

The complete guide to

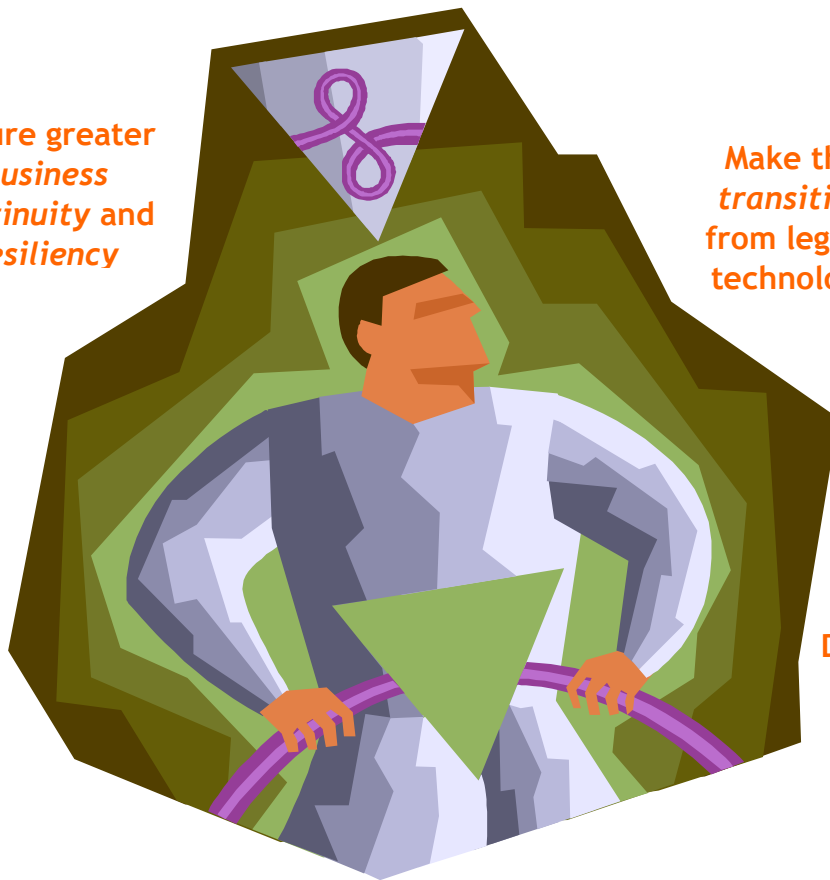
# SMART

*securely managed and reliable technology*

*Everything you need to know about  
leveraging DTCC'S connections to*

*Ensure greater  
business  
continuity and  
resiliency*

*Make the  
transition  
from legacy  
technology*



*Streamline  
access to all  
DTCC services*



*The Depository Trust &  
Clearing Corporation*

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## **Confidentiality**

This document contains guidelines and recommendations on designing and developing a network access infrastructure. This information is proprietary to DTCC and its members and should be considered confidential and handled as such.

Because of the nature of the subject matter, DTCC requests the recipient to maintain its confidentiality.





# How to Use This Document

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## Intended readers

This document is intended for multiple audiences, both operational and technical. It is modular in design, meaning that individual sections are targeted to appropriate readers. Icons identify the intended reader: for example, the section on communications infrastructure is intended for network architects, whereas the section on benefits is oriented to a business unit decision maker.

Audiences are designated by the following icons:

- ⊕ **Operations professionals** responsible for making decisions about the DTCC relationship and the network 
- ⊕ **Network security personnel** who wish to assess the compliance of the network access requirements of SMART with their own security policies 
- ⊕ **Network administrators** who need to configure network access control devices between their own network and the SMART secure IP network 
- ⊕ **Network architects** who need to design network solutions that take advantage of DTCC's SMART connectivity capabilities 

## Role of the DTCC team

Throughout this document you will find references to groups or people within DTCC that can anticipate and address your needs. Here is what each team member does.

- ⊕ **Relationship manager** The person responsible for managing your overall relationship. He or she will help you design an overall SMART strategy and ensure that goals and schedules are met.
- ⊕ **SMART implementation team** Once you have committed to act, this group will review your current connectivity and outline a technical strategy specific to your needs.
- ⊕ **Technical support teams** These teams are responsible for tasks like ordering lines, ensuring installation, and coordinating testing. Coordinated through the SMART Implementation Team, they will respond to all technical issues.

### SMART Tip

DTCC recognizes that our customers' time and resources must be carefully allocated. For a SMART strategy to be successfully implemented requires commitment. For this reason, DTCC recommends the identification of a "communications czar" responsible for overall project management.



## What is SMART?

DTCC's Securely Managed and Reliable Technology (SMART) is the technology backbone that supports the entire settlement infrastructure of the U.S. capital markets. SMART virtually eliminates systemic operational risk for settlements exceeding \$900 trillion each year, equal to the U.S. annual gross domestic product of \$10 trillion every three business days.

SMART connects a nationwide complex of networks, processing centers, and control facilities. Each is highly secured; engineered with multiple, independent levels of redundancy; and capable of processing DTCC's entire clearance and settlement workload. DTCC ensures the availability and reliability of the settlement infrastructure by extending SMART onto members' operating premises. DTCC maintains and manages multiple diverse network connections to SMART control devices installed at each member firm. As the owner of the entire infrastructure, DTCC can register each element with the Department of Homeland Security for high-priority restoration of service in the event of a telecommunications failure.

SMART connects a nationwide complex of networks

In addition to depository services offered by DTCC's subsidiary The Depository Trust Company (DTC), SMART also streamlines access to all clearing services, including the equity, fixed income, mutual funds, insurance, derivatives, and global corporate actions services offered by its subsidiaries National Securities Clearing Corporation (NSCC), Fixed Income Clearing Corporation (FICC), Emerging Markets Clearing Corporation (EMCC), DTCC Deriv/SERV LLC, and Global Asset Solutions LLC.

Although SMART is engineered principally for clearance and settlement activity and continuity, SMART streamlines access to *all* DTCC services, which means that DTCC customers can simplify their networks and consolidate location- and application-specific circuits into fewer, larger, general-use connections.

