RIVERBED

Riverbed Technology, Inc.

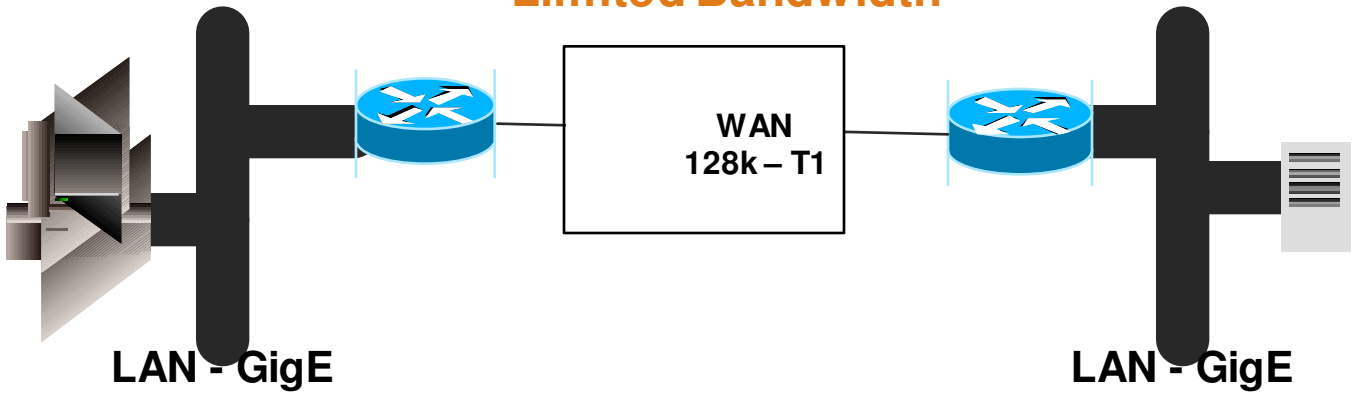
May, 2004

Context: Enterprise Distributed Systems

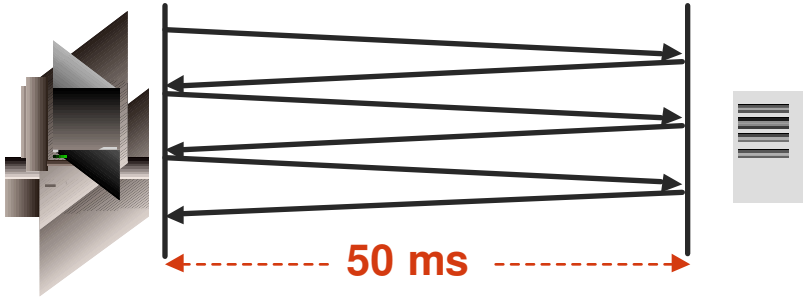
- **The Size of the Remote Workforce is Significant & Increasing**
- **Distributed IT Systems are Frustrating to Both Users and IT Managers – There is "Sand in the Gears"**
  - Core Enterprise Applications over the WAN Often Slow to a Crawl
  - Managing Distributed IT Systems is Increasingly Complicated & Expensive
- **A Strong Trend Toward IT Site Consolidation**
  (File Servers, Mail Servers, Tape Back Up, Storage, Support)
  - Cost Cutting
  - Data Protection
  - Compliance Requirements
  - Security Risks
  - More Control, Easier Management, Improved Processes

