to motivate people to accelerate improvement
Overcoming cultural barriers to integration and change

Aligns its resources by:

Using technology aggressively to achieve superlative processes
Balancing technology and human resources

Bandwidth Optimization - Stakeholders

Determine the bandwidth optimization needs of the stakeholders

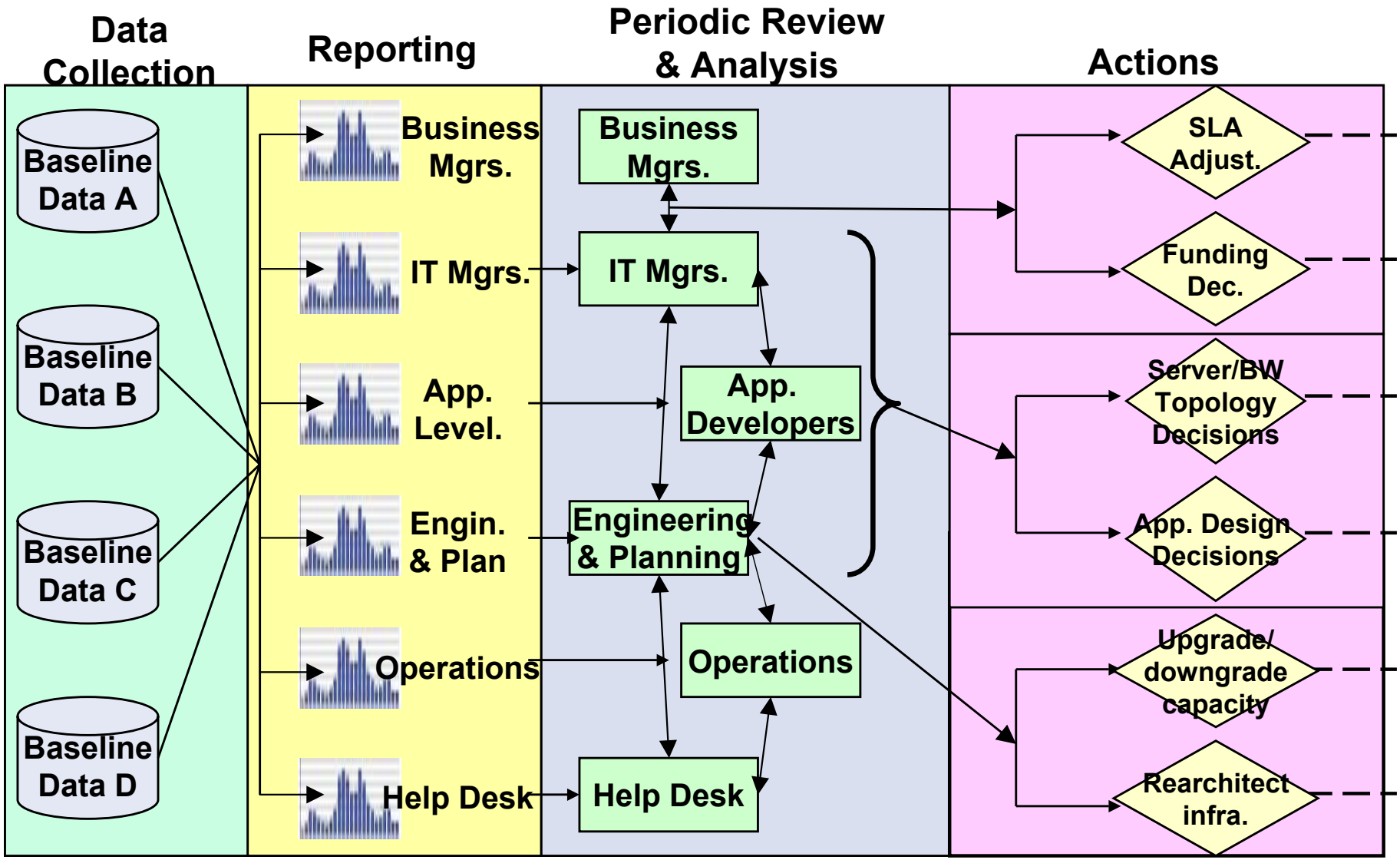
- Business Managers
- IT Managers
- Application Developers
- Engineering & Planning
- Operations
- Help Desk

Bandwidth Tool Selection

Conduct a bandwidth optimization issues and gap analysis

- Sales app performance is sluggish
- New client/server apps are experiencing long delays
- PeopleSoft HR apps are often unavailable
- Teleworkers find it impossible to access Intranet apps with consistency
- Hard to map how network and server congestion affects business

Re-engineer Your Bandwidth Optimization Processes



Bandwidth Optimization Tool Selection

Identify and prioritize bandwidth optimization objectives

Improve mission-critical app performance	9
Establish & measure app-specific service levels	7
Isolate problems quickly	8
Provide flexibly deployable solutions (apps/users)	6
Enhance capacity planning	5
Eliminate reactive management	8

Bandwidth Optimization - Organization

The final step is organization

"RAEW" Analysis

	STAKEHOLDERS					
FUNCTION	Business Managers	IT Managers	Application Developers	Engineering & Planning	Operations	Help Desk
Data Collection					**R/A/E/W**	
Reporting					**R/A/E/W**	
Periodic Review & Analysis:						
SLA adjustments	**E/W**	**R/A/E/W**	**E/W**	**E/W**		
Funding decisions	**R/A/E/W**	**E/W**				
Application design decisions		**E/W**	**R/A/E/W**	**E/W**		
Server/BW topology tradeoffs		**E/W**	**E/W**	**R/A/E/W**		
Upgrade or downgrade capacity		**E/W**	**E/W**	**R/A/E/W**		
Rearchitect infrastructures	**E/W**	**E/W**	**E/W**	**R/A/E/W**	**E/W**	**E/W**

R = Responsibility **E = Expertise**

A = Authority **W = Work**

Conclusions

- **Bandwidth optimization must be business driven**
  - Business metrics, end-to-end service perspective
- **Incorporate bandwidth optimization into your business process**
  - Identify stakeholder gaps
  - Re-engineer processes
  - Prioritize tool selection criteria
  - Organize to fit process & tools

Thank You!

Michael Kennedy
Mkennedy@nspllc.com

www.nspllc.com

Doing More with Less: Maximizing WAN Bandwidth

Don Templeton
VP, Customer Engineering
Peribit Networks, Inc.