This all-in-one, complete solution for our varied customer base effectively leverages customers' investments in their own networks. And SMART provides a tremendous level of certainty, security, flexibility, and cost controls, allowing customers to respond to dynamic business changes and take advantage of new services and technologies.

SMART leverages customers' investments in their own networks

Moreover, we believe that customers will find the various SMART services innovative, including our Participant

Browser Services (PBS) Web interface, the delivery of file information, and even the greater adoption of industry-standard technology for message delivery.

SMART is world-class. Now we need our customers to take full advantage of its capabilities. Small changes to your own infrastructure will substantially improve the overall capabilities of the entire U.S. clearance and settlement systems.

## **As a business/technical process manager, what do I need to do?**

Here are some objectives. When you have successfully addressed them, you will be able to say that your firm uses SMART to its best advantage.

- ⊕ Look at current network connectivity. When possible, consolidate, simplify, and upgrade. There are potential cost savings, and the upgrade to larger, multiuse circuits will position you to take advantage of all DTCC has to offer.
- ⊕ If you are a customer of one or more of the clearing corporations (FICC, NSCC, EMCC), make appropriate, timely decisions about business continuity upgrades.
- ⊕ If you are a customer of both DTC and the clearing corporations, examine all of your options related to SMART.
- ⊕ If you communicate via any of the legacy technologies we are retiring (“sunsetting”), ensure that you have a migration plan in place to avoid unnecessary risks and costs.



### Evolution of the SMART technology

(a history lesson)

We take pride in the fact that DTCC's technology has evolved as the needs of DTCC's customers have changed. SMART began with DTC's Participant Terminal System (PTS) network. Built in the early 1980s, PTS connected firms' terminal operators and DTC's computers. In its original form, circuits ran from DTC's mainframe to terminal controllers positioned in member firms' back-office areas. Operations clerks entered transactions on dedicated terminals.

The network grew to include circuits connecting DTC's computers and member firms' computers in order to transfer files and messages. IBM-proprietary communications protocols dominated business-to-business communications in the days before Internet protocols.

DTC's next step was to significantly upgrade its business continuity capabilities by developing its first alternate data center (ADC). To ensure members' connectivity to this ADC, the network was upgraded to frame-relay technology, provisioned through service arrangements with leading telecommunications carriers. Management and monitoring facilities were upgraded to ensure reliable connectivity all the way to a member firm's premises, connected in proprietary networks with audited route diversity. Multiple, geographically separate command centers were established, each capable of managing the entire communications and processing complex. Emergency procedures were developed and tested to ensure that connections could be reconfigured without disrupting service. The result is SMART's end-to-end management model.

Frame relay uses Internet protocols over private networks to create a highly reliable web of connections. Whereas a conventional network circuit may be thought of as a single strand of wire that fails if broken, frame relay relies on a fabric or web of independent

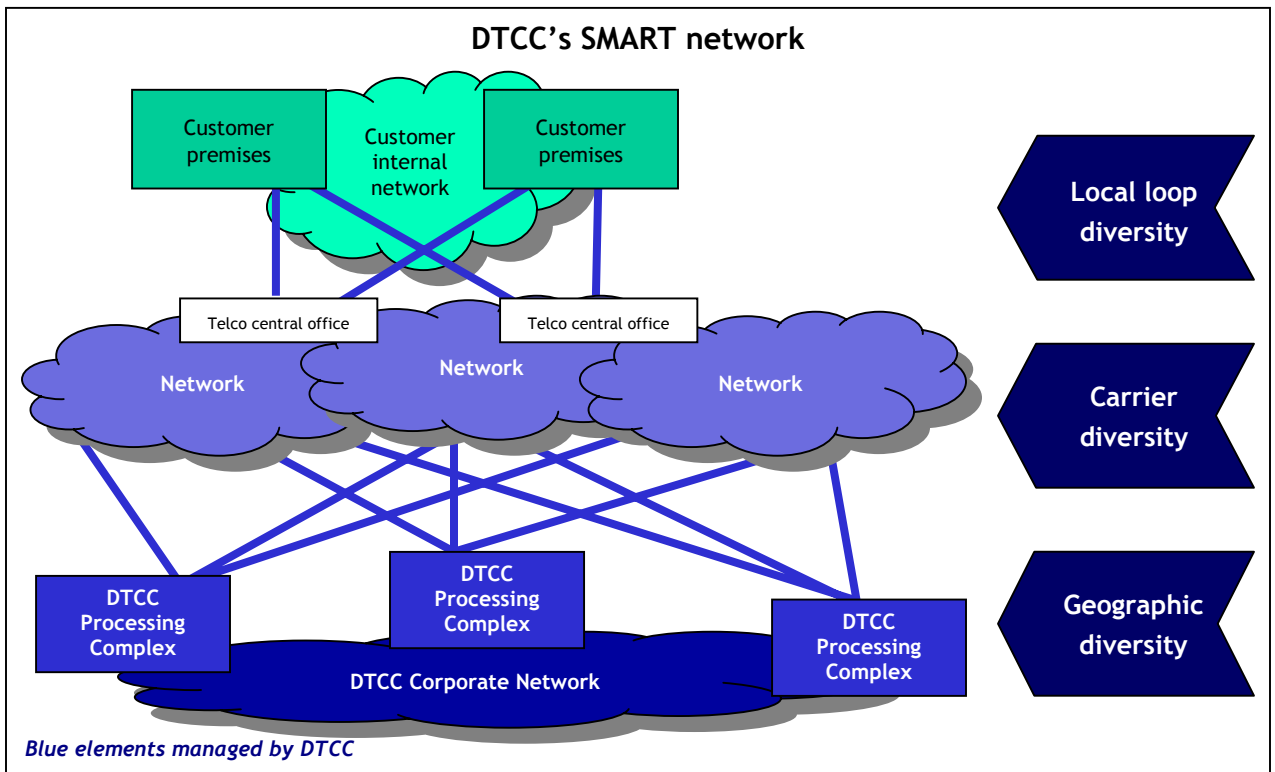
SMART's technology allows DTCC to connect its members to all of its processing complexes

connections. If any connection in the web fails for any reason, messages are automatically routed over alternative paths through the web. SMART's frame-relay technology also allows DTCC to connect its members to all of its processing complexes and to route traffic to or from any complex without the involvement or even the awareness of the member firm. Connections between the "frame-relay cloud"

and DTCC's processing complexes have been engineered to use diverse routes through multiple telecommunications central offices, to minimize the possibility of failure.

