

GoldSync® 5.5 Technical Primer

05/01

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I. OBJECTIVES

The *GoldSync® 5.5 Technical Primer* is intended to provide Administrators with a resource to use as a “best practices” guide in implementing GoldSync¹. The objective of the *GoldSync 5.5 Technical Primer* is to educate Administrators in how to consistently employ GoldSync using the following processes:

1. Identifying the variables for the successful operation of GoldSync (before implementing GoldSync).
2. Analyzing and evaluating the relationship between the variables, identified during the pre-implementation stage, and GoldSync
3. Incorporating procedures proven to consistently yield positive results and endorsing them in GoldSync's ongoing maintenance and use
4. Avoiding scenarios that do not work reliably or are considered tenuous and not recommending them in GoldSync's ongoing maintenance and use

This document includes a Test Scenario section. The results and conclusions, which are based on selected scenarios, provide GoldSync Administrators with information they can use as baselines when implementing GoldSync.

Additional results based on tests independently conducted by ZD Labs' eTesting facilities can also be found here: <http://www.etestinglabs.com/main/reports/frontrange.asp>

II. INTRODUCTION

A. GoldSync Synchronization Server

GoldSync Synchronization Server was introduced in September of 1995 as an add-on solution for organizations with distributed staff and/or offices. Since then, three major upgrades have occurred in GoldSync - 1.5, 4.0 and 5.0. Today, while organizations using GoldMine® 5.0 may still purchase GoldSync as an add-on, GoldSync is an integrated module within the GoldMine® Sales and Marketing product.

GoldSync is an enhancement to GoldMine's built-in synchronization function. While GoldMine can handle simple, point-to-point synchronization, it is limited in its ability to assist in multi-site synchronization. In contrast, GoldSync offers unattended, automated processing of remote synchronization sessions across two or more GoldMine/GoldMine Sales and Marketing databases, systems (licenses) and users. Chapter 4 of the *GoldSync Administrator's Guide* contains further information on the different license types that can be configured as a site. The guide is available for download at the following URL: <ftp://ftp.goldmine.com/Public/Manuals/gs5-admn.pdf>

GoldSync gives organizations the flexibility to choose connection methods, session intervals and sending/retrieving data options that work best for their remote user/office scenarios.

¹ The GoldSync 5.5 Technical Primer is **not** intended to replace, or act as a substitute for, the GoldSync Certification required for Solutions Partners to implement GoldSync, nor is it intended as a reference manual replacement for the current GoldSync Administrator's Guide documentation.

Unlike GoldMine synchronization, GoldSync automatically tracks settings, such as what information should be sent and retrieved, for multiple remote systems.

After the GoldSync server is configured to meet the synchronization requirements of an organization, the GoldSync Administrator can start its synchronization processes and initiate the automatic handling of the configured sites.

In addition to synchronizing contact information, organizations can also synchronize data structures, lookup lists and customizations. GoldSync provides additional control by allowing administrators to filter data by criteria such as territory, salesperson or customer type. As a result, organizations do not have to synchronize their entire GoldMine/GoldMine Sales and Marketing database; rather, they can choose to synchronize only the data pertinent or appropriate to each remote site or user, which allows for a more efficient synchronization process.

NOTE: Please be aware that GoldSync is executed as a desktop application and is **not** designed to function as an NT service². The capability to run GoldSync as an NT service is a common request from GoldSync Administrators and is included in the current log of open enhancement requirements for the product.

B. Scalability

Along with the rise of Enterprise Computing, came the demand for architectures and software solutions offering better integration and scalability. As a result, industry application development is focused on delivering solutions that can support enterprise requirements. Scalability is a core requirement for solutions developed for customers in the enterprise market, but what does scalability mean, and how does GoldSync fare as a scalable solution in the enterprise arena?

Scalability measures an application's ability to grow and meet the increase in demand on system resources--usually to accommodate growth in the number of users or rows of data. The way that an application is designed plays a critical role in determining its ability to scale effectively. GoldSync is a solution designed to support multi-user/multi-site environments, and includes support for multiple, simultaneous connections. As the amount of data and number of users increases, GoldSync scales as needed for a given range of users and data.

Although GoldSync scales from 1 to 50³ sites effectively, certain customer deployments occur in which GoldSync is not the best solution. GoldSync is designed to work **best** in small to medium-sized user/site environments, whether it is synchronizing against dBase or Microsoft[®] SQL Server version 7.x or 2000.

Although GoldSync has been deployed in large-sized environments of multi-million records with thousands of remote users, tests results or reference cases are not available from FrontRange Solutions guaranteeing or recommending GoldSync's performance under these scenarios.

² There are utilities that allow users to configure most applications, including GoldSync, to mimic the behavior of an NT service. Users have reported varying degrees of success with these utilities. However, GoldSync was not designed to accommodate this type of usage and if so deployed, is unsupported by FrontRange Solutions Support Services currently.

³ This number reflects a total number of configured sites, **not** concurrently processed sites.

GoldSync System Requirements⁴

In order for GoldSync to function properly, the GoldSync Administrator must adhere to one of the two system requirements outlined in the following tables. These recommended system requirements pertain to the computer processing the GoldSync tasks, commonly referred to as the GoldSync Server.