The WAN pain dilemma

The WAN is still the bottleneck

- It's a common cause of poor application performance
- Bandwidth costs have come down, but have stopped declining & may rise
- Tight controls on IT budgets & recurring spending, but …

The insatiable demand for more bandwidth continues

- Storage over WAN: back-up, disaster recovery, and replication
- Traditional Enterprise applications eat bandwidth
- Datacenter consolidation increasing WAN traffic
- "Cost avoidance" applications require headroom on WAN
    - Examples: Video conferencing, Distributed Learning, and VoIP

What's the best way to effectively solve this?

The Silent Thief

Up to 90% of network traffic is repetitive!

If these repetitions could be discovered, and replaced by much smaller symbols, in real-time … then WAN capacity could be increased by up to 10 times

What makes up all this repetitive traffic?

- Common language of a corporation: tag lines, company name, logos
- Applications originally developed for the LAN, now deployed across the WAN
- Email: attach a mongo PowerPoint file, and then CC 20 people in Europe
- TCP & UDP header information in streaming application: VOIP, etc

Sounds Like Compression ….

	Compression (LZ)	Limitations
Invented	Late 70s	Widely available, seldom used
Architecture	Search & Replace within packet	Very small data "window" (1500 Bytes)
Latency	High (typically 10 - 30 ms)	Negative impact on response time of real-time business applications
Scalability	Low speed (up to T1)	WANs today scale to T3 and up
Applications	Low speed point-to-point, modem, fax, etc.	Needs to operate in high speed, meshed, and Hub-Spoke IP WANs
System Effects	Requires more router power and memory, only when the network load is at it's heaviest	Reduces router performance, does nothing to reduce queue depth

What About QoS?

- Greatly solution to optimize existing capacity
- Prioritize some applications, at the expense of others
- Does not increase overall WAN capacity
- Can be complex to configure and manage

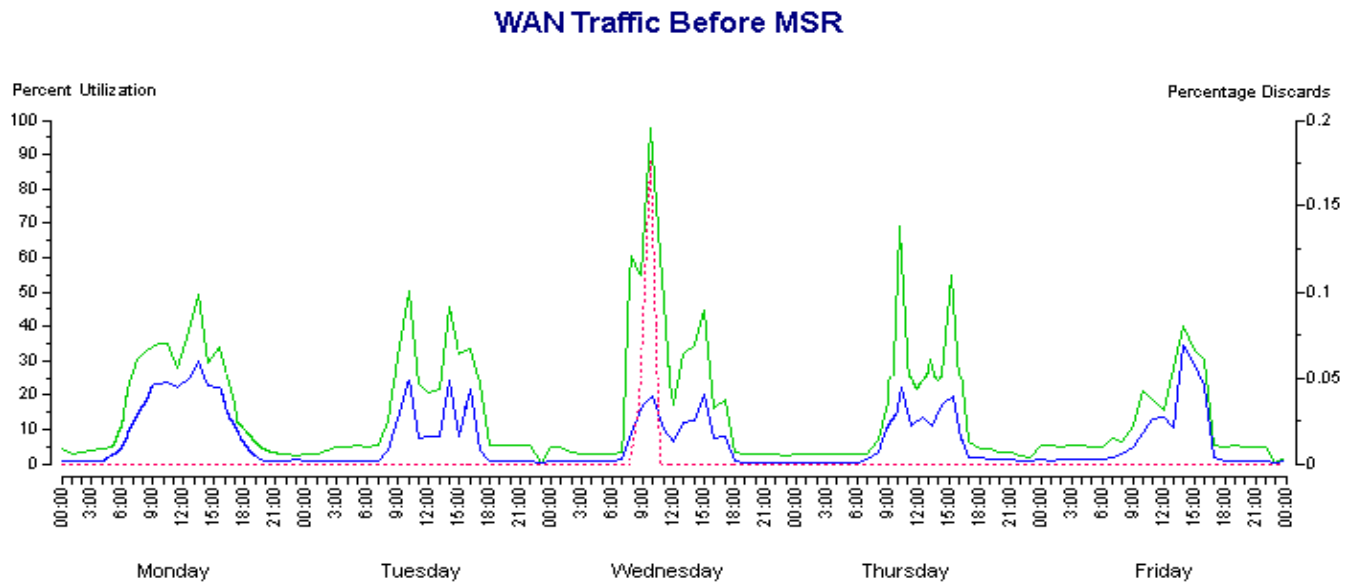
The Ideal Solution

Next Generation network compression ….

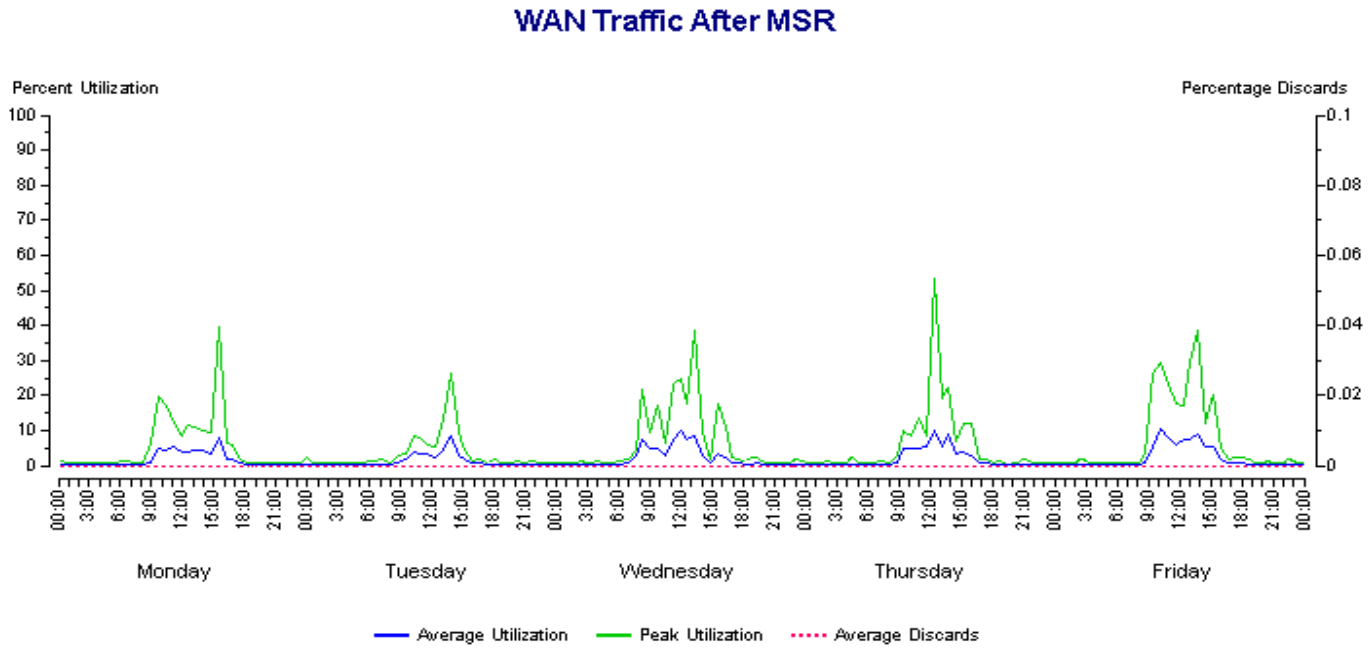
- Creates dramatically more bandwidth, extends the life of WAN
- Simple QoS: No “PhD” network engineers to analyze and tune
- Improve the performance of network and applications
- Extremely low latency
- Transparently scale to high network data rates
- Fault-tolerant, non-stop operation
- Centralized Management