Although much of the traffic continues to use IBM-proprietary protocols, these protocols are encapsulated in standard Internet-based TCP/IP protocols for the trip through SMART.





DTCC then extended its capabilities to yet another processing complex, at sufficient geographic distance from its original sites to survive even a regional catastrophe affecting the entire northeastern United States. SMART's network was further diversified by logically subdividing the network into multiple clouds, provided by multiple telecommunications vendors. Local loop connections to members' operating sites are also being further diversified to eliminate single points of failure wherever possible. All of DTCC's operations—including the entire SMART network—can be controlled from any of its processing complexes. In fact, on a regular basis, workloads are shifted amongst the processing centers to ensure resiliency. With the sponsorship of the Department of Defense, the Treasury Department, and the Federal Reserve Bank, DTCC registered all elements of the SMART network for high-priority recovery with the National Communications System's Telecommunications Service Priority program.

**SMART is designed to withstand even catastrophic disaster scenarios**

To summarize, SMART provides world-class capabilities to the financial services industry. It is designed to withstand even catastrophic disaster scenarios. Its end-to-end management ensures that time-critical settlement activities will occur, no matter what. The services offered over SMART are innovative, from our browser-based PBS interface, to the delivery of file information essential to your business by FTP, to the greater adoption of industry standard technology for message delivery. The question is, *Are you taking full advantage of all SMART and its SMART products has to offer?*

# Why You Should Get SMART



## Your benefits

(the benefits are many)

SMART enables you to

- ⊕ Simplify by consolidating location- and application-specific circuits into fewer, larger, general-use connections
- ⊕ Respond to dynamic business changes and take advantage of new services and technologies
- ⊕ Leverage your own investments in your network
- ⊕ Interconnect to the Secure Financial Transaction Infrastructure operated by the Securities Industry Automation Corporation
- ⊕ Improve reliability
- ⊕ Ensure business continuity
- ⊕ Generally use browsers and richer message formats for all DTCC services
- ⊕ Enjoy consistent service levels

With the sponsorship of the Department of Defense, the Treasury Department, and the Federal Reserve Bank, we register all elements of the SMART network for high-priority recovery with the Department of Homeland Security.

(a word from our sponsor)

## Your opportunity

(what you should do)

DTCC is making available to you a team of professionals focused on maximizing your use of SMART and its services. Coordinated through relationship management, the team consists of personnel from network administration, data network services, participant interface planning, and product management. Specifically, the team will help you

- ⊕ Examine your existing network circuits and advise you on ways to consolidate those connections into larger, more reliable, multifunction connections.
- ⊕ Figure out whether your current business continuity plans meet requirements and advise you if they are not.
- ⊕ Move you toward industry-standard technologies for both file delivery and messaging, so that we can retire the proprietary versions of these technologies and save you money by doing so.
- ⊕ Take advantage of the full complement of browser-based applications offered through Participant Browser Services.
- ⊕ Determine whether you should connect to SMART directly or to SMART via SFTI.
- ⊕ Advise you on how best to handle changes mandated as part of the Business Continuity Planning upgrade to clearing services.

## Top Ten SMART Tips

- 1** If you settle, you must be SMART. (All DTC members must have SMART connectivity.)
- 2** If you are a Fund/SPEED customer, you must be SMART.
- 3** If you use only clearing services (NSCC, FICC, EMCC), you may be SMART, you may use SFTI, or you may use both.
- 4** If your bandwidth requirements are 256K or greater, you must back it up with a second circuit of equal bandwidth.
- 5** If your requirements are less than 128K, you may use DTCC's dialup option.
- 6** The minimum bandwidth requirement is a 128K frac T. Line orders of 56K will no longer be accepted.
- 7** If you choose to use SFTI, you must connect to two geographically diverse access centers.
- 8** If you access SIAC applications, you must connect to SMART or to SMART via SFTI by year-end 2004.
- 9** If you use market data feeds, you will probably need a connection to SFTI.
- 10** If you believe that end-to-end management of network connectivity is the best way to ensure reliability, resiliency and redundancy, you must be SMART.



### Communications infrastructure

(the technical stuff)

DTCC's SMART connections are built specifically to transport mission-critical data. The complex is built entirely on high-end hardware and is a pure IP routed network. DTCC supports many customers and clients that maintain legacy

SMART network is IP but supports SNA through encapsulation and is designed using MPLS and frame relay

architectures (such as SNA) as well as pure IP infrastructures. DTCC encapsulates SNA traffic into TCP/IP traffic streams using the Data Link Switching Plus (DLSW+) standard. The transport network contains no legacy systems or protocols and uses IP exclusively.

The overall architecture is IP topology capable of reacting dynamically to network changes. The principal design is based on multicarrier MPLS/IP over frame-relay networks.

These private networks are for the use of DTCC customers. Bandwidth is delivered into DTCC-owned and -managed network devices at client locations as well as DTCC processing centers. The extended connection directly terminates at DTCC data centers on high-end network devices. Dynamic flexibility is provided by advanced router protocols in SMART and it's all managed by SMART engineers.

Interconnection with SIAC's Secure Financial Transaction Infrastructure (SFTI) has extended our backbone and WAN to the SFTI access centers. SMART's design allows for easy management and distribution of any IP-based data and applications from the depository, clearing, and settlement services as well as applications offered by SIAC.

### Carriers

Network distribution is facilitated across multiple carriers using MPLS and frame-relay networks. Use of these virtual private networks provides our users with carrier-class networking advantages. Many other IP backbones are engineered using leased clear-channel circuits from large-carrier telephone companies between their nodes and may not be engineered with the same carrier class of internetworking.

High-end routers and switches stand at each end of the network (DTCC and customer)

DTCC requires that all participants and clients maintain two connections with SMART. DTCC will connect SMART to two active customer locations for load sharing and heightened resiliency where possible. Members lacking a second active site or the internal network capability to exploit this model are served by a backup connection. DTCC supports the dynamic routing of data packets through the network and will assist customers using TCP/IP-based applications and services to automate failover techniques.