Speed Bumps
Causes of Application Problems Over the WAN

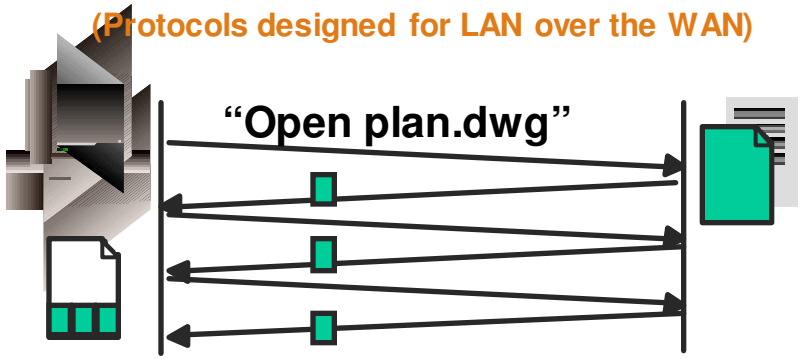
Limited Bandwidth



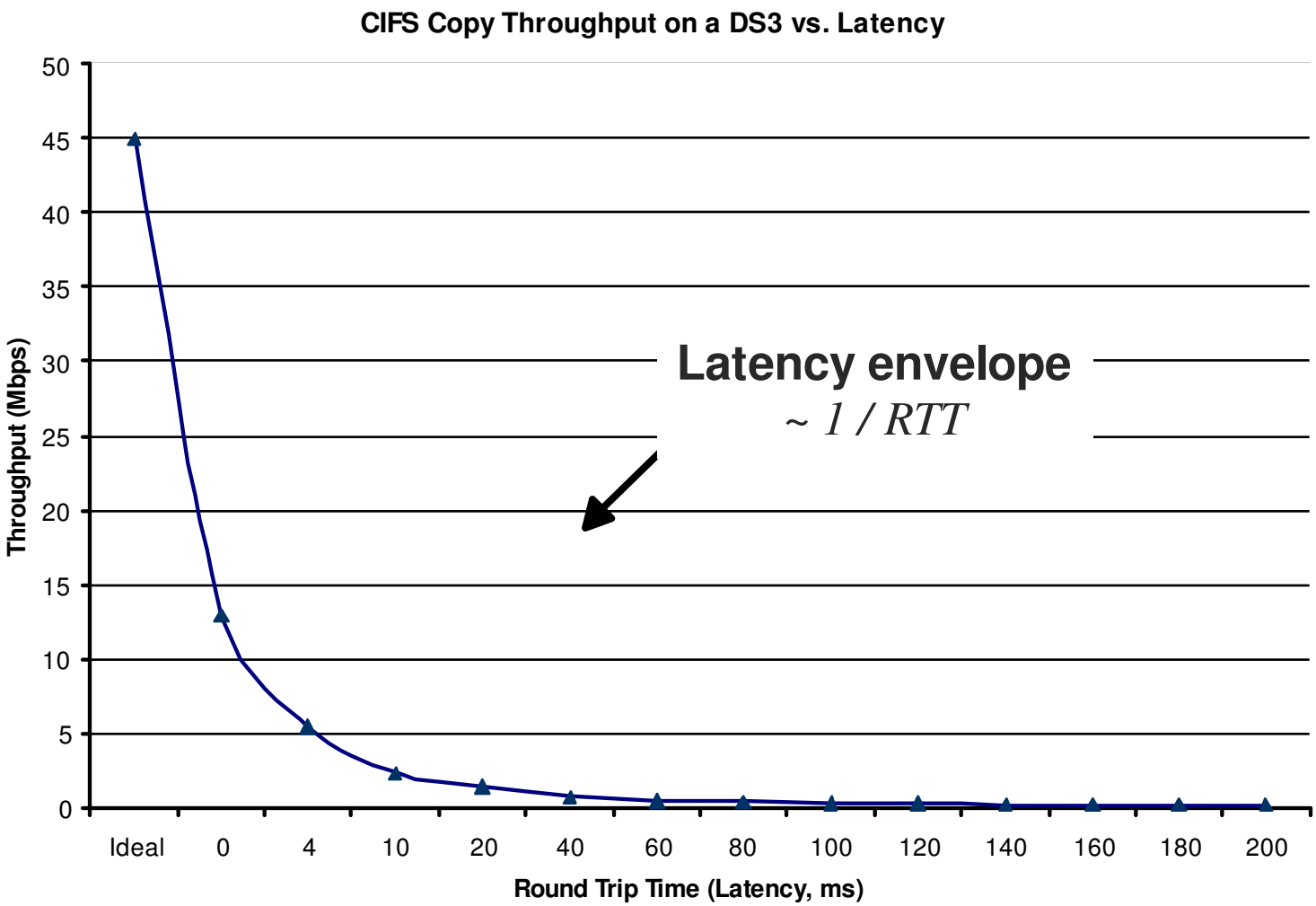
High Latency
(Distance, Speed of Light, Routing)



Chatty Protocols
(Protocols designed for LAN over the WAN)



