



**NYSE Technologies<sup>SM</sup>**

**Secure Financial Transaction Infrastructure<sup>®</sup>  
(SFTI<sup>®</sup>)  
Customer Guide**

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# 1 Introduction

Through the Secure Financial Transaction Infrastructure® (SFTI®), NYSE Technologies provides a reliable, robust, scalable, survivable and efficient computing and networking infrastructure to support the securities industry. SFTI® (pronounced 'safety') is a highly reliable and resilient carrier class network infrastructure that serves as a central access facility for trading systems, clearing and settlement systems, market data distribution, and other core securities industry utilities.

Today, members of the securities community access core industry utilities via multiple dedicated connections; SFTI® simplifies customer connectivity, improving both resilience and efficiency of the individual customer connection and of the industry as a whole, while continuing to provide at least the same level of availability and uptime that customers enjoy today. Key elements of SFTI® include:

1. Migrating connectivity away from legacy protocols to *TCP/IP*.
2. Replacing point-to-point circuits with *highly redundant networks*.
3. Offering a number of access points, distributed geographically within and outside of Manhattan, and located at vendor-neutral "carrier hotel" facilities (instead of bringing customer circuits to NYSE Technologies Data Centers). The access points are interconnected to each other and to the NYSE Technologies Data Centers with an actively managed, highly redundant, high bandwidth network.

This document outlines the processes by which customers obtain connectivity to SFTI® and, through SFTI®, access to the supported services.

## 1.1 Terminology

**"Customer"** means any entity using SFTI® to access any Services. Potential Customers are members of the financial services industry such as: member firms, market data vendors, financial information suppliers, foreign and regional stock exchanges, ECNs, clearinghouses and providers of post-trade services, market data recipients, extranet providers, and service bureaus with business connectivity needs that can be satisfied by the unique capabilities offered by SFTI® .

**"Service"** means an industry utility such as trade order routing, market data distribution, clearing and settlement.

**"Service Authority"** means the entity responsible for a service. NYSE, for example, is the service authority for the services available through CAP. The service authority determines who may use a service, under what terms and conditions. The list of service authorities includes, but is not limited to, the exchanges, clearing corporations, and market data providers.

**"Extranet Provider"** means an entity in the business of providing data connectivity between Customers and SFTI®, presumably over a managed, aggregated network.

**"Service Bureau"** means an entity in the business of providing transaction-processing services (e.g., submitting trades) on behalf of member firms.

**"First Mile Provider"** means a carrier or other firm in the business of connecting a Customer's facility to SFTI®.

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## 1.2 Intended Audience

This document is intended for Customers as well as extranet providers, service bureaus and first mile providers providing services in connection with SFTI®.

## 1.3 Objective and Scope

This document describes SFTI® and captures the functional requirements for connecting to SFTI® and accessing services, including technical requirements, provisioning and operating procedures, and Customer support.

This document does not cover the Services themselves (other than to provide a list of available Services). For details about Customer entitlement, and configuration options, SFTI® customers may refer to the “SFTI® Network Interface Specification” which is available on the SFTI® Self-Service Portal. For details of how to access this service, please refer to Section 4 of this document.

## 1.4 Outline

The remainder of the document contains the following sections:

**2 Background** - gives some of the rationale, goals and vision for SFTI®

**3 SFTI® Architecture** – reviews the basic technical approach

**4 The SFTI® Service Center** – Introduces the SFTI® Service Center

**5 SFTI® Provisioning Process** – Describes the steps involved in connecting to SFTI®

**6 Application Services through SFTI®** – Lists the services available through SFTI®

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## 2 Background

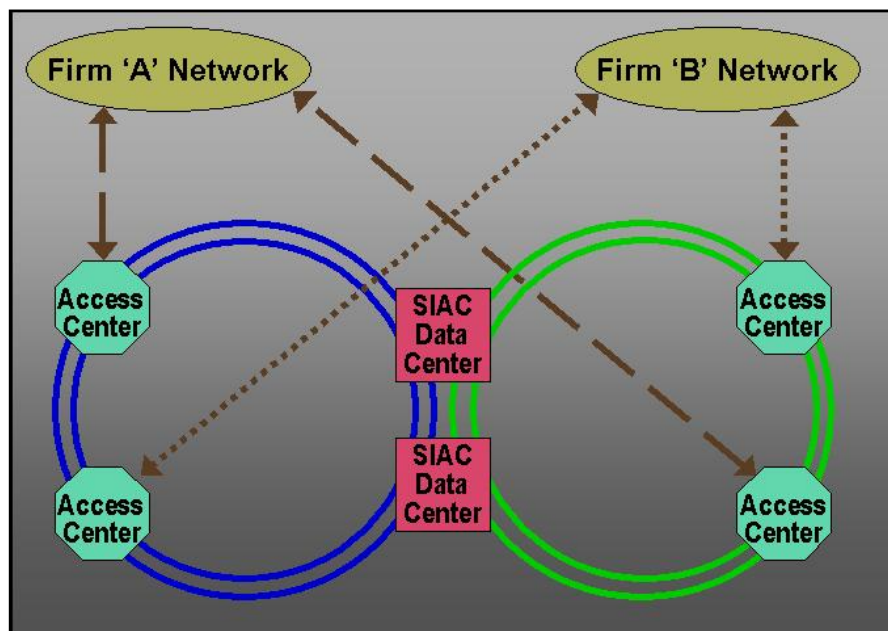
Member firms and vendors have had computer connections to the NYSE CAP, AMEX AAN, Shared Data Center (SDC) and NMS systems for a number of years. There are in excess of 3500 individual point-to-point circuits terminating on NYSE Technologies premises. Circuit types include everything from low-speed 9.6 Kbps bisync communications, X.25 connections, and LU6.2 communications to high speed DS3, and 100 Mbps. Many of these circuits are application specific and they are generally leased by Member Firms and vendors at a considerable annual cost. In addition, the complexity of managing and supporting the sheer number of circuits is increasingly taking its toll on technology resources and staff at both ends of the connection.