Automatic, dynamic flexibility is achieved using Cisco's EIGRP

## Network failover

DTCC currently has in place dynamic routing to address network failover for participants and clients. In the TCP/IP protocol family several protocols can be used that address dynamic routing between networks to accomplish automatic routing in the event of a network component failure. SMART has standardized on the RIP (Routing Information Protocol) version 2 (a well-established protocol that supports simple network interconnections) to provide this functionality.

End-to-end management of the SMART network requires the use of a limited number of standard protocols. These standard protocols include http, https, ftp, and a variety of proprietary protocols associated with such commonly used facilities as Sterling Commerce's Connect:Direct (also known as NDM) and IBM's Websphere MQ (formerly known as IBM MQ Series).

SMART interconnects with SIAC's SFTI network

Standards ensure the reliability of the complex. DTCC will work with you to maximize the capabilities of SMART and its interaction with your own network complex.

## Why SMART is Smart

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DTCC requires that all customers maintain two links (two words: business continuity) into SMART: whenever possible, two or more active links (no primary or backup), and when not possible, an active link with a backup.

Business continuity planning requirements were detailed in Important Notice Z#0004 dated October 2, 2002 (view at <http://www.dtcc.com/CustomerFocus/notices/z0004.htm> or see next page); customers affected by these requirements have been notified.

# IMPORTANT NOTICE



**#:** Z#0004

**DATE:** October 2, 2002

**TO:** All Participants

**ATTENTION:** Executive Management, Chief Information Officer, Chief Technology Officer

**FROM:** George Perretti, Vice President

**SUBJECT:** New Contingency Telecommunications Requirements

In the aftermath of the events of September 11, 2001, The Depository Trust & Clearing Corporation (DTCC), like many of its customers, has taken a number of steps to enhance its internal business continuity plans. At the same time, as a centralized processing hub for the industry, DTCC has a responsibility to ensure that linkages with our customers can withstand a future crisis. Clearly, the failure of any single party in the clearance and settlement process can affect the continuity and certainty of settlement generally. As part of the process to ensure certainty of transaction completion, DTCC is establishing new standards to protect the industry as a whole, initially by requiring backup telecommunications links for all Depository Trust Company participants.

DTCC will now require the depository's larger participants using CPU-to-CPU links to transmit to the depository instructions for the settlement of transactions to have contingency communications equipment installed and operational at an alternate location in addition to their existing primary telecommunications links. We are asking customers to meet the new requirement within 90 days from today.

The alternate location must have a fully functional system that is capable of supporting all of the participant's critical interactions with the depository in the event the participant's primary location is unavailable. In addition, the contingency site communications equipment must use a dedicated line with equivalent capacity to the primary connection, and must use a different central switching office than the primary site.

DTCC also intends to require firms to test connectivity between their alternate locations and the DTC data centers at least once a year beginning in 2003. Tests can be arranged by contacting DTC at least three weeks in advance of a planned test.

The DTC mainframe-to-mainframe connectivity protocols that are affected by the new requirement include:

- Connect:Direct (NDM),
- File Transfer Protocol (FTP),
- Mainframe Dual Host (MDH),
- Message Queuing (MQSeries), and
- CCF-VTAM.

PTS (and the replacement PBS) connections and Web services are not affected by this requirement.

In addition to this Important Notice, firms affected by this new requirement will be notified individually by letter and/or phone.

This is the first in a series of communications we will be sending to the DTCC customer base over the next few months, as we create a similar standard tailored for each of our subsidiaries, including National Securities Clearing Corporation (NSCC), Government Securities Clearing Corporation (GSCC), MBS Clearing Corporation (MBSCC) and Emerging Markets Clearing Corporation (EMCC).

We have assembled a highly skilled team that is ready and willing to assist you in meeting this new standard. If you have any questions or need further information, please contact Kenneth Wright, BCP Project Manager at 212-855-1368 or contact the undersigned at 212-855-8176.

We appreciate your continued cooperation and support in this critical industry-wide effort.

George Perretti  
Vice President





DTCC first announced its intentions to retire obsolete legacy technologies in its white paper of June 2000 (available at <http://www.dtcc.com/ThoughtLeadership/index.htm>). Plans called for making these moves over several years; when instituted they will yield significantly improved reliability and efficiency.

(yes, we're talking to you)

Over the years, we've allowed members to use a lot of different programs and methods for communication. Some of these communication vehicles are no longer supported by vendors. Others rely on mainframe technology that's hard to adapt in an emergency.

Examples of what we need to eliminate are RJE (remote job entry) and NJE (network job entry), two legacy IBM mainframe facilities. Examples of what we'll continue to support are

- ⊕ FTP for file transfer
- ⊕ Sterling Commerce's Connect:Direct (formerly known as NDM or Network Data Mover) for file transfers, including those using IBM-proprietary SNA transports
- ⊕ Websphere MQ for messaging interfaces, which is nearly ubiquitous throughout the industry.

Over time, we want to eliminate the IBM-proprietary SNA communications, but we recognize this is very difficult for many mainframe shops, especially those that use the MDH interface to depository and settlement applications. So we'll continue to support limited use of SNA for MDH and file transfer use through 2005. Customers who are making changes to their communications applications, however, should include conversion to more standard interfaces in their plans. And anyone who wants to access the NSCC, FICC, or EMCC applications via SFTI will have to convert to TCP/IP because that's all SFTI supports.

Here is what you need to think about, prepare for, and schedule.

### Business continuity upgrade (replacing SIAC's legacy Broker and Access networks)

#### **What it is**

Customers have accessed clearing applications through SIAC's legacy Broker and Access networks. These access points are being retired, in favor of the much more resilient SMART and SFTI facilities.

#### **What you should do**

If you use these legacy access networks you must move to SMART directly, or to SMART via interconnectivity with SFTI. If you connect to SMART via SFTI, you must access SFTI in at least two different geographic regions (New York, Boston, or Chicago).

***Why you should do it***

BCP upgrades for clearing services will be complete by the end of 2004. To continue using these services after December 31, 2004, customers must have connectivity to SMART or via SFTI into SMART. If any customers require access to the legacy networks after year end, those customers can be expected to pay for the maintenance of those networks (small number of customers = high cost!!).

