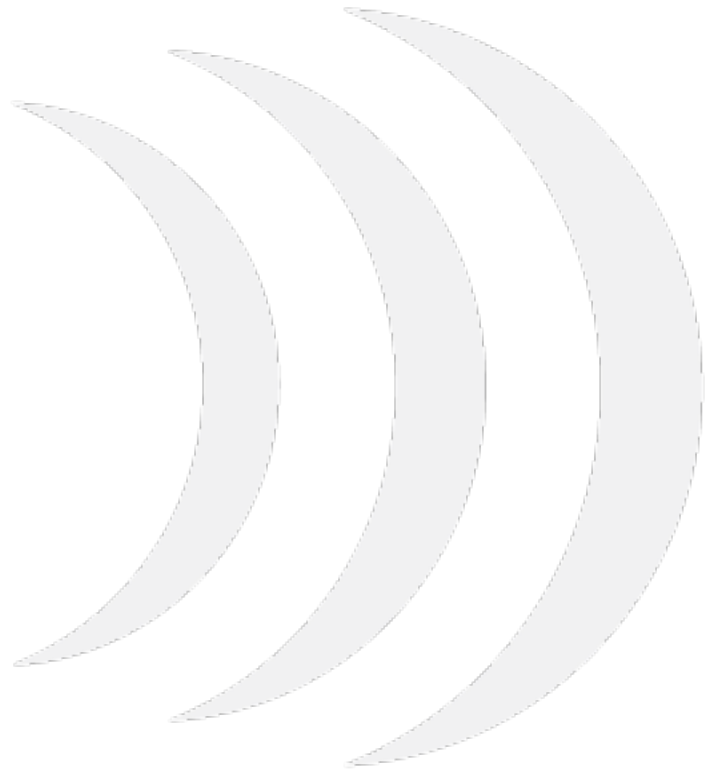


SYSTEM PLANNING GUIDE

Inform CAD and Mobile

Version 5.7



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CHAPTER 1 - OVERVIEW AND FORECAST

1. OVERVIEW

This document covers a diverse set of topics ranging from product architecture information, approval for Microsoft platforms, security and support communications, system component hardware and third party software and system restart checklists. This is intended as the primary reference point for system administrators and system planners. This information includes previously released information from a variety of documents including the Site Preparation Guide and Support Connectivity Guide and the Platform Planning Document.

In many cases, more detailed information is listed in product documentation and release notes and may change from version to version.

This document will be updated periodically and made available to all customers.

This document supersedes all previous versions of the Site Preparation Guide and Support Connectivity Guide, Site Preparation Guide or Site Prep Guide issued by TriTech. These documents are referenced by TriTech license agreements. This document also supersedes all previous versions of the Platform Planning Document.

2. INFORM CAD/INFORM ARCHITECTURE OVERVIEW (5.3 AND LATER)

2.1 INFORM CAD OVERVIEW

An Inform CAD system operates across multiple software tiers and server-based or workstation-based environments. Physically, these are deployed across the following components:

- ▶ Inform CAD Database Server
- ▶ Inform CAD Business Servers
- ▶ Inform CAD Interface Servers
- ▶ Inform CAD Workstations

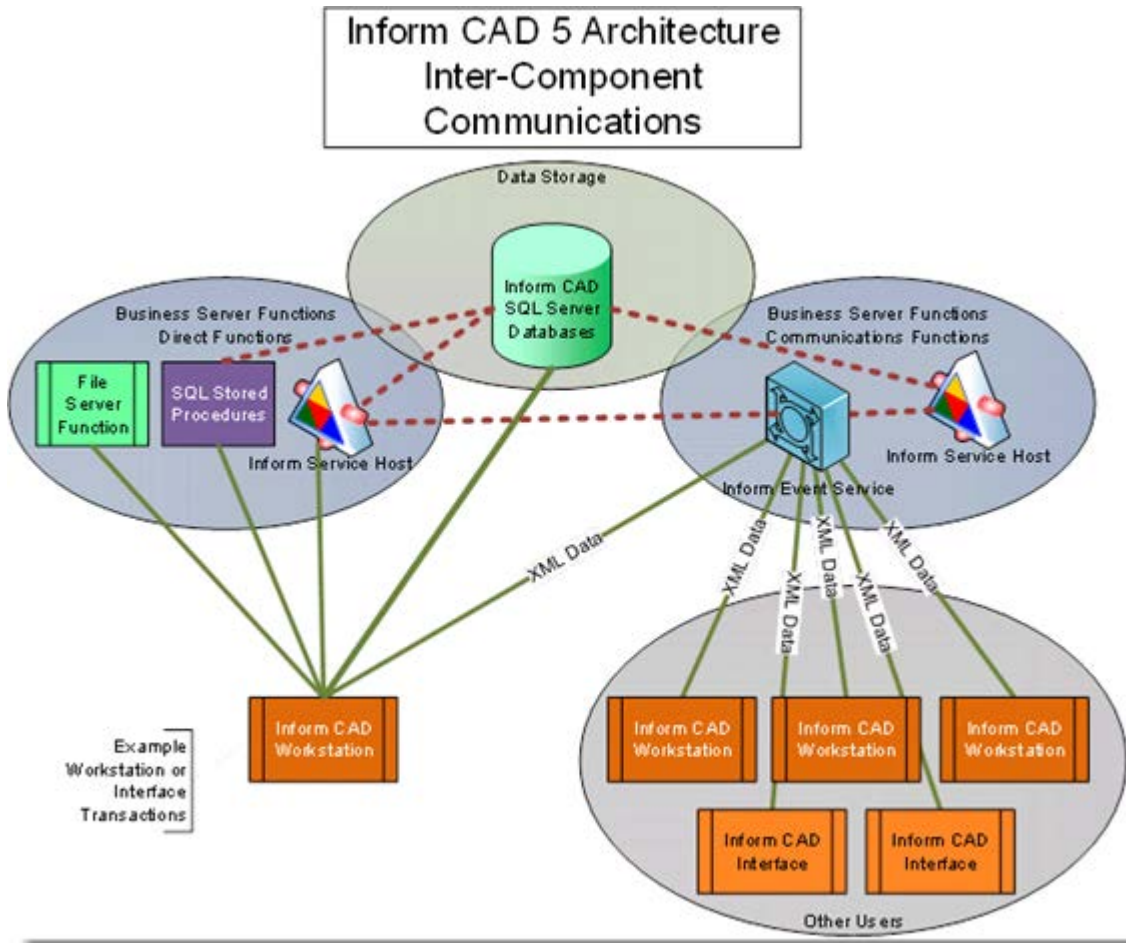
The Inform CAD System operates through the interaction of several applications, software services and database components that are spread across a multi-tier architecture. As this section will explain, these applications, services and components can be distributed in different ways across a mix of computers.

In its simplest terms, the following core principles explain the architecture of Inform CAD:

- ▶ Database Server - Generally, data is stored in the databases housed on the Production Database Server. This includes incident, activity and setup information. Workstations, interfaces and subsystems such as Mobile and Browser update data into these databases either directly or through an intermediate business server. The Database Server also performs the file server function via the Inform CAD share and also performs some functional transactions through stored procedures activated in support of workstation, business server or interface server transactions.
 - Data stored outside of Inform CAD databases include routing data and other mapping layers stored in files on the Inform CAD share (server and workstation) and some setup data on the Inform Mobile Server.

- ▶ Inform CAD Business Servers – Inform CAD Business Servers perform activities in support of the functions executed by workstations, interfaces or other business servers. These can generally be divided into two categories – direct functions or coordination/communications functions.
 - Direct functions support a particular activity executed by a user, such as providing information for an Inform CAD Recall Window (Web Server), retrieving or updating information into the databases from Browser users (Web Server), providing driving directions to Inform CAD or Inform Mobile users (Web Server) or processing a user message (Event Service).
 - Coordination/communication functions provide information that allows the collective group of users to be presented information in a consistent format and in "sync" with the actions of others, such as inter-process communications to keep workstations and interfaces in sync (Inform CAD Communication Service or Event Service), timers and warnings and other scheduled notifications and actions (CAD Monitor, the Inform CAD Communication Event Service, or Inform Database Event Service) or transmitting messages across and between systems (multiple server based components (Communication Event Service, interface messaging components and eventually the Inform Event Service).
- ▶ Inform CAD Interface Servers – Inform CAD Interface applications (and eventually services) provide automated functions that execute selected CAD actions based upon interactions with external systems. The interface functions either import data from an external source (911, justice databases, alarm systems and the like), export data to an external source (RMS, paging, station alerting and printing systems and the like), or perform both import and export functions (CAD to CAD, mobile systems and the like).

- ▶ Workstation Software – In addition to the user interface for the system, workstation software for CAD and Mobile include software components that perform system processing and manage data to and from the computer. Workstations utilize updates from Business Servers and the Database Server in order to maintain operational data on the local workstation in order to allow the user and the workstation to act upon current system data. As previously noted, updates based upon other user actions are processed through the actions of Business Servers.



Changes in technology including hardware speed and the approved use of virtualization allow for a reduced number of servers for core system components. This document will present recommended deployment plans that may be very different than previous recommendations or your actual system layout. This document will provide recommendations that leverage high powered multi-core processors and virtualization. Customers may continue deployments in a manner that utilizes standard server configurations.

This section also explains a phased series of architecture changes across Inform CAD’s two versions – 4.x and 5.x. It is vital that customer system administrators understand these changes as the most critical server based components of Inform CAD are being updated or replaced by new components. Therefore, the process to maintain, support and restart Inform CAD server components will substantially change between 4.x and 5.x.

Operation of an Inform CAD system requires:

1. a functioning Database Server
2. a working group of business applications operating across one or more servers
3. one or more workstations

4. A functioning Windows Active Directory domain.
5. A functioning Domain Naming Service (DNS).

The core changes in 5.x are focused upon replacing the majority of the business server applications that support Inform CAD.

Note: The following version specific overview includes information on components approved for virtualization. Virtualization of components is described in greater detail in Section 18.

2.1.1 INFORM CAD DATABASE SERVER OVERVIEW

The Production (live) Database Server operates as a file server and a data repository for both setup and operational data. The file server function serves as a file repository for workstations and interfaces; files are synchronized at the launch of workstation and interface applications in order to ensure that the latest files are being used. This facilitates initial installation, upgrades and updating of data stored in file formats (routing files, shape files and the like). Workstations and interfaces also synchronize their time with the Database Server (refer to Section 6 for additional information).

SQL Server provides data storage in the form of six (6) databases (4.5 and later) as well as server-based architecture components in the form of stored procedures. Examples of server-based functions include timers and warnings as managed by the CAD Monitor function in the form of stored procedures.

Note: Stored procedures installed by TriTech are a form of TriTech software code and are subject to the same licensing protections described under the source code provisions of the TriTech license agreement. A customer shall not alter these stored procedures. Non-TriTech developed stored procedures or triggers are not recommended to be utilized on the Production Database Server as these can introduce problems including, but not limited to, performance problems and application problems.

Inform CAD 5.7 includes one component that has been designed to operate on the Production Database Server – the Inform Event Service. Inform CAD 5.7 also includes VisiNet Service in Services windows service that can be hosted on one or more Inform CAD Business Servers. VisiNet Service in Services windows service executes and manages one or more service features for Inform CAD.

In its current design, Inform CAD requires a functioning Production Database Server in order for workstations to operate. Therefore, the Production Database Server is recommended to operate on a fault-tolerant server.

In lieu of full Fault-Tolerance other high availability technologies can be utilized such as VMWare (High Availability (HA), Fault Tolerance (FT) and Site Recovery Manager (SRM) or other approved hypervisor technologies. Additionally, Arcserve is a TriTech approved solution for disaster recovery (DR) and Hot Standby (HSB) to replicate databases and provide partially automated failover.

2.1.2 INFORM CAD 5.7 COMPONENT OVERVIEW

Since Inform CAD 5.3 the functionality of TCP socket-based Inform CAD Communication Service was replaced with WCF (Windows Communication Foundation) -based Inform Event Service. This is a mission critical component for the system.

Since Inform CAD 5.3 the majority of server-based business functionalities such as Inform Communication Event Service (for CAD Monitor and Messaging), TriTech Web Services (like Driving Directions Web Service, and Document Web Service, etc.) are consolidated into service features hosted inside one or more VisiNet Service in Services windows services. Each hosted service feature (with the exception of Logging Service) can be configured through Inform Configuration Utility to run within one of the concurrently running VisiNet Service in Services windows services on-demand.

- ▶ **Inform 5.7 Workstation/Interface Prerequisite Changes** – New versions of MSXML and .net Framework will be utilized with Inform 5.7 workstations and interface applications. Carefully review the release notes and utilize the version specific prerequisite CD. Refer to Technical Advisory - GA08-020 - Inform CAD Prerequisite Installer.
- ▶ Inform CAD, since 4.5 and continuing with 5.7, sends error/debug/instrumentation log entries from workstations and servers to the Logging Service through MSMQ (Microsoft Message Queue). This provides asynchronous logging functionality for all Inform CAD applications, comparing to the legacy file-based logging. Logging Service collects and bulk insert all log entries into the Log database which can be queried for troubleshooting and reporting purposes. File-based logging is kept as an additional option which is turned off by default.

2.1.3 OTHER SYSTEM COMPONENTS

Optional Business Servers (Citrix servers, Reporting Servers, Test/Training Servers, and the like) and Interface applications (NCIC/State Message Server, Paging, Station Alerting, and the like) are deployed based upon the operational needs of the customer. These are described in greater detail later in this document.