WAN Performance Effect

Before



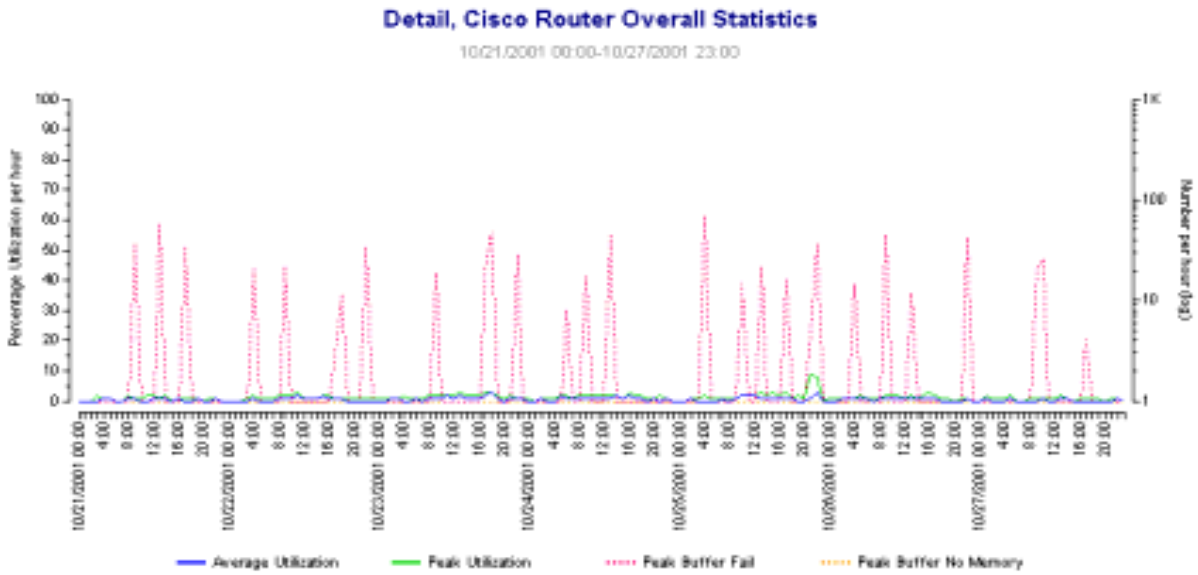
After



Improved Router Performance

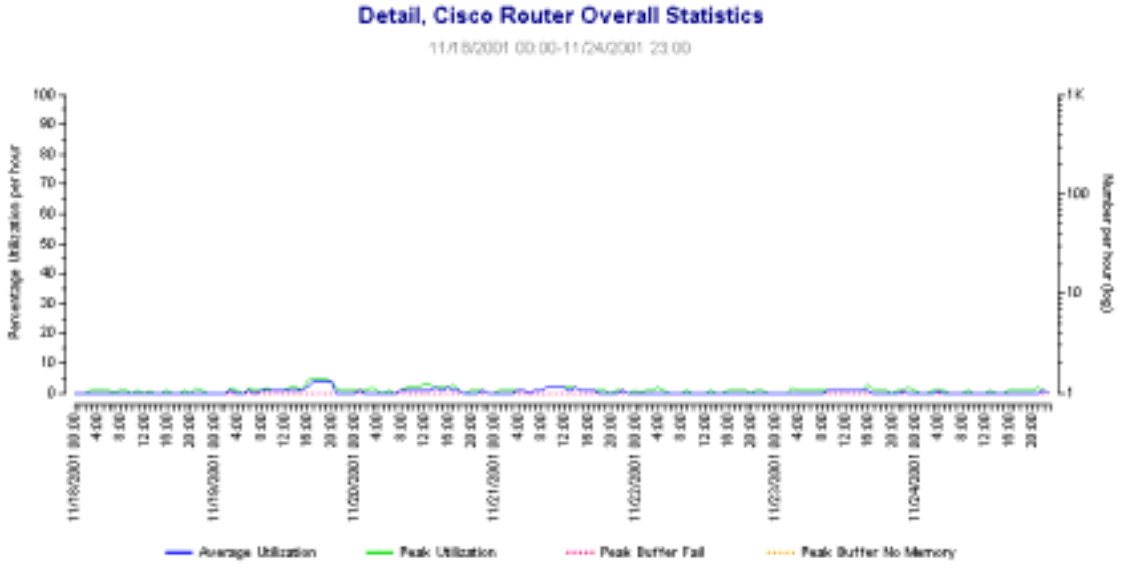
Actual router before

- Chronic buffer failures
- Dropped packets
- End-user response times



Actual router after

- Reduction of bytes and the number of packets sent through the router
- No buffer failures
- Avoided router upgrade