***When you should do it***

Now!

**SMART/Messaging**

***What it is***

SMART/Messaging represents the rebranding of our messaging product. SMART/Messaging, featuring IBM WebSphere MQ (formerly MQSeries) for messaging traffic, facilitates the delivery of secure, real-time messages between DTCC's computers and those of our customers, including messages such as delivery and payment orders. SMART/Messaging replaces MDH (Mainframe Dual Host). In any event, in 2005, the proprietary MDH communications technology will be retired, and all customers will move to WebSphere MQ.

***What you should do***

At this point, if you are planning, or testing with us, terrific. If not, don't sit back because the retirement date is in 2005. The life cycle of this project is long (6+ months) and there are definite resource requirements that must be scheduled on both sides.

***Why you should do it***

MDH will not be supported past 2005.

***When you should do it***

Begin coordination in early 2004.

## SMART/Mover

### *What it is*

#### SMART Tip

Hundreds of files are available to customers, but most customers are not using them to best advantage. Your relationship manager can work with you to tailor your SMART/Mover needs to your organization.

SMART/Mover, using Connect:Direct (also known as Network Data Mover or NDM) or FTP for file transfers, provides secure file transfer capabilities for more than 300 types of batch files and facilitates the transmission of machine-readable instructions and output between DTCC's computers and those of its customers. You probably know this product as CCF. CCF was originally based on proprietary telecommunications protocols. These protocols are being switched to industry standards (FTP and NDM). Many customers have already made the move; if you haven't, you should start immediately.

### *What you should do*

Start by talking to your relationship manager. Discussion will need to proceed with DTCC's participant interface planning area. Resources need to be scheduled for programming and testing. Be aware that the file layout is not changing, but the means of transmitting that file is changing.

### *Why you should do it*

We will be publishing sunset dates for the proprietary technology early in 2004. Any customer that does not comply by those dates will incur additional charges to cover the expense of maintaining the legacy protocols.

### *When you should do it*

As soon as possible. Mid-2004 is currently being targeted for full customer conversion.

## Leased equipment

### *What it is*

Do you have equipment that is old, large, and dirty looking? Is there a password taped to the front? Then you probably have some leased equipment, also known as "dumb terminals." Like black and white TV, it's time to phase them out.

### *What you should do*

We'll give you the stuff, if you want, but you must maintain it. We would rather you dispose of it for us, and connect via a local-area or wide-area network.

### *Why should you do it*

Browsers. New DTCC applications are browser based, and all PTS functionality is now accessible

through standard web browsers. Participant Browser Services (PBS) is expected to completely replace 3270 terminals in 2005. Don't worry, we'll keep a PTS terminal in the DTCC museum for display!

***When should you do it***

Now. Leased terminals will not be supported past year end.

## **Participant Browser Services (replacing Participant Terminal System)**

***What it is***

Your 3270, green-screen applications. Currently under conversion to Participant Browser Services, the browser-based option that provides better navigation, more functionality, more features, and is a heck of a lot easier on the eyes.

***What you should do***

Start to figure out how you want to convert your users. All PTS applications are available over a browser, and the most used applications have been converted to a graphical user interface. Integral to PBS is an overall SMART network discussion. Browsers equal more bandwidth requirements, and many customers still connect to us via low-speed (56K) lines. You wouldn't access AOL from home over a 56K line; why would you do it from work for high-value, critical transactions?

***Why should you do it***

You may not believe it yet, but the green screen user interface *is* going away. You may have another year or so, but do you want to wait until the last minute, when your people can be experiencing the benefits of browser based technology?

***When you should do it***

Well, what are you waiting for?

## Quick guide to making the transition from legacy technology

Technology	Definition	Potential Actions	Benefits	Key Dates	Next Step
Business continuity planning upgrades (Broker and Access networks)	Clearing corporation applications have been access through SIAC's legacy Broker and Access networks. These access points are being retired at year end 2004.	Customers must migrate communication to SMART or to SMART via SFTI	Consistent reliability, redundancy, access to all DTCC applications	Clearing applications will not be accessible from SIAC's legacy Broker and Access networks after year end 2004	Contact relationship manager
CCF RJE to FTP and NDM (SMART/Mover)	CCF is based on proprietary communications protocols; FTP and NDM are standard technologies	Transition must be coordinated with DTCC's participant interface planning area. Some programming and testing will be required. Penalties will be instituted in 2004.	Easier support for industry standards; less reliance on proprietary expertise	Targeted for year end	Contact relationship manager
MDH to MQ (SMART/Messaging)	MDH is based on proprietary communications protocols; MQ is a standard technology	Transition must be coordinated with DTCC's participant interface planning area. Some programming and testing will be required. Penalties will be instituted in 2005.	Easier support for industry standards; less reliance on proprietary expertise	Year end 2005	Contact relationship manager
Leased equipment	Dumb terminals; some in everyday use, others as contingency equipment	DTCC is retiring support for this equipment. It will also become obsolete when PBS replaces 3270. Customers can take the equipment from us in 2004. Recommendation is frame-relay LAN connectivity, with appropriate backup	Alternatives are more flexible; this technology is old, old, old	Announcement in early 2004 to retire support.	Contact relationship manager
3270 PTS to PBS	3270 = rigid, ugly, acronyms. PBS = navigation, drop-down menus, attractive, easy to train	3270 currently scheduled to be retired in 2005. The most used functions have been converted to PBS; the remainder scheduled for 2004. All network plans should include transition to PBS as a cornerstone.	Numerous; usability, ease of training	3270 to be retired in 2005	Contact relationship manager



### Upgraded business continuity planning for clearing services

(cost saving and peace of mind)

All DTCC services, including those offered by the DTCC subsidiaries National Securities Clearing Corporation (NSCC), Government-Backed Securities and Mortgage-Backed Securities divisions of the Fixed Income Clearing Corporation (FICC), and Emerging Markets Clearing Corporation (EMCC), are now available through SMART.