An effective functioning Windows network is essential for optimal operation of an Inform CAD system. The components described in this document rely upon components such as domain controllers, DNS servers, properly functioning network switches, and properly configured Windows security settings. This document addresses these topics in order to prepare the customer's system administrator to effectively support their system.

Note: The hardware recommendations within this document are provided based on TriTech's internal testing of the Inform CAD software. Performance on customer systems may vary from system to system, depending on the site's call volume, number of interfaces, network configuration and overall system complexity.

Customers routinely inquire about changes in hardware requirements between versions. TriTech's internal test systems are periodically refreshed with new hardware. This makes it difficult for TriTech to predict performance on older workstations and servers. TriTech's experience with upgrades in the 5.7 track has been that if the customer's existing equipment provides acceptable performance for Inform CAD, the next major version upgrade is not likely to significantly change performance unless the customer elects to activate new functionality or implements some other significant change (expanded workload, workstations, interfaces or OS/DB change). Nevertheless, TriTech will provide recommendations based upon the equipment with which TriTech tests.

Note: *Version specific requirements for Operating System, Database and supporting software (MDAC, MSXML and the like) are hard requirements and must be met for an upgrade.*

2.2 OTHER NETWORK AND SERVER TECHNOLOGIES

TriTech has approved the following technologies for use with Inform CAD:

1. Network Speed based on number of workstations and potential incident/AVL/Mail Volumes. If a customer satisfies ALL the following criteria, then 100MB network is sufficient

- a. Less than 16 Inform CAD workstations.
- b. On average, less than 600 incidents per day.
- c. On average, less than 100 on-duty units.
- d. On average, less than 3000 mails per day.
- e. GIS data (Streets network and map display files) on Q:\ does not exceed 500MB.
- f. On average, attachments are less than 4MB and no streaming media is used.

For everything else, the customer should be on a 1GB network.

2. Blade servers
3. Storage area networks (SAN) – Customers are cautioned that some forms of SAN do not provide the high speed connectivity needed for the load that some Inform CAD systems operate under. SANs used with Inform CAD should have a direct connection to the Production Database Server through fiber or similar connection.
4. Terminal port server – Many recent model servers do not have serial ports. Some external systems communicate to the CAD through a serial connection including many 911 systems, paging systems and station alerting systems. A terminal port server is a network based device that provides a virtual serial port that is translated to IP that can be configured to be accessed from an interface server.
5. Microsoft Windows Server Update Services - Microsoft Windows Server Update Services (WSUS) allows system administrators to deploy Microsoft product updates.
6. Approval for Citrix software, disaster recovery software and virtualization software is described in greater detail in Sections 12 and 18.

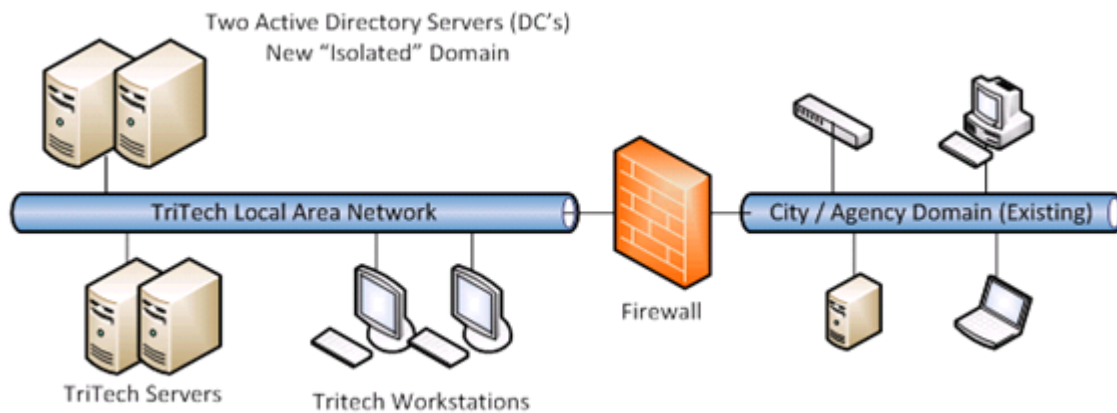
CHAPTER 2 – NETWORKING, SECURITY, AND SUPPORT CONNECTIVITY

3. NETWORKING AND SECURITY ACCESS FOR INFORM CAD/INFORM SYSTEMS

3.1 INFORM CAD AND ACTIVE DIRECTORY

The server and workstation-based components of a TriTech system rely upon an effectively functioning Windows-based network. TriTech strongly recommends that Inform CAD systems be implemented on an isolated network and not to attach the CAD domain to the customer’s existing Active Directory infrastructure.

Recommended Example:



TriTech’s network recommendations are as follows:

- ▶ **Group Policies** - Newly deployed Group Policies from the WAN side Active Directory can interfere with Inform CAD/Inform application(s).
TriTech has identified significant problems with TriTech applications, including Inform CAD, at customer sites due to a Group Policy that was applied. Group Policy related issues may sometimes be difficult to identify and troubleshoot.
- ▶ **Organizational Unit** - If the CAD system is part of an existing Active Directory, all the CAD users/groups and computers should be moved to a separate Organizational Unit (OU). ‘Block Policy inheritance’ should then be enabled on that OU.
- ▶ **Firewalls** - TriTech recommends separating the CAD network from the rest of the WAN and using firewall(s) between the CAD network and the WAN.
- ▶ **Security Patches** - TriTech cannot always guarantee that the latest operating system service packs and security patches will be compatible with TriTech applications. Therefore, systems running Inform CAD may become vulnerable and if they are part of an existing Active Directory infrastructure/network, exposed to possibility of being affected by a virus or an Internet worm.
- ▶ **Static IP Addresses** - Based upon problems experienced at customer sites, TriTech strongly recommends the use of static IP addresses for an Inform CAD System.

- ▶ **NIC Cards** – NIC cards should not be set to "auto"; they should be set to the highest matching speed applicable for the network and set to "full duplex."

Due to the mission critical nature of CAD, TriTech strongly recommends an isolated network.

While some TriTech customers have implemented their Inform CAD system as part of a broader network infrastructure, most of these customers have experienced problems secondary to outages and changes that had an unexpected and undesirable impact on the CAD system.

TriTech recommends that two (2) active directory servers/domain controllers (DC) be deployed on the Inform CAD network for redundancy. Both DC's should be running on servers with RAID 1 or RAID 5 disk configurations. Both DC's should be Global Catalogs, per Microsoft's "best practices" recommendation.

- ▶ **DNS** - TriTech recommends that the CAD system have its own DNS servers for name resolution and not rely upon a shared server used by the broader City network. DNS should be installed on both domain controller servers.
- ▶ **DHCP** – While TriTech does not recommend the use of dynamic IP addresses, if DHCP is utilized, each DC should have its own scope.

3.2 SERVER/WORKSTATION PERMISSIONS

Windows user accounts used to log in to servers and workstations should not be the same accounts utilized for the Inform Database Server or Inform Business Servers that maintain running applications if account lockouts are enforced due to password retries or other user-related security. Accounts should be specific to an individual or group of machines and not accessible for systems outside of the Inform CAD system. (Email, Web Sites, Other agency resources).

The Inform CAD and Inform Systems have been developed to operate within a defined framework of network security access. The following are the minimum standards.

3.2.1 SUPPORT AND INSTALLATION ACCOUNT

TriTech requires a domain account that is also a local administrator in order to install, upgrade and support the overall system. This account is typically named "TriTech". This account should be separate from the account used below for the Server Based Applications.

3.2.2 INFORM CAD DATABASE SERVER

TriTech requires a domain account that is also a local administrator (same as the support account) in order to install, upgrade and support the Inform CAD Database Server. TriTech recommends a separate domain account. If necessary, the domain account can be the same account used below for the Server Based Applications.

TriTech requires access to the SQL Server (TCP port 1433). The System Administrator (SA) account for Microsoft SQL Server is required by TriTech for installation, support and upgrades.

3.2.3 INFORM CAD AND INFORM INTERFACE AND BUSINESS SERVERS

There are two (2) types of network accounts needed for these types of servers:

- ▶ Services - TriTech requires a domain account that is also a local administrator for components within Inform CAD and Inform systems that operate as services. Examples include the VisiNet Service in Services windows service. This is account typically named "serviceacct".
- ▶ Server Based Applications - TriTech requires a domain account that is also a local administrator (the same as the support account, but separate from the service account) in order to operate server based console applications, such as Interface Applications and Mobile Server. This account is typically named "TriTech".

As noted previously, the account used for installations, upgrades and support can be the same account used for the Server Based Applications or it can be a separate account.

3.2.4 DISASTER RECOVERY SERVER ACCOUNTS

TriTech requires a user account with Domain Administrative permissions to run the Arcserve Engine service which is installed on the Production, HSB, and DR SQL Database servers. This account is used to update the DNS record on a Domain Controller running DNS, and other features; it is not used to log into any servers or to facilitate a failover to the Production, HSB, or DR SQL Database servers. This requirement applies to the following configurations:

- ▶ Production and Hot Standby
- ▶ Production, Hot Standby, and DR

TriTech requires a user account with local administrative permissions to run the Arcserve Engine service which is installed on the Production and DR SQL Database servers. This account is used to start SQL and to perform administrative tasks pertinent to the failover process. This requirement applies to the following configuration:

- ▶ Production and DR

TriTech required accounts:

ACCOUNT PURPOSE	ACCOUNT RIGHTS	TYPICAL ACCOUNT NAME
TriTech Console account Installs, Support, Upgrades and Interface apps	Domain and Local Administrator	TriTech
Inform CAD Service account	Domain and Local Administrator	serviceacct
Arcserve services account	HSB – Domain Administrator DR – Local Administrator	arcsvcacct

3.2.5 INFORM CAD WORKSTATIONS

TriTech requires a domain account that is also a local administrator in order to install, upgrade and support workstations (same as the support account). As noted previously, the account used for installations, upgrades and support can be the same account used for the Server Based Console Applications or it can be a separate account.

TriTech does not support nor recommend the use of a single Domain user account to facilitate the logging in of Dispatchers or Call Takers to more than one Inform CAD Workstation. The ramification for this configuration could lead to Dispatchers or Call Takers being locked out of CAD. The account can become locked out if there is a Group Policy configured to lock accounts after "n" times of entering wrong credentials, all users who are logged into Windows under the locked out account will not be able to access CAD resources such as SQL or the VisiCAD share.

TriTech recommends for each Inform CAD dispatch workstation an individual account be used to allow the Dispatcher or Call Taker to log in their workstation. Alternatively, each Dispatcher or Call Taker is assigned his or her own individual user account to log into the workstation.

The customer's Inform CAD users need a defined level of security access at the workstation level in order for Inform CAD to successfully operate. This is generally setup via Power User security access. The following levels of access are required for an Inform CAD user:

- ▶ User must have 'Modify' permissions to the local hard drive (Read & Execute, List Folder Contents, Read, and Write).
- ▶ User must be able to write to the registry
- ▶ User must be able to register COM components
- ▶ User must be able to create desktop icon(s)
- ▶ User must be able to communicate on TCP ports
- ▶ User must be able to ability to set the system time
- ▶ User must be able to map and access the Q: drive
- ▶ User must be able to make ODBC and OLE/DB connections to the SQL Server(s)
- ▶ User must be able to write messages to Microsoft message Queue (MSMQ)

Note: User interface functions that support the above noted options can be disabled, but the Power User account must have the ability to implement these functions through Inform CAD. For Inform CAD to function, it is also very important to turn User Account Control off on Windows 7-based workstations.

3.2.6 INFORM MOBILE WORKSTATIONS

The customer's Inform Mobile users need a Windows account that allows the application to synchronize device time with a compatible GPS time sync signal in Inform CAD 5.7. Since time stamps for actions such as status changes are performed based upon the device time, failed time synchronization will cause unexpected results.

3.3 INFORM CAD OPERATION VIA WIDE AREA NETWORK

WAN bandwidth requirements for Inform CAD workstations to run remotely will vary based upon the overall size of the system and the utilization level for interfaces and features.

VPN is not recommended for connecting a workstation via a WAN. This is due to orphaned connections of Microsoft components that can cause the failure of system components. Please consult with TriTech before activating one or more remote workstations.

TriTech recommends the use of Citrix or ClearCube for running Inform CAD workstations across a WAN connection that is less than 100Mbps to the desktop or where the connection must be established via VPN. The use of Citrix with Inform CAD is described later in this document in Section 12.

4. MACHINE NAME GUIDELINES

TriTech works with the customer to establish an effective deployment plan for machine names. The following guidelines are recommended for machine names:

1. Hyphens (-) are not supported in either workstation or server machine names.
2. SQL Server machines names cannot begin with numerical values.
3. RFC 1034 states that domain names cannot have underscore ("_") characters. As such, VMware and possibly other software do not support the underscore. To keep things simple, TriTech does not recommend the use of ("_") in any machine names
4. The server host name must be unique. For example: CCLLTT##
 - a. CC refers to an abbreviation for the customer city - this should consist of three (2) alpha characters. (example, SD for San Diego)
 - b. For customers with multiple locations, LL refers to the location, usually based on the local of the site (chars. e.g. PB for Public Safety Building, CH for City Hall) - this must consist of two characters. Please make them letters.
 - c. TT refers to the machine's primary function. These are designated with the following:
 - DC for a Domain Controller
 - CADS – CAD SQL
 - CADI – CAD Interface
 - MBLS – Mobile SQL
 - MBLI – Mobile Interface
 - MBLC – Mobile SQL combined with Mobile Interface
 - RPTS – Reporting/Archive SQL
 - DWHS – Reporting/Data warehouse/Archive SQL
 - RMSS – Records Management System SQL
 - RMSA – Records Management System Application
 - RMSW - Records Management System Web
 - FBRS – Field Base Reporting SQL
 - FBRA – Field Base Reporting Application
 - FBRW – Field Base Reporting Web
 - JALS – Jail SQL
 - JALA – Jail Application
 - IQSQ – IQ SQL
 - IQWB – IQ Web
 - IQAP – IQ Application
 - IQAN – IQ Analytics
 - INTF – Interface Server
 - WEBR – Web Recall Browser
 - BRWS – Browser
 - TTMS – TriTech Message Switch
 - PRXY – Proxy
 - ARR – Application Request Routing
 - 911A – Inform 911 Application
 - 911S – Inform 911 SQL
 - d. ## are numeric values to resolve the multiple instances of the same type of machine. This will generally be two (2) numbers. They should not be random, but should reflect a first dispatch station (01), a second dispatch station (02) or a third station (03), etc....

