

Data Center Networking Strategies

Transport Solutions

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September 20, 2006

- History of the (Data Center Networking) World
- Business-Driven Decision Factors
- Taking Control of Your Network

Data Center Network History

NOW



THEN

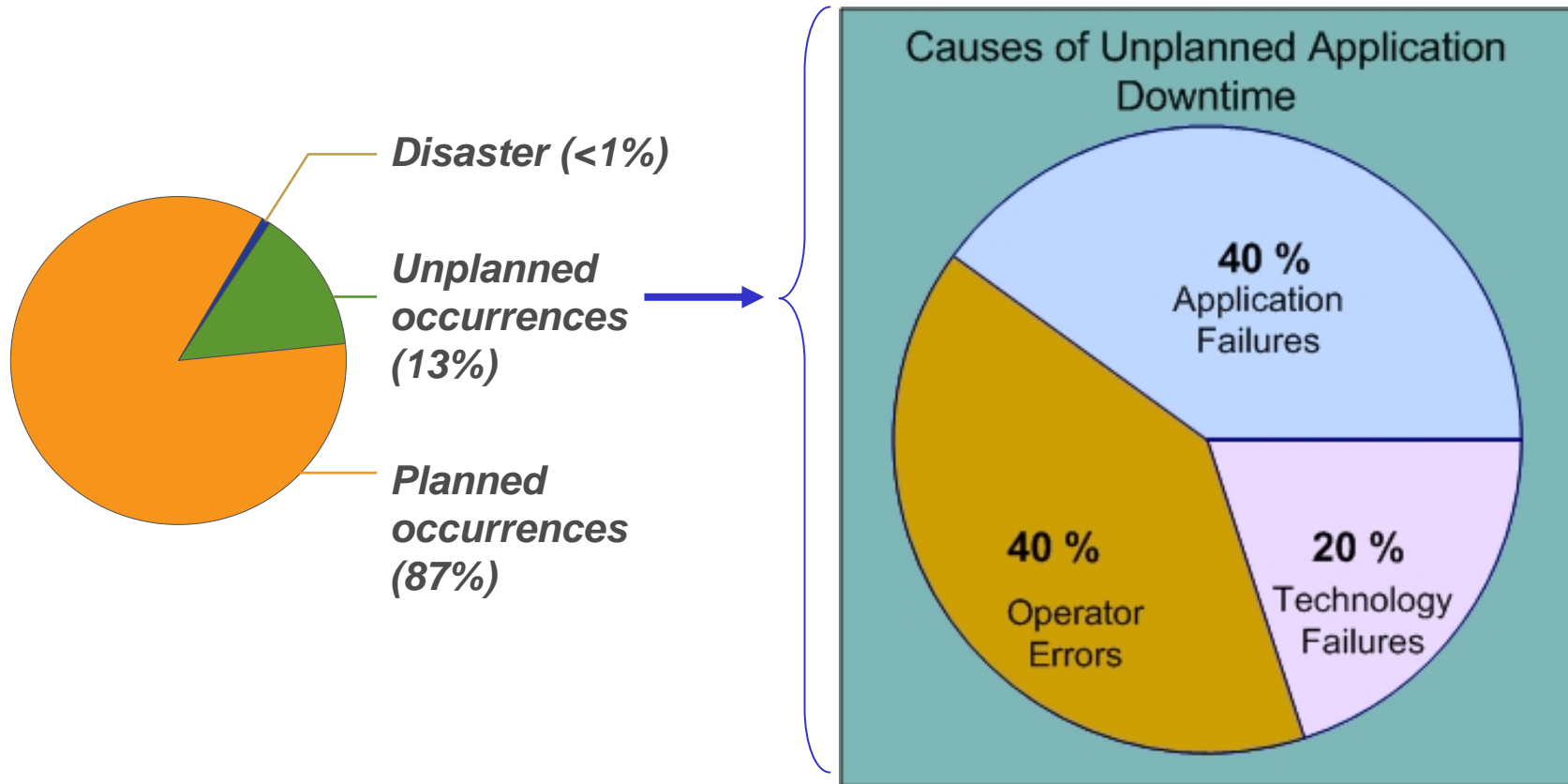
Data Center Bandwidth	Applications	External Factors
GbE WDM	<ul style="list-style-type: none"> • N x Data Center • Mature BC/DR • Multimedia Collaboration • VoIP • SRDF 	<ul style="list-style-type: none"> • SOA • Virtualization • Grid computing • MPLS • HIPPA, SOX
SONET (OC-n)	<ul style="list-style-type: none"> • Intranets • E-commerce • SAN • Voice Conferencing 	<ul style="list-style-type: none"> • IP adoption • Supply chain integration
DS3s	<ul style="list-style-type: none"> • Tape Backup • Some Remote Networking 	<ul style="list-style-type: none"> • Early Internet influence • Frame Relay
T1s	<ul style="list-style-type: none"> • Dial RAS • SNA • Token Ring, Banyan 	<ul style="list-style-type: none"> • ILEC alternatives? • Private Line or X.25? • PSTN Voice = 95% of traffic

Decision Factors for DC Connectivity

- **Protection Ratio** ↓

(Cost for redundancy / Cost of downtime)

Downtime Cause Breakdown



Source: Gartner Research 2002 Survey

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- **Expansion Ratio** ↑

(Benefit from expansion / Cost to expand)

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- **Expansion Ratio** ↑
(Benefit from expansion / Cost to expand)
- **Control Ratio** ↑
(Control over #1 & #2 / Cost to manage)