The events of September 11<sup>th</sup>, 2001 highlighted the vulnerabilities of the communication infrastructure supporting the securities industry. Due to its close proximity to the World Trade Center, the American Stock Exchange sustained considerable damage and as a result could not reopen for business immediately following the attack. The New York Stock Exchange and NYSE Technologies remained fully operational, but the markets could not re-open immediately, because a large population of the member firm community had lost connectivity to the exchanges. Although most of these firms maintained multiple circuits, they did not provide real redundancy, and restoring connectivity was difficult for several reasons. First, due to undocumented changes made by the local communications carriers, circuit routing was not as geographically diverse as has been believed. The loss of a single Central Office destroyed a large number of connections. Second, due to the application-specific “stovepipe” nature of the point-to-point circuits, it was not always feasible to substitute a surviving circuit for one that had been destroyed. Finally, due to the extreme and widespread nature of this disaster, the securities industry had to wait behind higher priority tasks (e.g., emergency services, law enforcement, hospitals) for the attention of the local communication carriers.

Since September 11<sup>th</sup>, 2001, most connectivity has been restored but the underlying structural problems still exist. Most circuits to the exchanges have been restored with many of these having temporary patches and rerouted links. Circuit inventory and management challenges still remain. The infrastructure is operational but it is inefficient and difficult to manage. There is ongoing work by the local providers to repair and rebuild the infrastructure, and that work will continue to disrupt existing connectivity. All in all, the state of the securities industry connectivity may be more fragile today than it was prior to September 11<sup>th</sup>, 2001.

As a result, we evaluated the connectivity practices and needs of the financial services industry. Using the results of a survey of industry connectivity patterns and optimum conduit and route diversity, SFTI® was deployed. SFTI® is a highly resilient and robust facility that provides for the effective consolidation of Customer data traffic onto a genuinely redundant, geographically distributed, centrally managed data access infrastructure tailored to support industry members' unique transport and transactional requirements. SFTI® has extended its reach by establishing additional access centers elsewhere, namely in Boston, Chicago and Philadelphia, and expanding to other cities as required.

### 3 SFTI® Architecture



**Figure-1:** SFTI® Architecture

Figure-1 provides a conceptual overview of the SFTI® architecture. At the physical layer, the infrastructure is made of diverse fiber infrastructure that passes through the data centers. The infrastructure goes to a different set of access centers providing network redundancy and isolation to failure. This topology guarantees diverse routing and redundancy with no single point of failure. It will provide easier access to NYSE Technologies systems from Customers and Extranet providers. There will no longer be a need to provision separate Customer circuits for each NYSE Technologies supported service that is desired. Ethernet connected Customers will have the ability to scale their bandwidth requirements by provisioning additional bandwidth as the need arises. 10G Ethernet connections to the SFTI® network are now available.

Network monitoring, management and reporting capabilities will be enhanced and centralized for all SFTI® components. Finally, Customer care will be streamlined and centralized by the development of a central Service Desk that is responsible for all Customer problem and issue calls.

#### 3.1 Access Methods

Instead of relying on vulnerable point-to-point connections to exchanges, market centers and content service providers – including the New York Stock Exchange, American Stock Exchange and NMS – Customers establish connections to two or more of the nine SFTI® Access Centers located in New York, Chicago, Boston, New Jersey and Philadelphia.

With SFTI®, there is no longer a need for you to provision separate customer circuits for each service. Your connection to SFTI® provides you access to your choice of NYSE Technologies-supported services from the New York Stock Exchange, American Stock Exchange and NMS. And our SFTI® B2B product allows you even more choices –

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connecting you to exchanges, market centers and content service providers not hosted at NYSE Technologies.

Customers can tailor their SFTI® access to meet their unique needs, choosing one or more of the following four access methods for connecting to SFTI®:

- SFTI® Direct Connection (SDC access method)
- SFTI® Managed Connection (SMC access method)
- Connecting via a Service Bureau (SB access method)
- Connecting via a Extranet Provider (EP access method)

Some Customers may use a hybrid approach: different access methods from different locations, or different access methods for different services.

### **3.1.1 SFTI® Direct Connection (SDC)**

Customers may choose to connect their equipment to SFTI® directly at the access center via Ethernet connections. In such a case, the Customer will be responsible for providing their own MAN or WAN connection from their facility to two or more SFTI® access centers, and handing off to the SFTI® edge routers via Ethernet (100Base-T, Gigabit Ethernet, or 10G Ethernet). The Ethernet handoff can be achieved either by housing a Customer router in the access center, or by contracting with a carrier who will handle the Ethernet handoff.

The DC method is available to all Customers who wish to connect directly to SFTI® including, but not limited to, Member Firms, Service Bureaus, Extranet Providers, and Internet Service Providers. Service Bureaus usually connect to SFTI® using this method, but Extranet Providers and Internet Service Providers may connect to SFTI® **only** using this method.

It is recommended, but not required, that Customers terminate their diverse access center connections at geographically diverse sites within their own network to provide true redundancy.

A Customer can set up direct connectivity in coordination with the SFTI® Service Center using the procedure described in Section 6.

### **3.1.2 SFTI® Managed Connection (SMC)**

SFTI® Managed Connect (SMC) customer connectivity is based on the same technical standards as an SDC customer. The difference is that an SMC customer receives a fully deployed and managed end-to-end service. NYSE Euronext will order, provision and turn-up the Customer Premise Equipment (CPE) at the customer site, the carrier provided Ethernet circuits and all SFTI® provisioning. The customer only has one single point of contact for the entire service which is NYSE Euronext.

Customer will be provisioned with a MAN or WAN connection from their facility to two or more SFTI® access centers, and will be connected to the SFTI® edge routers via Ethernet (100Base-T, Gigabit Ethernet, or 10G Ethernet).

A Customer can set up direct connectivity in coordination with the SFTI® Service Center using the procedure described in Section 6.

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### **3.1.3 Service Bureau (SB)**

Customers may also elect to use a Service Bureau (SB) to access SFTI®. Service Bureaus are entities in the business of providing transaction-processing services (e.g., submitting trades) on behalf of member firms. They also typically offer value-added financial services, such as archiving or data translation.

Customers who wish to use this method of access should contact the service provider of their choice. The specification of the access between a Customer and the service bureau will not be covered in this document, and should be acquired from the individual service bureau.

The Customer will be responsible for ensuring that all of their requirements and services are provided for by the service bureau of their choice.