The Latency Paradox

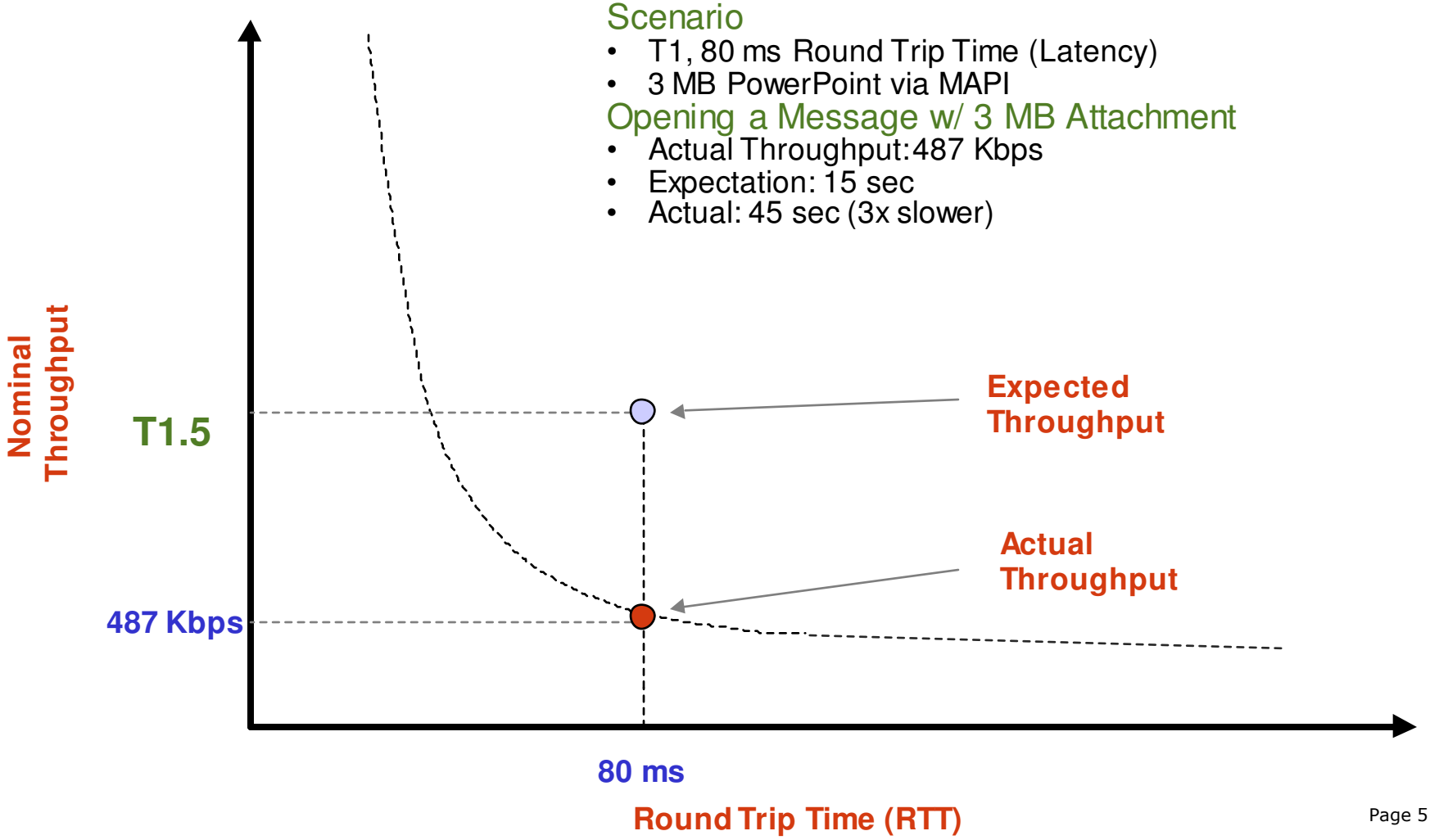


Large Financial Institution

Exchange E-mail Attachment

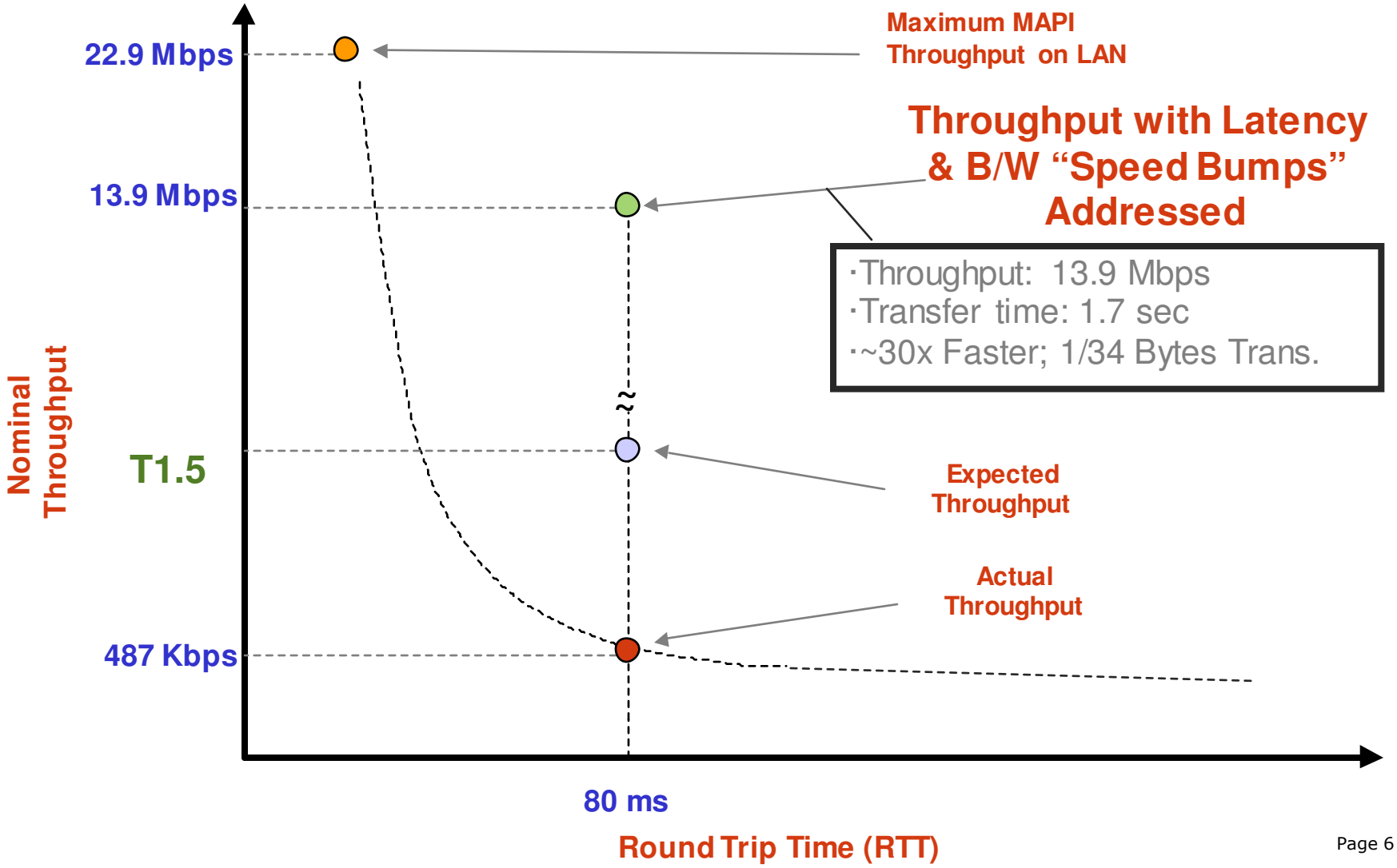
Scenario
- T1, 80 ms Round Trip Time (Latency)
- 3 MB PowerPoint via MAPI