Table 1: Minimum System Requirements

Operating System	Disk Subsystem	RAM Allocation	Central Processing Unit	Network Connection	Client Utilities
Microsoft Windows98	IDE drives may be used in less demanding scenarios RAID Array or mirrored (for larger databases or heavy synchronization)	128 MB RAM for less than 2 GB database with 10 concurrent sync sessions	Single processor adequate PII 350 mhz for 10 sites or under, simultaneous processing	10 Base-T adequate TCP/IP	MS-SQL Client Utilities 7.x (if you are using MS-SQL 7.x as a backend for your database)

Table 2: Recommended System Requirements

Operating System	Disk Subsystem	RAM Allocation	Central Processing Unit	Network Connection	Client Utilities
Microsoft Windows NT 4.0, Service Pack 6	IDE drives may be used in less demanding scenarios RAID Array or mirrored (for larger databases or heavy synchronization)	256 MB RAM for less than 2 GB database with 10 concurrent sync sessions	Single processor adequate PII 350 mhz for 10 sites or under, simultaneous processing	100 Base-TX recommended TCP/IP	MS-SQL Client Utilities 7.x or 2000 (if you are using MS-SQL 7.x or 2000 as a backend for your database)

⁴ Published Minimum Requirements

III. THE VARIABLES

As the old adage goes, “an ounce of prevention is better than a pound of cure.” Nothing can replace good preparation and implementation practices when deploying a complex application, and good preparation requires an in-depth analysis of the contributing variables. A GoldSync Administrator must identify the variables needing evaluation when installing GoldSync. Two kinds of variables exist:

- The first variable type is called a *pre-requisite* variable. This variable type must exist prior to deploying GoldSync. These variables are independent of GoldSync itself, but are integrated into the processing function; as a result, they have either a direct or indirect effect on GoldSync's performance. The Borland Database Engine (BDE), Microsoft SQL Server and Operating System are variables that fall in the pre-requisite category.
- The second variable, which we call a *manipulated* variable, is described as a highly definable variable type. Usually, the variable's value is expressed in a quantitative manner such as number of records, amount of CPU power or amount of “load”.

Throughout the course of this primer, we discuss these variables and the relationships they have with GoldSync. Where available, these discussions are supported by specific, statistical information gathered from in-house tests conducted by the Quality Assurance (QA) Department. The statistical information referenced is in Section VI of this document.

For now, we will discuss the variables with which GoldSync Administrators must be familiar before installing and deploying GoldSync.

A. Borland Database Engine

GoldMine uses the Borland Database Engine's (BDE) IDAPI driver for dBASE and MS-SQL. When GoldMine connects to a database, it dynamically loads the `idapi32.dll` either locally or from a shared network location. When GoldSync is run for the first time from a computer/server reading the BDE from a shared network location, the local GoldSync machine creates registry entries using the default values⁵ in the Configuration tab of BDEADMIN, while it loads the referenced `idapi32.cfg` into its memory. GoldMine uses the parameter settings found in the database alias of the referenced `idapi32.cfg`, except for the MAX DBPROCESSES setting, in which case it uses the value stored in the registry.

B. Microsoft SQL Server

As of press time, MS-SQL Server 7.0 and MS-SQL Server 2000 are the only SQL servers supported in GoldMine Sales and Marketing, version 5.00.041 and above. MS-SQL Server 7.0 was redesigned by Microsoft to offer improved scalability, better performance and ease of use. MS-SQL Server can dynamically configure and tune itself by automating some tasks that previously required manual configuration. The recent release of MS-SQL Server 2000, has continued where MS-SQL Server 7.0 left off by building upon the modern, extensible architecture introduced in MS-SQL Server 7.0⁶.

⁵ Initialized values

⁶ Please read the *SQL Server 2000 Product Guide*, January 2001 for more information

C. Operating System

Although GoldSync can run on Windows 9x systems, FrontRange Solutions strongly recommends that Administrators install and deploy GoldSync on Windows NT-based systems such as Windows NT 4 or Windows 2000 only.⁷

Microsoft's NT-based systems come in different editions. Both Standard and Enterprise editions are available. Though it may be helpful to know all the differences⁸ between these two NT editions, the key benefit of determining the differences is to understand how this particular variable affects planning for the MS-SQL server implementation in conjunction with GoldSync.

For more information on Windows Operating Systems, please refer to the respective product documentation.

D. Resources, Data and Load

What is the right PC technology for GoldSync? Is the physical makeup of the computer on which GoldSync is installed and from which it runs an important factor in determining the success of a GoldSync implementation? How do Administrators know when they have the right hardware components to ensure the successful operation of GoldSync? What method of synchronization best fits the kind of network infrastructure the client has?

Unfortunately, there's no quick or simple way to determine if a particular computer's configuration or network infrastructure effectively and consistently serves GoldSync's processing requirements. Determination is difficult because the amount of data and load a customer requires GoldSync to support also varies; thus, GoldSync's requirements change as the variables change.

In order to establish standards that Administrators could use as baselines, FrontRange Solutions designed specific scenarios for use in our in-house testing environment. These scenarios are discussed in the Test Scenario section of this document.

⁷ See Exhibit A-3 and A-6 for comparative results

⁸ The major functionality that Enterprise Edition adds to the Standard Edition is having the capability to support multiple processors and larger amounts of memory than what a Standard Edition can support. The Enterprise Edition also has the ability to link servers together to handle larger loads.