DTCC and SIAC have been working diligently to provide the financial industry with a highly resilient core clearance and settlement infrastructure. The interconnection of these two networks has established a new level of reliability for participant communications with the market infrastructure. With these highly resilient network options available to participants, the retirement of older, less robust facilities is in order. Effective December 31, 2004, services offered by DTCC's subsidiaries NSCC, FICC, and EMCC will no longer be accessible via the Broker and Access networks currently supported by SIAC. Participants of these clearing corporations can opt to access these services via DTCC's SMART directly, or to SMART via SFTI. The NSCC service Fund/SPEED requires a direct SMART connection.

DTCC operates multiple processing and process control sites across North America to ensure its capabilities even in the event of a regional catastrophe. These facilities are currently provided for settlement and depository services, as well as certain clearing services, the global corporate actions services, and certain institutional processing services offered by Omgeo. DTCC will extend these capabilities to *all* DTCC products and services supporting equity and fixed income clearing, mutual funds, and insurance, including all services offered by NSCC, FICC, and EMCC through the scheduled migration of applications from SIAC's data center to DTCC's data centers.

Although these upgrades have been planned to avoid work by member firms, the improved business continuity capabilities that are one of the key objectives of this activity cannot be realized without upgrading communications mechanisms to avoid access via the Broker or Access networks. After establishing physical connectivity with SMART or SFTI, participants will need to alter the logical routing of communications to reach the newly upgraded services.

Let's say that you're a customer who's running Connect:Direct and Websphere MQ through your own circuits into SIAC's broker network today. We'll work with you to determine what upgrades we need to make to your SMART connections. In the most typical case, we'll want to start by installing new, upgradable connections to two of your operating sites. We'll then conduct a series of tests with you to ensure that all the new installation is working properly. Then you will need to modify your router, firewall, and/or application configurations to use these new connections. This doesn't involve programming, but it will take some hours' dedication by your firm's communications or systems engineers.

Once your business is operating through the new SMART connections, DTCC can discontinue or reclaim the old connections. At this point, most customers will actually save money.

One other point about the new, upgraded connections is that we want to use all of them all of the time. Any firm that has two or more operating locations and enough internal network capability to route information among their sites can benefit from running multiple “hot” links, rather than maintaining duplicate backup links whose functionality isn’t assured until they’re needed.

Since delays beyond the end of 2004 will increase risks and costs to the industry, any participants who delay migrating their access to these services to SMART beyond this date will be expected to fund their portion of any additional costs incurred for continued support of the Broker and Access networks.

Users of SFTI provide their own communications circuits to multiple SFTI access centers, which are currently located in three geographic areas: Boston, Chicago, and New York. SIAC provides connectivity from these access centers to the appropriate data processing sites. DTCC’s business continuity plans require participants who access DTCC clearing applications via SFTI to connect to SFTI in at least two of these three geographic regions. DTCC’s depository and settlement services, offered by DTC, are not accessible via SFTI.

Let’s say that you’re a customer using NSCC and DTC services who’s running Connect:Direct and Websphere MQ through your own circuits into SIAC’s broker network today. We’ll work with you to determine what upgrades we need to make to the SMART connections you use for DTC services. In the most typical case, we’ll want to start by installing new, upgradable connections to two of your operating sites. We’ll then conduct a series of tests with you to ensure that all the new installation is working properly. Then you will need to modify your router, firewall, and/or application configurations to use these new connections. This doesn’t involve programming, but it will take some hours’ dedication by your firm’s communications or systems engineers.

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DTCC is an official “aggregator” into SFTI, and members who wish to use SMART for fully managed communications with the exchanges may do so.

## **The bottom line**

Customers will have to access NSCC, FICC, EMCC, DTC, DTCC Deriv/SERV, Global Asset Servicing, and Omgeo services directly through SMART, or through SMART via SFTI interconnectivity, or through a combination of SMART and SFTI. Today’s access through

communications lines provided and managed by the customer, and connected to SIAC's legacy internal Broker and Access networks, is expected to be eliminated by year-end 2004.

As a result, configurations for each firm will need to be changed, to route clearance messages and files through different network connections. For most firms, it's just a matter of updating firewall and router rules, although some will need to let us upgrade their SMART connections, and some may need to change communications applications.

**How do I know what I need?**

If you are a...	you can connect to...		and therefore...
	SMART directly	SMART via SFTI	
DTC customer	Y	N	Already have, and must maintain, a direct SMART connection
Clearing Corporation customer only	Y	Y	May connect to SMART directly or to SMART via SFTI for most clearing corporation applications
Clearing Corporation FUND/Speed customer	Y	N	Must establish a direct SMART connection



## When It Pays To Be SMART



DTCC believes that end-to-end management of all network connectivity is the best way to ensure reliability, resiliency, and redundancy. With central management, network connectivity is constantly tested and verified in conjunction with the entire SMART processing complex to ensure the resiliency of the U.S. securities clearance and settlement infrastructure.

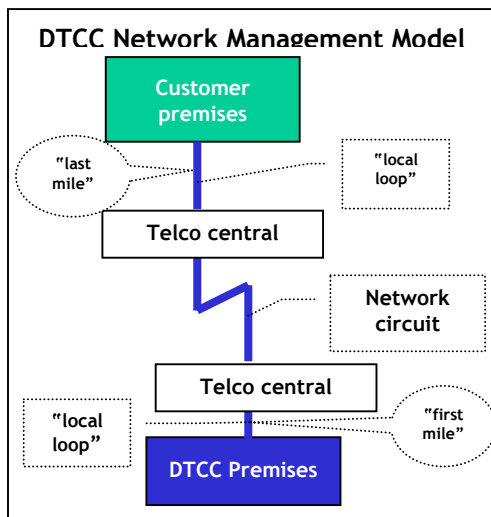
(the management approach explained)

Compare SMART's centralized management to a federated model, which distributes responsibility of the network to many individual players. Consider the simple wide-area network model shown in the accompanying chart.

Wide-area networks include a "local loop" circuit from a point of termination to a nearby telecommunications central office. At the central office, the "local loop" circuit connects to the network circuit, which spans the distance to a telecommunications central office near the opposite point of termination, where another "local loop" completes the route. Some form of connection technology is required on both ends, typically a router or switch. The local loops are also sometimes referred to as "first mile" and "last mile" connections.