Opening a Message w/ 3 MB Attachment
- Actual Throughput: 487 Kbps
- Expectation: 15 sec
- Actual: 45 sec (3x slower)



Large Financial Institution

Email Attachment

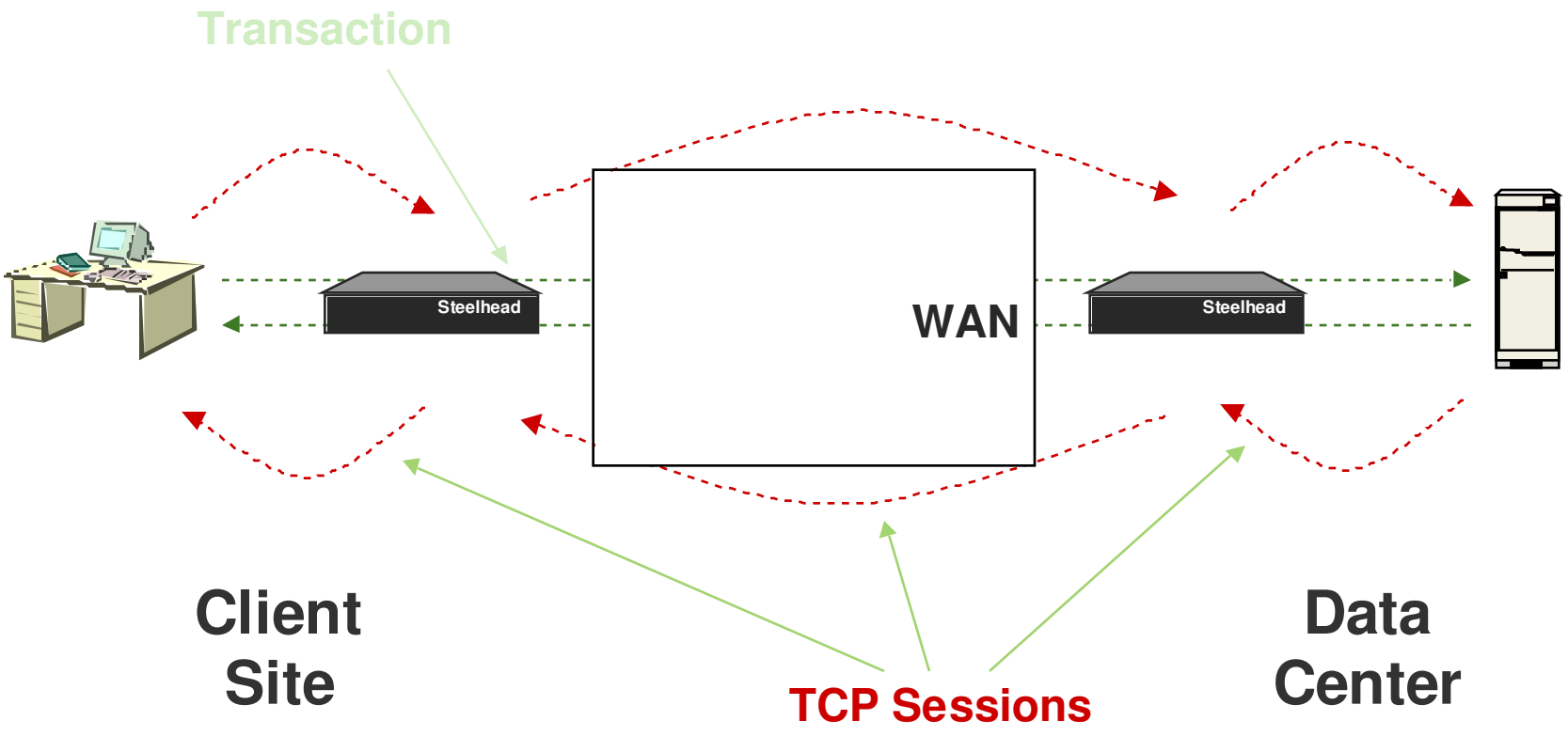


Transaction Acceleration Solution

A Multi-Pronged Approach

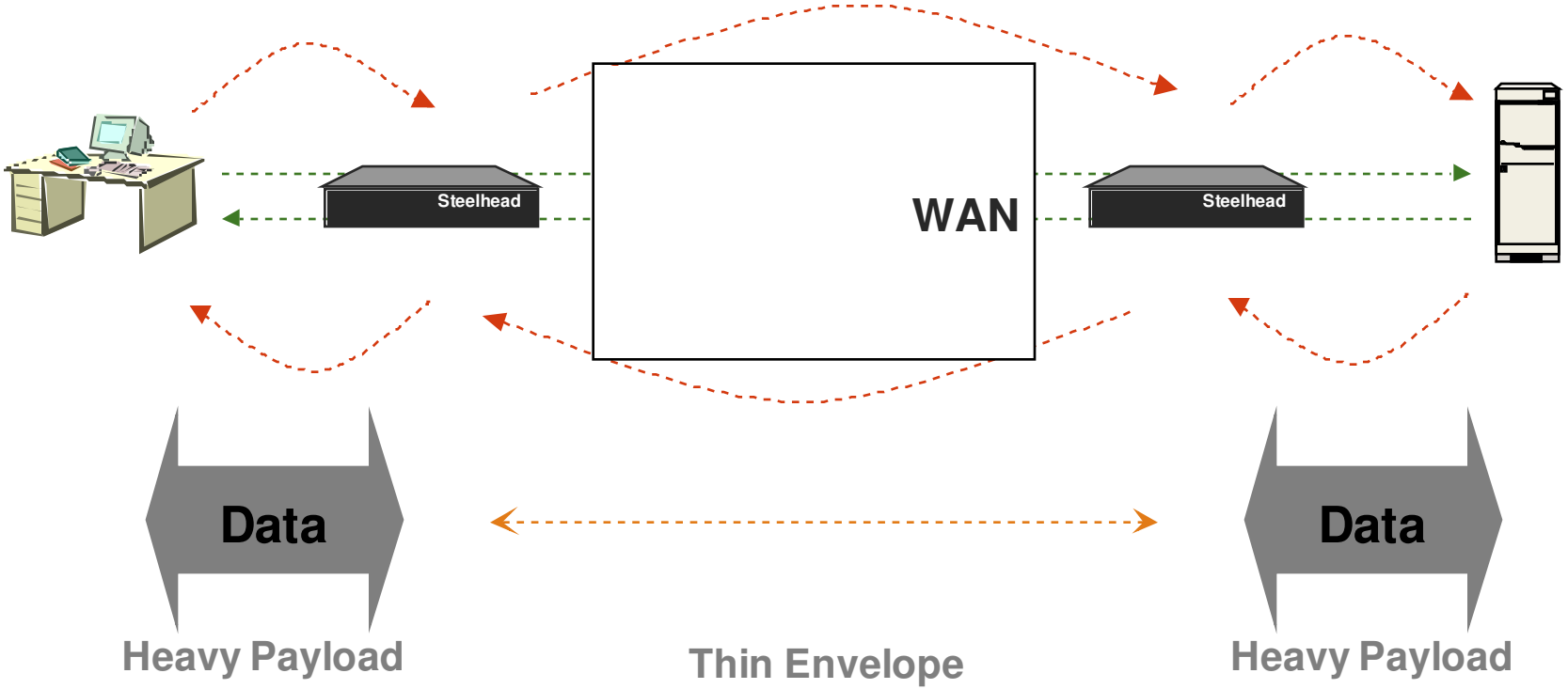
Technolog	What Does it Do?