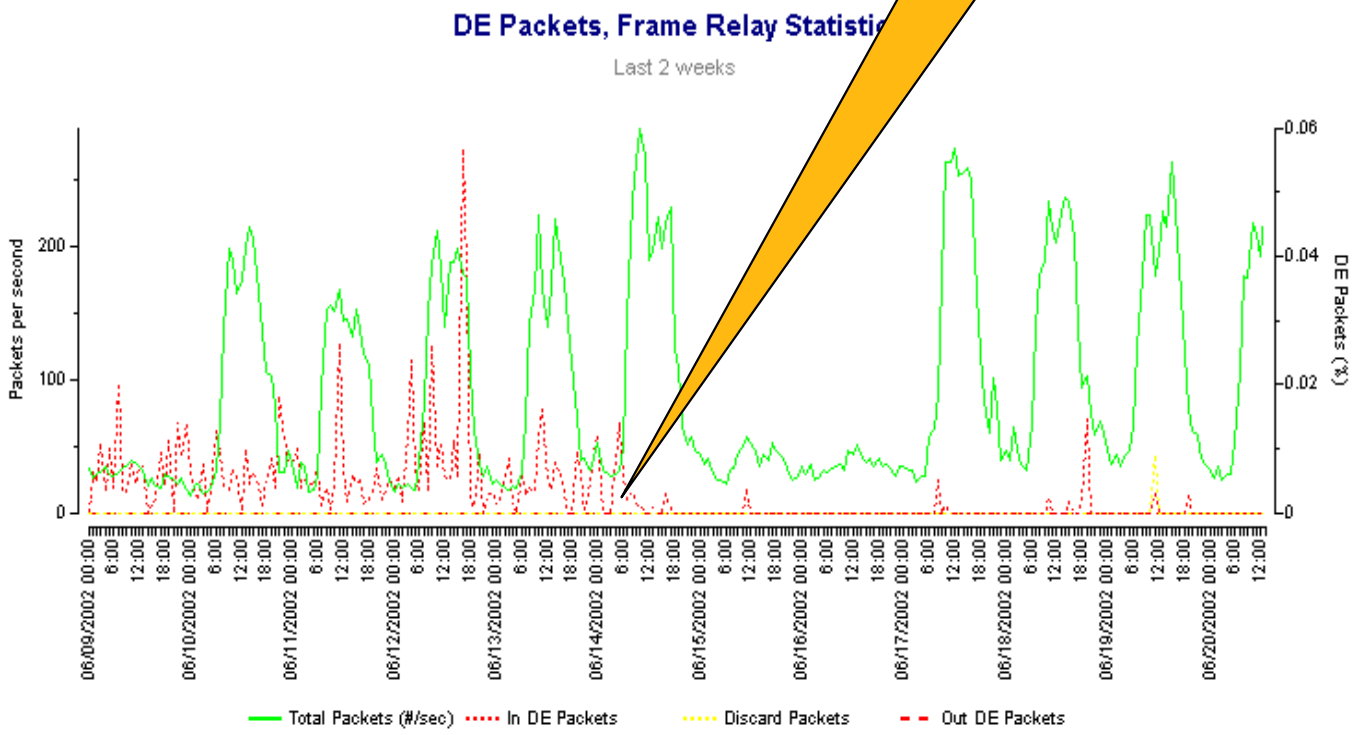


Improved Frame Relay Performance

Dramatically reduced utilization

- At the same time, eliminated most of the packets marked as discard eligible (DE)
- Fewer dropped packets
- Improved end-user response time

Installed here, two T1's replaced by a single T1 circuit



Customer Case Study: Network Appliance

WAN link congested by storage traffic

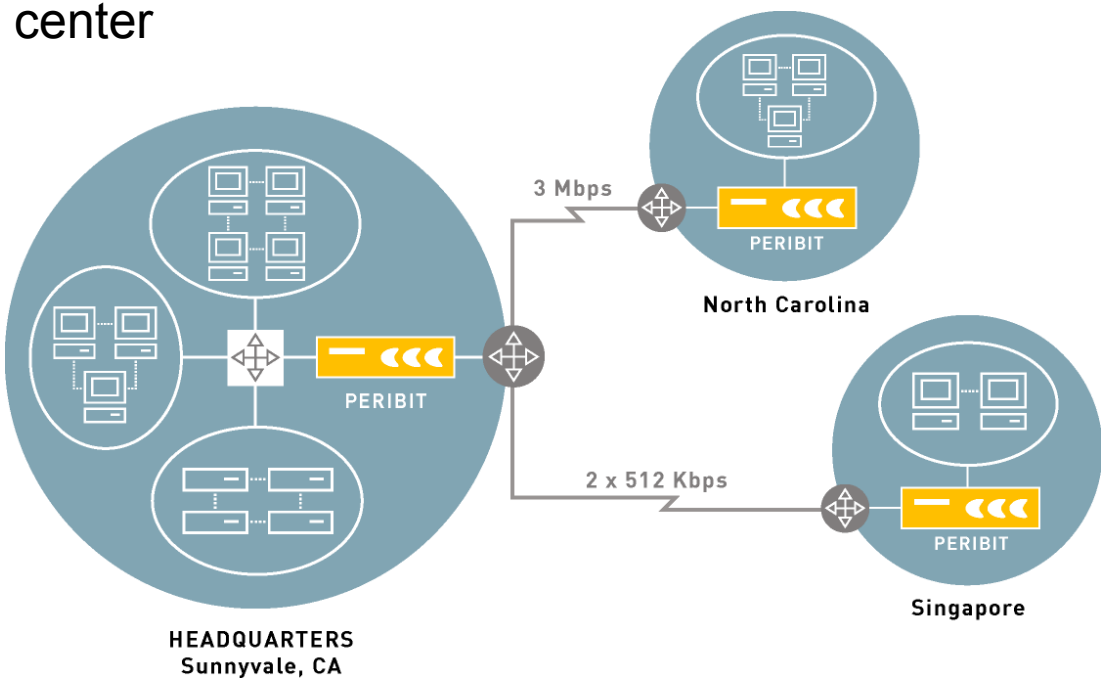
- Severe impact on customer support call center

Dramatic reduction to traffic

- 67% reduction provided instant relief

3x Increase in bandwidth

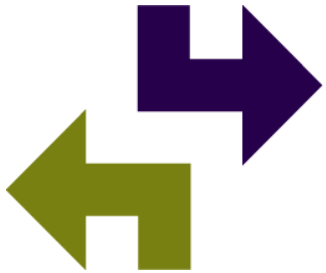
- 6 month ROI



"I was faced with spending another $7,000 per month to upgrade my links. With Peribit I cut traffic on my existing links by over 60%. This worked so well, I am now installing another SR-50 on an international link that would cost us over $20,000 per month for the same capacity."
Peter Sivo, Corporate Services Manager, Network Appliance

Summary

- Traditional compression doesn't scale and adds too much latency
- QoS solutions are good, but do not generate any more useable bandwidth
- Peribit
  - Instantly creates significant new bandwidth over existing network
  - Scales easily from low speed to high speed
  - Optimally prioritizes and allocates traffic over the new bandwidth
  - Installs in minutes and is easy to manage



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Bandwidth Optimization with Route Control