5. FIREWALL PORT CONFIGURATION

The following diagram outlines the firewall port configuration to operate those products that require internet access and to provide support access. This diagram is based upon Inform CAD 5.7 and Inform Mobile 5.7.

With version 5.7, Inform Browser is integrated with Inform CAD's core business components and its hosting Web Server needs to be on the same domain as that of Inform CAD for OS Authentication when accessing network resources hosted inside the secured network. Starting with version 5.3 Inform Browser is installed with TriTech.Launch.

With version 5.7, TriTech recommends placing Microsoft's IIS with the ARR (Application Request Routing) plugin into the DMZ, shown as the ARR Web Server in the following diagram. ARR Web Server functions as the reverse proxy and HTTP/HTTPS network traffic filter for Inform Browser hosted inside the secured CAD network. If needed, ARR Web Server supports end-to-end SSL communication, in addition to the light-weighted SSL offloading.

In addition to the ARR Web Server for Inform Browser, TriTech's Inform Relay Server can be installed in the same host to relay TCP/UDP traffics between Inform Mobile Client and Inform Mobile Server.

With Inform Browser and Inform Mobile Server installed in the secured CAD network and ARR Web Server and Inform Relay Server installed in the DMZ, there is no longer need to open SQL Server and MSMQ ports between the DMZ and CAD network.

There are customers who purchase a second Archiving & Reporting Server to allow other organizations to report on data. Previously this was allowed to be placed in the DMZ. For security reasons TriTech no longer recommends this configuration. There may be customers who need to place this second Archiving & Reporting Server in the DMZ, if that is the case the agencies do so at their own risk and against the recommendation of TriTech.

Note: Ports identified for support purposes include the most common forms of connectivity. Additional ports for less common access tools are identified in Section 7.

6. TIME SYNCHRONIZATION

TriTech products operate using the Windows time of the applicable machine. Time synchronization occurs through several components as a part of an Inform CAD – Inform System operating within a Windows network. Windows Active Directory also synchronizes time with computers through the Domain Controller. The system administrator should evaluate system components to ensure that time sync problems do not cause unexpected system behavior.

1. Within an Active Directory with Windows time service enabled, Windows will sync workstation and server times to the Domain Controller time. It is recommended that the Domain Controller is synched to desired reliable time source.
2. Based upon code within the applications, all Inform CAD interface/business servers and workstations will automatically synchronize their time to the Inform CAD Database Server once every 60 minutes.
3. Inform Mobile Clients will get their time from the GPS (AVL). Therefore, it does not require any special configuration.
4. Please note: TriTech highly recommends customers utilize a precision time source (i.e., NetClock) and associated software to precision time synchronization. Please consult the installation guides applicable to your chosen time source device.

5. For customers not utilizing a precision time source device TriTech recommends the use of Windows Time Synchronization. However, some customers may choose to disable the Microsoft Time Synchronization feature and use the TriTech component commonfuntion.exe instead. Please see Inform CAD Technical Advisory TA15-009 regarding disabling Windows Time Synchronization.

7. SUPPORT COMMUNICATIONS AND CONNECTIVITY

Remote connectivity to the customer system is essential for the research, diagnosis and resolution of issues in a timely and efficient manner. This connectivity is also utilized during the implementation of new systems/components and during the upgrade process for new TriTech software versions and service packs.

TriTech recommends both a primary and a secondary method of connectivity to ensure the ability of TriTech to connect to the customer system to provide critical support services. Connectivity options approved by TriTech are described in this section.

7.1 TRITECH SECURITY PROGRAM FOR REMOTE CONNECTIVITY

TriTech operates a CJIS–level security program for its personnel, facilities and infrastructure consistent with Federal Standards for “Criminal Justice Information¹” and “Protected Health Information²” provisions for remote connectivity in order to provide data security.

TriTech infrastructure security for Security Authorized personnel includes personal passwords and Advanced Authentication to gain access to the TriTech network. Personnel must first successfully login to their computer with Advanced Authentication before they can connect to a customer site with secure access login to the customer system and/or to remotely access the secure servers/storage where customer data/information is stored.

TriTech domain passwords meet or exceed CJIS standards including rules for length, complexity, reuse, expiration and exclusions.

Advanced Authentication, as deployed at TriTech, utilizes a variety of techniques including an issued building access card (HID), the employee’s fingerprint, or an issued YUBIKEY device (depending on implementation site). Remote access to TriTech’s network and secure servers requires an additional level of Advanced Authentication through a DUO/Cisco validation. Other methods of approved Advanced Authentication may be used at the discretion of the TriTech Director of Information Services and in accordance with the FBI CJIS Security Policy.

7.2 TRITECH APPROVED METHODS OF CONNECTIVITY

TriTech has approved VPN (virtual private network) connectivity as the sole primary form of support connectivity for Inform CAD and Inform CAD Subsystems (Inform Mobile and the like) deployed by TriTech. Each customer under a Software Maintenance and Support Agreement shall establish a dependable VPN form of access for TriTech use in order to be supported. VPN access must allow for multiple simultaneous connections from TriTech.

¹ Including Criminal Justice Information (CJI), National Crime Information Center (NCIC) data, and State specific CJI as described in the U. S. Department of Justice - Federal Bureau of Investigation - Criminal Justice Information Services Division’s Criminal Justice Information Services (CJIS) Security Policy.

² Federal Health Information Portability and Accountability of Act (HIPAA) of 1996.

VPN is a network that is constructed by using public telecommunications infrastructure to connect network nodes. For example, there are a number of systems that enable the creation of networks using the Internet as the medium for transporting data. These systems use encryption and other security mechanisms to ensure that only authorized users can access the network and that the data cannot be intercepted.

For information on setting up VPN access for remote support services contact TriTech Customer Support.

7.2.1 APPROVED VPN CONNECTIVITY METHODS AND CLIENTS

- a) TriTech must be able to connect to the customer site using one of the following:
 - a. Microsoft PPTP (typically requires Microsoft VPN Server)
 - b. Cisco VPN IPSec client (requires Cisco VPN enabled device, such as PIX firewall, router or dedicated VPN concentrator) - The Cisco VPN enabled device allows the customer to restrict access to the remote user to a specific series of computers or sub-net of the customer's network. TriTech recommends the use of these devices and prefers that TriTech's access be limited to the specific areas of the network where TriTech software components are in use.
 - c. Cisco Appliance-to-Appliance VPN tunnels – TriTech has approved Cisco appliance-to-appliance VPN tunnels and has deployed this form of connectivity at a limited number of customer sites. This will be done using TriTech's firewall.

Note: Customers utilizing the Appliance-to-Appliance connectivity should plan for a backup solution in case of a TriTech network outage to allow for a secondary method of connection.

- b) Other TriTech Inform Products

TriTech Inform Law RMS, FBR and Jail Products are supported using VPN connectivity. Some of these customers use GoToAssist for support connectivity. These customers are charged an additional fee to offset the additional licensing costs. The GoToAssist fee based option is not currently available for Inform CAD and Mobile remote connectivity. An option for such a fee-based system is under discussion at the time of this document's publication.

7.2.2 ALTERNATE FORMS OF VPN CONNECTIVITY

Customers that utilize non-recommended forms of VPN or other connectivity are taking responsibility for any delays associated with TriTech's ability to provide remote support services. TriTech will work with the customer to provide support in these situations, however, there have been instances where a customer's alternate method of connectivity has not worked or had limitations that prevented TriTech from rapidly resolving a critical problem.

7.3 REMOTE ACCESS AND TCP PORTS

In order to support TriTech applications and services, TriTech staff needs access to the remote computers' desktop (console). TriTech utilizes the following methods of access:

- ▶ Microsoft Remote Desktop Connection (RDP) – TCP port 3389
- ▶ VNC – TCP port 5900
- ▶ PCAnyware – TCP port 5631 and UDP port 5632
- ▶ Dameware – TCP port 6129
- ▶ Microsoft NetMeeting (limited support, should be discussed between customer and TriTech before it is approved) – TCP ports 522, 389, 1503, 1720 and 1731. UDP ports: dynamically assigned ports (1024-65535).

TriTech staff needs direct access to CAD SQL servers (TCP port 1433) with the SQL System Administrator (SA) account.

7.4 FILE TRANSFERS

TriTech staff needs to have the ability to transfer files to computers running TriTech applications at a customer site. With most customers, TriTech staff is allowed to map drives directly over the VPN connections after being successfully authenticated in the CAD domain. The following ports need to be open to allow file sharing in Microsoft environment: TCP ports 139 and 445, UDP ports 137 and 138. These ports are identified in the Firewall Port Configuration Diagram in Section 5.

An alternate, but not recommended method of transferring files is via Microsoft Remote Desktop Connection (RDP). This method is not meant for large file transfers and could significantly delay support efforts (double the time to transfer files) in the case of a critical issue with the CAD system, including CAD down.

8. SECURE SUPPORT ACCESS

TriTech has implemented procedures and technology safeguards to limit access to customer systems and customer data. These procedures are described below:

8.1 TRITECH PERSONNEL AUTHORIZED FOR SUPPORT CONNECTIVITY

TriTech hiring process includes a background check to evaluate individuals who will have access to restricted and highly confidential information, customer records, technology and restricted sections of the building and/or customer sites via physical or electronic means. These individuals are typically members of the Customer Service, Product Management, Engineering, or Project Operations departments.

Individuals lacking such approved security access are not provided access to customer login information, servers or devices containing customer data, or sections of the facility where such computers reside.

As noted in Section 7.x.x, all Security Authorized personnel must logon to machines utilizing advanced authentication methods prior to initiating a connection to a customer site.

8.2 CUSTOMER DATA SECURITY

Customer data is entrusted to TriTech Software Systems with the expectation that the data will be managed, kept strictly confidential and disposed of in such a manner as to prevent access by any non-TriTech personnel or non-authorized TriTech personnel. Secure management of customer data is managed according to the following procedures:

TriTech has deployed a secure technology infrastructure hosted at secure TriTech corporate facilities. TriTech facilities have the following protection features on site:

- ▶ Monitored by security cameras.
- ▶ Card key authentication required for building access.
- ▶ Alarm system with individual staff access.
- ▶ Secure server facilities with limited access (subset of TriTech Security personnel).
- ▶ Secure sub-networks for storage of Client data and Client information.

If customer data must be downloaded or installed on TriTech secure servers, such data is only utilized for testing, implementation and support purposes as authorized by the customer. Customer data is not shared with non-authorized TriTech personnel or third parties including other customers.

8.3 USER ACCESS AND PASSWORDS

TriTech needs both VPN access and a user account on the customer's network (this is separate from the TriTech account within Inform CAD or Inform systems).

VPN accounts are typically issued individually to TriTech Security Authorized personnel. Such accounts are infrequently utilized and often need a password reset before the person can connect.

Note: If a customer requires TriTech to have individual VPN accounts, the customer must have staff available on a 24x7 basis to issue passwords when TriTech contacts the customer to perform remote support tasks.

Some customers alternatively have a few generic accounts that are locked out all of the time – they enable these VPN accounts only when the TriTech person has contacted them to request access. In this case, passwords are set to expire the same day.

Note: The customer **should not disable** the accounts defined in Section 5.6 that are used to operate the system—specifically:

- The local administrator domain services account for components within Inform CAD and Inform systems that operate as services;
- The local administrator Windows account needed to support the system and to operate server based console applications; and
- The TriTech account within Inform CAD or Inform systems. Disabling one or more of these accounts could disable system components.

Note: TriTech distributes a listing of approved TriTech personnel that are authorized to remotely connect to a customer system. Please contact TriTech to be added to this e-mail distribution list. TriTech requests that the distribution list be limited to one person per customer site.

Note: Due to the large number of customer sites and the large number of TriTech staff involved in the provision of remote implementation, upgrade and support services (including after-hours support), **TriTech will not accept key generating devices (tokens) for security access.** Customers that use password generating devices will hold these with the IT staff or the dispatch supervisor who can then provide access to TriTech staff when necessary.

CHAPTER 3 - SYSTEM COMPONENTS

Note: The hardware requirements outlined in this section may have alternate recommendations for customer's operating systems under a significant load. The term "Large Site" or "Large Sites" is used to describe such systems. Large Sites are those with forty (40) or more CAD workstations in regular use, with 200 or more on-duty units with AVL/mobile devices or heavy call volume (over 2000 incidents a day).

9. INFORM CAD DATABASE SERVER

The Inform CAD Database Server operates primarily Microsoft products – that is, Microsoft Windows and SQL Server. TriTech recommends against the use of other applications on the Inform CAD Database Server.

9.1 DATABASE SERVER OVERVIEW

9.1.1 DATABASE SERVER HARDWARE PLATFORMS

Inform CAD Database Server may be deployed in a single server environment, a clustered environment (for server redundancy), or on a fault tolerant platform.