IV. PLANNING A GOLDSYNC IMPLEMENTATION

In the previous section, we identified the pre-requisite and manipulated variables with which GoldSync Administrators need to be familiar before deploying GoldSync. In this section, we provide steps showing how to configure the variables using settings and strategies beneficial to GoldSync's implementation. Additionally, this section discusses other implementation and configuration-related procedures that are fundamental components of a GoldSync installation and deployment.

A. Borland Database Engine

As noted in the previous section, GoldMine uses BDE to connect to a database. When GoldSync is run for the first time from a computer/server reading the BDE from a shared network location, the local GoldSync computer creates registry entries using the default values⁹ in the Configuration tab of BDEADMIN while it loads the referenced idapi32.cfg into its memory.

GoldMine uses the configurations of the database alias in the referenced idapi32.cfg, except for the MAX DBPROCESSES setting, in which case it uses the value stored in the registry. Since the MAXDBPROCESSES default value¹⁰ may be too low when processing multiple sites, we recommend that MAXDBPROCESSES be set to "999"¹¹.

Administrators can edit the MAXDBPROCESSES setting directly in the local computer's registry key:

```
HKEY_LOCAL_MACHINE\SOFTWARE\Borland\DatabaseEngine\Settings\DRIVERS\MSSQL\DB_OPEN
```

OR:

in the Configuration tab of BDEADMIN by launching it from the **Tools|BDE Administrator** menu in GoldMine Sales and Marketing.

Another BDE setting that may require tuning is BLOBS TO CACHE. This parameter determines how many BLOBs are cached on the client. The error message returned by GoldSync when the value of BLOBS TO CACHE is too low relative to the amount of blobs cached is "Invalid Blob handle in record buffer". The default value is 64 and can be increased to a maximum value of 65536. Although GoldMine's blob limitation per record is set to 64K, some GoldMine/GoldSync queries may require caching more than one record at a time. Setting this parameter's value to 512 has consistently worked, even in larger databases with enormous blob files sizes.

B. Microsoft SQL Server

As mentioned in the previous section, GoldMine Sales and Marketing uses MS-SQL 7.x and MS-SQL Server 2000 for its Database platform. Using one of these platforms is one of the

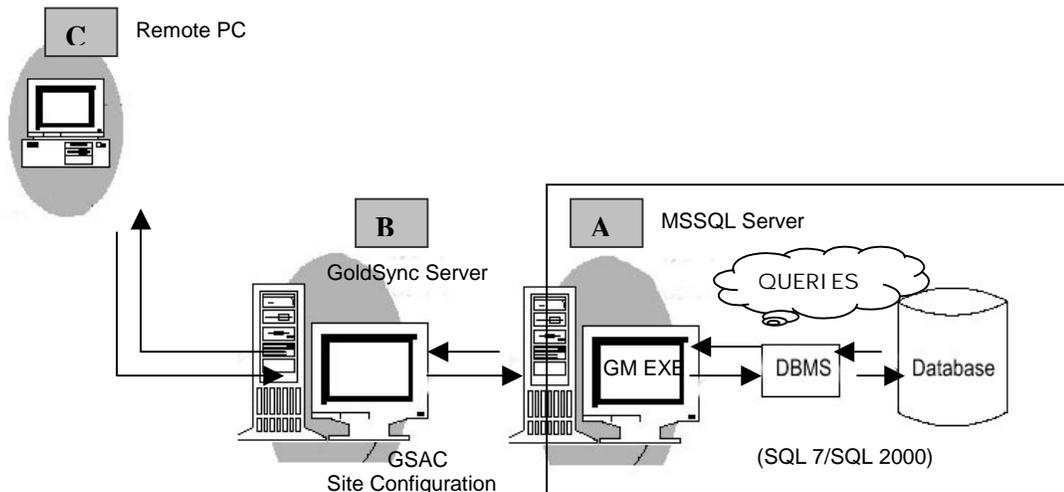
⁹ Initialized values

¹⁰ The default MAXDBPROCESSES value is "31"

¹¹ There are no established formulas that can be used to compute recommended values for this parameter as the number of simultaneous connections increases. However, there are no known overhead issues affecting processor, memory or disk I/O when using "999" as a standard value. Additionally, this parameter has no known maximum value.

prerequisite variables required before deploying GoldSync using GoldMine Sales and Marketing 5.00.041 and above.

Following is a diagram of a hypothetical scenario:



Remote PC (C) initiates a synchronization session with the GoldSync server (B). The GoldSync server accepts the connection, checks the site configuration from the GoldSync Administration Center, then it calls on the GoldMine Sales and Marketing executable to issue requests via queries to the MS-SQL Server (A), which is the Database platform GoldMine Sales and Marketing uses. The SQL Server database engine is responsible for processing the incoming database requests and returning the appropriate results to GoldMine Sales and Marketing.

At this point, we can see how the MS-SQL Server variable can influence the operating results of a GoldSync implementation. Understanding how MS-SQL Server is configured and managed is critical to GoldSync's successful deployment. Hence, as an additional resource to GoldSync Administrators, we have included some basic information on MS-SQL Server¹², as well as some of the known SQL errors possibly generated during synchronization.

1. MS-SQL Server's self-tuning capability:

The auto-configuring and self-tuning capabilities of MS-SQL Server were introduced in MS-SQL Server 7.0 to eliminate the administrative overhead that usually accompanies SQL Server administration. FrontRange Solutions recommends that GoldMine Sales and Marketing Administrators take advantage of these built-in features to get the optimum performance from the SQL server at all times, even if the application's queries change over time.