### **3.1.4 Extranet Provider (EP)**

An Extranet Provider (EP) is an entity in the business of providing data connectivity between Customers and SFTI®, presumably over a managed, aggregated network. Extranet Providers are envisioned as intermediaries, maintaining a presence at two or more carrier hotels for SFTI® access and providing a direct link to their Customers' premises. Extranet Providers are expected to be the primary connectivity method for Customers who wish to access SFTI®-supplied services from locations in which there is no SFTI® access center nearby.

Customers who wish to use this method of access should contact the service provider of their choice. The specification of the access between a Customer and the Extranet Provider will not be covered in this document, and should be acquired from the individual service provider.

## **3.2 Technical Specifications**

This section summarizes the technical specifications a Customer should be familiar with when connecting to SFTI®. A more detailed discussion can be found in the SFTI® Network Interface Specification, which is provided during the Technical Implementation Meetings. Customers may also obtain the Specification from the SFTI® Customer Care Facility (See Section 4 for contact information).

### **3.2.1 Protocols Supported**

SFTI® supports a number of industry-standard protocols in order to reduce complexity, leverage the Customer's resources, and reduce the need for development or customization. All connectivity into SFTI® will be using IP over Ethernet at either 100 BaseT or 1000BaseT or 10G Ethernet speeds. BGP4 will be used as the route discovery mechanism for unicast traffic. RIP2 and BGP4 will be used for the source network discovery required for multicast subscription.

### **3.2.2 IP Addressing**

Customers may use globally registered IP addresses on those devices that will be accessing NYSE Technologies-supported services. NYSE Technologies will allow Customers to utilize private addressing in their networks under the condition that NYSE Technologies assign those addresses from a private range specified by NYSE

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Technologies. NYSE Technologies will serve as the central administrator of those private address ranges.

Each Customer IP addressable entity (logical or physical) that accesses NYSE Technologies-supported services requires its own IP address. Given this IP address, SFTI® must be able to route outbound to the Customer's device via the access method contracted by that Customer, i.e. the address must be reachable. Every IP address that can be assigned to a device is either a globally unique, registered IP address or a "private" IP address from a range of IPs that we assign.

If a Customer's device uses a private address from a range not assigned by us, the Customer will need to present a globally registered IP address to us utilizing a method such as NAT (Network Address Translation). However, NAT may limit the Customer's ability to take advantage of redundant connections seamlessly and could "break" applications that rely on knowing the true IP address of the end device.

### 3.2.3 Security

We maintain the integrity of the overall SFTI® environment through the use of datalink, route and packet security. Although our security measures are not intended to replace or augment their existing customer security mechanisms, SFTI® has instituted mechanisms that protect the overall integrity of SFTI® and provide customers with the following benefits:

**Filtering.** Ingress and Egress IP Source/Destination, Anti-Spoof and Service Filters on All Customer Interfaces ensure that communications between a customer connection and an approved SFTI® service is allowed, with all other communications blocked. This also prevents a SFTI® customer whom is aware of another customer's network address from successfully communicating with them.

**Policers.** To prevent denial of service attacks against SFTI®, policers act as rate limiters on all allowed protocols.

**Route Policies.** Routing information that is exchanged between customers and the SFTI® network is filtered to allow customers to only see approved destination networks and no other. These policies prevent a customer from discovering another customer's network address as part of their BGP exchange (if dynamic routing is utilized by the customer). In addition, separate service VLANs have been implemented utilizing MPLS on the SFTI® backbone and 802.1q at the customer interface, with separate routing policies for each virtual backbone.

**Encryption.** For customers utilizing dynamic BGP routing, SFTI® offers support for MD5 Header Encryption between BGP Peers, which is used to validate the source of routing updates. This will prevent unauthorized BGP route updates from impacting a particular customer's routing table. SFTI® also supports protocol encryption at the customer edge. Currently, we are not offering encryption on the SFTI® backbone, but it can be made available as a value-added service on a per-customer basis.

**Separate Out of Band Management of SFTI® Network Gear.** There is no control or monitoring access from the customer or other data carrying interfaces on SFTI®. A separate network is utilized to centrally manage and monitor SFTI®.

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**Security Reviews.** To maintain the continued reliability and security of the SFTI® network, we conduct periodic Internal Audit reviews and utilize the services of third-parties to conduct risk assessments and penetration tests.

### **3.2.4 Bandwidth Guidelines**

SFTI® has been designed to allow multiple services to share the same physical connection. Given a properly sized connection, Customers can run multiple services over a single set of physical circuits.

Each service, be it a market data feed, order routing connection or a generic messaging link, will have its own bandwidth requirements. For market data feeds, these requirements can not only vary widely but also change frequently.

Your NYSE Technologies sales representative can provide our most recent estimates of your bandwidth requirements. *Note however that requirements for connections to any markets should be assess in conjunction from representatives from that market as well as only the market itself can provide a firm bandwidth estimate.*

#### **Note**

Prior to ordering circuits from a common carrier or extranet provider, it is **STRONGLY RECOMMENDED** that the Customer first determines the total bandwidth required to support all of the anticipated services that will be requested. Using the table included in the SFTI® Order Form, identify the desired services and the associated bandwidth demands. Calculate the total aggregate bandwidth required by adding up the bandwidth requirements of each of the individual services desired.

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## 4 SFTI® Self-Service Portal

The SFTI® Self Service Portal is a free tool which offers registered Customers the ability to check on their SFTI® service status in near-real time.

The portal offers comprehensive monitoring capabilities of the Customer's SFTI® account including:

- **Direct Connections** - the ability to list all Customer connections, or router ports (logical and physical)
- **SFTI® Entitlements** - the listing all of Customer Service Entitlements per SFTI® Access Center
- **Bandwidth Performance** - a list of Access Center locations broken down by connections and VLAN's to show near real-time average bandwidth performance, by day or by year
- **Contacts** - a list of available contacts for the Customer for communications and informational alerts

### 4.1 Accessing the Portal

The SFTI® Self Service Portal can be accessed at [www.nyxdata.com/connectivity](http://www.nyxdata.com/connectivity). To authorize account details, Customers are required to register on this site before access is permitted.