- ▶ Single Server

Single server systems do not have an option for automatic system failover. The Hot Standby/Disaster Server solution described in a later section of this document can provide for a rapid manual failover to a back-up server for single server systems.

- ▶ Dual Server

TriTech has previously deployed two different dual server systems – Octopus and Microsoft Cluster Server (MSCS). TriTech no longer deploys these systems for new projects TriTech does not directly support either of these systems. If a customer elects to deploy this type of a software redundancy solution, they will need to provide or arrange for support of such a system.

- ▶ Inform CAD Fault Tolerant Server (Stratus ftServer)

TriTech offers fault tolerant server systems from Stratus. Fault tolerant systems offer hardware with no single point of failure – providing 99.999% hardware up time (not more than five minutes of unplanned hardware down-time in a year). The Stratus ftServers utilize Windows and SQL Server without the use of MSCS.

Note: Fault tolerant systems may still require periodic down time for OS, DB, and firmware upgrades. Customers should review the information on the Hot Standby/Disaster Server to be used in conjunction with fault tolerant servers to manage rolling upgrades of OS, DB, and firmware with minimal CAD down time.

Stratus offers an optional Active Service Architecture to allow for a process called Active Upgrade. This allows for splitting the Stratus server components when performing some forms of system maintenance. This allows the system to operate on one “slice” while working on the other slice. This option is described in more detail in Section 13.

Please contact your Account Executive (AE) for more information on server replacement options.

9.1.2 DATABASE SERVER HARDWARE REQUIREMENTS

- ▶ Database Server Processor
 - Small to Medium Sites: A minimum of one quad-core 2.26 GHz Intel processor or equivalent.
 - Large Sites: Should consider scaling processor speed up to two (2) quad-core processors.
- ▶ Database Server Memory
 - Low to Medium volume systems: Memory of 8GB of RAM is recommended.
 - Large Volume Sites: Should consider operating with 12GB or more of RAM.

Note: The amount of RAM assigned to the OS and DB will vary by the version of OS in use; 32bit vs 64bit. Please carefully review the Microsoft documentation prior to purchasing or attempting to configure additional RAM for a SQL Server.

- ▶ Database Server Disk Space

Hard drive requirements vary with the size of the customer's code files and streets database, the use of interfaces such as AVL, and the volume of incidents managed annually. TriTech utilizes a formula for estimating disk space for new systems – however, the most effective method for analyzing future hard disk needs is periodic analysis of the size of your system's database and its growth over time.

Inform CAD SQL Servers typically have multiple disk drives split into several partitions. The recommended configuration is as follows:

- C: partition is on its own controller.
- D: data partition is on its own controller. The D: drive should only contain the MDF data files and the Inform CAD share.
- L: Log partition is on its own controller. The L: drive should only contain transaction logs (LDF) files.

TriTech suggests that system administrators ensure drive redundancy utilizing RAID or other technologies as appropriate to their site. Some system features can significantly impact disk space growth.

- AVL updates of unit positions.
Snapshot logging in some cases requires double the disk space of AVL logging – customers should carefully monitor their settings.
- The “Documents” functionality in 5.7 and above allows for adding documents as attachments to caution notes, premises and incidents. Extensive use of this feature can consume disk space quickly and should carefully be monitored.
- Activity Log growth can consume large amounts of disk space over time and should be monitored.

Note: Insufficient disk space is still one of the most common causes of system down events.

TriTech offers optional advanced tools for database management which provide for purging of the live database and archiving of this data on the Inform CAD Archiving and Reporting Server. Please contact your (AE)Account Executive (AE) for information on these new data management tools.

9.1.3 DATABASE RE-INDEXING

Re-indexing is of particular importance to your site. Database growth and the data archiving process can cause indexes to be progressively less effective. This affects the speed at which data is retrieved and ultimately slows down your system. TriTech recommends that customers re-index their system frequently. Large customers, especially those that aggressively archive data, should closely monitor data fragmentation and may need to re-index daily or weekly depending on the index fragmentation level and their performance requirements. When using SQL Server Standard Edition, the re-indexing process currently requires the system to be taken offline. This is especially important for sites that utilize the archiving feature of the Archive and Reporting Server and for high call volume sites. Depending on the level of fragmentation there might be a need to regularly take the system offline to perform a database reindexing maintenance to maintain an acceptable database performance level.

SQL Server 2008 Enterprise Edition introduces the ability to re-index your databases without taking the system offline and running a manual re-index— however, this important feature is only available in the Enterprise version.

Please note that even with the Enterprise Edition there are certain tables that cannot be re-indexed online due to limitations of SQL Server data types. Even though re-indexing online is an option with Enterprise Editions, some performance degradation may be experienced and as such, even online re-indexing operations should be scheduled around non-peak usage times.

Each customer will need to determine the relative value of this feature compared to the additional cost of the enterprise version of SQL Server. TriTech recommends that sites with a large number of workstations and/or high call volume implement the enterprise version of SQL Server in order to take advantage of this important capability.

TriTech has implemented a reindexing job that will run daily/weekly for each CAD database depending on the client's performance requirements. The job will defragment the indexes based on fragmentation threshold daily and rebuild the indexes weekly (Enterprise version will attempt to do Online indexing; Standard version will only defragment the indexes). It is recommended that job be implemented in low user activity window to limit the performance impact that the process may induce.

9.1.4 DATABASE SERVER AND DOMAIN CONTROLLER FUNCTIONS

TriTech does not support utilizing the Database Server as a Domain Controller. Doing so raises security and performance issues. Domain Controllers are typically run with a privileged account, which could conceivably allow an attacker access to the Active Directory. Running a Database Server on a Domain Controller can increase resource demands and degrade performance of the SQL Server. Finally, SQL Server is not supported on a read-only domain controller.

10. INFORM CAD BUSINESS/INTERFACE SERVERS

Inform CAD Business/Interface Servers (for most installations) operate a mixture of Microsoft and TriTech applications. With the availability of more powerful servers (with and without virtualization), there is now an opportunity to consolidate server based applications and servers used for your Inform CAD-Inform System. For customers desiring to minimize the number of physical servers, TriTech recommends the use of more powerful servers for Inform CAD Business/Interface Servers – we refer to these as Multi-Application Servers (specifications below). Standard servers can be utilized (specifications below), but more resources may be needed to operate the system.

TriTech has successfully implemented systems with either dedicated physical servers or consolidated server based applications onto limited, but more powerful servers. The decision will be based upon the customer's particular goals for system administration costs, redundancy, and impact to the operation. Remember to consider that a single server running multiple applications (interfaces or mobile applications) may prompt all of the applications to be stopped when troubleshooting a problem with a particular application, rebooting the server or applying OS patches to the server.

For Inform CAD Business / Interface Servers General Hardware recommendations refer to the TriTech Hardware Specification Guidelines.

10.1 CD / DVD DRIVE

Many recent model servers do not have CD / DVD drives by default. When planning server replacements, make sure that one or more servers for your Inform CAD network will have CD / DVD drives.

10.2 INFORM WEB SERVER

Inform CAD has several related software applications/services that are web-based. These include Inform Browser and Recall. These applications and services operate through Internet Information Services (IIS).

- ▶ **Inform Browser** operates under the control of Inform CAD Security and provides access to unit and incident information and selected Inform CAD functions (such as paging, messaging, and basic rostering). It displays in Internet Explorer. Inform Browser utilizes Microsoft .NET technology. This server also operates the Remote Processor that is needed for Browser Rostering and Call-Taking functions.
- ▶ **Inform CAD Recall** works as a component of Inform CAD 5.7 and provides information displays to support certain CAD functions. It utilizes Internet Explorer technology, but displays in its own form on the Inform CAD workstation. Placing the Web Server with Inform CAD Recall installed into the DMZ is not a supported configuration due to security concerns
- ▶ **TriTech Media Service** – FTP Component needed for Document Attachment feature in 5.7. If the customer will utilize the Document Attachment feature (specifically streaming video), disk space for this server should be carefully monitored and expanded as needed. Placing the Web Server with TriTech Media Service installed into the DMZ is not a supported configuration due to security concerns.

Each of these web-based functions is supported by a Inform Web Server operating Internet Information Server (IIS Server) with IIS 6 Management Compatibility. These can be supported from the same server in most cases - with volume and security being the primary factors.

10.2.1 INFORM BROWSER NETWORK CONFIGURATION

The Inform Browser server needs to reside on the CAD Domain in order to be installed or upgraded. Inform Browser can function as an Internet or Intranet application. However, Inform Recall and Web Services are not designed as secure Internet applications and should be limited to an Intranet environment. Therefore, the Inform Web Server for Recall and Inform Web services must be inside of the customer's firewall.

If Inform Browser will be accessible from the Internet, TriTech recommends that the Inform Browser server be placed in the Inform CAD trusted network and a reverse proxy be placed in the DMZ to proxy the request to the Inform Browser server. TriTech also recommends that a web certificate be created (self signed) or purchased by a trusted Certificate Authority to secure http traffic between the Inform Browser client and the Inform Browser server. TriTech has tested Microsoft IIS 7 Application Request Routing v3 to fulfill this recommendation.

10.2.2 INFORM WEB SERVER HARDWARE / THIRD PARTY SOFTWARE REQUIREMENTS

The Inform Web Server operates on a Standard Inform CAD Business Server with the installation of Internet Information Server (IIS) in IIS 6.0 compatibility mode.

Additional hard disk space may be needed for the FTP functions associated with the Documents and Attachment functions that are available in 5.7. Streaming video is stored on the Web Server through the FTP function. If this feature is utilized, disk space should be increased based upon customer use and these files should be backed up as part of the customer's daily data back-up program.

Note: Due to hardware constraints, some customers have operated their IIS server on the Inform CAD Reporting Server. For security reasons, Microsoft strongly recommends that IIS servers not be mixed with servers running other applications, such as SQL Server. TriTech recommends customers to plan for a separate server to operate as the Inform Web Server in the future.

10.3 UNIT SWAP/AUTO DISPATCH

A pair of optional CAD functions – Unit Swap and Auto Dispatch - operate with a server based architecture. These functions are running constantly and require significant processor capacity. These components can be co-located on a Business Server running VisiNet Service in Services for small to medium size sites. A dedicated server is recommended for Large Sites.

10.4 INFORM CAD REPORTING SERVER

TriTech now offers two types of Reporting Server (previously referred to as Data Warehouse), the Inform CAD Reporting Server and the Inform CAD Data Archiving & Reporting Server (both described in detail below). The Reporting Server is primarily used for reporting purposes.

- ▶ Inform CAD offers a configuration that allows retrieving Premise History, Incident Snapshot, and AVL Playback information from the Reporting Server and for searching for incidents through Incident Editor from the Reporting Server.
- ▶ Inform Browser allows for searches of Reporting Server data from the Incident Search, Unit History and Unit Activity functions. Additionally, the new Browser Drill-Down Reports can access Reporting Server data.
- ▶ Inform Mobile can also be configured to run some queries from the Reporting Server.

10.4.1 INFORM CAD REPORTING SERVER (DAILY RESTORE OF PREVIOUS NIGHTS BACK-UP)

The Inform CAD Reporting Server database (DB) is a copy of the customer's production databases. The reporting DBs are automatically backed up to a remote SQL Server and restored each night from a backup of the production databases. Once the reporting database is restored, report writers will be able to extract data to support management decisions using Third Party report writer applications (e.g. SQL Server Reporting Services, MS Access, Crystal Reports, and the like).

10.4.2 INFORM CAD DATA ARCHIVING & REPORTING SERVER – (SQL REPLICATION WITH COMPREHENSIVE DATA PURGING)

This version of SQL replication combines near real-time automatic duplication of the Inform Database data with comprehensive data purging. Comprehensive data purging allows the customer to remove data not needed for daily operations while retaining appropriate, contractual amounts of data (like 90, 180, or 365 days) to create a smaller, faster-reacting production database.

In the case where the Archive & Reporting Server is not the same version of SQL as the Inform Database server and Distribution database resides on the Archive & Reporting server; the Archive & Reporting server needs to be the higher version of SQL.

Note: The aggressive use of purging can increase the need for database re-indexing.

The purging tools are installed in a way that allows data on the destination (Subscribing) databases to build up over time for historical ad-hoc reporting purposes, while maintaining a smaller and quicker production databases for CAD operations. This functionality is achieved by keeping production database deletions from being carried out on the destination databases.

Note: The use of the Premise History look-up from the Reporting Server can make the production CAD susceptible to performance issues from the Reporting Server. Large or complex reports or queries on the Reporting Server can slow the retrieval of Premise History and slow the call-taking process for all users. Customers that do such reporting and desire to use the Premise History look-up from the Reporting Server should consider adding a second Reporting Server.

Note: When deploying an Archiving and Reporting Server it is important to plan for data backups of the databases on this server. Data that has been purged from the Production Database Server only exists on the Archiving and Reporting Server. Some customers have purchased a second Archiving & Reporting Server to allow other organizations to report on data. Previously this was allowed to be placed in the DMZ, for security reasons TriTech no longer recommends this configuration. There may be customers who need to place this second Archiving & Reporting Server in the DMZ, if that is the case the agencies do so at their own risk and against the recommendation of TriTech. Please refer to the firewall port recommendations earlier in this document for configuration settings needed for this product.

10.5 INFORM CAD TRAINING/TESTING SERVER

The Training/Testing Server is designed to allow clients to perform training or testing of new versions of Inform CAD and configuration changes. The OS version and DB version should match the production version. The only exception to this is when the customer is testing a new version of Inform with a new OS/DB configuration.

The Training/Testing System is an excellent setting to test new OS versions, security profiles and third party software prior to deploying in the production environment.