Auto Detection & Interception	TransparentDeployment
Scalable Data Referencing (SDR)	Bandwidth Optimization
Transaction Prediction	Latency Optimization TransparentTurn Reduction
Virtual TCP Window Expansion	TCP Optimization

Transparent Deployment
Auto Detection and Configuration



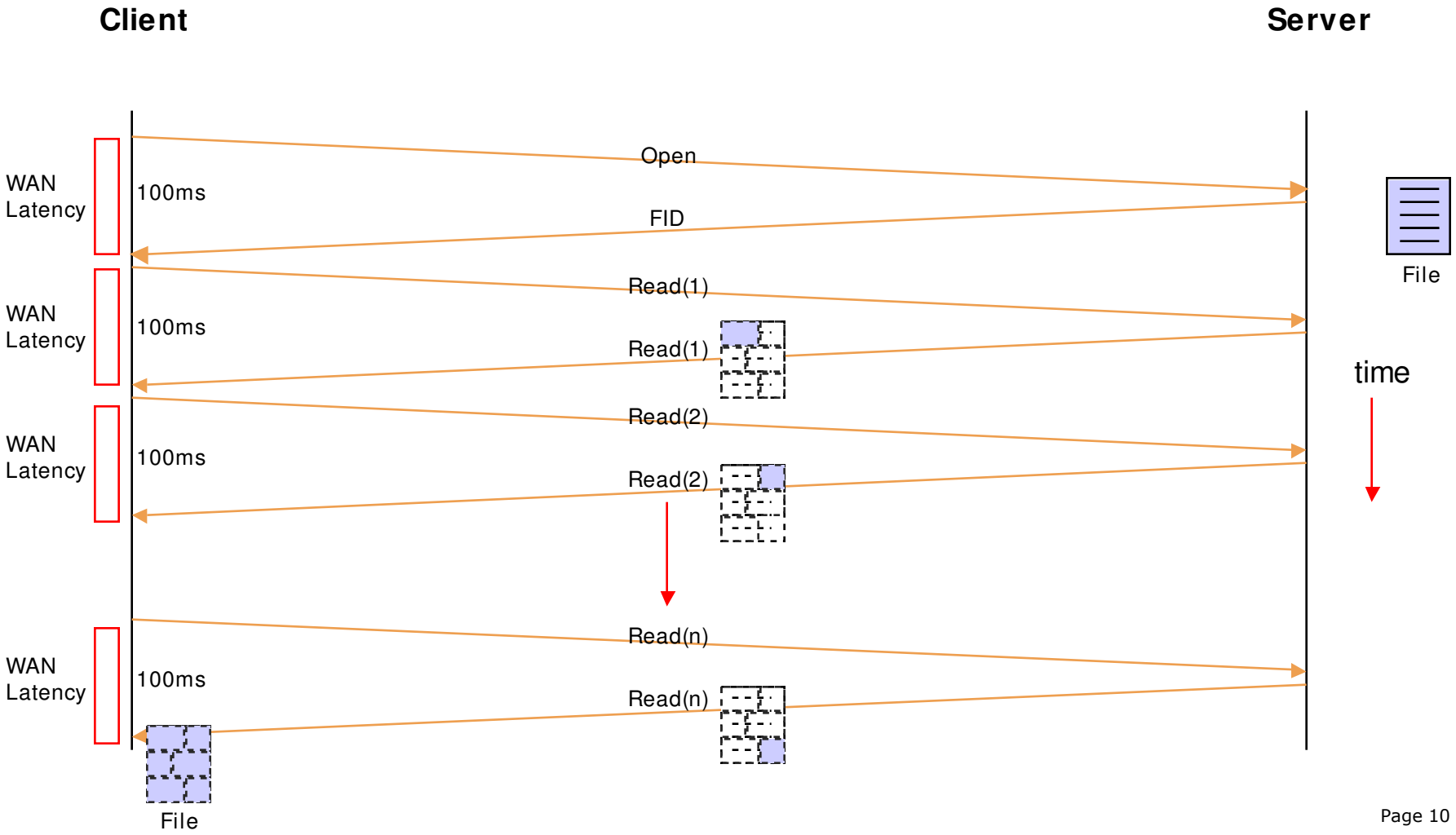
Scalable Data Referencing (SDR)