For registration queries, please contact

1. Telephone: **+1.866.873.7422 or +1.212.383.3640**
2. E-mail: **service.desk@nyx.com**

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## 5 The Global Service Desk

The task of connecting to and from multiple locations in a multi-vendor environment involving the delivery of multiple services is inherently complex. In an effort to manage this complexity, we have established streamlined, coordinated procedures and a single point of contact to coordinate Customer interaction from preliminary inquiries, through provisioning, testing and cutover, to operational support.

The Desk will offer “one stop shopping”: Staff will be able to answer some operational questions directly, and solve some problems, while in other cases, staff will help Customers navigate to the appropriate organization within NYSE Technologies or at a service authority, and will coordinate and follow-up on any response. In any case, center staff will take ownership of the question, issue or problem from the first call until it is addressed to the Customer’s satisfaction.

### 5.1 Accessing the Desk

There will be two ways to interact with the Global Service Desk:

1. Telephone: **+1.866.873.7422 or +1.212.383.3640**
2. E-mail: **service.desk@nyx.com**

The Global Service Desk will be staffed 24 hours per day 7 days per week. During these times, Customers can expect the telephone or email to be answered by a qualified staff member. At any time of day or night, Customers can use the web interface to browse for information, download documents and fill out requests for service.

### 5.2 Working with the Global Service Desk

#### 5.2.1 *General inquiries*

The Global Service Desk can provide the caller with information about all of the services and features of the SFTI® environment along with documents and links to information about other NYSE Technologies products and business contacts. Much of the general information about SFTI® as well as a variety of procedures and information documents can also be obtained through the NYSE Technologies web page at <http://www.nyse.com/technologies/sfti/1223635951074.html>.

#### 5.2.2 *Establishing new service*

For new service provisioning, the NYSE Technologies sales organization will coordinate the procedure described in Section 6 below. A representative from the IMAC team will act as the Customer agent, arranging for the tech interchange meeting with the SFTI® teams, and notifying the appropriate Service Authorities about pending requests for service approvals and track the status of those parallel efforts.

The SFTI® support teams will support all aspects of the provisioning and maintenance process. Together with the Sales Support group, they will work with the Customer to define a connectivity solution that meets their needs. Depending on the collocation requirements, they will coordinate the installation of Customer equipment and support testing efforts. They will configure, test and turn up the SFTI® connectivity required and assist the Customer in validating connectivity end to end.

The IMAC team will provide support for all testing requirements from the establishment of SFTI® connectivity through to application testing and service cutovers.

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### 5.2.3 Solving a problem – Operational, Billing or Functional

Problem reporting and resolution will be a primary focus of the Global Service Desk. You will be asked to identify yourself, and the organization you are representing. This will allow us to call up a profile of your account to review your operating environment and history, including any steps already taken with regard to the current problem.

You will be asked to describe the nature of your problem with any identifying system, circuit or other reference numbers so as to help locate records in our database that describe your operating environment. Simultaneously as it works on your problem, the Global Service Desk will create a trouble ticket. Most SFTI® specific problems will be dealt with within the Global Service Desk where monitoring and diagnostic tools are available to help pinpoint network problems. For application or other internal NYSE Technologies problems, the Global Service Desk will escalate the call and ticket to the appropriate support group. The Global Service Desk will continue to track the ticket through resolution and upon confirmation by the Customer close the ticket.

Utilizing a full array of monitoring and diagnostic tools, the Operations Support group will proactively monitor the health and status of Customer connections to SFTI®, and will notify a designated Customer contact in the event of a problem such as a loss of connection, impaired level of response or high number of errors associated with an interface. The Operations Support group will open a trouble ticket, and work actively with the Customer throughout the process of repair and restoration.

### 5.2.4 Reporting

*(Available in the Future)*

The SFTI® Service Center will provide various standard reports about the health and status of Customer connections. SFTI® will collect and report traffic statistics online from all Customer interfaces. Customers can access information about their order and account status either by phone or through web access. The SFTI® Service Center will also provide information about various SFTI® initiatives, enhancements and planned maintenance issues as they develop. The following sub-sections define some services available through the SFTI® Service Center.

#### 5.2.4.1 Bandwidth Utilization per Service & per Physical Interface *(Available in the Future)*

Bandwidth reports are delivered per physical interface and per service. In this context, a service is a logical sub-interface. For example, a Customer of NYSE CAP will get an aggregate BW utilization for all purchased NYSE CAP applications – not a breakdown report for CMS, Institutional Express, and others.

#### 5.2.4.2 Service Availability per Physical Interface

*(Available in the Future)*

SFTI® will provide weekly uptime reports online for each Customer interface connected to SFTI®. Service availability per physical interface will be available for the market opening hours.

#### 5.2.4.3 Custom Reporting Services

*(Available in the Future)*

Customized statistics, utilization statistics and historical reporting services may be available as a future capability. At the time this document was written, this offering had not been fully defined. Additional information will follow in the near future.

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## 6 SFTI® Provisioning Process

The tasks required to begin using SFTI® are, at a high level of abstraction:

- Establish an overall plan: decide from which customer locations to connect to which SFTI® access center, with what type of connectivity. Decide which services to obtain via SFTI®.
- Develop a detailed engineering implementation plan, including a schedule.
- Obtain necessary approvals from service authorities for the services to be delivered
- Order necessary circuits
- Install and configure equipment, as necessary
- Test

The detailed steps involved in each of these steps will vary according to the services being obtained, the type of connectivity being used, and Customer requirements and status. Existing Customers with a service agreement in place, for example, will generally not need to negotiate a new agreement to cover that service.

### 6.1 Gather basic information

Prior to working with SFTI® Customer care staff to establish a plan, a Customer should prepare answers to the following preliminary questions. A useful pre-meeting form for recording the answers can be found in Appendix A.

1. Identification info (Firm name, contact info, who will be the coordinator for SFTI® provisioning).
2. Customer status (New Customer; existing NYSE Technologies Customer migrating to SFTI®; existing SFTI® Customer adding new locations or services).
3. Connectivity model (SFTI® Direct connect, SFTI® Managed Connect, Extranet connect, Service Bureau; see Section 5.4 below for more detail).
4. Locations from which to connect (i.e. office and data center locations)
5. Services to be delivered via SFTI® (See Section 6 for list of services)
6. Estimates of readiness for each location / each service
7. Preliminary choice of vendors for connectivity / equipment as applicable
8. Preliminary estimates of data volume
9. Existing circuit inventory (if applicable)

Customers may also obtain the service-specific approval forms for each desired service from the SFTI® Service Center.