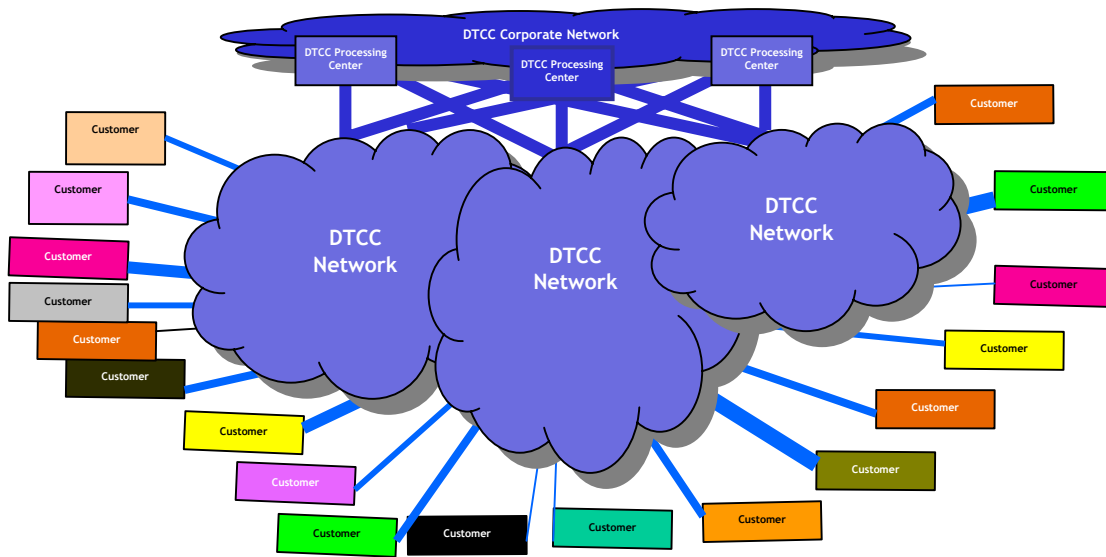
DTCC has traditionally managed the entire network, from its processing complex out to the connecting router, on customer premises, including both local loops and the network circuit. This central management approach has allowed DTCC to guarantee consistent service levels.

If DTCC were to employ a federated model, it would manage only its internal network. Each customer would be responsible for setting up its own connections from its corporate network to a router or switch on DTCC premises. This approach would allow the customer maximum flexibility to provision any type of circuits it wanted, at whatever cost it could negotiate with its telecommunications carriers. The trade-off, however, is that DTCC could then take no responsibility for the overall network, since each customer would monitor its own communications and be responsible for correcting problems at any point in the connection, including its termination equipment on DTCC premises.



The technology on which the SMART network is built effectively supports channels up to a bandwidth capacity of T3 that operate at 45 Mbps. Historically, no member firm has required T3 bandwidth for clearance and settlement traffic

## DTCC SMART



DTCC believes that a centrally managed, end-to-end solution, based on a “self-healing” distributed web of channels—similar to the Internet—provides greater reliability. Moreover, provisioning the underlying infrastructure through multiple premier telecommunications vendors further reduces risk of failure. DTCC’s implementation offers national, and potentially global, reach at low incremental cost.

With the complete activation of the latest geographically dispersed remote data center in the summer of 2003, DTCC’s facilities are able to continue processing even in the event of a regional catastrophe. The SMART network is engineered to ensure that members’ processing facilities can communicate with whatever DTCC processing centers are operational.

### Management capabilities

DTCC developed SMART to meet the needs of clearance and settlement processing. By its nature, clearance and settlement is a collaborative, noncompetitive system that works only if all parties to the system are able to participate. SMART therefore avoids any systemic risk that would result from one or more members’ inability to communicate with the central clearance and settlement systems.

The management design of SMART avoids weak links by centralizing management of the entire communications complex at DTCC. As described earlier, DTCC manages the complex as an integral system all the way from its processing centers to the network terminations on two or more of each customer’s premises.

Any of DTCC’s multiple independent processing centers is capable of managing the entire communications facility. Monitoring, management, and processing responsibilities regularly rotate among the multiple centers.

DTCC also routinely changes customer communications routes to its processing centers, moving messages among the various processing centers and routing a customer's communications through different network clouds. This practice helps ensure that all routes function before they are needed in an emergency affecting a DTCC processing center, a customer site, or any part of a network.

In an emergency, DTCC network management will route traffic to and from whatever customer site it can reach and that responds. No other coordination is required to restore or continue service, since recovery and reconfiguration are completely under the control of DTCC staff, who practice recovery and reconfiguration procedures during the normal course of business operations.

Because they are owned and managed by DTCC, all circuits and switching elements of SMART also qualify for high-priority recovery in the event of a catastrophe affecting the national telecommunications systems. The Department of Homeland Security's National Communications System operates the Telecommunications Service Priority program, which determines the sequence in which telecommunications services are restored following an outage. Evaluated as a critical part of the U.S. economic infrastructure, SMART qualifies for recovery after executive, military, and emergency services.



### **What is SMART?**

DTCC's Securely Managed and Reliable Technology (SMART) is the infrastructure that supports settlement in the U.S. capital markets.

SMART encompasses a nationwide complex of networks, processing centers, and control facilities. Each is highly secured, engineered with multiple, independent levels of redundancy, and capable of processing DTCC's entire clearance and settlement workload. DTCC ensures the availability and reliability of the settlement infrastructure by extending SMART onto members' operating premises. DTCC maintains and manages multiple diverse network connections to SMART control devices installed at each member firm.

### **Why is DTCC relaunching its network? What's new and different?**

The network is an integral part of DTCC's overall technology complex that we call SMART—Securely Managed and Reliable Technology. We've been able to upgrade this technology into a world-class, extraordinarily highly available complex without troubling our customers. Now we need our customers to work with us on the next phase of these upgrades. We've been so successful in implementing changes that were transparent to DTCC's customers that many firms don't understand our capabilities and may not appreciate the need for changes to their own infrastructure that will make substantial improvements to the overall capabilities of the U.S. clearance and settlement systems.