Never Send the Same Bytes Twice



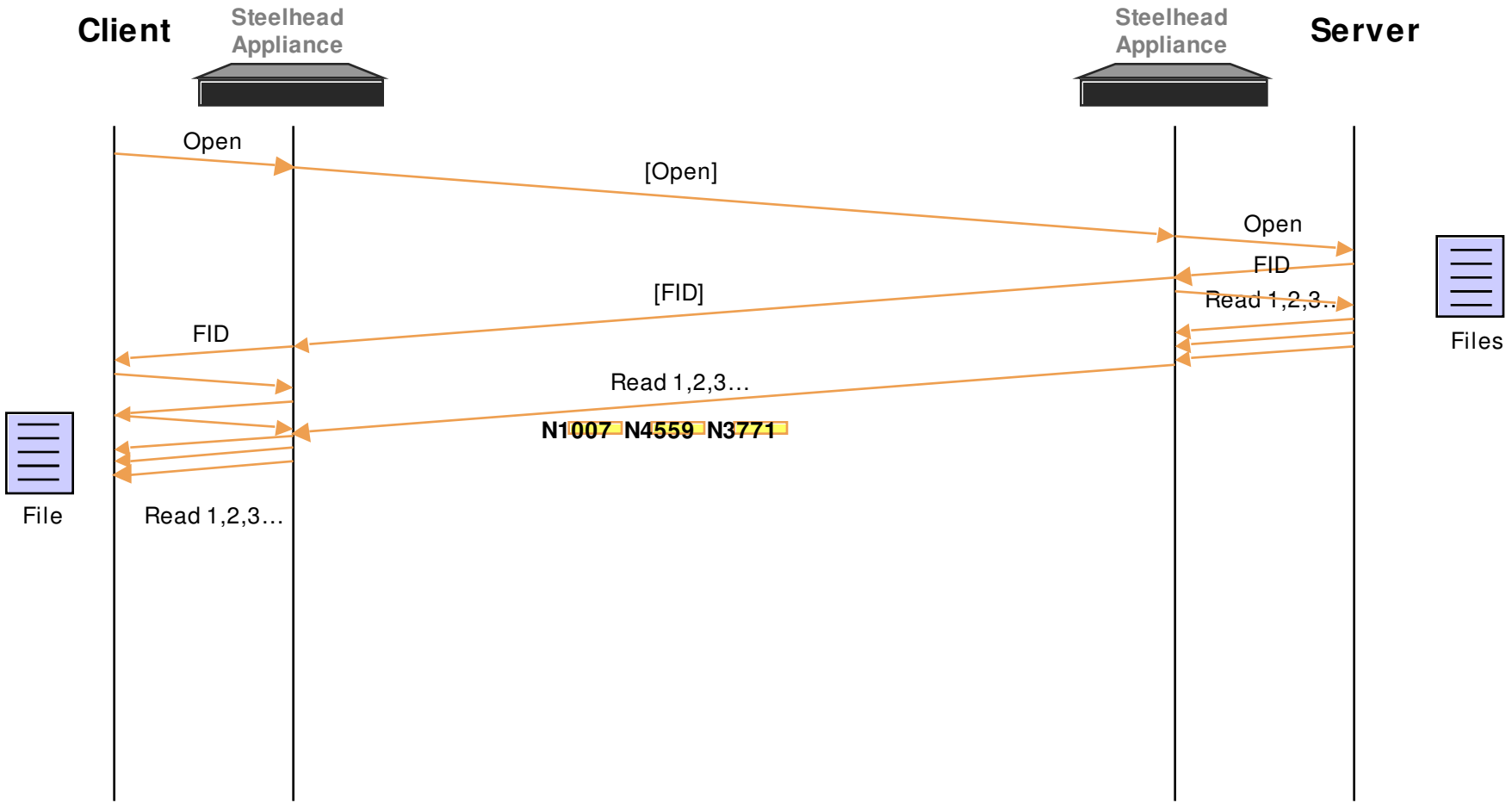
Transparent Turn Reduction

Typical Client Server Interactions



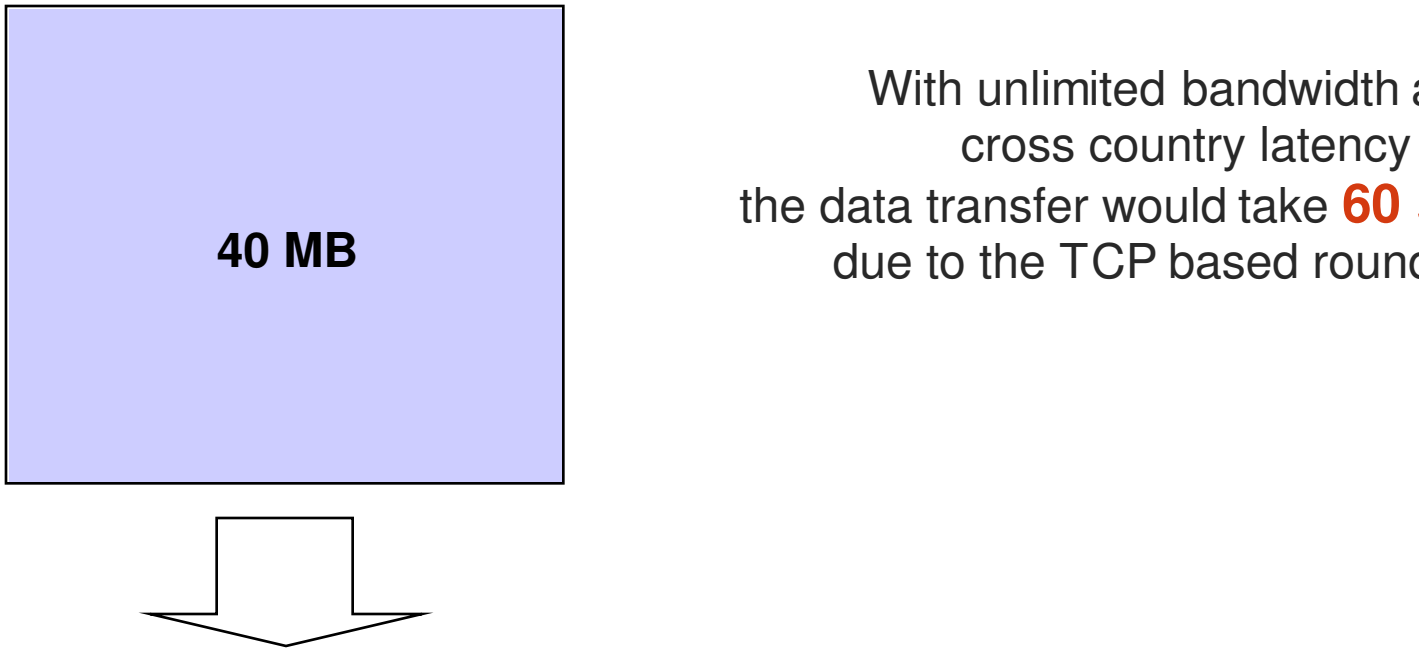