### 6.2 Participate in a Customer Technical Implementation (CTI) Meeting

After gathering the basic information, a Customer should schedule a Customer Technical Implementation Meeting with SFTI® IMAC. The purpose of a Technical Implementation Meeting is to establish a detailed plan and schedule that will result in a deployment tailored to the Customer's anticipated needs.

The details of a Technical Implementation Meeting depends upon whether the Customer is

1. an existing NYSE Technologies Customer migrating to SFTI®, or
2. a Customer new to NYSE Technologies and SFTI®, or
3. an existing SFTI® Customer requesting new connectivity (i.e. to a different location), or
4. an existing SFTI® Customer requesting new services.

At the Technical Implementation Meeting, the NYSE Technologies team will go over all aspects of the connection process to SFTI®. You should come to the meeting with a good

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understanding of your environment and requirements, at a minimum with the answers to the questions asked in Section 5.1 above.

At the meeting, you and NYSE Technologies staff will discuss and determine:

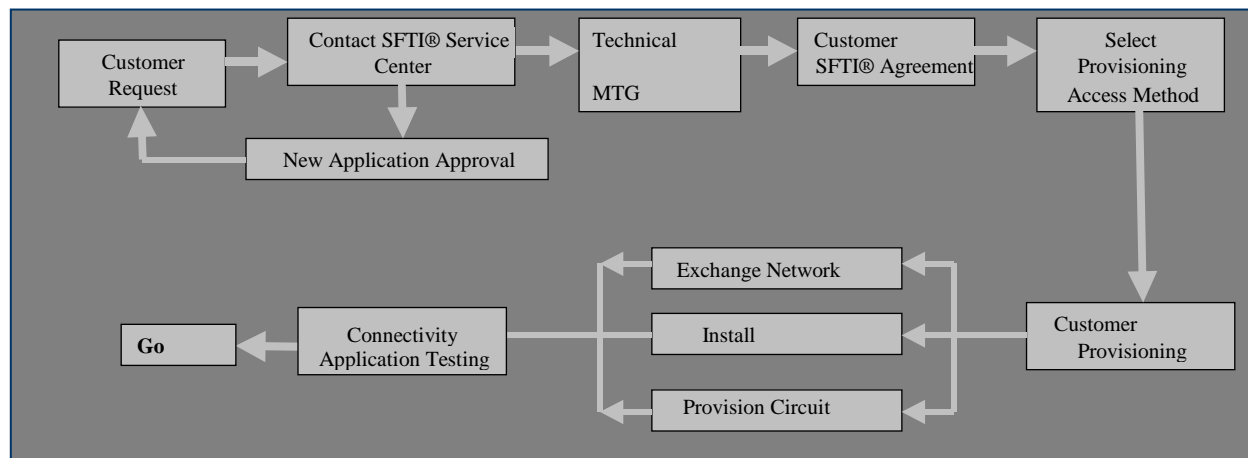
- Connectivity requirements (Based on existing circuit inventory (if applicable) plus intended services and scope of intended use. Includes a bandwidth forecast)
- Access method (SFTI® Direct Connect, SFTI® Managed Connect, Extranet, Service Bureau or a combination.)
- Access Center choice (which SFTI® Access centers you will connect to)
- Circuit details (if applicable). Which locations need to be connected into which Access Centers, using what types of circuits, provided by which vendors.
- Collocation details (what equipment (if any) you will place at SFTI® Access Centers.
- Equipment configuration details: IP address interface scheme, VLAN configuration, interface speeds (100BaseT, 1000BaseT, or 10G Ethernet) and others.
- Testing, cutover and fallback options.
- Approvals needing to be obtained (e.g., various service authorities)
- Pricing

If you have selected the SMC service, many of these questions will be answered by NYSE Technologies.

The result of a Technical Implementation Meeting will be:

1. a **plan document** that states the requirements, the overall connectivity plan, and the details required to implement the plan (circuits and equipment to be ordered, approvals to be obtained, configurations to be made)
2. **an order for services** that describes the services to be provided by NYSE Technologies, the price for the services, and the associated schedule. The order will also outline Customer and NYSE Technologies responsibilities (e.g., for management and configuration of equipment)

The SFTI® Service Center will record the plan document and monitor and coordinate progress against it.



**Figure-2: SFTI® Process Flow**

### 6.3 Preliminary approvals

Following the Technical Implementation Meeting, the SFTI® Service Center staff will report back to the Customer on preliminary approval by the service authorities and by the engineering review team. Preliminary review indicates that the overall plan is expected to be approved, pending only final contractual documents and other steps required by the service authorities. Most Customers will want to initiate provisioning efforts with their carriers and equipment vendors following preliminary approval.

### 6.4 Provisioning

Customers can choose one or more of the following four access methods for connecting to SFTI®:

- SFTI® Direct Connection (SDC access method) – see Section 5.4.1
- SFTI® Managed Connection (SMC access method) – see Section 5.4.2
- Connecting via a Service Bureau (SB access method) – see Section 5.4.3
- Connecting via a Extranet Provider (EP access method) – see Section 5.4.4

The SDC and SMC method is available to all Customers who wish to connect directly to SFTI® including, but not limited to, Member Firms, Service Bureaus, Extranet Providers, and Internet Service Providers. Service Bureaus usually connect to SFTI® using this method, but Extranet Providers may connect to SFTI® **only** using this method.

The EP, and SB methods are available for Customers who prefer to use a third-party service provider to connect to SFTI®. Customers of these methods should contact their preferred service provider for further details about connecting to SFTI®.

A Customer may order multiple circuits for redundancy. SFTI® supports access from four (4) different access centers on two (2) diverse logical networks. NYSE Technologies recommends that each Customer access SFTI® from at least two (2) access centers, one on each logical network. It is also preferred, but not required, that Customers terminate their diverse access center connections at geographically diverse sites within their own network to provide true redundancy.

