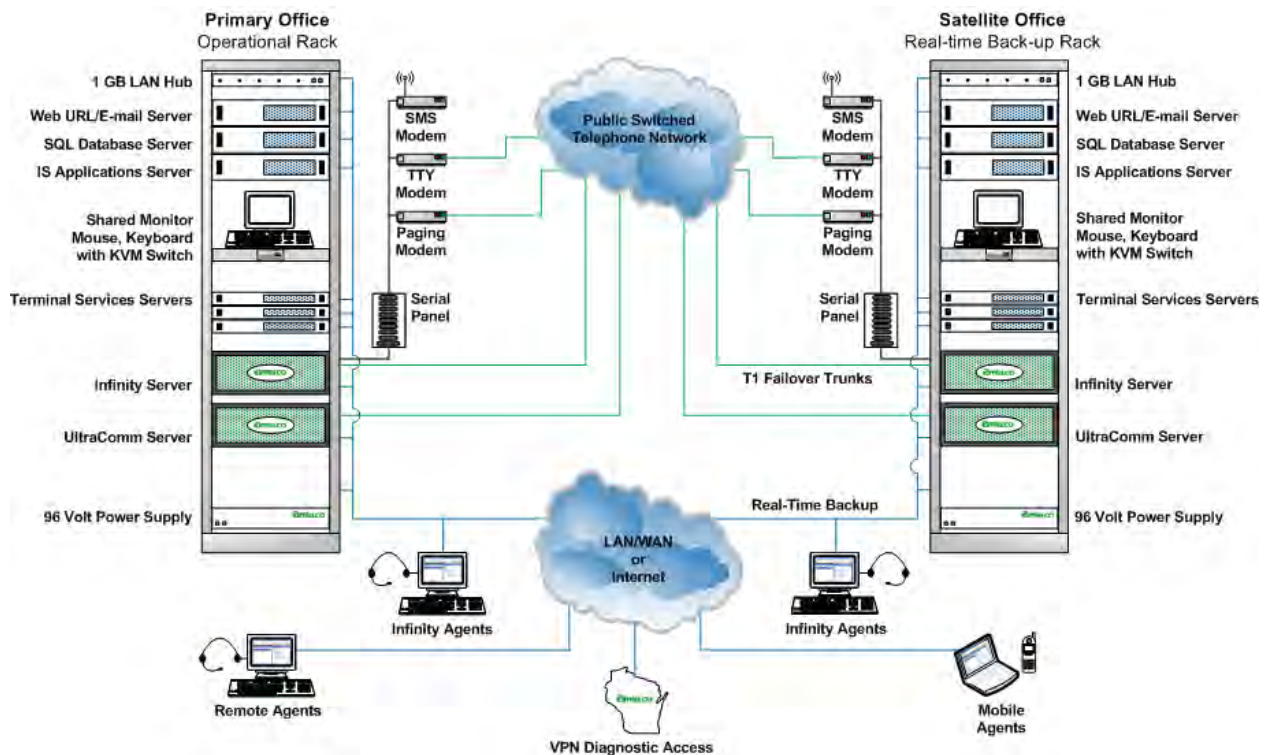


## Disaster Planning Technical Notes

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Planning for the possibility of a service outage, regardless of the extent of the disruption, is crucial for every call center. Having a disaster recovery process in place is a means to ensure customers that their calls can be processed 24 hours a day 7 days a week. Despite the magnitude of the problem, from a simple equipment failure, to an area-wide loss of electric power, to a catastrophic act of nature, an emergency preparedness plan should be in place and designed to address any type of service outage.

### Disaster Planning Overview

We've all seen the old joke in which the words don't fit on the Plan Ahead sign. But making certain that a call center is prepared should an emergency arise is no laughing matter.

It is critical that every call center have a plan in place – in advance – that addresses every possible business interruption, whether it's due to a telephone company outage, a weather-related emergency, an area-wide power outage, a local equipment failure, or even a terrorist attack.