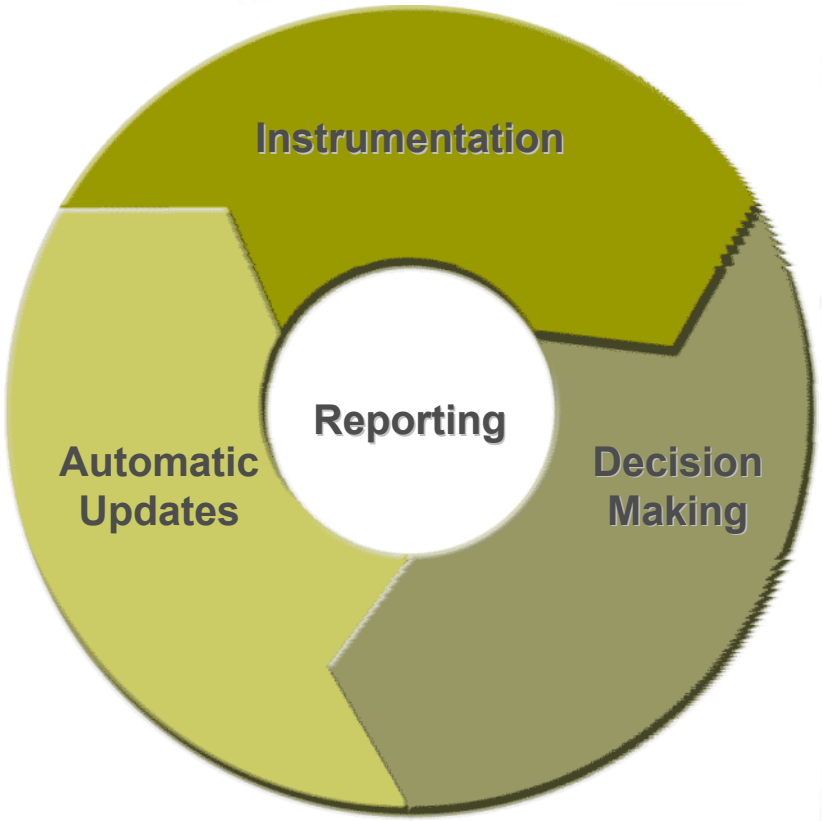
Dr. Mike Lloyd
Chief Technology Officer

RouteScience

A new product category

- Measures in real time an organization's end-to-end application performance to its own end users over Internet and private WAN links
- Automatically routes traffic to the best performing link for each user based on cost and performance metrics
- Makes the Internet predictable and reliable
- Enables contained or reduced spending on Frame Relay, ATM, and private lines
- Eliminates the risks of using a single provider private network

Route control optimizes Internet routing



- Real time application performance monitoring across active and inactive network paths
- Engine to determine network changes to meet customer-specific policies for cost and performance
- Automated enforcement of policies via real time BGP updates
- Detailed reports on applications rescued, actions taken, and problems solved

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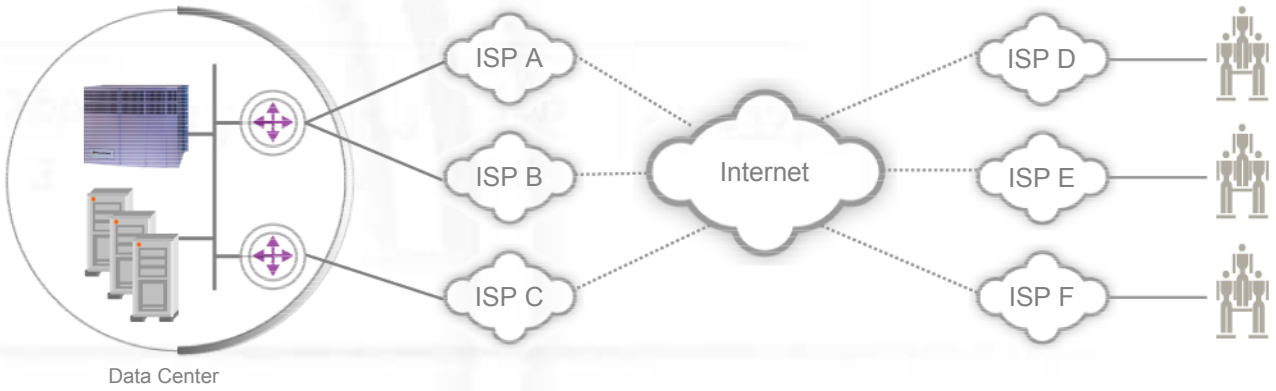
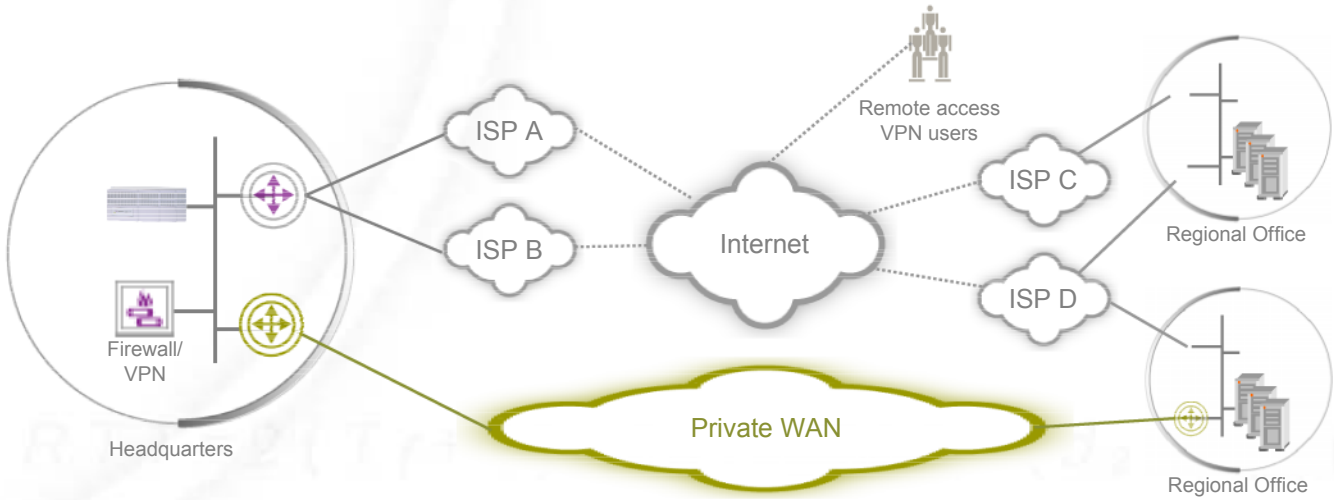
Applications of route control technology

eBusiness web sites



Corporate WAN



Lack of control costs enterprises every month

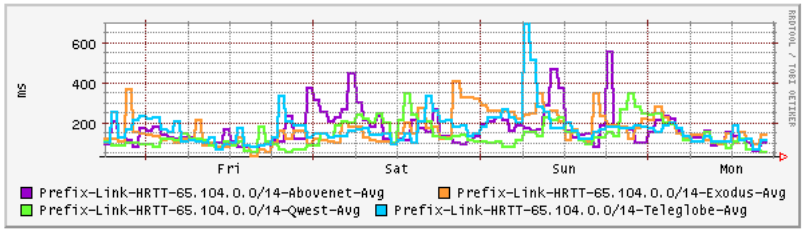
- Overspend on corporate WAN bandwidth
  - Rely on very expensive Frame Relay, ATM and private links
  - Exceed minimum commits on ISP bandwidth