Transparent Turn Reduction

Transaction Prediction



Normal TCP Dynamics

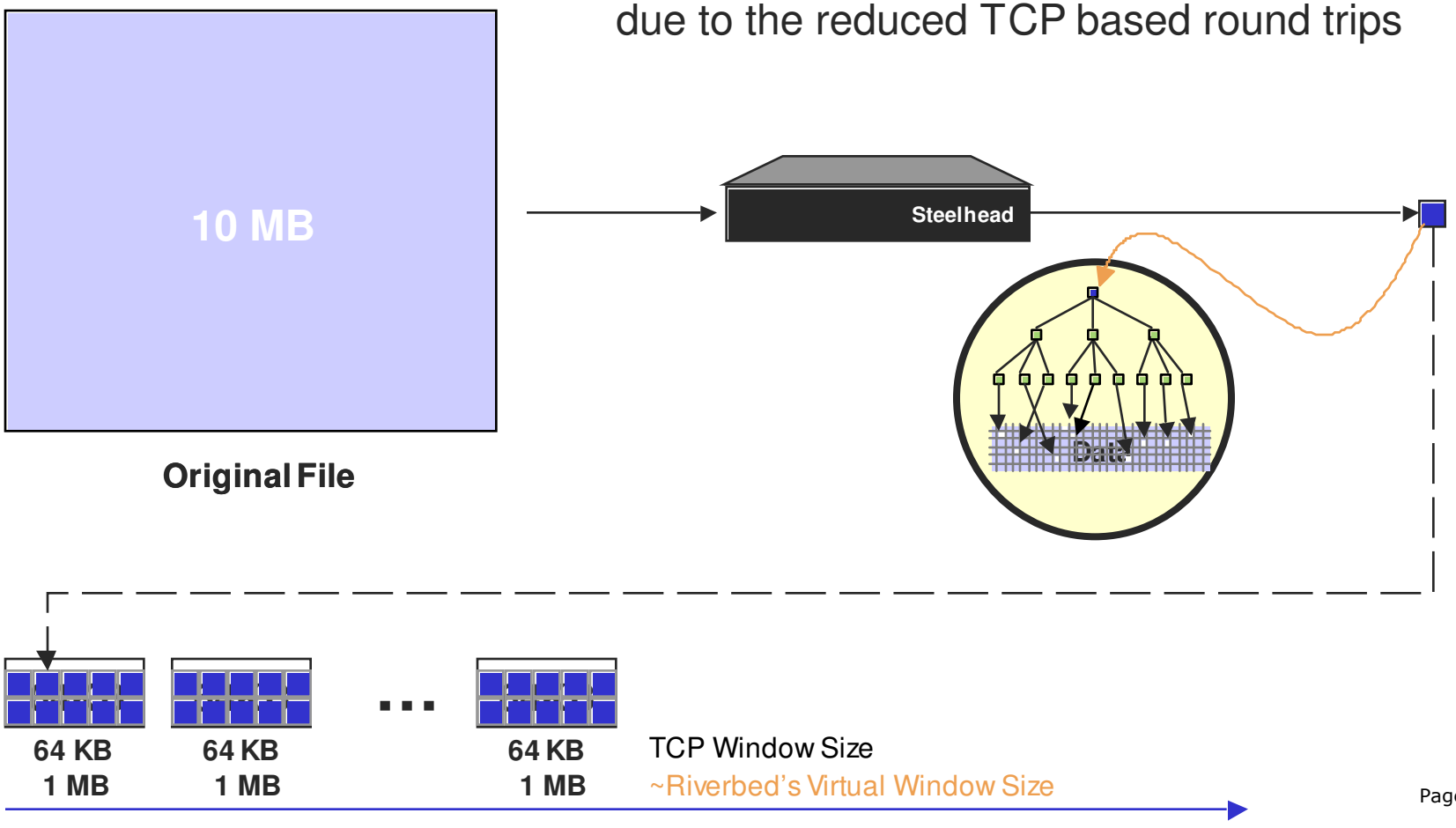
Send large file across the WAN
(via WAN Friendly Protocol like FTP, HTTP, other)