The crucial step is to plan ahead. Sit down with your staff and identify any and every type of emergency that is likely to occur. Then add to that list the unexpected, the types of situations that you can't foresee, such as the train derailment that releases a noxious cloud and necessitates evacuation of a widespread area where the call center is located.

Only after you have an idea of what could happen, can you really start identifying things you can do to be prepared. But remember the old rule of military maneuver that no plan ever survives the first encounter with the enemy. So flexibility should be equally as important to a preparedness plan as is thorough planning.

New technologies are adding every day to the arsenal of tools available to help call centers better prepare for maintaining operations during a state of emergency and in the chaos after the crisis is passed and the recovery is under way.

Talk to your call center equipment vendor, telephone company representatives, internal IT staff, Internet provider, and anyone else who might be involved in critical business operations about emergency services they might offer. You will gain valuable perspective from all of them.

Identify other resources that you can enlist to assist and possibly even handle your calls should your facility be forced off-line for an extended time period. Cooperative relationships with similar businesses, both in the immediate area and in other parts of the country, can be used to enhance a preparedness plan.

AMTELCO offers its Infinity customers an optional Emergency Access service. The Wisconsin-based call center supplier keeps a full-featured emergency Infinity system, and a number of dedicated telephone trunks, up and running 24 hours a day, 7 days a week, that its customers can quickly reroute traffic through in the event of a service outage at their locations.

When establishing such a cooperative venture be certain to consult with your telephone connectivity provider to ensure that calls can be rerouted quickly and efficiently should the need arise.

Take a good long look at your hardware configuration. What seems an adequate system under normal operating conditions could be masking a major problem that won't really raise its head until the worst possible moment. Spending a few hundred dollars, in advance and on your budget schedule, can save you thousands of dollars in lost revenue should a crisis arise. This expense enables you to provide both new and existing clients with the assurance that your call center provides a comprehensive level of service.

Deploying fault-tolerant servers with redundant power supplies, RAID disk arrays, and battery back-up capabilities along with clustered servers and open databases such as Microsoft SQL Server should be an integral part of a preparedness plan. Investing in such hardware and software greatly improves the availability and reliability of data located at facility.

A not-so-obvious element of your planning is establishing a relationship with a secure hosted data center to store copies of critical data in a secure off-premises location. Whether the data center is a simple vault service or a fully staffed facility that can host applications on-site, such back-up capability should be a part of any preparedness plan.

An off-premise data center can securely replicate your business data to servers located in dispersed and separate locations that are often geographically far removed from the area impacted by the emergency. When called into service, the hardware at the data center, frequently

in the form of virtual servers, instantaneously captures and processes your traffic until regular service can be restored.

AMTELCO maintains a business partnership with a secure and hardened data center with multiple locations in Wisconsin and Minnesota which is available to any AMTELCO Infinity owner.

Using work-at-home operators is a simple element of a preparedness plan. With work-at-home operators, if there is a weather, or other, emergency that makes travel difficult or requires the facility to be evacuated, work-at-home operators can continue functioning. Use of Voice Over Internet (VoIP) for these remote operators can be utilized to reduce telephone costs.

A number of medical facilities across the country have devised simple, but creative, solutions to keeping the call and data traffic moving during an emergency, particularly in the event that the facility must be evacuated. This concept can work equally as well for a call center.

These institutions keep a bank of laptop computers with wireless Internet connectivity and a number of cellular telephones ready for use at any time. In the event of a forced evacuation, and when electric and telephone services remain available, the staff simply grabs the laptops and cell phones and continues call handling, effectively becoming mobile operators.

In an institutional or healthcare environment, redundancy can go both ways. Consider using your Infinity call center system as a backup to your institutional PBX. With Infinity's switching capabilities, you can continue to answer and process calls, even if your PBX is offline.