2. Memory Usage:

MS-SQL Server 7.0 and MS-SQL Server 2000 show an increase in memory usage when compared to earlier versions. This increase is due to the redesigned query

¹² The term MS-SQL Server refers to both MS-SQL 7.0 and SQL Server 2000

optimizer that uses hash and merge joins, which do more in-memory processing. Earlier versions of MS-SQL Server relied solely on nested loop iterations to perform joins. Nested loop joins inherently use disk I/O.

Depending on the nature of the queries, MS-SQL 7.0 may try to cache as much data as it can and release memory only as it is needed by other applications; therefore, the more memory the MS-SQL server has, the better caching capability it has for loading the database into memory, as well as for performing queries in memory and relieving the disk subsystem of excessive disk I/O activity.

Memory, however, is a finite resource. Operating Systems may impose limits on the amount of memory used by any application. Administrators must know the key differences of the various versions and editions of the Windows NT-based systems (Windows NT4 Regular, Windows NT4 Enterprise, Windows 2000 Professional and Windows 2000 Advanced Server) to effectively determine what memory capabilities are available to MS-SQL Server. This information is required to help Administrators make a guided decision when planning the MS-SQL server implementation.

NOTE: Using the default memory settings for MS-SQL Server can cause the MS-SQL server to consume a high percentage of system memory. In some cases, this may leave only 5 megabytes of RAM free and potentially degrade system performance. Administrators may limit memory consumption by adjusting the **Maximum** memory amount within the properties of the MS-SQL Server.

3. Disk I/O subsystem performance can affect MS-SQL Server's performance:

RAM is a limited resource. Because MS-SQL server tries to cache as much information as it can into memory, at some point it is unlikely that the RAM available will be sufficient to hold all the information--especially when running queries on large databases. Consequently, virtual memory is used and the disks will be hit.

I/O performance becomes critical in sustaining heavy read and/or write activities. The physical disk subsystem must provide a database server with sufficient I/O processing power for the database server to run without disk queuing.

4. SQL Server Profiler and SQL Server Performance monitor:

It is helpful to use tools such as SQL Profiler and SQL Server Performance monitor, in assisting Administrators with performance tuning. SQL Server Profiler records provide detailed information about activity occurring on the database server. These tools are useful when troubleshooting SQL error messages and symptoms with applications that issue queries on the databases that are hosted to MS-SQL.

5. Common SQL errors generated during synchronization

a. Native SQL error 8645:

This error message occurs when processing multiple sites simultaneously in GoldSync. This message indicates that the query sent to MS-SQL server has timed-out and that it was not executed. This MS-SQL "timeout" issue can be influenced by the following conditions:

- System configuration specific to hardware on the MS-SQL database backend (i.e. CPU, RAM, etc.)
- Number of GoldSync sites being processed simultaneously
- Number and size of records being evaluated in the GoldMine Sales and Marketing databases for one or more of the GoldSync sites

(1) *In order to suppress the SQL error message, Administrators may:*

- Decrease the number of sites that are processed simultaneously. FrontRange recommends 10 concurrent sites
- Manually create ‘initial’ transfer set(s) to include all the records in the databases (refer to Factsback 552 for details) when adding new GoldSync sites to a system¹³
- Increase system resources; for instance, add physical memory to the MS-SQL server. Access to RAM is much faster than disk access; however, if RAM is limited, increasing the size of the virtual memory paging file can help.
- Increase the setting for “maximum” memory used (or set a fixed memory size) in the Properties of the MS-SQL server, via the Enterprise Manager.
- Increase the “Query Wait” option, which specifies the time in seconds (from 0 through 2147483647) that a query waits for resources to become available before it times out¹⁴. If the query wait configuration option is –1 (default setting), then MS-SQL waited 25 times the estimated query cost in memory required to run the query. If query time is a non-negative value, then MS-SQL waited this amount of time, in seconds, for the memory required to run the query.

(2) *To set the query wait option (using Query Analyzer):*

```
sp_configure (T-SQL)
```

You can use the query below to display or change global configuration settings for the current server.

```
sp_configure [[@configname =] 'name'] [,[@configvalue =] 'value']
```

¹³ This workaround assigns an updated cut-off date (date/time when the ‘initial’ transfer set was created) for each new remote site, thereby creating a smaller transfer set(s), which includes only the records that have been added to the databases since the last manually set creation date.

¹⁴ In MS-SQL, memory-intensive queries, such as those involving sorting and hashing, are queued when there is not enough memory available to run the query. The query times out after a set amount of time calculated by MS-SQL Server (25 times the estimated cost of the query), or the time amount specified by the non-negative value of the Query Wait

Examples:

- **List the advanced configuration options** -- this example shows how to set and list all configuration options. Advanced configuration options are displayed by first setting the show-advanced option to 1. After this has been changed, executing `sp_configure` with no parameters displays all configuration options:

```
USE master
EXEC sp_configure 'show advanced option', '1'
RECONFIGURE
EXEC sp_configure
```

- **Change a configuration option** -- this example sets the query wait setting:

```
USE master
EXEC sp_configure 'query wait'15, '100'
RECONFIGURE WITH OVERRIDE
```

b. Native SQL error 0:

This error seems to be most prevalent when the number of concurrent sites being processed exceeds 10. Often, the error indicates a network disconnection or that there are not enough user connections configured on the MS-SQL server to support the total number of physical connections.

Reducing the number of concurrent sites usually resolves this error message. We recommend that Administrators monitor the network activity as well, because network issues can also cause this error message.