10.5.1 TRAINING/TESTING SERVER HARDWARE/THIRD PARTY SOFTWARE REQUIREMENTS

For small Training/Testing CAD networks with limited workstations, the Training/Testing Server can operate on a Standard Inform CAD Business Server with the addition of SQL Server. Disk space needs to be sized to accommodate the production databases and Inform CAD File Share. For larger Training/Testing systems, the server hardware may need to be scaled up in terms of both processor and RAM.

10.6 INFORM CAD INTERFACE SERVER

The Inform CAD Interface server supports TriTech interface applications. The number of applications that can be hosted on a single server will vary based upon CAD incident volume and the type of interfaces.

10.6.1 INTERFACE SERVER HARDWARE/THIRD PARTY SOFTWARE REQUIREMENTS

The Interface Server operates on a Standard Inform CAD Business Server.

Some high volume interfaces, such as AVL/mobile interfaces, may require higher processor and RAM requirements. Stratus is now offering a smaller fault tolerant server that may be applicable for mission critical interfaces. Please contact your Account Executive (AE) for additional information.

10.6.2 MULTIPLE INTERFACES PER INTERFACE SERVER

TriTech has successfully tested standard interface configurations in an environment where a number of the standard interfaces are running on a single server. Based upon the test results, our standard interfaces can successfully operate on a single server. With the availability of low cost fault tolerant computers, this presents an opportunity to reduce hardware and administrative costs while improving protection from hardware failure.

11. INFORM NCIC / STATE MESSAGE SERVER

Inform NCIC/State Message Server performs justice queries for law enforcement agencies including queries to state and federal law enforcement databases, local databases, such as courts and records management systems and the CAD database (BOLO). TriTech products, including CAD and Mobile, can activate queries and receive “returns” containing data from these various data sources.

12. INFORM CAD CITRIX SUPPORT

12.1 INFORM CAD CITRIX OVERVIEW

TriTech approves Citrix for use with remote Inform workstations over limited bandwidth WAN or wireless connections. TriTech created a special code path to support Citrix users and this is a separately licensed function. This special code path allows each of the Citrix workstations to manage their own separate messaging, view controller and other settings like a normal Inform CAD session.

The number of workstations that can be served is related to size and complexity of the CAD system and the capability of the servers, as well as the call volume.

12.2 APPROVED WINDOWS SERVER AND CITRIX VERSIONS

TriTech has approved the following versions of Citrix XenApp for Inform CAD version 5.7.

Inform Version	Windows Server Version (32 bit or 64 bit)	Citrix Server Version	Citrix Client Version
Inform CAD 5.7	Windows Server 2008 R2 Enterprise Edition SP1 Windows Server 2008 Enterprise SP2	Citrix XenApp 6.5 Enterprise or Platinum Edition Hotfix Rollup Pack 1	Clients 12.3
Currently Testing but not yet certified	Windows Server 2008 R2 SP1 Windows Server 2012 R2	Citrix XenApp 7.6 Enterprise or Platinum Edition	Receiver 4.2

Note: TriTech does not currently support the use of Citrix with PowerPhone CACH, or Pictometry.

Note: TriTech now supports the use of Citrix with ProQA Paramount, see the Inform Product 5.7 Release notes for installation and configuration instructions.

Citrix is licensed by the workstation with each workstation needing a license for both Citrix XenApp Server and Windows Terminal Server 2008 CALS/Remote Desktop Services 2012 CALS (Citrix runs “on top” of Terminal Server). Each workstation also will need an Inform CAD license.

12.3 INFORM CAD CITRIX SCALABILITY

The scalability of Citrix with Inform CAD was tested for 1) the number of workstations that can be supported per Citrix Server and 2) the per workstation bandwidth needed to communicate with the Citrix Server.

The approved Inform CAD Citrix Server (with the specifications listed below) supports 8-12 Inform workstations for a small to medium size site. Large Sites should adjust the number of workstations down to (5-8) and test the configuration before implementing. Large Sites should test the configuration under load before implementing and adjust the number of workstations down where applicable.

TriTech recommends the use of the Platinum or Enterprise Edition of Citrix XenApp in order to take advantage of a setting called CPU Utilization Management. This setting prevents individual users and processes from taking too much CPU at any given time. This setting is only available with the Platinum, Enterprise, and Fundamentals editions of Citrix (TriTech has tested the Platinum edition).

Additionally, TriTech recommends that hyper-threading for processors be activated on Citrix Servers for Large Systems or sites attempting to have 8 or more simultaneous users.

12.4 INFORM CAD CITRIX BANDWIDTH REQUIREMENTS - WORKSTATIONS

The bandwidth needed to operate CAD in this configuration is a minimum of 128Kbps (bandwidth) per Citrix Inform client. It may be possible to operate with less than 128Kbps through the use of an accelerator device. Based upon these estimates, up to 12 Citrix Inform users could connect via a T1 connection (1.544Mbps).

Please note that Inform CAD Queue displays can affect bandwidth and the frequency of updates and bandwidth consumption. This would include countdown timers (time since status change) and the like. Please consider your bandwidth when enabling new features that will affect the frequency of Citrix updates.

Large Sites with complex mapping displays particularly with Geo may require additional bandwidth beyond 128Kbps.

12.5 INFORM CAD CITRIX SERVER CONFIGURATION

12.5.1 STANDARD INFORM CITRIX SERVER

TriTech recommends only one level of server for Citrix utilization for Inform CAD. This recommendation has evolved from previous recommendations based upon more information from testing in TriTech's lab as well as operations at customer sites.

The approved Citrix Server supports 8-12 Inform workstations for small to medium size sites. Large Sites should adjust the number of workstations down to (typically to 5-8) and test the configuration before implementing or increase the server processor/memory.

Note: Additional processor and RAM is often needed to extend the number of workstations. Hyper-threading is recommended if attempting to operate 8 or more workstations on a server.

12.6 INFORM CAD CITRIX SERVERS AND UPGRADES

During an upgrade of CAD software (versions, service pack and patches), all users have to exit from that specific CAD Citrix server in order for the upgrade prerequisites to take effect, and run "TriTech.Launch" from the desktop of the Citrix server to pull down new software components from the database server. Sites should plan for sufficient server capacity to allow for continued operation during an upgrade. This can be in the form of additional production Citrix servers or the ability to re-point a test/training Citrix server on a temporary basis to production.

Sites with a single Citrix server will need to plan for some downtime during an upgrade.

12.7 INFORM CAD CITRIX SERVERS AND SEPARATE ENVIRONMENTS

CAD Citrix servers can only operate on a single environment – that is, a CAD Citrix server can be on the production system or the test/training system, but not both at the same time. The Multi-Environment selector does not work with Citrix servers as the CAD users on a Citrix server are effectively sharing the same software and connections to a single environment. Therefore clients should plan for separate Citrix servers for test/training and disaster recovery.

12.8 INFORM CAD CITRIX WORKSTATION

Citrix workstations should generally be the same hardware specifications as the standard for the same version of Inform CAD with the following differences:

1. Citrix workstation needs to be added to the Machine_Info table of the System database.
2. Citrix workstations do not require Inform CAD Prerequisites from the Prerequisite CD.
3. Citrix workstations do not require Power User windows permissions. They should have the permissions necessary for them to interact with the Citrix server.

12.9 INFORM CAD CITRIX USER TROUBLESHOOTING

Citrix users should be trained on how to utilize the Citrix Connection Center to manage problems with their Citrix session. This can be accessed from the Citrix icon in the Windows tray.

13. INFORM CAD AND INFORM MOBILE BACK-UP SERVER AND DISASTER RECOVERY OPTIONS

Inform CAD and Inform Mobile Systems have a variety of options for deploying back-up and Disaster Recovery. For Inform CAD, these include 1) for Stratus customers, the use of the Active Service Architecture; 2) on-site Hot Standby Servers; and remote Disaster Recovery Systems. Mobile can be configured with a remote Disaster Recovery site option that can be managed manually by the System Administrator or have automated updates through TriTech approved Disaster Recovery Software.

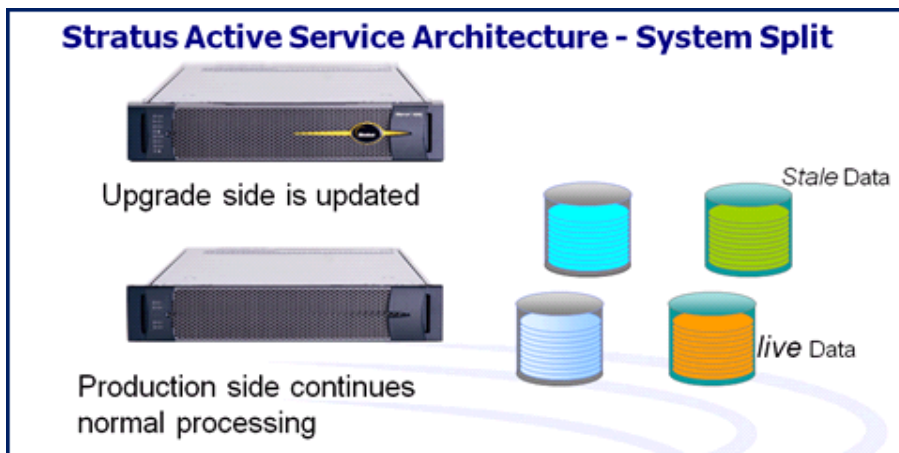
13.1 STRATUS ACTIVE SERVICE ARCHITECTURE

Note: This information includes proprietary information from Stratus Technologies.

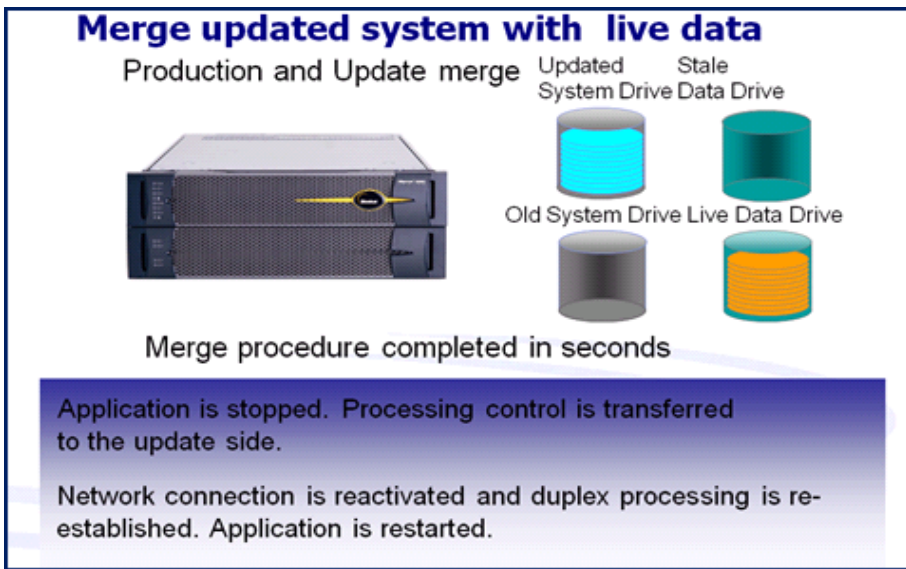
Newer models of Stratus can be ordered with an optional Active Service Architecture from Stratus that allows for Active Upgrade. This process allows a system administrator to “split” the two operating Stratus slices while continuing to operate the system. As noted in the following diagram, one slice continues to operate and updates system databases. The offline slice can have OS and firmware updates performed.

Note: SQL Server updates are not recommended as these may impact database formats and may cause problems when the data is resynchronized. While many OS updates can be performed (patches, service packs or versions), some changes by Microsoft can require Stratus firmware updates. Whether you use Active Update or not, always consult with Stratus regarding OS updates prior to implementing them on your system.

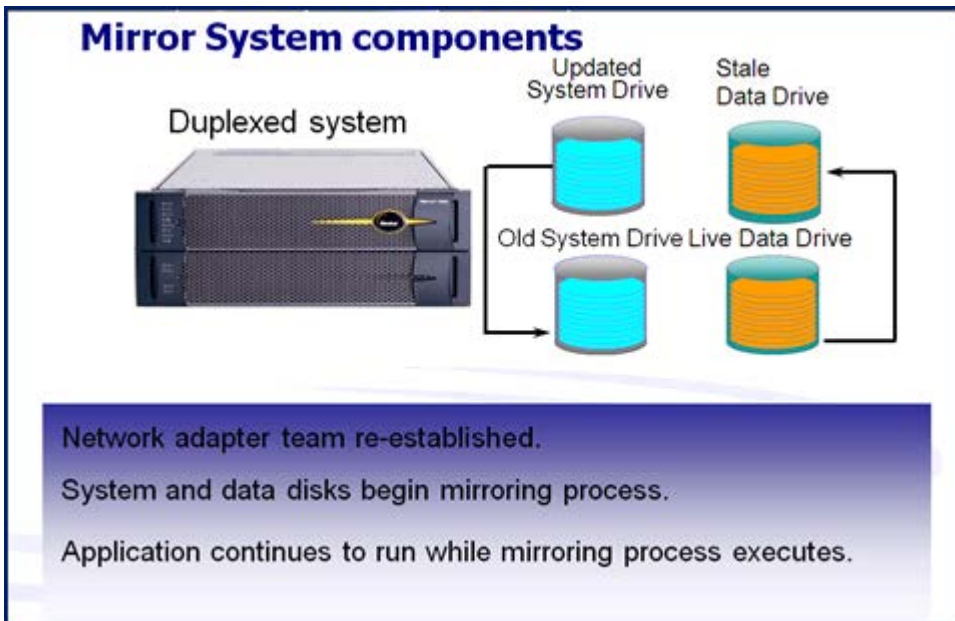
When the split occurs between the slices, Inform CAD does not need to be taken down. Users can continue to operate. During this time, the Stratus system is not fault tolerant. Therefore, System Administrators should limit the time planned for the system to run in this mode. This is illustrated in the diagram below:



When the update work is complete, the slices are remerged, the Inform CAD System will have to be taken down and restarted.