With unlimited bandwidth and
cross country latency
the data transfer would take **60 seconds**
due to the TCP based round trips

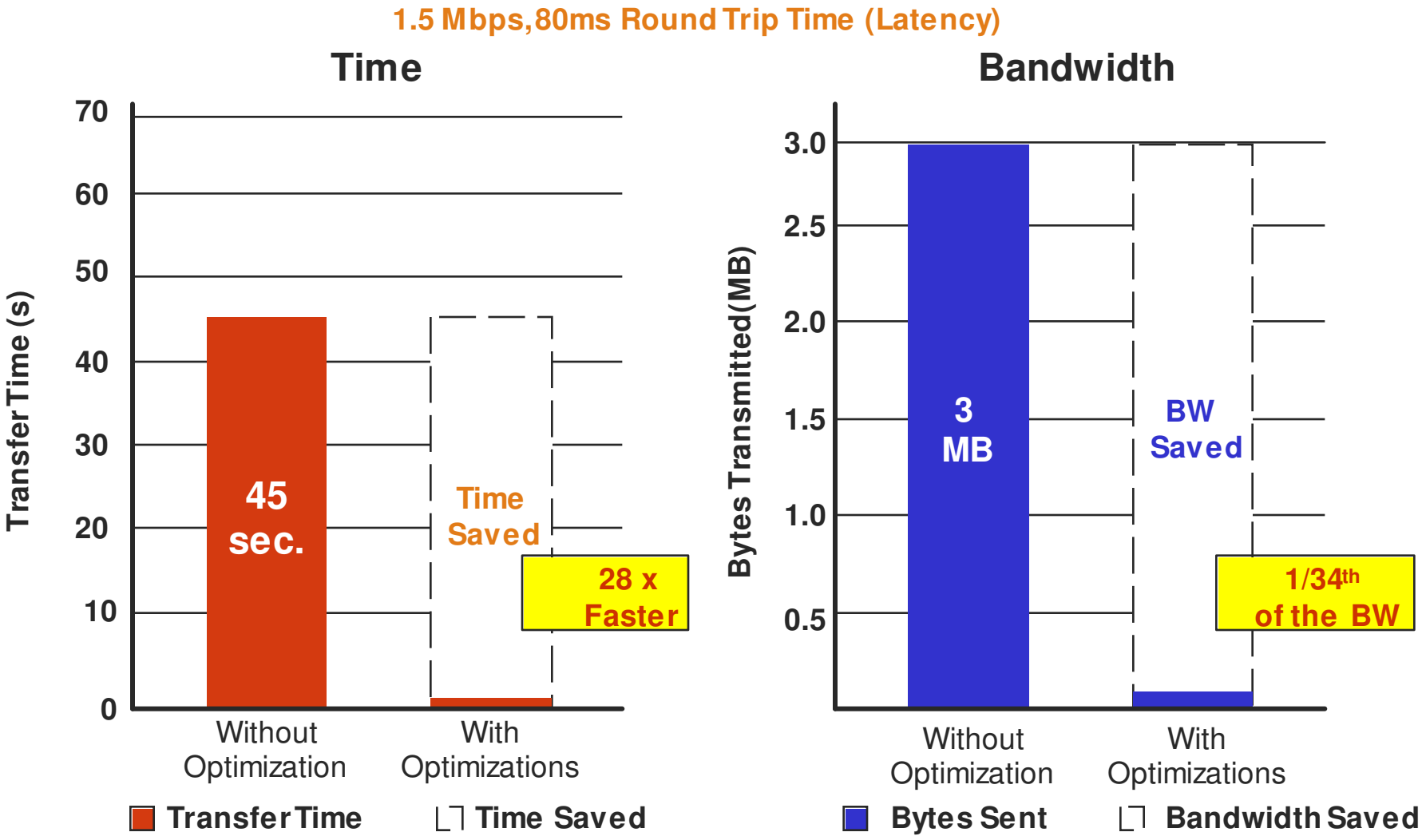
Virtual TCP Window Expansion
Result of Scaleable Data Referencing

The data transfer would take **only 4 seconds** due to the reduced TCP based round trips



Global Professional Services Company

3 MB Exchange Attachment



Steelhead Appliances

Enabling the Serverless Office

- **Improves application performance over the WAN by up to 100 times**
- **Enables IT site consolidation**
  - Mail Servers
  - File Servers
  - NAS Servers
  - Back Up Systems
  - Support
- **Increases WAN capacity by up to 100 times**