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#### 6.4.1 SFTI® Direct Connection (SDC)

Customers may choose to connect their networks to SFTI® directly at the access centers via optical Ethernet connections or through MAN or WAN connections. In the latter case, the Customer will be responsible for housing equipment in at least two access centers, each on separate logical networks. The Customer will also be responsible for the optical Ethernet, MAN or WAN connection from the access centers to their Enterprise networks. At the access center, NYSE Technologies will provide an Ethernet port to the customer's optical Ethernet facility or local equipment. The DC method is available to all Customers who wish to connect directly to SFTI® including, but not limited to, Member Firms, Service Bureaus, and Extranet Providers. Service Bureaus usually connect to SFTI® using this method, but Extranet Providers may connect to SFTI® **only** using this method.

##### 6.4.1.1 Ordering a Circuit

To order a circuit, each Customer must adhere to the following procedure:

1. Contact the SFTI® Service Center to discuss the various services available to suit your needs. NYSE Technologies will distribute the SFTI® Interface Specification, which contains detailed technical and configuration information the Customer will need for successful implementation. NYSE Technologies will also issue E-Permits to permit installation of the circuits at the access centers.
2. Contact the telecommunications carrier of their choice to order diverse circuits from the Customer's Enterprise network to at least one access center on each of the SFTI® logical networks.

##### 6.4.1.2 Equipment Collocation (if necessary), Installation, and Configuration

Note: Given the general availability of MAN and WAN Ethernet services provided by vendors, customers no longer require collocating equipment within the Access Center. Customers can order circuits directly into the Access Centers and get cross-connects directly into the SFTI® router, reducing latency and hops.

1. Customer orders the equipment they need. At the same time, the Customer should also decide whether to place the equipment within their own rented space at the same carrier hotel as the Access Center or collocate it with other firms using the SFTI® collocation service.
2. Once the Customer decides about collocation and the equipment arrives, the customer will work with NYSE Technologies to install the equipment. Customers are not permitted to install equipment. All work needs to be performed by NYSE Technologies employees or contracted personnel.
3. The carrier and SFTI® personnel work together to complete the installation of the circuit.
4. After the install and configuration of the circuit and equipment is completed, the SFTI® Service Center will arrange for communications testing.

##### 6.4.1.3 Communications Testing

Once the Customer's communications circuit and network infrastructure (routers, etc) is in place, arrangements can be made to test connectivity and fail-over capabilities (for

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redundant circuit installations) with SFTI® and relevant NYSE Technologies services. Throughout the testing process, the SFTI® Service Center will be the single point-of-contact for coordinating testing with all internal business units.

NYSE Technologies will provide to the user the subnets the firm will route to within NYSE Technologies. In turn, the firm needs to provide to NYSE Technologies the set of registered IP addresses to which NYSE Technologies will route. Alternatively, the firm may use private IP addresses; please see Section 3.2.2 for further details.

The following sets of communications testing will be performed:

Circuit Testing tests connectivity from the Customer's routers at the access centers to SFTI®'s edge using "ping". "Pings" are not permitted to originate from anywhere else on the Customer's network.

Network Testing tests connectivity from the Customer's network to each of the NYSE Technologies internal services desired. This test may also use "ping" to establish connectivity although each FSN may have other validation mechanisms.

Failover Testing tests the recoverability of the data path. This test is conducted by disabling one of the circuits into SFTI® and performing ping test verification.

If any communication problems are uncovered, NYSE Technologies will assist to troubleshoot the problem and will require the support of both the Customer's communication team and its access provider. It is the Customer's responsibility to coordinate with their carrier and obtain the carrier's cooperation. Once the Customer completes communications testing, they are ready to conduct application testing.

#### 6.4.1.4 Application Testing

Application testing tests the application's functionality on the Customer's network. A subscription to each service, such as CMS, IDCE, etc., will each require an application test. The testing procedure will vary depending on the service(s) being requested. Please consult the respective interface specifications for detailed explanations of the applications that you wish to test.

#### 6.4.2 SFTI® Managed Connection (SMC)

SFTI® Managed Connect (SMC) customer connectivity is based on the same technical standards as an SDC customer. The difference is that an SMC customer receives a fully deployed and managed end-to-end service. NYSE Euronext will order, provision and turn-up the Customer Premise Equipment (CPE) at the customer site, the carrier provided Ethernet circuits and all SFTI® provisioning. The customer only has one single point of contact for the entire service which is NYSE Euronext.

Customer will be provisioned with a MAN or WAN connection from their facility to two or more SFTI® access centers, and will be connected to the SFTI® edge routers via Ethernet (100Base-T, Gigabit Ethernet, or 10G Ethernet).

Customers are expected to provide internal network IP ranges and routing information, provide suitable space to locate the NYSE Technologies equipment.

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#### 6.4.2.1 Ordering a Circuit

1. NYSE Technologies will order the circuits on behalf of the customer. The customer must provide specific addresses for their data center or office locations. If the customer has any preference on carriers, this should be communicated to the Service Center.

#### 6.4.2.2 Equipment Collocation (if necessary), Installation, and Configuration

1. NYSE Technologies will order the equipment on behalf of the customer, configure the equipment and ship it to the customer location for self-installation or dispatch an engineer for installation services. Customer is expected to provide an Ethernet handoff from the customer internal network to the NYSE Technologies equipment.

#### 6.4.2.3 Communications Testing

Once the Customer's communications circuit and network infrastructure (routers, etc) is in place, arrangements can be made to test connectivity and fail-over capabilities (for redundant circuit installations) with SFTI® and relevant NYSE Technologies services. Throughout the testing process, the SFTI® Service Center will be the single point-of-contact for coordinating testing with all internal business units.

NYSE Technologies will provide to the user the subnets the firm will route to within NYSE Technologies. In turn, the firm needs to provide to NYSE Technologies the set of registered IP addresses to which NYSE Technologies will route. Alternatively, the firm may use private IP addresses; please see Section 3.2.2 for further details.

The following sets of communications testing will be performed:

Circuit Testing tests connectivity from the NYSE Technologies' router at the Customer's site to the Access Centers to SFTI®'s edge using "ping". "Pings" are not permitted to originate from anywhere else on the Customer's network.

Network Testing tests connectivity from the Customer's network to each of the NYSE Technologies internal services desired. This test may also use "ping" to establish connectivity although each FSN may have other validation mechanisms.

Failover Testing tests the recoverability of the data path. This test is conducted by disabling one of the circuits into SFTI® and performing ping test verification.