- Exposure to significant single provider risks
  - SP staff reductions and other cost cutting will impact any single network's availability
  - Major outages are increasingly frequent

"Although we do not expect any immediate cessation of WorldCom services, its financial straits along with the pending layoff of 28 percent of its work force will result in diminished service levels."

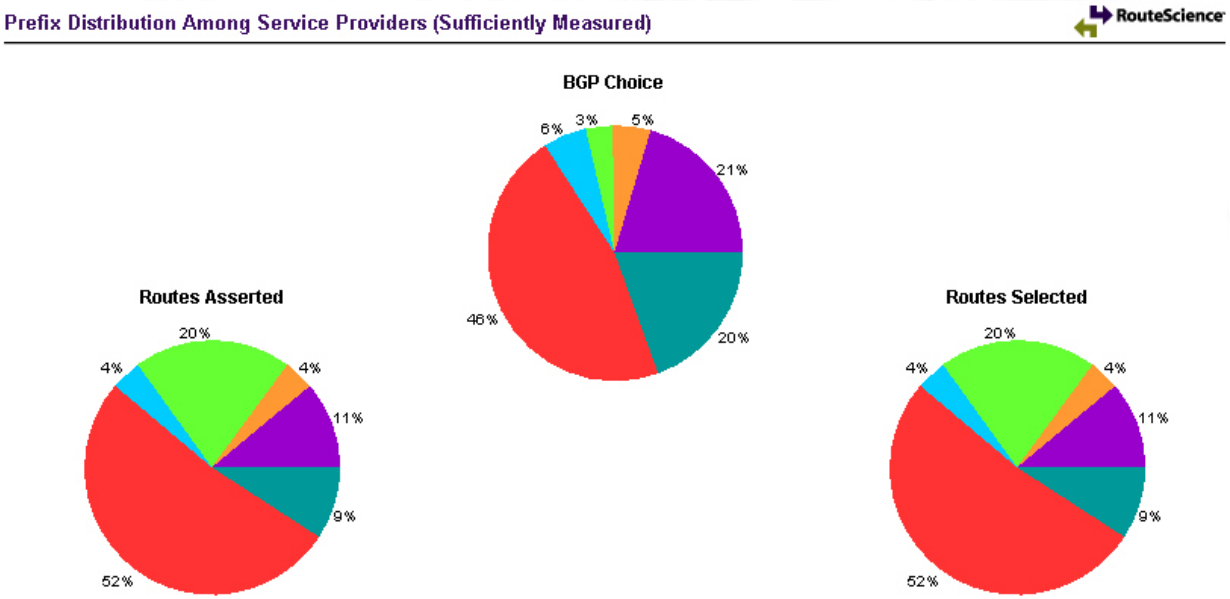
Surviving the WorldCom Fallout
*M*ETA Group
July, 2002

- Increased cost and missed opportunities from unpredictable Internet performance
  - Application "brownouts" impact productivity
  - New applications dictate additional high-cost Frame Relay or ATM bandwidth



Real world route control experience

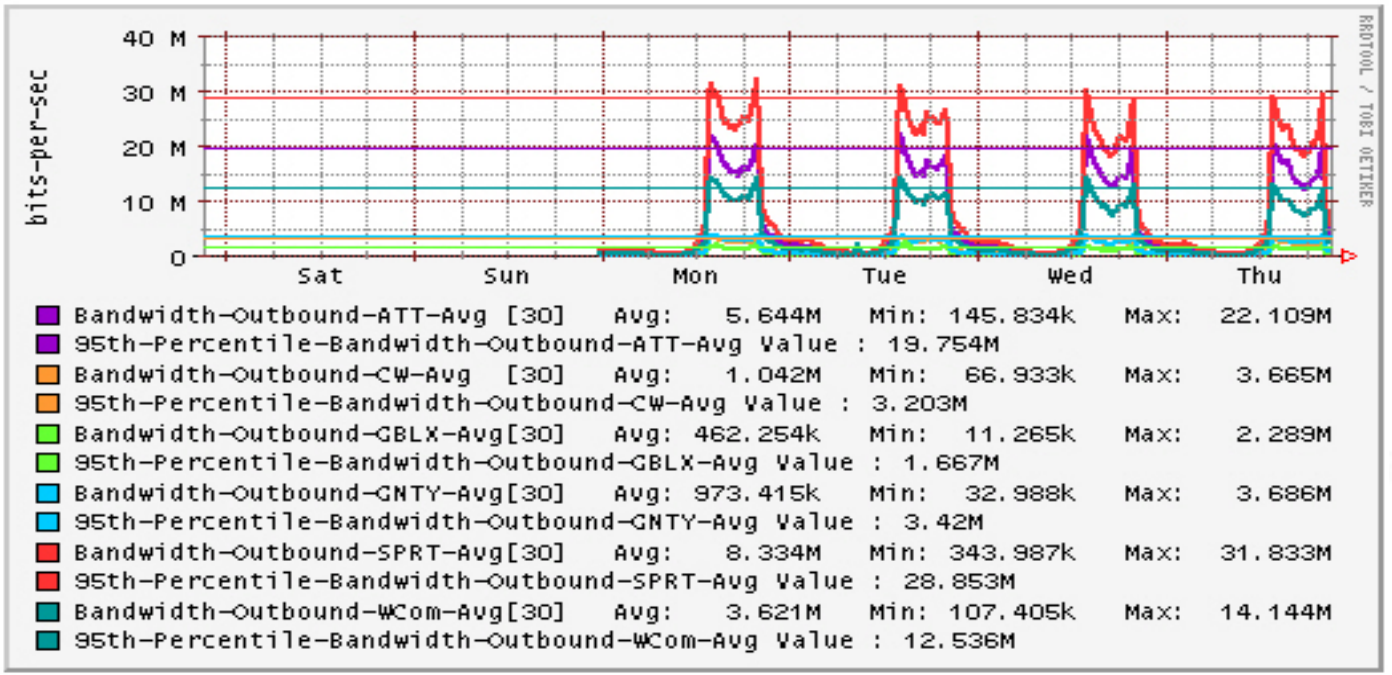
- Business policy goal is to optimize performance and cost simultaneously
  - Only move traffic which will perform well on the other links