Continuum of choices



Bundled
Loops

Self-Managed
Access

Dark
Fiber

Skillset
needs



Upfront
costs*



TCO*



Expandability\
Protection options



* Smaller (<20Gbps) networks

3-Tier Data Center MAN Solution

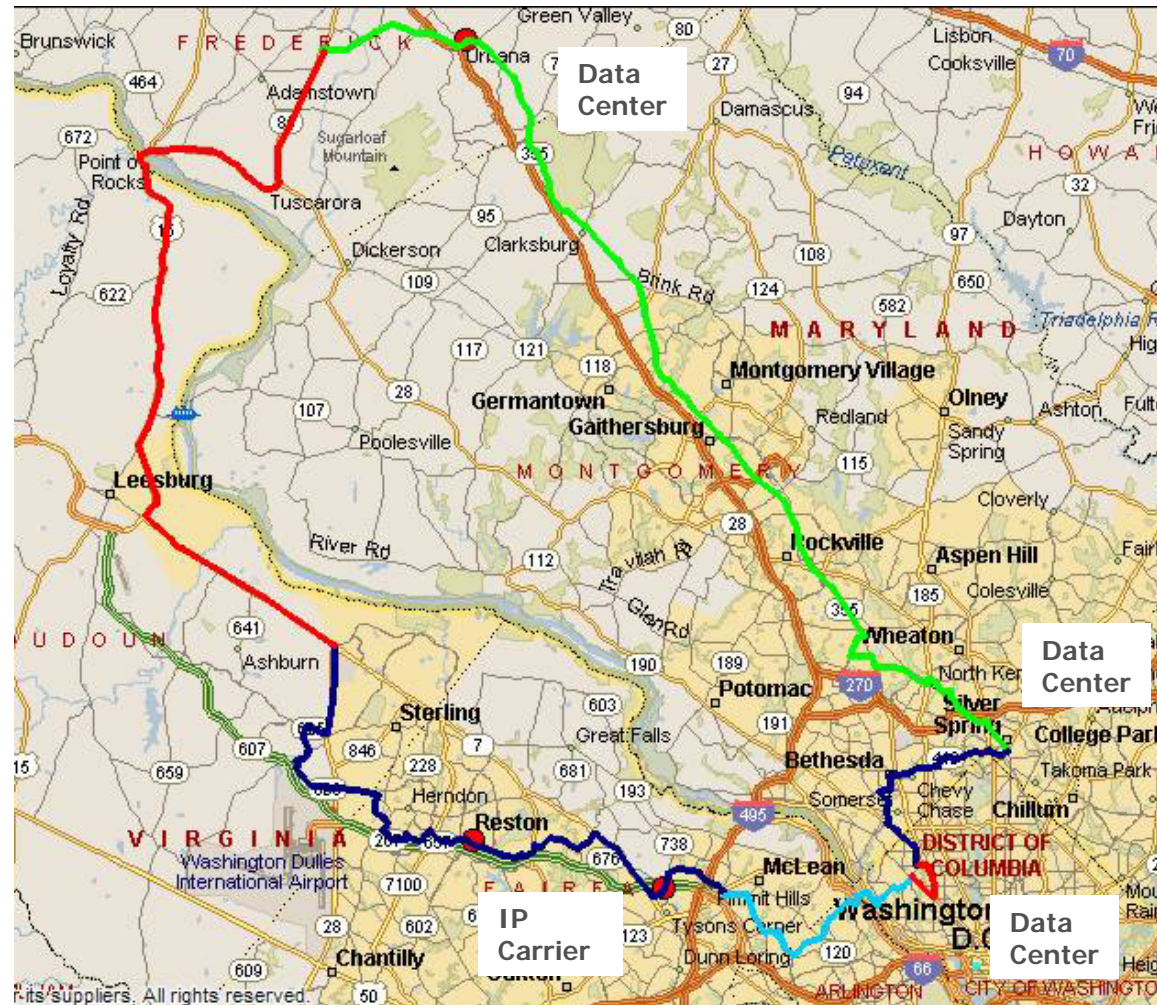
Company: Financial Services Industry Client

- Situation

- New Data Center
- SRDF for BC strategy
- High performance criteria

- Solution

- Leverage multiple fiber sources plus 25-mile build
- Exceeded technical criteria
- Designed for easy scaling



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Examples of lost revenue estimates for 1 hr downtime (2000 data)

Brokerage operations	\$6,450,000
Credit card authorization	\$2,600,000
Ebay	\$225,000
Amazon.com	\$180,000
Package shipping services	\$150,000
Home shopping channel	\$113,000
Catalog sales center	\$90,000
Airline reservation center	\$89,000
Cellular service activation	\$41,000
On-line network fees	\$25,000
ATM service fees	\$14,000

Source: Internet Week, 4/3/00; Contingency Planning Research, 2000

Metro Solutions Flags

- High Bandwidth Metro Circuits
 - > 100mbps Ethernet
 - OC-12+ SONET
 - Waves (1.25, 2.5, 10Gpbs)
- Metro Area Network Applications
 - Data Center networking
 - BC/DR
 - Multi-carrier connections
 - Campus-to-campus
- Non-Standard / Unique Application Need:
 - ESCON
 - FICON
 - Fibre Channel
 - Video Transport - DVB-ASI, SDI
- Special Diversity Requirements
 - Core Diversity
 - Lateral Diversity
 - Equipment diversity
 - Specific Carrier Diversity
- Special Equipment Configurations
 - Dual Node/Dual Chassis Custom Design
 - LAN-PHY (10GbE)
 - WAN-PHY (SONET OC192)
- Special Construction Required
- Very Specific Fiber Requirements
 - Aerial vs Underground