The System Drives (with the OS and firmware updates) are synchronized as are the Data Drives. This normally takes only a short time, but can be longer depending upon how long the system was operated in split mode.



Please consult your Stratus representative before attempting to perform an Active Upgrade.

13.2 INFORM CAD HOT STANDBY/DISASTER SERVER

TriTech has approved a third party Disaster Recovery software that is used to automatically update Inform CAD Database information and Inform CAD File Share information between the production database server on either an on-site Hot Standby Server (HSB) or remote Disaster Server.

13.2.1 INFORM CAD HOT STANDBY

An on-site HSB acts as a replacement for the production database server. This provides an on-site redundant server for those sites that operate standard servers and a third level of redundancy for sites that operate Stratus fault tolerant servers. The HSB Server reuses the production server's business server(s) and workstation(s) and there are minimal manual configurations that have to be executed on the production database server, such as database consistency check. This is facilitated by the Disaster Recovery Software Arcserve High Availability's (HA) ability to update the DNS record of the production server in DNS. The update of the DNS record allows the business server(s) and workstation(s) to continue to point to the production database server's host name and launch CAD.

At this time, TriTech configures the system for manual intervention to initiate a failover. The System Administrator can do manual activation of the failover process remotely. The TriTech.Launch icon on the workstations and interfaces are pointed to the HSB database server's name and no workstation change or re-direction is needed after a successful failover to the HSB Server. Once the manual server failover has been activated, the Inform CAD workstations and interfaces are restarted. To failback – the replication between the Master and Replica is reversed and another failover is manually triggered once the two servers are back in sync. The system is then reset to the original configuration to synchronize files and data.

While the Stratus Active Service Architecture would be the recommended method, the HSB Server has been tested to allow for rolling upgrades of OS service packs and server firmware on the primary server. This would reduce system downtime during such scheduled upgrades to a few minutes. Upgrades of full OS versions may be so extensive that a rolling upgrade may not be possible in all situations. Please contact TriTech for additional information regarding specific OS versions.

13.2.2 INFORM CAD DISASTER SERVER

A remote Disaster Server acts as a replacement for the production database server. This provides an off-site redundant server, but the system requires its own set of business server(s) to operate the system from the remote site.

The WAN connection between production and Disaster Server sites should be a minimum of T1 (1.544Mbps) speed to allow for the timely update of files and data. This is only for the data update and is not sufficient bandwidth to operate a substantial number workstations and interfaces from one site connected to another.

At this time, the system will be configured for a manual intervention to activate a failover. Manual activation of failover can be done remotely by the System Administrator.

There are manual steps that are needed to activate a remote Disaster Center. TriTech will configure Arcserve to perform many of the manual steps such as copying preconfigured files and executing batch files. These are based upon the need to change certain database and file settings before the system can be activated. These settings can be pre-configured in advance to allow for a simplified process for the System Administrator. These include the following:

- ▶ Preconfigured Files – These files must be preconfigured for the Disaster System and should be stored on the Disaster Server. Arcserve post failover will copy the files into their respective location in the Inform CAD File Share.
 - Launch - Maintaining a preconfigured Launch

- TriTech Config.
- System Ini
- ANIAI1.ini (if necessary)
- ▶ ISQL Files - TriTech will preconfigure ISQL files that can be stored on the Disaster Server and are executed via batch files. These will activate functions within SQL Server that will update server configuration information that is stored within the Inform CAD databases. There are two different ISQL files that need to be run before activating the system.
- ▶ Manually execute a database consistency check. (Optional)

Once the manual server failover has been activated and the previous steps are completed, the Inform CAD workstations and interfaces are restarted based upon the applicable restart checklist.

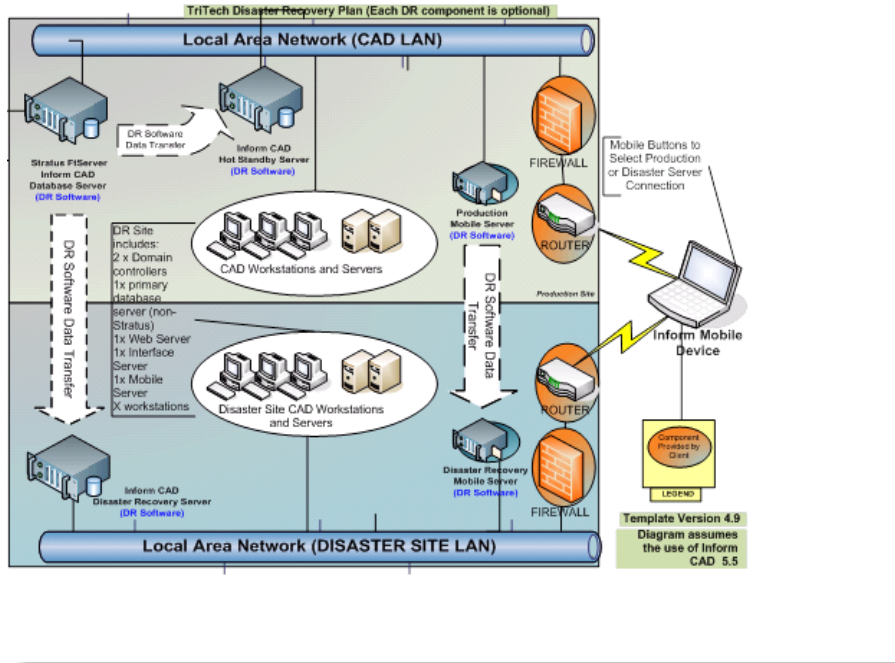
To failback, the replication between the Master and Replica is reversed and another failover is manually triggered once the two servers are back in sync. The same steps have to be followed when failing back to the production system. The system is then reset to the original configuration to synchronize files and data.

13.2.3 INFORM MOBILE

A remote Disaster Recovery Mobile server acts as a replacement for the production Mobile server. This provides an off-site redundant server which can only be activated against the Disaster Recovery Inform CAD server. The Disaster Recovery Mobile server can be deployed in two methods:

1. The first method is with the use of Arcserve HA, the production Mobile database and directory can be synchronized with the DR Mobile server in real time. Any updates to the Production Mobile server such as adding a device, modifying a HTML page, changing a Mobile database setting is automatically synchronized with the DR Mobile Server. The failover process with the use of Arcserve HA in this configuration is a manual process. During the failover process, Arcserve HA will copy configuration files to their respective locations in the Mobile directory. To failback, the replication between the Master and Replica is reversed and another failover is manually triggered once the two servers are back in synch. The system is then reset to the original configuration to synchronize files and data.

- The second method is without the use of Arcserve HA. In this configuration, all Disaster Mobile server configuration files are configured to launch against the Disaster Recovery Inform CAD server. There is no manual failover process nor are changes performed on the Production Mobile server being sent to the Disaster Recovery Mobile server. As a result, any changes to the Production Mobile server such as adding additional devices, modifying HTML files, or changing Mobile database settings have to manually be performed against the Disaster Recovery Mobile Server.



13.3 HOT STANDBY/DISASTER SERVER BEST PRACTICES

The Hot Standby/Disaster Server data may not be actively utilized for reporting purposes (like a Reporting Server) when it is in the Target mode. Additionally, replication may need to be restarted after each server failover.

The system has been tested through both LAN and WAN connections. The network connectivity for LAN or WAN should be 100Mbps or greater.

TriTech has identified some challenges related to customer use of Arcserve for Disaster/Hot Standby Server functionality. These best practices have been developed to prevent problems with this system.

Recommended Actions:

- Always perform synchronization prior to failing back to the production database server.
- Do not failover to your Hot Standby Server in order to do database maintenance. Arcserve works by copying data from the disk level. Changes made to your offline database – including reindexing or database defrag – will be overwritten when you resynchronize your servers.
- If you have problems with a failover or a failback, please contact Technical Services, including after hours. Do not attempt to failback and forth between servers if you have a problem as you may damage your most current database if you have missed a step or had an interruption in the process.
- Always contact Technical Services before elective failovers. This will allow for the designation of a configuration engineer in advance to support you if a problem is experienced.
- For elective failovers, have users exit CAD and stop interfaces before the cutover.
- Follow the Arcserve maintenance document before you apply Microsoft updates, SQL service pack, or hot fixes.

13.3.1 DISASTER/HOT STANDBY SERVER HARDWARE/THIRD PARTY SOFTWARE REQUIREMENTS

Disaster/Hot Standby Server hardware and third party software should match the Production Database Server. Please contact your Client Account Manager for more information on implementing Arcserve HA.

14. INFORM CAD WORKSTATIONS

Inform CAD Workstations operate a mixture of Microsoft and TriTech applications. Optimal performance and functionality requires adherence to hardware, software and configuration standards.

14.1 STANDARD INFORM CAD WORKSTATION CONFIGURATION

- ▶ Computer configuration: Business workstation class machine
- ▶ Processor: One dual core 2.0 GHz or faster processor minimum
- ▶ RAM: 4GB recommended
- ▶ Disk: 120 GB minimum
- ▶ Operating System: Windows 7 (32 or 64-bit) or Windows 8.1 (32 or 64-bit)
- ▶ Supporting Software Components: Specific to the type of application or software service being operated. Review the TriTech release notes and version documentation.

Note: TriTech issues CDs that facilitate the installation of software prerequisites of for interface servers and CAD workstations.

In order to deploy Inform CAD on OS versions within the mainstream support cycle for windows, TriTech will be routinely moving to newer OS versions. **In anticipation of an evolving OS environment, customers are encouraged to budget for workstation hardware replacement every three years.** Many customers now buy new hardware for the dispatch center and rotate older dispatch center equipment to stations or headquarters for administrative use.

Note: TriTech recommends a clean installation of an OS version rather than upgrading between major OS versions.

15. INFORM BROWSER WORKSTATIONS

Inform Browser operates on a variety of Windows OS platforms. It requires the applicable version of Microsoft Internet Explorer for the version of Inform Browser. The workstation needs to be configured with the Windows OS compatible with the customer's network and which will operate the required version of Internet Explorer (9.0 or higher). Please refer to Inform Browser documentation for specific Internet Explorer and security settings.

16. INFORM GISLINK WORKSTATIONS

Inform GISLink Workstation.

- ▶ Computer configuration: Business workstation class machine
- ▶ Processor: One dual core 2.0 GHz or faster processor minimum
- ▶ RAM: 4GB recommended
- ▶ Disk: 120 GB minimum
- ▶ Operating System: Windows 7 (32 or 64-bit) or Windows 8.1 (32 or 64-bit)
- ▶ Supporting Software Components: Specific to the type of application or software service being operated. Review the TriTech release notes and version documentation.

Inform 5.7 Prerequisite CD needs to be run on the GISLink Workstations. The Prerequisite CD will install needed software such as ArcGIS Engine Runtime Version 10.2.

Please refer to Inform GISLink documentation for specific prerequisites as versions change.

17. INFORM MOBILE

17.1 MOBILE SERVER OVERVIEW

The Inform Mobile Server provides the functionality necessary for interaction between Mobile workstations and is the integration point between other systems such as Inform CAD (along with the Mobile interface) and for the Inform NCIC/State Message Server.

17.1.1 MOBILE SERVER CONFIGURATION

- ▶ Operating System: Windows Server 2008 SP2 (32-bit), Windows Server 2008 R2 SP1 (64-bit), Windows Server 2012 R2 (64-bit)
- ▶ Supporting Software Components: Specific to the type of application or software service being operated. Review the TriTech release notes and version documentation.
- ▶ Database Management: SQL Server 2008 R2 32 bit or 64 bit SP1 Standard, Enterprise, or Express Edition, SQL Server 2012 SP1 64 bit Standard, Enterprise, or Express Edition.

17.2 MOBILE INTERFACE SERVER

- ▶ Operating System: Windows Server 2008 SP2 (32-bit), Windows Server 2008 R2 SP1 (64-bit), Windows Server 2012 R2 (64-bit)
- ▶ Supporting Software Components as distributed on the specific version Prerequisite installation media.

The Inform Mobile Interface server supports the interaction between Mobile users and Inform CAD. The Mobile Interface Server operates on a standard Inform CAD business server/interface server.

For small Mobile systems (less than 75 units or less than 75), the Mobile Interface can successfully be co-located on the same server as the Mobile Server.

For medium Mobile systems (less than 400 units or less than 400 incidents), the Mobile Interface server needs to reside on its own business class server.

For large Mobile system (greater than 400 units or greater than 400 incidents), two separate Mobile Interface servers need to reside on separate business calls servers. The current maximum concurrent users per Mobile interface are as follows:

- ▶ Law Agencies: 150 Units
- ▶ Fire / EMS (alone or combined): 250 Units

A Mobile Server can be linked to multiple Mobile Interfaces. This is done when the number of concurrent users exceeds recommended levels for a Mobile Interface.

17.3 MOBILE WORKSTATION REQUIREMENTS

Inform Mobile Workstations operate a mixture of Microsoft and TriTech applications. Optimal performance and functionality requires adherence to hardware, software and configuration standards.