Link Name	BGP Choice	Routes Asserted	Prefixes Moved	Routes Selected	Prefixes Moved
ATT	1,649	898	+340/-1,091	896	+340/-1,093
CW	373	302	+220/-291	302	+220/-291
GBLX	261	1,599	+1,425/-87	1,602	+1,428/-87
GNTY	460	318	+220/-362	319	+221/-362
SPRT	3,721	4,179	+1,532/-1,074	4,180	+1,534/-1,075
WCom	1,575	743	+280/-1,112	740	+281/-1,116

Bandwidth costs before route control

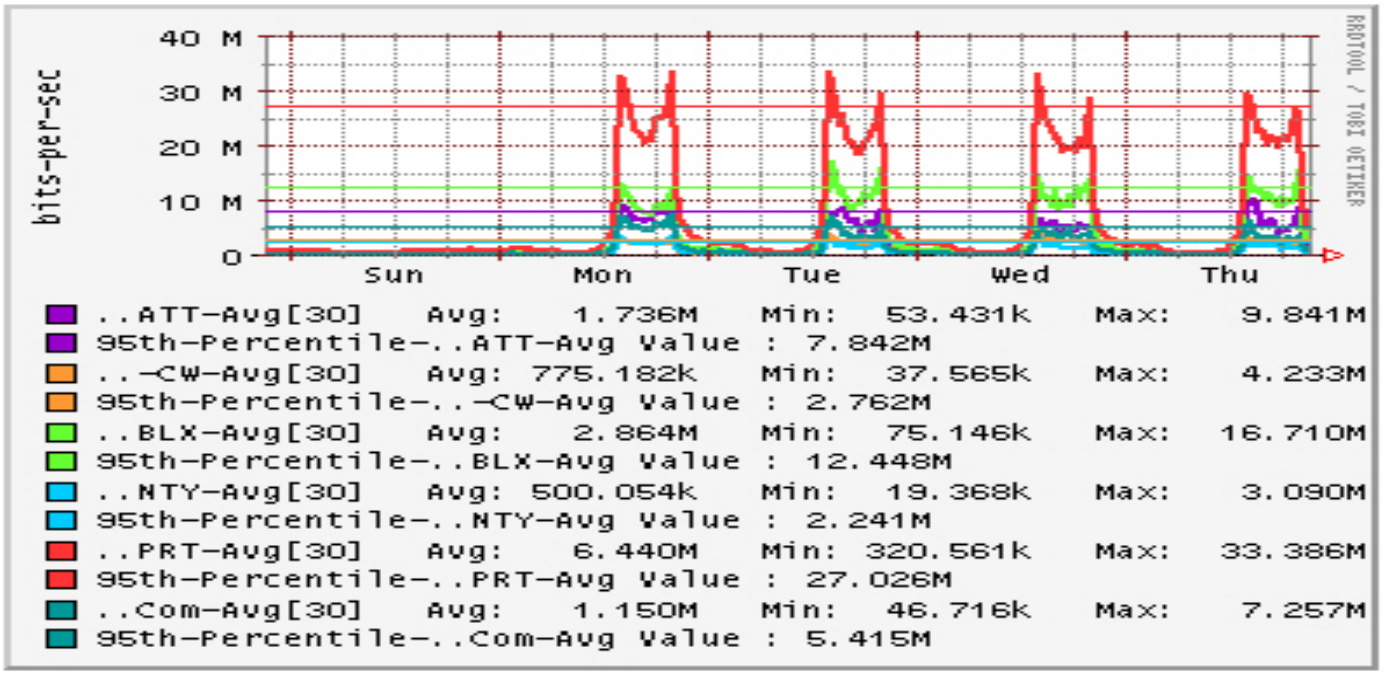
- Based on link utilization and ISP billing structures, this customer's bandwidth costs were approximately:
  - **Genuity:** **$4,060 per month**
  - **Global Crossing:** **$4,128 per month**
  - **Cable and Wireless:** **$8,740 per month**
  - **ATT:** **$8,910 per month**
  - **WCOM:** **$8,201 per month**
  - **Sprint:** **$14,000 per month**
  - **Total cost:** **$48,039 per month**



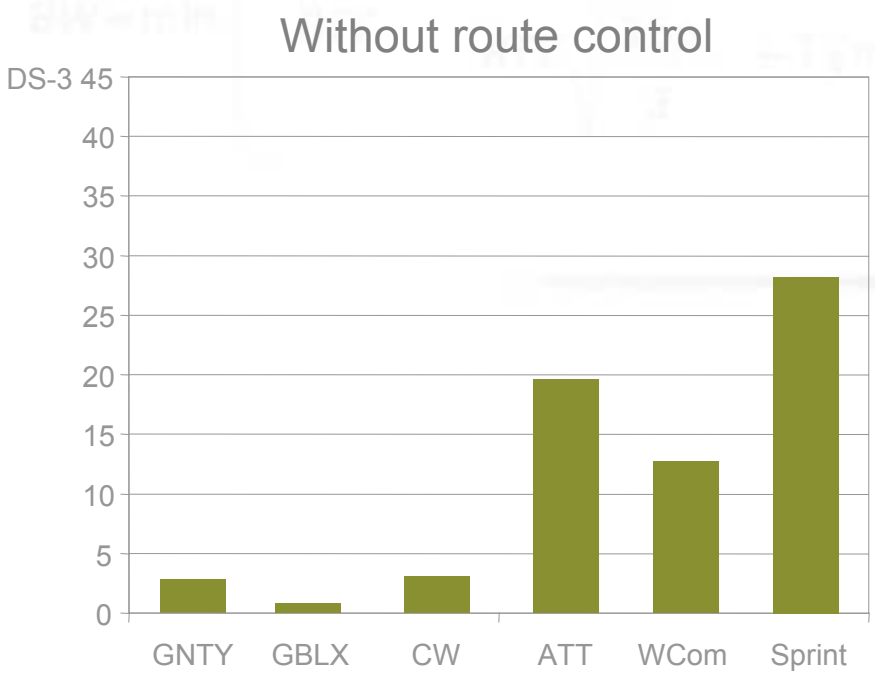
Bandwidth costs after route control

- Route control moved traffic based on business policy and lowered this customer's costs to:
  - Genuity: $2,055 per month
  - Global Crossing: $4,541per month
  - Cable and Wireless: $4,475 per month
  - ATT: $4,950 per month
  - WCOM: $3,870 per month
  - Sprint: $14,000 per month