Then, once all your plans are in place, set aside time once a quarter or twice a year to test everything to make sure the plan will work should it ever be needed. Documentation and checklists are valuable tools in this venture to ensure that steps in testing and verification are not missed.

## Disaster Planning Checklist

New technologies are adding every day to the arsenal of tools available to help call centers better prepare for maintaining operations during a state of emergency and in the chaos after the crisis is passed and the recovery is under way.

- Develop a preparedness plan that covers all aspects of your business.
  - Include your staff and other experts in the planning process.
  - Identify any and every type of emergency that is most likely to occur.
  - Plan for the unexpected, the types of situations that you can't foresee
  - Flexibility is equally as important as thorough planning.
- Identify other resources that you can enlist in times of emergency.
  - Cooperative relationships with similar businesses enhance a preparedness plan.
  - Talk to your equipment and service vendors about emergency services they offer.
  - Consult with your telephone connectivity provider to ensure that calls can be rerouted quickly and efficiently.
- Take a good long look at your hardware configuration.
  - Investing in redundant hardware and software greatly improves the availability and reliability of your data.
  - Deploy fault-tolerant servers with redundant power supplies, RAID disk arrays, and battery back-up capabilities.
  - Make use of clustered servers and open databases such as Microsoft SQL Server.
  - Consider wide area or dispersed deployment of system servers and devices to allow a site to be shut down.
  - Check with your vendor to ensure they offer such hardware, software, and capabilities.
- Establish a relationship with a secure hosted data center to store copies of critical data in a secure off-premises location.
  - An off-premise data center can securely replicate your business data to servers located in an area not impacted by the emergency.
  - Virtual Servers at a data center, can capture and processes your traffic until regular service can be restored.
  - Check with your vendor to ensure they offer such a service.
- Make provisions for work-at-home operators in your preparedness plan.
  - Work-at-home operators can continue functioning when an emergency makes travel difficult or requires your facility to be evacuated.
  - Connecting remote operators via Voice Over Internet (VoIP) can help reduce telephone costs.
- Set aside time once every quarter or twice a year to test everything to make sure the plan will work should it ever be needed.

## Infinity Disaster Planning

The Infinity Intelligent Series system is configured to reduce downtime to an absolute minimum. It has redundant components in the server and has redundancy built into the software as well as redundancy options available with the Microsoft Windows Server operating system and Microsoft SQL Server database environments.

The focus of disaster preparedness starts with ensuring you are able to answer calls. Providing access to Infinity data and applications can follow as a slightly less important, but still critical requirement.

## Network Outage Disaster Planning

Planning for an outage with one of the system servers is critical. This type of outage is inevitable when considering planned system upgrades, operating system upgrades, and possible hardware failures.. Planning for an outage with the network also is a critical factor given the reliance on network connectivity for operation of the system. Infinity relies on an operable local area network for call processing and application functionality.

## Infinity Server Outage

The Infinity server is a critical component of an Infinity-based call center. It provides the interface to the telephone company trunks or to a PBX. It provides the Automated Call Distribution (ACD) mechanism that routes calls to operators. It provides the Integrated Voice Response (IVR) voice functions to play greetings to callers and route calls based on caller input. It also provides the IP interface for the operator application to connect with to establish a session and login to the ACD.

## Dependencies

To remain operable, the Infinity ACD Server has the following dependencies:

- Applications – The only application that resides on the Infinity server is the Infinity switching application. Several client applications connect to the Infinity server and are reliant on it to operate.
  - Infinity Telephone Agent
  - Infinity Supervisor
  - Infinity MDR
  - Unity Voice Logger Gateway
  - IS Gateway
  - UltraComm
  - eVoiceLink
  - eResponse
  - Infinity Web Applications (web chat, web callback, web applications)
- Telephone – The Infinity server can operate without telephone connectivity but it would not be capable of receiving or generating calls. Operators could login to the Infinity ACD and could access Infinity application data but could not receive incoming calls or generate outbound calls.