For more information on MS-SQL 7.0, please refer to the MS-SQL 7.0 product documentation.

C. Operating System

The GoldSync server, just like the MS-SQL server, performs a lot of intensive processing. Because of this processing, a GoldSync Administrator must ensure that the system acting as the GoldSync server can sustain the demands of heavy load processing--not occasionally, but consistently. Select a system that is stable, reliable and scalable. Windows NT-based systems have an absolute advantage in this area when compared to Windows 9x systems. FrontRange Solutions strongly recommends that Administrators install and deploy GoldSync on Windows NT-based systems such as Windows NT 4 or Windows 2000 only.

¹⁵ A query may hold locks while it waits for memory. In rare situations, it is possible for an undetectable deadlock to occur. Decreasing the query wait time prevents such deadlocks from happening. Eventually, a waiting query will be terminated and its locks released. However, increasing the maximum wait time may increase the amount of time before the query is terminated.

Also, it may be critical for the Administrator to understand that the different versions of NT-based systems offer varying levels of support for memory and processing capabilities, per Section III.C of this document.

For more information on Windows Operating Systems, please refer to their respective product documentation.

D. Resources, Data and Load

In addition to all the variables detailed in the preceding section, resources (hardware¹⁶ and infrastructure), data and load are the most important. These three variables can have a significant and direct impact on GoldSync's functionality and performance. Resources, data, and load have an interdependent relationship that makes planning a GoldSync implementation almost impossible without accounting for all three.

For example, when the Administrator determines the hardware requirements of a GoldSync implementation, that person has to determine the amount of data and load the GoldSync server has to process. Additionally, the Administrator has to look at the client's infrastructure to determine the limitations it may pose to the overall GoldSync implementation. To help create some standard recommendations with regard to hardware requirements, data and load, FrontRange Solutions has designed several scenarios, which were used in QA tests (available in Section VI of this document).

The following information can help a GoldSync Administrator when dealing with the manipulated variables such as resources, infrastructure, data and load.

1. Selecting a GoldSync server:

A GoldSync server is a system that is used to execute the processes configured for GoldSync. Depending on the amount of data and load, the GoldSync server may be required to perform intensive processing. FrontRange Solutions strongly recommends selecting a system that can perform *dedicated* GoldSync functions.

NOTE: Systems serving as MS-SQL servers and acting as servers for other applications or systems running resource-intensive applications, are **not** good candidates to be GoldSync servers.

Though GoldSync works on any system that meets minimum requirements, FrontRange Solutions strongly recommends (especially when running multiple sites) that administrators deploy GoldSync on systems using a Windows NT-based Operating System with at least 256 MB¹⁷ of RAM and with a processing power of at least a Pentium II-350. A good rule of thumb is to install as much memory as the computer will hold, especially in the case of single-processor machines.

Additionally, based on several tests conducted by the QA Department, we have determined that the overall load being processed by the GoldSync server has the greatest influence on GoldSync's performance. The more data

¹⁶ Processor, memory, disk subsystem

¹⁷ The memory requirement is less stringent for the GoldSync server than it is for the SQL server.

GoldSync processes via concurrent tasks, the more processing power it requires from the machine on which it is running¹⁸.

NOTE: The location of the BDE or the GoldMine/GoldMine Sales and Marketing executable that GoldSync uses does **not** have any observable bearing on GoldSync's performance.

Finally, FrontRange Solutions also recommends that Administrators run the same executable and BDE for GoldSync that the main server is running, in order to keep things easier to manage and troubleshoot.

2. Setting the maximum simultaneous synchronization sessions:

GoldSync processes can support multiple, simultaneous synchronization sessions. Further, each session may have one or more connection. The kinds of hardware components (such as processor speed, memory and disk subsystem) available to the GoldSync server affect the number of simultaneous synchronization sessions it can handle.

Based on several customer-reported issues, as well as extensive in-house testing conducted by the QA Department, FrontRange recommends 10 simultaneous synchronization sessions per GoldSync server¹⁹. This applies to both connected and non-connected sync methods.

NOTE: FrontRange Solutions strongly recommends against exceeding this 10-session recommendation. Test results have been inconsistent, and we are unable to qualify them as a best practice benchmark. It is also extremely important to note that this number fluctuates, as it is dependent on variables such as the amount of data needing to be processed per site and the processing power of the GoldSync and MS-SQL servers²⁰.

3. Determining the need to use multiple GoldSync servers:

Given that the recommended maximum, simultaneous synchronization session is 10 per GoldSync server, the only way to process more sites concurrently is to set up multiple GoldSync servers. This procedure is synonymous to "load balancing", where application tasks are distributed to multiple systems to increase and leverage the computing power that cannot be realized through a single, dedicated GoldSync server²¹.

NOTE: Any potential load balancing benefits may not be realized, if conflicting limitations from the MS-SQL server's capabilities exist. The number of simultaneous GoldSync procedures²² is always physically constrained by the MS-SQL server. Please refer to MS-SQL 7.0's documentation on Performance Tuning.

¹⁸ Data will be made available in a separate document

¹⁹ This is based on the assumption that the MS-SQL Server itself, is able to handle this number of concurrent processes. See Test Summary in the Test Scenarios section of this document

²⁰ Please refer to [Section VI Test Scenarios](#) of this document for additional data supportive of this recommendation.