If any communication problems are uncovered, NYSE Technologies will assist to troubleshoot the problem and will require the support of the Customer's communication team. Once the Customer completes communications testing, they are ready to conduct application testing.

#### 6.4.2.4 Application Testing

Application testing tests the application's functionality on the Customer's network. A subscription to each service, such as CMS, IDCE, etc., will each require an application test. The testing procedure will vary depending on the service(s) being requested. Please consult the respective interface specifications for detailed explanations of the applications that you wish to test.

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### 6.4.3 *Service Bureau*

Customers may also elect to use a Service Bureau (SB) to access SFTI®. Service Bureaus are entities in the business of providing transaction-processing services (e.g., submitting trades) on behalf of member firms. They also typically offer value-added financial services, such as archiving or data translation.

Customers who wish to use this method of access should contact the service provider of their choice. The specification of the access between a Customer and the service bureau will not be covered in this document, and should be acquired from the individual service bureau.

The Customer will be responsible for ensuring that all of their requirements and services are provided for by the service bureau of their choice.

#### 6.4.3.1 *Ordering Connectivity*

To connect to SFTI® via a Service Bureau, each Customer must adhere to the following procedure:

1. Contact the SFTI® Service Center to discuss the various services available to suit your needs. Names of Service Bureaus who have connections to SFTI® can be provided.
2. Contact the service bureau of your choice to arrange connectivity to the Service Bureau.
3. Test your connectivity with the Service Bureau.

#### 6.4.3.2 *Application Testing*

Application testing tests the application's functionality on the Customer's network. A subscription to each service, such as CMS, IDCE, etc., will each require an application test. The testing procedure will vary depending on the requested service(s). Please consult the respective interface specifications for detailed explanations of the applications that you wish to test.

Application testing for CAP and AAN, can be supported during daytime hours via dedicated test environments. SDCAN will support testing on an as-needed basis in the production environment. Testing for NMS will be supported by NYSE Technologies, after-hours, and must be prearranged by appointment.

### 6.4.4 *Extranet Provider*

An Extranet Provider (EP) is an entity in the business of providing data connectivity between Customers and SFTI®, presumably over a managed, aggregated network. Extranet Providers are envisioned as intermediaries, maintaining a presence at two or more carrier hotels for SFTI® access and providing a direct link to their Customers' premises. Extranet Providers are expected to be the primary connectivity method for Customers who wish to access SFTI®-supplied services from outside the New York metropolitan area, including both domestic and international Customers.

Customers who wish to use this method of access should contact the service provider of their choice. The specification of the access between a Customer and the Extranet Provider will not be covered in this document, and should be acquired from the individual service provider.

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#### 6.4.4.1 Ordering a Circuit

To connect to SFTI® via an Extranet Provider, each Customer must adhere to the following procedure:

1. Contact the SFTI® Service Center to discuss the various services available to suit your needs. NYSE Technologies will distribute the SFTI® Interface Specification, which contains detailed technical and configuration information the Customer will need for successful implementation. NYSE Technologies will also issue an E-Permit number in order for any Customer to connect to SFTI®.
2. Contact the Extranet Provider of your choice to order circuits from your Enterprise network to the Extranet Provider's network.
3. SFTI® Engineering builds a configuration profile and SFTI® Operations provisions the circuit(s).
4. Once connectivity from Customer to Extranet Provider is completed, the Customer should call the SFTI® Service Center to arrange for communications testing.

#### 6.4.4.2 Communications Testing

Contact your individual service provider for specific details on their procedure for testing communications between your network and their environment. After establishing connectivity to the service provider, the Customer should contact the SFTI® Service Center to arrange an end-to-end test from their network to SFTI® and the Financial Service Networks. This will require support from both the Customer's communication team and its service provider. It is the Customer's responsibility to coordinate with the extranet provider and obtain its cooperation.

NYSE Technologies will provide to the user the subnets the firm will route to within NYSE Technologies. In turn, the firm needs to provide to NYSE Technologies the set of registered IP addresses to which NYSE Technologies will route. Alternatively, the firm may use private IP addresses; please see Section 3.2.2 for further details.

The following sets of communications testing will be performed:

Circuit Testing tests connectivity from the Customer's network edge routers to the extranet provider's network. The Customer will not be able to 'ping' the SFTI® edge routers because only the extranet provider's routers at the access center locations can 'ping' them. These routers will have already established connectivity with SFTI® beforehand.

Network Testing tests host-to-host connectivity from the Customer's routers to the desired hosts on each of the financial networks, e.g., BBSS (CAP), IDCE (AAN), SDC, or NMS. This test will use 'ping' to establish connectivity.

Failover Testing tests the recoverability of the data path. This test is conducted by disabling one of the circuits into SFTI® and performing ping test verification.

Circuit and network connectivity testing for CAP, AAN, and SDC can be supported during daytime hours. Testing for NMS will be supported by NYSE Technologies, after-hours, and must be prearranged by appointment. If any communication problems are uncovered, NYSE Technologies will assist to troubleshoot the problem and will require the support of both the Customer's communication team and its access provider. It is the Customer's responsibility to coordinate with their carrier and obtain the carrier's cooperation. Once the Customer completes connectivity testing, they are ready to conduct application testing.

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#### 6.4.4.3 Application Testing

Application testing tests the application's functionality on the Customer's network. A subscription to each service, such as CMS, IDCE, etc., will each require an application test. The testing procedure will vary depending on the requested service(s). Please consult the respective interface specifications for detailed explanations of the applications that you wish to test.

Application testing for CAP, AAN, and SDCAN can be supported during daytime hours. Testing for NMS will be supported by NYSE Technologies, after-hours, and must be prearranged by appointment.

### 6.5 Configuration (for DC Customers only)

After the Customer has equipment installed at the access center and provisioned and tested its WAN circuits with the carrier, the next step for the Customer would be to consult the SFTI® Network Interface Specification to provision and configure a router's interface to SFTI®. The specification is available from the SFTI® Service Center.

### 6.6 Configuration (for Extranet Providers)

Extranet providers will follow the same procedure for Direct Connect customers. Details must be worked out with SFTI® Provisioning on the IP address ranges that will be used for their customer base. Each customer will be provisioned from this agreed upon IP address range. The extranet provider must ensure they complete any contract relationship for distributing multicast services with appropriate exchanges before the extranet customer will receive the multicast service. The technical details of the configuration of the router's interface with SFTI® can be found in the SFTI® Network Interface Specification.