- Network - The Infinity server can operate without network connectivity, but it would not be possible to distribute calls through the ACD to operators and client applications and would not be able to connect to other applications (Telephone Agent, Supervisor, MDR, IS Gateway, UltraComm, eResponse, eVoiceLink, Network Archiver, Infinity Backup Server). Operators and other client applications login to the Infinity ACD via a range of TCP/IP ports (5000-5199). Without network connectivity, Infinity could still process calls but would be limited in what could be done with those calls. Calls would remain in the Infinity server and callers would listen to voice prompting or calls could be automatically redirected out to alternate trunks or phone numbers using failover routing.
- SQL Server Database – The Infinity server does not rely on connectivity to the SQL Server database for core call processing functionality. Most SQL Server related interactions are handled by the Infinity Intelligent Series Applications Server.

### **Utilization of PBX Consoles**

Ensuring that operators can handle calls should be a top priority. In the event of a planned or unplanned server or network outage in the institutional environment where a PBX exists, one level of backup is to utilize PBX consoles or phone sets as backup operation. The PBX consoles can be placed at some number of operator positions. During normal mode, the PBX consoles are not utilized and are often placed in the PBX Nite Mode. When operating in Backup Mode, the PBX consoles are taken out of Nite Mode. PBX calls are then directed to the phones rather than to Infinity. This allows operators to process calls using the PBX consoles or phone sets at their desks.

### **Utilization of Infinity Backup Operator Application**

While an operator is in Backup Mode, they can still access Infinity information even if the Infinity servers are offline or the network is out of service. This is accomplished using the Infinity Backup Operator application. The Backup Operator application enables operators to look up Infinity information such as Directories and On-Call Schedules using information at their desktops. This is accomplished by exporting the Infinity data to the operator desktops on a scheduled basis.

### **Infinity Backup Servers With Network and Real Time Backup**

The Infinity server contains an internal database containing the switch, ACD, and voice parameters required to process calls. AMTELCO offers an optional Network Backup feature that replicates the Infinity data to a secondary or backup Infinity server on a batch mode basis. This batch mode process typically is run once a day during a slow period of call processing.

AMTELCO offers an optional Real-Time Backup feature that replicates the Infinity data to a backup Infinity ACD server on a real-time basis. Real-Time Backup ensures that the backup Infinity server always has current data in the event that the server needs to be placed into live mode.

Both the Network Backup and Real-Time Backup are designed to allow a backup Infinity server to take over call processing in the event that it is required. The backup servers can be located near the primary server or can be at an entirely different physical location.

To take over call processing, the backup Infinity server must be populated with telephony boards and must have a connection to your telephone company or PBX trunks. Each site must make

provisions to reroute calls to the backup server trunks in the event that it is necessary. The rerouting should be as simple as possible and possibly even automated. Check with your telephone company provider or PBX vendor for options on rerouting calls.

### **Infinity Backup Server Configuration**

The Infinity Backup Server application is designed to connect with the primary Infinity server and replicate the contents of the Infinity server database to a hard disk drive in another chassis via the local area network. In the event that the primary Infinity server goes off line, the backup server chassis can be activated, or the backup hard disk can be moved to the primary Infinity server, and near-normal service levels can be restored in a matter of minutes.

An effective Backup Infinity server chassis can be:

- One of the existing telephony servers in a multi-chassis Infinity environment;
- A dedicated server chassis containing little, or no, telephony resources;
- A spare, but fully populated, server chassis containing all of the telephony resources required to operate the call center;

AMTELCO preloads the backup server software and matches the configuration to the customer database size. The backup server is configured to boot from the internal hard disk drive. It normally boots to a menu with two choices that enable quickly selecting the mode in which the server should operate.

1. Backup Server - in normal conditions, the Backup Server selection is used.
2. Infinity - If the backup server needs to take over call processing, the Infinity selection is used:

The backup Infinity server requires a static IP address, you also need to program the IP subnet mask and may require a default gateway setting. Contact your Network Administrator (if necessary) prior to installation to obtain the information for this server. During installation you will be required to program the Infinity server's IP address and provide a station number for the backup server. AMTELCO Field Engineering can help provide the server's IP address and help locate an available station number if needed.