²¹ In one of the test scenarios we performed, processing 15 sites did not work on a single GoldSync server. However, when these sites were divided between 2 GoldSync servers, the processing finished successfully. See the Test Scenarios section (VII-D) for further information.

²² The number of records/updates being processed simultaneously, relative to the GoldSync server's resources, has the greatest influence on the success of this procedure. See Test Summary of the Test Scenario section of this document

4. Setting the synchronization period:

Just as distributing the tasks across multiple GoldSync servers helps in load balancing, scheduling a specific time when the GoldSync server handles specific processes is also a good strategy. By assigning a specific time for sites to synchronize, the Administrator is assured that the server can handle the processing load at any given time, without the need to physically monitor the system.

Administrators can use the **Sync Period** setting on the group member's properties to configure this. Set it through GoldSync's Process Properties. Please consult the *GoldSync Administrator's Guide* for further information on configuring the GoldSync server.

5. Choosing a synchronization connection method:

The synchronization module was designed to provide users/sites with various methods to synchronize across multiple systems, given different customer requirements, environments and resources. Hence, both connected and non-connected methods have been included with GoldSync; however, despite the availability of these options, FrontRange consistently recommends that Administrators implement the *Internet (Direct)* method over other synchronization methods for the following reasons:

- a) The *Internet (Direct)* method is simple to configure. Administrators need to specify only the address (numeric or name) of the GoldSync/ GoldMine machine to which the remote connects.
- b) The *Internet (Direct)* method works well with common network security options such as firewalls. GoldSync uses 5993 as its default port. The network Administrator can configure a hole on the firewall for this port, to receive packets of data and still feel secure. In addition, this method offers the added flexibility of being able to assign a different port number to receive the GoldSync connection.

- c) The Internet Direct method, which uses the TCP/IP protocol, is the most reliable transport method. This protocol provides a virtual connection between two systems. A virtual connection may be made up of many physical connections, which support the multiple routes that a packet can take while traversing the Internet.

Additionally, the TCP/IP protocol guarantees the sending of reliable packets of information.

- First, it guarantees the retransmission of dropped packets that are typically lost due to network problems.
- Second, it ensures that each packet received has exactly the same content as when it was sent. If a bit has changed or been dropped for some reason, the protocol detects this difference and has the packet re-transmitted.

These underlying benefits are hidden to users, but by using *Internet (Direct)* method, these benefits are incorporated into the synchronization process.

- d) This method is easier to troubleshoot than the other connection methods.

While the other sync connection methods are also functional, they contain more variables that need to be isolated when troubleshooting. A Telnet procedure is usually the only tool needed to confirm a problem with the *Internet (Direct)* method.

For example, consider e-mail synchronization. There is no way to verify that a transfer set was retrieved by a remote site with this method because e-mail synchronization is a "non-connected" procedure. GoldSync updates the cutoff date for the next synchronization session after successfully creating a transfer set, *even if* the remote site fails to retrieve that transfer set. This may leave gaps in the remote's data in a situation where a transfer set was not successfully retrieved due to some condition external to GoldSync and/or GoldMine/GoldMine Sales and Marketing.

Further information on e-mail synchronization, as well as other synchronization methods, can be found in Chapter 8 of the *GoldSync Administrator's Guide*. This manual is available at the following URL:

<ftp://ftp.goldmine.com/Public/Manuals/gs5-admn.pdf>

6. Designing a plan that can reduce actual synchronization processing time:
When using a connected method for synchronization, creating transfer sets in advance for the sites can significantly reduce the processing time.

Another variable that can reduce multiple-site processing time is the use of multi-processor systems. GoldSync is designed to take advantage of the high



performance computing power that Windows NT-based technology provides. This improved performance has been verified by several tests conducted by the QA Department.

While this section provides generic resource guidelines in planning a GoldSync implementation, it is vital for the GoldSync Administrator to identify the role synchronization plays in the client's overall solution when planning the GoldSync implementation, and then use the information above to analyze applicability and feasibility.

Please refer to the *Test Scenario* section of this document for a more detailed analysis of the relationship that exists between the most common computer/server variables and GoldSync.

V. DEPLOYMENT

A number of issues can result from end-user practices or implementation errors. In order to maximize potential success, FrontRange Solutions strongly recommends that administration duties be restricted to the Certified GoldSync Administrator²³. Based on research conducted by the GoldSync Resolutions (GSR) team²⁴, a list of common pitfalls that users have encountered, as well as a list of highly recommended best practices has been compiled. These items are detailed in the "Do's" and "Don't" sub-sections that follow.

A. Customizations

In GoldMine/GoldMine Sales and Marketing, customizations are defined as those modifications that Administrators make to fields or files in order to tailor the product to each customer's unique requirements. These customizations could be user-defined fields (Contact2), Field Views, Details, Expanded Details, F2 Lookups, Lookup.INIs and Resources.

1. Do's

- a) Create/modify customizations from the main server (i.e., master license) **only**:
 - Implement customizations only from the main, network installation of GoldMine/GoldMine Sales and Marketing. Remote users or remote sites should not be authorized to customize their local copies and then to synchronize those changes back to the main master license. Please refer to the *GoldSync Administrator's Guide* for information on how to synchronize customizations.
 - Implement internal access/security controls over the modification of customizations used company-wide. Administrators should centralize this function and not allow remote users and/or remote sites to add customizations. Doing this limits the possibility of duplication, as well as confusion as to which customization changes should prevail. The remote users need to be informed of this policy. For greater control, the Administrator can configure the GoldSync server to not retrieve customizations from the remote sites.