17.3.1 STANDARD INFORM MOBILE WORKSTATION CONFIGURATION

- ▶ Computer configuration: Business workstation class machine or business class or ruggedized laptop.
- ▶ Processor: One 1.06 GHz or faster processor minimum
- ▶ RAM: 2GB recommended
- ▶ If other applications are going to run on the workstation, TriTech recommends additional RAM on the workstation.
- ▶ Disk: 12 GB minimum
- ▶ Operating System: Windows 7 SP1 (32 or 64-bit) or Windows 8.1 (32 or 64-bit)
- ▶ Supporting Software Components: Specific to the type of application or software service being operated. Review the TriTech release notes and version documentation.
- ▶ Other requirements:
 - 800x600 pixel minimum display; 1024x768 recommended. Touch screen computers are recommended.
 - Wireless access - commercial wireless or IP enabled radio system. It is important that you review the capabilities of your wireless/radio system with TriTech before initially deploying Mobile or making post-Go-Live changes.
 - Ethernet connectivity or CD drive for initial installation.

17.4 MOBILE SERVER AND INTERFACE NETWORK CONFIGURATION

TriTech requires that both the Mobile Server and the Mobile Interface Server(s) be located inside of the firewall within the secure CAD network.

The Relay server can be deployed in the DMZ, allowing all Mobile clients to connect to the Relay server while the Mobile Server is located within the secure CAD network.

18. INFORM CAD – INFORM COMPONENT VIRTUALIZATION

TriTech has approved the use of a Hypervisor product to host specific business and interfaces servers utilized with the Inform CAD and Inform product suite.

Approved Virtualization Product

TriTech has approved VMware's vSphere ESXi as a supported hypervisor for Production use with the Inform CAD suite. Support for the vSphere Hypervisor will be through VMware. Customers should ensure that their personnel have been trained in the installation and management of this software and that software support and services has been purchased for this system.

<http://www.vmware.com/support/>

The following servers are approved for virtualization:

- ▶ Inform CAD
- ▶ Inform Archive & Reporting server(s)
- ▶ Citrix server running Inform CAD
- ▶ Business/Interface servers such as:
 - ANI/ALI
 - Paging
 - Inform CAD Web Server
 - Inform CAD Browser Server
 - Inform CAD Mobile Server

Note: Some interfaces may require a Serial port to connect an interface to a third party vendor such as the Zetron Station Alerting Interface. TriTech has successfully used PortServer by Digi to connect high-speed serial ports to any TCP/IP Ethernet Network.

During testing of a virtual Citrix server under simulated load, TriTech determined that a single Citrix user uses approximately the resources of a physical or hyper-threaded processor on the physical host. For a small deployment of Citrix users, a virtual Citrix server may be sufficient but for a large deployment of Citrix users, physical hardware is recommended.

TriTech tested and approved Arcserve HA as the Disaster Recovery software solution. Some TriTech clients have opted to use VMware SRM in conjunction with SAN to SAN replication as their DR solution. TriTech will work with our clients on a consulting basis to assist with the failover process and testing. Maintaining the failover process and solution is the responsibility of the client.

The free version of vSphere ESXi is approved for Training/Testing systems. However please note there is no support from VMWare available on the free version.

Customers electing to deploy vSphere ESXi in their Production environment should carefully assess server capacity and should perform a limited rollout of VMware Server with a preplanned roll-back strategy. It should be understood by the customer that when planning a virtual solution, performance for a VM is measured in MHz and MB of RAM. Although a single virtual 2.26GHz CPU may be allocated to the VM, the server will only consume the amount of vCPU resources needed to perform its task. However, great care must be taken to not over-subscribe host server resources to VMs as performance issues will likely be incurred. TriTech also recommends the use of Shared Storage.

Customers should also be aware of software licensing models. Understand how VMware licenses their product as well as the benefits of using Microsoft Data Center licensing 2012 VS Windows Server 2012 Standard licensing.

With proper planning and server capacity, vSphere ESXi can be used effectively in a Production environment. TriTech has not tested Microsoft's Hyper-V Hypervisor solution. Customers who are comfortable with Microsoft's Hyper-V solution can deploy it at their own risk.

19. CLIENT VIRTUAL DESKTOP INFRASTRUCTURE (VDI)

TriTech is working on a standardized and TriTech supported VDI solution utilizing VMWare Horizon View. Until a solution is fully developed, customers desiring to implement VDI should work directly with TriTech Systems Architects to design a TriTech supported solution on a case by case bases.

20. COMPATIBILITY WITH THIRD PARTY PRODUCTS

Customers often want to operate Third Party software applications on the same workstation as their TriTech software products. Some TriTech applications are more tolerant of Third Party products – such as Browser workstations or Citrix Inform CAD workstations. Inform CAD workstations and Inform Mobile workstations should be treated more carefully for Third Party product compatibility. Inform CAD workstations are particularly sensitive to a specific operating environment due to the need for high volume traffic between workstations and servers and because of the time sensitive nature of dispatch. Third Party products can introduce changes to that environment that can cause unexpected results.

TriTech does test some popular Third Party products for collocation with Inform CAD Command such as ProQA and its sister products and Microsoft Office. But it is impractical to attempt to test every product requested by TriTech's customers. TriTech also recognizes that customers have valid needs to use some Third Party products.

For these reasons, TriTech has developed a process that will allow customers to take responsibility for testing and utilizing Third Party products with Inform CAD Command workstations and Inform Mobile workstations. This process does not mean that TriTech will support Inform CAD or Inform Mobile with these Third Party products. If a problem occurs, TriTech may request the removal of the Third Party product in order to resolve the problem or rule out a conflict. But this process does provide a relatively safe method for customers to test and safely utilize Third Party products. Many customers have successfully utilized this process.

If the customer desires to load Third Party software (not required by Inform CAD) on a CAD workstation, such as office automation software like Microsoft Office, the customer should first review the applicable Inform CAD release notes for compatibility information (i.e., ProQA, Microsoft Office). If information is not available, the customer should contact the TriTech Technical Services department to determine if compatibility information is available for this specific type of software.

20.1 THIRD PARTY PRODUCT COMPATIBILITY TESTING PROCEDURE

If no compatibility information is available, the customer is responsible for making a determination regarding loading of the Third Party software. Inform CAD or Mobile problems caused by the Third Party software are not covered items under the support agreement. If the customer assumes responsibility and elects to proceed with the installation, TriTech recommends that the customer successfully complete a recent Inform CAD System Administration course and be competent in the installation and reinstallation of Inform CAD Software at the workstation level. When the customer has this foundation of technical skills, the following procedure is recommended for testing a Third Party software application:

1. Select a single workstation for testing purposes. The workstation should not be needed for use in dispatching purposes.
2. Load the new application following installation instructions from the manufacturer. Reference applicable TriTech Technical Advisories for known conflicts (e.g., Crystal Reports versions) with components that are used by Inform CAD to determine what optional items may be installed.
3. Following the installation, restart the workstation. Review the information in Add/Remove Programs paying particular attention to common prerequisites to make sure newer versions have not been installed by the Third Party software. Uninstall inappropriate supporting components (MDAC, MSXML, .NET Framework and the like). Reinstall the applicable version of prerequisites and review ODBC connections.

4. Launch the applicable TriTech application (Inform CAD or Inform Mobile) and test both the TriTech application and the Third Party application for functionality. If there are Inform CAD or Mobile problems, consider uninstalling Inform CAD or Mobile (remember to not leave components in the Recycle Bin) and reinstalling. If the two applications are working properly, run the single workstation for one to two weeks to determine if problems occur under load. If no problems occur, consider loading the Third Party software on additional workstations as part of a phased roll-out.

Please note that compatibility may change with each version release of Inform CAD/Mobile or with new versions of the Third Party software as dependent components change. Therefore, the Third Party application may not work with an upgrade and may need to be uninstalled by the customer to troubleshoot Inform CAD problems. Additionally, performance issues may occur with all applications if the customer adds additional applications without adding additional memory.

Note: One of the most common problems affecting Inform CAD performance are errors related to workstation or network configurations. Errors occurring during computer start-up from Third Party applications can negatively affect Inform CAD functionality and performance.

20.2 TRITECH SUPPORT OF THIRD PARTY PRODUCTS

TriTech's support agreement covers software developed by TriTech (such as Inform CAD, Inform Mobile, Interfaces, special database tools, WebView and Voyager products). The base support agreement does not cover support for third party products, including third party hardware and software (such as Microsoft). More specifically, any third party hardware or software defects or upgrades, as well as network setup, domain management, and base mapping data is not covered under TriTech's standard support agreement.

To assist customers with specific needs, TriTech has implemented custom support agreements to provide support for some third party hardware and / or software. For example, for some customers TriTech has contracted to be first point of contact for help desk and issue tracking for third party products, such as Fire RMS, Police RMS, and the like. For other customers, TriTech has contracted to provide direct support for selected hardware products, including cases where we contract with a local vendor to maintain the customer's hardware. If you are interested in such a custom support program, please contact your Account Executive.

20.3 VIRUS PROTECTION SOFTWARE CONFIGURATION

TriTech strongly recommends the implementation of Virus Protection software with TriTech systems including Inform CAD, Inform Mobile and Inform RMS.

This includes but is not limited to the servers, workstations, and Mobile MDC units. The implementation of Virus Protection software can have a significant impact on the operation and performance of software systems including the noted TriTech systems. Therefore, the Client should carefully follow these guidelines when deploying or upgrading Virus Protection software. Depending on how it is implemented, Virus Protection software has been known to cause problems on networks such as performance degradation and dropped Inform CAD inter-process messages which can result in out-of-sync workstations. Additionally, improper scanning activities for viruses can negatively impact Microsoft's SQL Server and other third party software including Computer Associates (CA) Arcserve RHA.

TriTech has provided the following recommendations to assist system administrators with the implementation of Virus Protection software to minimize the risk of virus infection as well as to minimize performance degradation as a result of virus scanning activities. These recommendations are provided as a reference point for the initial installation and are not necessarily all-inclusive. As with most technologies, additional or ongoing configuration is required to achieve optimal performance. It is important to emphasize that the improper implementation of Virus Protection software can impede a system's performance.

20.3.1 PLATFORM SPECIFIC RECOMMENDATIONS

1. For all Windows OS-based equipment in your system, please follow the Microsoft guidelines which can be found at <http://support.microsoft.com/kb/822158>.
2. For all servers running Microsoft SQL Server, please follow the recommendations in the Microsoft article “Guidelines for choosing antivirus software to run on the computers that are running SQL Server” at <http://support.microsoft.com/kb/309422>.
3. For customers using Arcserve RHA (an CA software application), CA recommends that the “%windir%\CASpool” (folder and all of the folders or files that are being synchronized by Arcserve must be excluded from active and scheduled virus scans. This includes the TriTech file structure on the server.
4. If your system uses Microsoft Cluster Server, please consult with your Virus Protection software vendor to determine its compatibility with Cluster services. Because Virus Protection software drivers reside above the file system, they may not properly address the nuances related to a clustered environment. For more information on this topic, please refer to: <http://support.microsoft.com/kb/250355>.
5. If you use Microsoft Access for reporting, do not scan these database files while in use as they too can be corrupted by active virus scanning. For more information see Symantec Document ID: 2002091913503748 on their website.
6. Customers utilizing VMWare products should consult the VMWare best practices for additional Antivirus and Security. For more information see VMWare websites:
<http://kb.mit.edu/confluence/display/istcontrib/VMware+Security+Recommendations+and+Best+Practices>
<http://www.vmware.com/files/pdf/VMware-View-AntiVirusPractices-TN-EN.pdf>

20.3.2 GENERAL VIRUS PROTECTION RECOMMENDATIONS

1. The frequency for Virus Definition file updates should be configured to run daily. Virus Definition files are essentially databases that hold information pertaining to viruses. The updating of both the Virus Definition files and the Virus Scan engine should be permitted. This is considered a best practice.
2. Machines should scan only their local drives (not network drives); therefore, do not set active or scheduled scanning of the Inform CAD Q: drive other than the server hosting the file share.
3. Virus Protection software needs to be disabled when software updates occur, whether the updates are from Microsoft, TriTech, or any other software vendor. This will prevent file locking problems from occurring and is considered a best practice.
4. Port activities within the Virus Protection software have to be managed, for example, you would want to allow VNC packets to be sent and received without each packet being scanned. Disrupting VNC packets could impede the VNC application and slow the network.
5. The implementation and management of Virus Protection software requires regular monitoring of security related websites for the purpose of staying informed on virus threats, technical tips, and security related advisories. Please monitor your Virus Protection software provider’s site. Other reference sites include the following:
 - a. <http://us.mcafee.com/virusInfo/default.asp>
 - b. <http://www.sarc.com>
 - c. <http://www.cert.org>
6. Other management activities include the regular review of Virus Scan log files for each computer, which contain statistical information about the scanning activities on that machine.
7. Another important consideration is the implementation and management of Firewall and IP Ports. Many security breaches can be prevented through effective IP Port management, for example, IP Ports should be closed except for the ones being used. Often this is not the case, as many systems are vulnerable because most IP Ports are open. Please refer to the firewall port recommendations earlier in this document for configuration settings needed for this product.

8. As with any network/system change, it is a good practice to install the software initially on a limited number of computers and then monitor for performance or any other anomalies that were not occurring prior to the installation of the software. Monitor for a one to two week period of time. If everything appears to be fine, deploy on the rest of your system and monitor for problems.