### **Infinity System Server Maintenance**

In any server configuration, the optional Infinity Network Backup and Real Time Backup features can be used to replicate the Infinity database to another server and dramatically reduce the time and effort required to restore call processing functionality in the event of a server upgrade or failure.

In addition to the network backup capabilities, AMTELCO recommends utilization of the daily server database backup procedure using a DAT cassette tape drive installed in the Infinity server chassis. This provides another layer of protection and redundancy. The daily DAT cassette backup can be scheduled, and is recommended to run during a slow call processing time, such as the middle of the night.

## Infinity Intelligent Series Application Server Outage

The Infinity Intelligent Series Application Server is a critical component of an Infinity-based call center. It provides the application services and SQL Server database interface for the system. Operators can continue to process calls without the Intelligent Series Application Server in operation, but they would have very limited application functionality.

### Dependencies

To remain operable, the Infinity Intelligent Series Application Server has the following dependencies:

- Applications – Several key applications may reside on the Infinity Intelligent Series Application Server. These applications may change from site to site so each site must review the applications that are dependent on the application server:
  - Intelligent Series Server (Intelligent Messaging, Intelligent Information, Intelligent Dispatching, Intelligent Directories, Intelligent On-Call Scheduling, Directory Contact Methods)
  - Infinity MDR
  - Unity Voice Logger Gateway
  - IS Gateway
  - eVoiceLink
  - eResponse
- Telephone – The Infinity Intelligent Series Application Server can operate without telephone connectivity.
- Network - The Infinity Intelligent Series Application Server cannot operate without network connectivity. The Intelligent Series Server service relies on a connection to the SQL Server database to operate. All Intelligent Series client applications (operator, supervisor, web) connect to the Intelligent Series Server service via a network TCP/IP port. If the connection cannot be established, no client/server interactions can take place.
- SQL Server Database – The Intelligent Series Application Server cannot operate without a connection to the SQL Server Database. The Intelligent Series Server service relies on a connection to the SQL Server Database to operate and will not start up properly without the connection. In addition, the Infinity MDR application, which is responsible for capturing Infinity statistical events and writing them to the SQL Server database, cannot operate fully without a connection to the SQL Server database. In the event that the connection cannot be established, the MDR will write the statistical events to local files on the application server. These files can be merged into the SQL Server database when the database connection has been restored.

### Infinity Intelligent Series Application Server Redundancy

The Infinity Intelligent Series Application Server contains critical call center applications. In the event that the Infinity Intelligent Series Application Server is offline, those critical applications would not be functional. The Infinity server and the Infinity Telephone Agent workstations can continue to operate and process calls without the applications server but they would have limited functionality.

Many sites choose to deploy a redundant Infinity Intelligent Series Application Server. The key to this deployment is to replicate the applications installed on each server and to provide network connectivity to the redundant application server for the client applications that need to connect to it. There is no real-time data that needs to be replicated on this server, only applications and connectivity to the server. The redundant application also must have access to the primary or backup SQL Server.

### SQL Server Redundancy

The SQL Server contains critical application data. For full functionality of the call center, the SQL Server must be in operation. Infinity can continue to process calls and direct them to agents without SQL Server the in operation, but application processing would be limited. The Intelligent Series applications do not function without a connection to the SQL Server database.

Many sites choose to deploy redundancy in the SQL Server configuration. This can be in the form of SQL Server Clustering or SQL Server replication. AMTELCO does not have specific clustering or replication requirements and generally leaves the implementation of these services up to our clients.

Example 1 of an Infinity site that has implemented SQL Server redundancy:

We run 2 SQL Servers which are identical. Each server is running Windows 2003 R2 sp2 server with SQL 2005 sp2 and is fully patched.. Each server has dual Xeon processors, and 5 hot-swappable drives configured as RAID 5. The servers also have dual, hot-swappable power supplies. Each box is plugged into two UPS's.