²³ Certification requires an individual to successfully complete a self-paced course and exam, aimed at teaching GoldSync configuration fundamentals, internal mechanics and troubleshooting methodology.

²⁴ The GoldSync Resolutions (GSR) team consisted of a group of Senior Support Engineers with advanced GoldSync Training that were assembled specifically to function as a team to provide the highest level of support available for diagnosing, resolving and escalating synchronization-related issues. Effective March 31, 2001, the GSR team was dissolved with the reorganization of Support Services.

- b) Synchronize customizations affecting the structure of the database prior to, and separate from, synchronizing the data contained within the newly added/changed structures:
- Creating fields and user-defined fields affects the structure of the GoldMine/GoldMine Sales and Marketing database. These new fields are containers that have to be rebuilt into the database structure before GoldSync can accept data and/or data changes related to the fields. When data is synchronized at the same time as the new and/or changed fields and user-defined fields, the containers for these fields do not exist, and therefore are not already in place to accept the retrieved information²⁵.
- c) Always create a transfer set of the customization files prior to purging/deleting Tlogs²⁶:
- While it is normal for structural and data changes to occur in GoldMine/GoldMine Sales and Marketing, issues can arise when the changes have an impact on the structure of the default fields that are a part of every GoldMine/GoldMine Sales and Marketing installation, such as User-Defined fields 1-16. The only way that these structural changes will synchronize to remote systems (even to a fresh installation) is if the corresponding Tlogs exist on the originating/sending system/site.

When the RecID method²⁷ and "Ignore cut-off date" options are both used to create and send the transfer set, however, the remote site does **not** retrieve the changes for these default records--since these particular RecIDs already exist in the retrieval system. In order for the remote systems to retrieve these records, the incoming transfer set must contain the updated Tlogs.

²⁵ GoldMine will passively retrieve the data and the corresponding Tlog in the database. The retrieved data will not be displayed and remains passive, even after a rebuild process takes place. If the records are resent in subsequent sync sessions, barring a change that creates an update Tlog, these records will not be retrieved again and will remain as hidden data. Hence, keep in mind that newly created customizations must be synchronized first and separately from the data.

²⁶ Tlogs can be purged using the following methods only:

- a. Selecting the Purge logs option from the GoldMine logs and checking GoldMine Files logs and Contact Files logs from the list of logs that will be purged
- b. Dropping/Deleting the existing Conttlog and Gmtlog tables from MS-SQL
- c. Deleting the existing Conttlog.dbf and Gmtlog.dbf files from the GoldMine and Contact Files Directory
- d. Manually deleting Tlog records through the use of third party applications

²⁷ The RECID method is a transfer set creation method that allows records with no existing Tlogs to be included in the transfer set, provided that their RECIDs fall within the cut-off date

Although ways exist to work around the issues, it is better to implement practices that can prevent this problem from occurring. The optimal (though not most realistic) practice, is to never purge or delete the Tlogs.

FrontRange Solutions recognizes, however, that situations exist where the tactic of purging/deleting Tlogs is required for resolving other potential issues²⁸.

The alternative solution to not purging or deleting Tlogs is to create a transfer set of customizations before purging/deleting Tlogs. Doing this means that the Tlogs for the changes on the default fields are retained and may be used for special situations where they are needed.

2. Don'ts

a) Never manually copy customization files:

In GoldMine 3.x and earlier, the process for applying customizations required Administrators to manually copy files such as Contodef.*, Fields.* and Lookup.* from one system to another. With the introduction of GoldMine 4.x, and with all subsequent versions -- other than the install command utility provided with GoldMine 4.x²⁹ -- synchronization is the **only** supported method of transferring customization information from the main server to remote systems.

²⁸ Below are known circumstances where purging Tlogs can become a solution:

- Transfer set creation process taking too long because of enormous amount of Tlog records on the site creating the transfer set
- Retrieval process taking too long due to the enormous amount of Tlog records on the retrieval system, which are evaluated during the retrieval process
- Eliminating zzzDEL tlogs that prevent record changes from being retrieved

²⁹ GoldMine 4.00.1202 includes an automated feature known as the "Undocked Installer utility", which simplifies and automates the creation of undocked user licenses and the installation of customizations. Currently, this utility is available for GoldMine 4.x only.

B. Connection Method

1. Do's

- a) Use the *Internet (Direct)* connection method when using RRAS to connect to the network:
 - Though RRAS³⁰ simulates a network connection, FrontRange Solutions recommends that the *Internet (Direct)* method be used instead of the network connection method when synchronizing. With the use of the TCP/IP protocol in conjunction with RRAS, the combination provides better network performance, steadier connection and optimum bandwidth utilization.
- b) Verify that the remote site connecting to the network via RRAS has proper network access:
 - There have been several instances where synchronization connection problems were traced to the remote site having inadequate network rights to the host GoldMine/GoldMine Sales and Marketing directory. Verify that the user logging into the network has full rights³¹ to that directory.
- c) Ensure that the GoldSync designated port is configured to allow packets in and out through the firewall:
 - GoldSync must be allowed to monitor ports through the firewall³² before users from outside the network can connect to the server and synchronize.
 - When synchronizing via *Internet (Direct)*, the TCP/IP protocol is used. Any TCP/UDP connection has two endpoints: the source address and port, and the destination address and port. Since TCP/IP is a two-way protocol, the packets need to pass both in and out of the port to complete the communication process. If the designated port is not configured to let packets out, GoldSync will deem it as a lost communication and may return a 10061 error message.