### 6.7 Exchange network information

NYSE Technologies and the Customer update the plan document to show final assignments of network addresses, AS Numbers, etc. for the connected systems.

### 6.8 Connectivity & Application Testing

The nature of communications testing is different depending upon the access method being used. The nature of application testing remains constant across the access methods. Please consult Section 5.4 for a summary of the tests required for the chosen access method prior to 'go live'.

### 6.9 Go Live

Connectivity tests and end-to-end application tests have been successfully completed. The Customer is now ready to go on production. SFTI® Service Center coordinates a "go live" date with the Customer. Prior to the "go live" date, Customer's WAN connections to NYSE Technologies are migrated over to SFTI®.

## Glossary

### List of Terms and Abbreviations

The following table identifies the meaning of various terms and acronyms. Within the definitions, terms that are underlined have their own definitions elsewhere in the table.

Acronym	Term	Meaning
AAN		<u>AMEX</u> Access Network; current extranet providing access to AMEX production systems.
AMEX		The American Stock Exchange- acquired by NYSE in 2008 and now part of NYSE ARCA.
	Carrier Hotel	A physical facility, either a building or a facility within a building, in which more than one carrier or service provider or customer maintains a point of presence, designed to make it easy to make interconnections between the various participants' points of presence.
	Ethernet	A standard for layer 2 network connectivity as defined by the IEEE standard 802.3
	Extranet	A non-public network intended to give system or network access to a set of outside entities that have individual intranets.
	Internet	The public collection of networks commonly known as the Internet, originally conceived and implemented by the Department of Defense and public universities as the ARPANet.
LAN		Local Area Network; A network of machines generally limited to a local area, such as one or more floors of a building, or nearby buildings.
	Layer	A tier of the OSI model of networking.
MAN		Metropolitan Area Network; A collection of local area networks (LANs) that would otherwise be a wide area network (WAN), but which is local to a single metropolitan area.
NMS		National Market System
NYSE		New York Stock Exchange
	Packet Filtering	A technology that inspects packets as they enter a piece of networking equipment, such as a router, and take action on the packet (such as to discard, forward, or log it) based on a preconfigured rule set.

<b>Acronym</b>	<b>Term</b>	<b>Meaning</b>
	Public Extranet Provider	Any NYSE Technologies Customer who connects to SFTI® and purchases access to services for the purpose of redistributing those services to other Customers, often with additional access methods or protocols for the convenience of the end Customer(s).
SDCAN		Shared Data Center Access Network; current extranet providing access to SDC production systems.
	Application Services	Specific applications that are currently provided by NYSE, AMEX, NMS and SDCAN.
SFTI®	Secure Financial Transaction Infrastructure	Proposed IP access network for NYSE Technologies production network; the topic of this GDS.
	SFTI® Access Center	A facility within a carrier hotel (typically a cage enclosure) that houses SFTI® edge routers, rack space for customer equipment, and associated patch panels and interconnect facilities.
VLAN		Virtual Local Area Network; a networking standard that allows network devices, sometimes even those that span multiple layer 2 switches, to appear as if they all reside upon a traditional shared media Ethernet segment. This concept has been migrated so that devices on a Resilient Packet Ring may be assigned to one or more VLAN's and achieves the same result in a ring topology.
WAN		Wide Area Network; network connectivity using protocols to support distances greater than a <u>MAN</u> or <u>LAN</u> .

## 7 Appendix A: Basic information form

**About you:** *The person listed here should be the coordinator for SFTI® services at the customer*

*\* Denotes required fields*

		Note / Comment
<b>*Name:</b>		
<b>*Title:</b>		
<b>*Organization:</b>		
<b>*Mailing Address:</b>		
<b>*Phone:</b>		
<b>Alt Phone:</b>		<i>A number usable if the telephone switch serving your main phone number is not working</i>
<b>Cell / Pager</b>		
<b>*E-mail:</b>		<i>Used for informational email alerts and notices on SFTI® products and services</i>
<b>Fax:</b>		
<b>Contact remarks:</b>		<i>(e.g., pager, etc.)</i>

Are you representing  the entire organization or  a single business unit.

(Name of business unit / list others if known):

**Alternate contact person**      *\* Denotes required fields*

		Note / Comment
<b>*Name:</b>		
<b>*Title:</b>		
<b>*Organization:</b>		
<b>*Mailing Address:</b>		
<b>*Phone:</b>		
<b>Alt Phone:</b>		<i>A number usable if the telephone switch serving your main phone number is not working</i>
<b>Cell / Pager</b>		
<b>*E-mail:</b>		<i>Used for informational email alerts and notices on SFTI® products and services</i>
<b>Fax:</b>		
<b>Contact remarks:</b>		<i>(e.g., pager, etc.)</i>

**About your locations:** *List the names of the physical locations from which you plan to connect to SFTI®, either on an ongoing operational basis or on a contingency basis. List only the names by which you will refer to these locations, there will be space to enter the address and other information later:*


**About your services:** *List the NYSE Technologies services you use now*

Service family	Already use it	Plan to use it (date)	No plan to use it
AAN			
NMS			
CAP			
SDC			

**Location detail:** (repeat for each location listed in Section XX above)

<b>Name of location</b>		
<b>Street address</b>		
<b>City</b>		
<b>State / Province</b>		
<b>Country</b>		
<b>Zip / Postal Code</b>		
<b>Ops Center Phone #</b>		
<b>Local Contact Person 1</b>		< Same fields as "Contact" above>
<b>Local Contact Person 2</b>		< Same fields as "Contact" above>
<b>Additional Contact Info</b>		
<b>From this location I plan to connect to SFTI® via: (Check all that apply)</b>		
<input type="checkbox"/> <b>Direct (list Telco if known)</b>		
<input type="checkbox"/> <b>Extranet Provider (list if known)</b>		
<input type="checkbox"/> <b>Service Bureau (list if known)</b>		
<input type="checkbox"/> <b>Public Internet</b>		

**Customer technical contacts:** List Network, application and any customer NOC details below

	phone	pager	email	hours of operation
Network engineering support				
Application/development support				
Network Operations (NOC)				
System Operations				
Escalation contacts (add below)				