We have enabled network load balancing on both servers using a cluster IP of 10.0.0.9 with the cluster running in Multicast mode. The individual servers are 10.0.0.7 (SQL1) and 10.0.0.8 (SQL2). Using this method, multiple servers appear as a single "fake" server to the network. We can ping 10.0.0.9 in just the same way as we ping a real server.

We then set up the databases running on SQL1 to be mirrored on SQL2. This involves a full backup of the database on SQL1, copying it to SQL2, and then restoring it in the NORECOVERY mode. It is easier if nothing is writing to the database while the backup is being taken.

We then set up mirroring from SQL1 to SQL2. Mirroring can be achieved in a number of ways. We went for high availability with automatic failover. To achieve this, we needed a third SQL (this one can be any flavor of SQL) to act as a "Witness" server. There is a wizard in SQL Management Studio to achieve this and it makes the whole process very simple. (It sounds a lot more complicated than it really is.)

SQL1 becomes the "Principal" server (i.e. the main one) and SQL2 becomes the "Mirror" (i.e. the backup). Note that this applies to the individual databases – not SQL itself. The Witness server simply acts as a referee. Its job is to see whether the Principal is online and available or not. In the event it drops off line, or a database times out, the Witness and the Mirror server talk amongst themselves and vote to swap over. The backup becomes the principal for that database and takes over.

Once that's set up, you simply start the mirroring process. SQL1 accepts a transaction from an application (e.g. a call record from MDR) and this is immediately duplicated on the mirror server.

This is all fine and dandy but... how does it work in practice?

We have pointed all our SQL applications at 10.0.0.9 – the cluster – rather than an individual machine (i.e. SQL1 or SQL2). The app doesn't care which server it's using: in fact, it doesn't realize it's using two servers. In the event of a failure or loss of communication with one box, the remaining box and the Witness server decide among each other if the failed box really has failed. Once they decide that this has happened (we're talking milliseconds here), the backup box takes over and becomes the main server. *All this happens automatically – there's no human intervention.*

When the failed server comes back on line, it checks with the Witness server as to what's happening with the databases it was running. The Witness server tells it that the backup server has taken over and the failed server comes back online as a backup itself. That way, you've always got a main server (the Principal) and a backup (the Mirror) for each database.

The joy about this route is for maintenance if nothing else. I can take down either box to load updates or make a physical change, and the service is not interrupted. The boxes automatically swap over between themselves.

It does need some testing. It is possible to failover a database from one box to the other manually. This enables you to check that all the apps are ok and there's no issues with the app or the setup on both servers.

Example 2 of an Infinity site that has implemented SQL Server redundancy:

We use NSI Double Take to replicate the MDF and LDF from the live SQL Server to a backup SQL Server in real time.

IF we need to fail over:

- The application services are stopped.
- The live SQL Server is stopped.
- Replication is stopped.
- The backup SQL Server is started.
- Applications are pointed at the backup SQL Server and restarted.

## Web Application Server Outage

The Web Application Server is not a critical component of an Infinity-based call center. It functions as a gateway application to allow web users to interact with the system. It does not impact call center call or application processing in any way.

### Dependencies

To remain operable, the Web Application Server has the following dependencies:

- Applications – Several AMTELCO applications may reside on the Web Application Server. These applications may change from site to site so each site must review the applications that are dependent on the web server:
  - Infinity Web Applications (Infinity Web Chat, Infinity Web Call Back, Infinity Web Directory, Infinity Web On-Call, Infinity Web Roster, Infinity Web Messaging)
  - Intelligent Series Web Applications (IS Directory, IS On-Call Scheduling, IS Reporting, IS CMI, IS Dashboard, IS Call Log)
  - Web Dashboard Gateway

- Telephone – The Web Applications Server can operate without telephone connectivity.
- Network - The Web Application Server cannot operate without network connectivity. The Infinity Web Applications, the Intelligent Series Web Applications, and the Web Dashboard Gateway are all services that connect to the Infinity server or Infinity Intelligent Series Application Server. Without the connection, the Web Application Server cannot operate. The Web Application Server must also provide connectivity for internal web users on the local area network, and optionally external web users accessing the web services from the Internet.
- SQL Server Database – The Web Application Server does not connect directly with the SQL Server but relies on it to be in operation to serve requested data back through the Intelligent Series Application Server.