20.3.3 SCHEDULED VIRUS PROTECTION RECOMMENDATIONS

1. Definition files should be updated before the scheduled scans are started.
2. Nightly scans should be configured so that they do not interfere with normal call activity or the nightly maintenance routines (i.e. Backups, etc.).
3. All TriTech folders and files can be scanned during a scheduled virus protection scan. This includes the Inform CAD file structure on the File Server, and the TriTech folder and all of its subfolders on business servers and workstations, the Inform CAD file structure on Mobile Servers, and the Inform RMS file structure on Law RMS Servers and Workstations. As noted in the general recommendations network and/or mapped drives should not be scanned. Do not scan the Inform CAD Q: (network drive) from a workstation.)
4. As noted in the Platform Specific Recommendations, Microsoft and EMC require files to be excluded from any virus scanning to protect against data corruption.
 - a. UNDER NO CIRCUMSTANCES should the SQL Server's "Data" directory ever be scanned. Configure your virus scan activities to exclude this directory, which on a typical SQL Server installation will be the "\Program Files\Microsoft SQL Server\MSSQL\Data" directory. Disabling the scanning of the SQL Server "Data" files by type is also acceptable, they can be identified by having one of the following file extensions -*.mdf, .ndf, and *.ldf. The full Microsoft guidelines for configuring SQL Server with Virus Protection software can be found at: <http://support.microsoft.com/kb/309422>.
 - b. EMC recommends that the RepliStor "C:\Documents and Settings\All users\Application Data\Legato Replistor Data" be excluded from active and scheduled scans. Refer to the RepliStor Administration Guide for additional information.
5. Expect performance impacts during the scan.
6. Stagger scans across the system so that performance impacts will be dispersed.
7. Notify users about the scan and expected performance impacts.

20.3.4 ACTIVE SCANNING RECOMMENDATIONS

1. When implementing on-access scanning, it should be done in a conservative manner. Heuristics should NOT be used. Typically, the default configuration will have heuristics disabled.
2. Perform active scanning at the Network level where vulnerability of a virus infection is most likely, this is generally where access to or from an outside source is possible such as an E-mail server or an Internet server.
3. As noted in the Platform Specific Recommendations, Microsoft and EMC require files to be excluded from any virus scanning to protect against data corruption.
 - a. UNDER NO CIRCUMSTANCES should the SQL Server's "Data" directory ever be scanned. Configure your virus scan activities to exclude this directory, which on a typical SQL Server installation will be the "C:\Program Files\Microsoft SQL Server\MSSQL\Data", D:\MSSQL\DATA and L:\MSSQL\Logs directories. Disabling the scanning of the SQL Server "Data" files by type is also acceptable, they can be identified by having one of the following file extensions -*.mdf, .ndf, and *.ldf. The full Microsoft guidelines for configuring SQL Server with virus protection software can be found at: <http://support.microsoft.com/kb/309422>

- b. Arcserve recommends that the Arcserve RHA engine process should be excluded whenever possible from anti-virus 'On Read Access' or Scanning all-together. This will alleviate additional IO overhead on the read access of the files that we need to capture changes from and also the amount of IO that occurs when we create our journal files for replication within the RHA "Spool" directory. (Usually L:\CASpool). Many popular anti-virus solutions allow for an entire process to be excluded from scanning or at the very least "On read access" scans. These are below with information pertaining to how to enable such exclusions.
- c. Required Exclusions:
 - At a bare minimum the spool folder on the MASTER, REPLICA and CONSOLE servers needs to be excluded from anti-virus 'On-Access Scanning'. The default location for the spool folder is:
 - Master, Replica, and Console Servers:
 - %SYSTEMDRIVE%\Program Files\CA\Arcserve RHA\
 - Master and Replica Servers:
 - CASpool Directory (Usually L:\CASpool)
- 4. The TriTech file structure should be excluded from active or on demand scanning. This will prevent file locking problems from occurring (refer to the table below).
- 5. The table below is provided as a guide for configuring scanning activities and file exclusions within the Virus Protection software across key TriTech computer platforms.

INFORM CAD SQL/FILE SERVER	INFORM CAD WORKSTATIONS AND INTERFACES	INFORM CAD WEB SERVER
Active Scanning should use default settings, NO heuristics should be used	Active Scanning should use default settings, NO heuristics should be used	Active Scanning should use default settings, NO heuristics should be used
Exclude the Inform CAD File structure databases and transactional log files from Virus scan activities. Usually: D:\Visicad (TriTech File share) D:\MSSQL\DATA (TriTech Database's) L: MSSQL\LOGS (TriTech transaction Logs) C:\Program Files\Microsoft SQL Server\ (Microsoft SQL server Databases and Transaction Logs) For Arcserve - Exclude the following folders and subfolders from Virus scan	Exclude the following folders and subfolders from Virus scan activities. 1. Q:\, and subfolder 2. C:\TriTech, and subfolders 3. C:\WINDOWS\system32\config, and subfolders (EventLog storage) 4. C:\WINDOWS\system32\msmq, and subfolders (MSMQ storage) 5. C:\Program Files\ TriTech Software Systems	Exclude the following folders and subfolders from Virus scan activities. 1. Q:\, and subfolder (if available) 2. C:\TriTech, and subfolders 3. C:\WINDOWS\system32\config, and subfolders (EventLog storage) 4. C:\WINDOWS\system32\msmq, and subfolders (MSMQ storage) 5. C:\WINDOWS\Microsoft.NET, and subfolders (ASP.NET on-the-fly compilation cache) 6. Media Archive folder 7. Media Stream folder 8. C:\Program Files\ TriTech Software Systems For Arcserve - Exclude the following folders and subfolders from Virus scan activities

<p>activities</p> <p>1)Arcserve Application folder %SYSTEMDRIVE%\Program Files\CA\Arcserve RHA\ 2) CAspool Directory</p>		<p>1)Arcserve Application Folder %SYSTEMDRIVE%\Program Files\CA\Arcserve RHA\ 2) CAspool Directory</p>
<p>Exclude the following file types from Virus scan activities:</p> <ol style="list-style-type: none"> 1. .mdf 2. .ndf 3. .ldf 4. .mdb 	<p>Exclude the following file types from Virus scan activities:</p> <ol style="list-style-type: none"> 1) .mdb 	<p>Exclude the following file types from Virus scan activities:</p> <ol style="list-style-type: none"> 1) None

MOBILE SERVER(S)	MOBILE CLIENT(S)	MOBILE INTERFACE
<p>Active Scanning should use default settings, NO heuristics should be used</p>	<p>Active Scanning should use default settings, NO heuristics should be used</p>	<p>Active Scanning should use default settings, NO heuristics should be used</p>
<p>Exclude the following folders and subfolders from Virus scan activities.</p> <p>C: or D\Program files\ TriTech Software Systems and subfolder(s) (Mobile Server Application and Logs)</p>	<p>Exclude the following folders and subfolders from Virus scan activities.</p> <p>C: \Program files\ TriTech Software Systems and subfolder(s) (Mobile Client Application and Logs)</p>	<p>Exclude the following folders and subfolders from Virus scan activities.</p> <ol style="list-style-type: none"> 1. Q:\, and subfolder 2. C:\TriTech, and subfolders 3. C:\Program Files\TriTech and subfolders 4. C:\WINDOWS\system32\config, and subfolders (EventLog storage) 5. C:\WINDOWS\system32\msmq, and subfolders (MSMQ storage) 6. C:\Program Files\ TriTech Software Systems
<p>Exclude the following file types from Virus scan activities:</p> <ol style="list-style-type: none"> 1. .mdf 2. .ndf 3. .ldf 4. .mdb 	<p>Exclude the following file types from Virus scan activities:</p> <ol style="list-style-type: none"> 1. .mdb 	<p>Exclude the following file types from Virus scan activities:</p> <ol style="list-style-type: none"> 1. .mdb

CHAPTER 4 - SITE PREPARATION

21. CUSTOMER RESPONSIBILITIES FOR INSTALLATION AND TRAINING

21.1 SUPPORT CONNECTIVITY INSTALLATION

Prior to the arrival of equipment for installation on site, all support connectivity specified in the Support Communications and Connectivity section of this document should be installed and in working order.

21.2 NETWORK CABLES

Prior to the arrival of equipment, all necessary network cables should be in place. Each workstation and server on the network will require at least one network cable. Each cable should be able to reach from the network switch to the location for the workstation or server. The Inform CAD network requires the use of Category 5e or, where applicable, Category 6 network cable with male RJ-45 connectors on each end. TriTech can provide network cabling services; however the cable is not covered under the TriTech Software Maintenance and Support Agreement. Please contact your Account Executive (AE) for further details.

The customer will purchase any necessary adapters or wall plates to facilitate installation of the network cable. It will be the customer's responsibility to place the cable in walls, floors, ceilings, and through radio console furniture. The customer may also need a "short" set of cables to be used during training, until the CAD system is moved to its permanent location. Please review the training requirements with your project manager.

Note: If multiple network switches will be linked to support the number of computers needed for the Inform CAD system, these should be linked through a high speed interconnect cable and not by bridging from port to port with a CAT 5e cable.

21.3 STAGING AREA

TriTech requires a secure area for storage and staging of equipment during the installation phase of the project.

21.4 TRAINING SCHEDULE

User Training schedules will vary based upon the type of training and the type of application being trained (i.e., CAD vs Mobile). Classes are not more than eight (8) hours a day in length. The class size is limited to a maximum of 10 students with no more than two (2) students per workstation. One student per workstation is preferred whenever possible. It is preferred that classes are held during typical business hours, however, special class times/days can be arranged through your project manager on a case-by-case basis.

21.5 TRAINING LOCATION

The training classes should be held in a classroom environment that is outside of the live Dispatch Center. Training in the environment of the Dispatch Center proves to be a distraction for both the students and the on-duty personnel. The training room should be secured when not in use.

The customer is required to provide a projector capable of 1024 X 768 or greater resolution for use throughout the User Training class. Two (2) projectors are preferred.

21.6 WINDOWS/MOUSE EXPERIENCE

All students are required to have basic typing skills and exposure to Windows and mouse functions prior to attending Inform CAD User Training class. It is highly recommended that all students complete a Microsoft Windows computer-based training (CBT) program prior to attending training. There are several commercial products that are inexpensive, easy to use and provide excellent exposure to basic Microsoft Windows functionality. It is the responsibility of the customer to ensure that employees meet the minimum requirements prior to attending the training.

21.7 TRAINING GROUND RULES

Students should be dedicated to the class for the entire duration of the course – especially for multi-day courses. Distractions with normal work duties should be avoided while students are participating in the training.

It is preferred that a customer System Administrator or other customer team member attend each User Training class. This person is a valuable asset to answer questions regarding agency decisions on the system's set up.

All students are expected to fully participate in the training, which consists of lecture, hands on, and written coursework. A written and practical exam will be given at the conclusion of the class. Students that do not perform well in the class will be referred to the System Administrator for remediation. As it is necessary to maintain a positive learning environment, students who create a distraction in the class will be referred to the System Administrator.

22. PHYSICAL AND ENVIRONMENTAL REQUIREMENTS FOR COMPUTER ROOM

22.1 COMPUTER ROOM

CHARACTERISTIC	DESCRIPTION
Spatial	Provide adequate space and working area for equipment and personnel
Fire Protection	Provide smoke detectors, fire suppressant
Dust/Static Free	Maintain clean and static free environment
Limit Access	Restrict entry, minimize foot traffic
Uninterruptible Power	Provide UPS and line conditioning for computer room equipment
Voice Telephone Line	Provide outside access to contact support
Modem Telephone Line	Provide RAS support for disaster contingency dial-up
Computer Cabinet	Provide storage and access for equipment

Note: Typical equipment in computer room may consist of: server(s), monitor(s), keyboard(s), mouse, hub(s), printer, scanner, modem, and interface/message switch(s). This preparation guide is only intended to provide general information. For detailed specifications please refer to each equipment specification supplied by the manufacturer. All manufacture specifications are subject to change without notice.

22.2 ENVIRONMENTAL SPECIFICATIONS

CHARACTERISTIC	DESCRIPTION
Storage temperature	0 degrees C to 40 degrees C (30 degrees F to 104 degrees F)
Storage humidity	8% to 80% (relative)
Operating temperature	10 degrees C to 28 degrees C (50 degrees F to 82 degrees F)
Operating humidity	15% to 80% (relative)
Maximum thermal dissipation	91 kcal per hour (360 BTU per hour)

Note: Operating temperature and humidity ranges may vary depending upon the mass storage devices installed. High humidity levels can cause improper operation of disk drives. Low humidity ranges can aggravate static electricity problems and cause excessive wear of the disk surface.

22.3 ELECTRICAL AND PHYSICAL SPECIFICATIONS FOR EQUIPMENT

Please refer to the following manufacturer websites for up to date system specifications:

Stratus

Servers

<http://www.stratus.com/Products/ftServerSystems>

HP/Compaq

Servers

<http://welcome.hp.com/country/us/en/prodserv/servers.html>

VMware

Virtualization

<http://www.vmware.com/products>

Desktop PCs

<http://welcome.hp.com/country/us/en/prodserv/desktops.html>

Networking

<http://welcome.hp.com/country/us/en/prodserv/networking.html>

Dell

Servers

<http://www.dell.com/us/business/p/enterprise-products?~ck=mn>

Desktop PCs

<http://www1.us.dell.com/content/products/category.aspx/workstations>

Networking

<http://www1.us.dell.com/content/products/category.aspx/networking>

Cisco

Switches

<http://cisco.com/en/US/products/hw/switches/index.html>

Routers

<http://cisco.com/en/US/products/hw/routers/index.html>

VPN Solutions

<http://cisco.com/en/US/products/hw/vpndevc/index.html>

Note: Most servers are configured with dual power supplies and dual power cords. We strongly recommend that customers provide separate circuits for the two power cords. If uninterruptible power supplies (UPSs) are selected, two will be provided by the customer (i.e., one for each power cord). This configuration should enable the server to continue to function on one power supply if the circuit breaker on the second power supply is tripped.

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