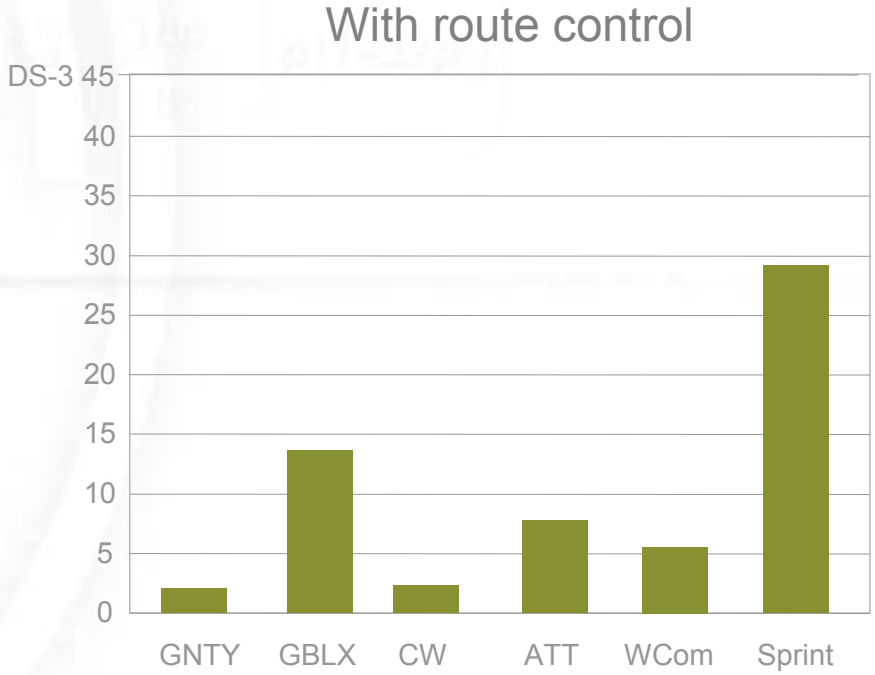
  - Total cost: **$33,881 per month**



Benefits of optimizing ISP bandwidth with route control



Total monthly costs = **$48,039**



Total monthly costs = **$33,881**

Monthly savings - $14,158
Annual savings - $169,896
Overall Performance Gain - 82%

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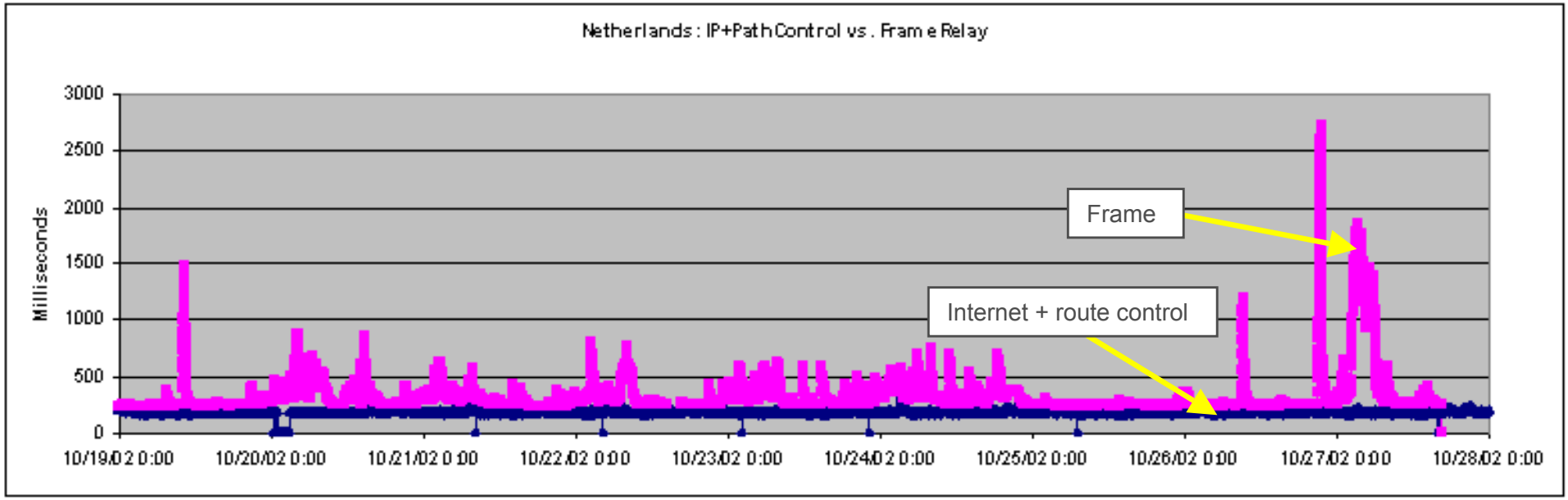
Proof that route control makes the Internet work for mission critical apps

- Real-world customer application running on AS400's all over the world
- Frame too expensive; price/performance unacceptable
- Internet far cheaper, but it isn't reliable enough
- Route control solves this problem
  - Switch between ISPs in real time to increase reliability
  - Customer found Internet plus route control actually better than Frame



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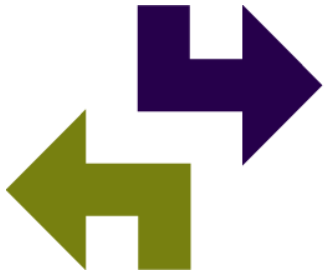
Spend a lot less for comparable bandwidth, or spend a bit less and get lots more bandwidth!

Private WAN	Annual Cost	Internet VPN	Annual Cost
128 kbps	$7,200	**2 x 512k SDSL**	$2,880
512 kbps	$28,700	**2 x T1**	$22,800
1.5 mbps	$41,800	**3 x T1**	$34,200
3.0 mbps	$60,800	**2 x 3mb DS-3**	$40,800
6.0 mbps	$118,400	**2 x 6mb DS-3**	$83,800

All prices are for 12 months of service, based on a blind RFP issued to multiple private WAN and Internet service providers in February, 2002. All costs include the local loop but no installation or other one-time charges. All FR and ATM prices are for CIR shown at 50% of port capacity. ISP prices are for minimum commit shown (with burstable ports above 1.5 mbps)



RouteScience™

Empowering organizations to control their Internet routing at the network edge