## Workstation Outages

Infinity is well suited to handle planned or unplanned workstation outages. If an unplanned outage occurs on a workstation, any calls that were currently on the workstation will be reassigned to other operators. The operators receiving the reassigned calls would see all current information that was on the original workstation screen when the outage occurred.

If workstation maintenance is planned, the affected workstation is simply taken out of the ACD call rotation when the operator logs off the workstation. Calls are then directed to other available operators until the affected operator logs back in.

## Real-Time Backup

The Infinity Real-Time Backup feature makes it easy to replicate the entire Infinity database across a TCP/IP network connection to a Backup Infinity Server chassis. As changes are made in the primary Infinity server database, they are replicated across the network to the Backup Infinity Server. This ensures that the Backup Infinity Server always has current data.

The Real-Time Backup application can be enabled to replicate all or just some of the Infinity database tables. Portions of the Infinity database, such as the voice recordings, require large amounts of bandwidth. This bandwidth usage must be taken into consideration when choosing a location for the Backup Infinity Server.

If the Backup Infinity Server ever is used as the primary Infinity server in the event of a disaster recovery, the data entered into the Backup Infinity Server will be resynchronized back into the primary Infinity Server when it is brought back online.

## Emergency Access

AMTELCO's Emergency Access service enables call centers to answer their phone calls if, for any reason, their Infinity system is not able to function properly due to telephone line or equipment failure.

The hosted Emergency Access service provides an Infinity server at a secure location that can be used 24 hours a day, 7 days a week, 365 days a year to provide a call center with service within minutes.

Several levels of service are available through AMTELCO's Emergency Access service:

**Co-located customer equipment live system** – A fully functional system is located at the hosting facility for taking calls. The customer is responsible for maintaining the software at co-location facility and for purchasing any hardware and software updates to the system. The telephony connectivity for a co-located system also is the customer's responsibility.

**Co-located customer equipment hot backup system** – A fully functional redundant system is located at the hosting facility composed of customer-owned equipment. The system is configured for real-time replication of the customer's operational system. The telephony connectivity for a co-located system also is the customer's responsibility.

**Shared Standby Equipment** – A fully functional redundant system is located at the hosting facility composed of AMTELCO-owned equipment, available to Emergency Access service subscribers. In an emergency the customer database is loaded onto the shared standby hardware so the customer can answer inbound calls forwarded to the shared telephony phone resources.

**Real-time customer hard drive backup** – A regularly scheduled replication of customer data is performed and the data is maintained at the hosting facility. In time of need, the customer's replicated hard disk drive is moved from the storage unit to a shared standby equipment in order to restore the customer's enterprise to operation. The telephony connectivity for the shared standby system is provided by AMTELCO

**Emergency server** – The customer can provide AMTELCO with a DAT tape backup of their system that can be used in case of emergency. In the event of the emergency the customer has access to the shared standby equipment and the shared backup telephony resources.

**Emergency shared telephony resources** – AMTELCO contracts for telephony resources that are used by customers in the case of emergencies. AMTELCO provides information on how the customer's telephone lines can be forwarded to DID numbers and toll-free 800 numbers as needed.

*(This white paper was compiled by Kevin Beale, director of R&D Software Development, Bill Curtin IV, director of corporate IT services and manager of Hosted Services enterprise offerings, and Alan Tucker, software documentation editor.)*