### **What sorts of changes do member firms have to make?**

Customers will have to access NSCC, FICC, and EMCC services directly through SMART, or indirectly through interconnectivity with SIAC's Secure Financial Transaction Infrastructure. Today, most of the access is through communications lines the customer provisions and manages that are connected to SIAC's legacy internal Broker and Access networks.

This will require configuration changes for each

firm, to route clearance messages and files through different network connections. For most firms, it's just a matter of updating firewall and router rules, although some will need to let us upgrade their SMART connections, and some may need to change communications applications.

**What's involved in upgrading SMART connections?**

DTCC owns and manages every component of SMART, all the way into a member's operating sites. (Members get an extra level of protection with this service since DTCC, as the owner of the communications circuits, registers all the networking elements with the Department of Homeland Security for very high-priority restoration in the event of a service outage with the telecommunications provider.)

A customer that doesn't have enough SMART bandwidth to accommodate its clearance traffic as well as the existing settlement and depository services will need to authorize us to upgrade our facilities in their sites and work with us to coordinate any installation and testing of the new facilities.

**Don't these upgrades increase costs to the participants?**

We've analyzed how we communicate with each of our members, and we find a lot of opportunity for consolidating and upgrading service for even higher reliability. In addition to accommodating the clearance traffic, we want to provide enough bandwidth to each member firm to allow the firm to comfortably communicate with us from browsers, XML, and ISO messages. Industry members continue to demand the flexibility of TCP/IP access to their desktops and self-defining messages to their servers, so all new or substantially upgraded services are being offered along these lines. The industry also continues to demand the security and reliability of end-to-end managed, private-network communications rather than relying on public networks like the Internet.

The challenge is that browsers and XML messages can create data communications traffic that's an order of magnitude larger than what firms see with

legacy interfaces, and—at least in this market climate—no one wants to pay the premium for the additional bandwidth.

By consolidating access to all the DTCC services, we find that we can provide the bandwidth customers need for modern services and access to clearing as well as settlement and depository services without increasing their costs. The key to this is consolidating communications so that we operate a few large pipes into the most diverse sites the customer operates, instead of the jumble of small circuits we've added over the years as customers have diversified their operations. The customer then eliminates the cost and management expense of its lines into SIAC's legacy networks, and we eliminate our management cost for the large number of limited-use circuits installed today. We can install and manage a couple of T1 channels at a much lower cost than 10 smaller circuits. So most customers should actually see an overall upgrade in capabilities with little or no increase in cost. Many will actually see their costs decrease.

**Can you explain the significance behind the name SMART?**

It's a new way of thinking for DTCC. We've expanded our definition of *connectivity* as providing an integrated set of reliable, secure, flexible network solutions for our customers, rather than as just managing the underlying infrastructure that supports DTCC's individual products.

**How does DTCC's SMART network serve the industry?**

DTCC's SMART network is built specifically for the purpose of transporting mission-critical data, clearing and settling trades from virtually every U.S. marketplace including the New York Stock Exchange, Nasdaq, American Stock Exchange, the regional U.S. exchanges, and many of the world's fast-growing electronic trading networks.

DTCC now regularly processes, from multiple operating sites, 4 billion shares across all markets and settles more than \$3 trillion daily. In every sense of the word, we are a hub among our participants.

**DTCC has put a lot of effort into business continuity planning, including the establishment of additional processing centers and the dispersal of critical staff to multiple locations. How does SMART fit into DTCC's plans for business continuity?**

DTCC's SMART communications facilities have evolved as an integral part of DTCC's world-class business continuity capabilities. In terms of business continuity, SMART is absolutely state of the art; it's designed to withstand even catastrophic disaster scenarios. In fact, all of DTCC's operations, including the entire SMART network, are fully redundant and can be controlled from any of DTCC's multiple data processing locations.

Through this rigorous method of managing all network elements, DTCC guarantees continuous and consistent service levels, ensuring that customers have needed capacity, reliability and consistency—complete from end-to-end. This is our guarantee that time-critical settlement activities will occur, no matter what.

**What is the benefit of SMART to the individual DTCC customer?**

Although SMART is engineered principally for clearance and settlement activity, one of the great advantages for customers is that once they are connected to SMART, access is streamlined into *all* of DTCC's services. This all-in-one complete solution for our varied customer base effectively leverages customers' investments in their own networks. And SMART provides a tremendous level of certainty, security, flexibility, and cost controls, allowing customers to respond to dynamic business changes and take advantage of new services and technologies.

**With interoperability between SMART and SFTI now active, what does this mean for customers?**

This interoperability is a cooperative offering between DTCC and SIAC that provides a new level of reliability for customer communications with the market infrastructure. We believe this creates many more options for firms as they plan for their long-term business continuity and their daily network connectivity.

Almost all services offered by DTCC subsidiaries National Securities Clearing Corporation (NSCC), the Government- and Mortgage-Backed Securities divisions of Fixed Income Clearing Corporation (FICC), and Emerging Markets Clearing Corporation

(EMCC) are now equally available through SMART or SFTI, except the NSCC mutual funds service Fund/*SPEED*, which is offered only via SMART. At this time, DTCC's settlement and depository services, offered by The Depository Trust Company (DTC), are accessible only via SMART.

**Are there any restrictions on the use of SFTI to access DTCC's clearing services?**

We're requiring members to connect to SFTI in two of its geographic regions—currently New York, Chicago, and Boston—if they wish to use SFTI for access to clearing services. The NYSE mandate demands that their members connect to two different SFTI access centers, but it doesn't specify how distant these access centers need to be from each other. Since SMART is engineered to continue operations even in the event of a regional catastrophe, we want to make sure the system isn't vulnerable to a key customer connecting to two access centers in Manhattan, for example.

**When will I be able to deliver data to SIAC through my DTCC SMART connections?**

The service is available today. We're working with a number of customers to verify their connectivity via SMART to SIAC-hosted services and via SFTI into SMART for DTCC-hosted services.



## Whom to Call and When

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DTCC has assembled a highly skilled team that is ready and willing to help you connect to DTCC services applications and networks. If you have any questions or need further information, please contact your relationship manager. He or she is prepared to coordinate a project plan and ensure resource availability.

Projected completion time will vary by firm, dependent upon network complexity and resource availability.