³⁰ Routing and Remote Access Service is a Windows NT service that allows users to securely connect to their network to access files and even run applications using a phone line.

³¹ Delete, read and write access

³² A firewall is a system that enforces an access control policy between two networks. It blocks traffic and it permits traffic.

Align the system clocks of the workstations or remote users docked to the network with the server's clock:

- Synchronization functions by tracking and recording changes/updates/deletions in a user's GoldMine/GoldMine Sales and Marketing system with specific date and time values. As users gain access to GoldMine/GoldMine Sales and Marketing from different computers (either those on a network or in the field on notebooks), differences often exist between the system clocks on these PCs, leading to unsynchronized data between systems.
- To eliminate this clock drift problem, GoldMine/GoldMine Sales and Marketing allows all PC/workstations on the network to "tune" their system clocks with the server's clock. Administrators have the option to align the clocks of all the workstations every five minutes, or to align the internal synchronization stamp clock. Doing so produces the required RecIDs, thereby resolving clock drifts.
- GoldMine/GoldMine Sales and Marketing uses the Windows NET TIME command to read the server's clock, making it compatible with most servers including NT4, Novell³³, Windows 95/98, etc. To verify whether the server supports this, at a command prompt type: NET TIME \\computername -- if this returns a value, the function is supported.

NOTE: Even if the server cannot respond to the NET TIME query, Administrators can set **any** machine on the network as the master clock.

On the PC/workstations on the network, Administrators must activate master clock synchronization. To do this, set the following entries in the GM.INI

```
[GoldMine]
MasterClockMachine=\\REX
UpdateLocalClock=1
```

The MasterClockMachine= entry specifies the server machine name of the system which has the designated "master clock".

The UpdateLocalClock=1 option sets the workstation's system clock to the time of the master clock machine. The default,

³³ FrontRange Solutions does not recommend the use of Novell as a server system for GoldMine/GoldMine Sales and Marketing, as the Novell Client32/IntraNetWare drivers have been known to cause data corruption problems in the past. These issues are circumvented by using the Microsoft Client for NetWare in place of the Novell Client32/IntraNetWare. The tradeoff users experience is Microsoft-supplied drivers causing the loss of functionality within applications that specifically require Client32/IntraNetWare drivers.

UpdateLocalClock=0, does not set the workstation's clock, but rather only relies on the time of the master clock machine for all synchronization time stamps.

When the master clock machine is synchronized with an atomic clock over the Internet, setting UpdateLocalClock=1 would allow the clocks of all systems running GoldMine/GoldMine Sales and Marketing to be synchronized automatically as well.

d) Implement a procedure where, in any failed transfer set retrievals, remote users/sites **must** report back to the GoldSync Administrator, when using a non-connected method such as E-mail synchronization:

- When using non-connected methods of synchronization such as e-mail or shared paths, no way exists to verify that the transfer set was retrieved successfully by the remote site. As a result, GoldSync automatically updates the cut-off date for the next synchronization session after successfully creating a transfer set. This may expose the remote site to gaps in its data if an Administrator does not recognize the retrieval failure right away.

It is a best practice for the GoldSync Administrator to train the remote users to check the Process Monitor logs after every synchronization session to verify whether the session finished successfully and to have the remote user report any failed synchronization process as soon as possible when using a non-connected method.

2. Don'ts

a) Modem synchronization is the least preferred connection method:

- Though the modem connection method is still supported, it is the least recommended of all the available methods because of its inherent unreliability and the amount of troubleshooting required, which is typically hardware-oriented, rather than GoldSync-oriented. If modem synchronization continues to return issues even after extensive troubleshooting, FrontRange strongly recommends that Administrators implement another connection method.
- For users that have modems, but do not have Internet access, the Administrator can set them up to connect to the network remotely via RRAS. Once connected, they can use the *Internet (Direct)* method to synchronize with the GoldSync server. Network synchronizations across a RRAS connection are not recommended.

b) Windows9x/ME RRAS Clients

- FrontRange Solutions strongly advises that one use a WindowsNT based operating system on any workstation that will be synchronizing through a RRAS connection.
- Windows9x/ME workstations are known to cause intermittent time-out errors on the GoldSync server and intermittent socket disconnects on the workstations.
- These connection issues are most common when synchronizing transfer sets larger than 5 megabytes, but the behavior has also been observed when this file size is not exceeded.

C. Tlogs

Tlogs are an essential part of the synchronization process. Tlogs are records, which are stored in ContTlog.dbf or GMTlog.dbf and keep track of the field-level changes made to records in the GoldMine/GoldMine Sales and Marketing database. Each time a record is created or modified, the Tlog records the change, as well as the time of the change -- down to the millisecond -- in the appropriate Tlog file (GMTlog for files in the GMBase folder and Conttlog for contact set-specific files).

3. Do's

- a) Take time to learn the Tlogs mechanics and the impact they have on synchronization:

Understanding the Tlogs mechanics and their synchronization effects is the most important of the "Do's" best practices Administrators should apply. The better an understanding the Administrator has about the Tlogs mechanics, the better judgment the Administrator can develop in figuring out the do's and don'ts of synchronization³⁴.

- b) Keep Tlogs tables as far back as possible:

- Although purging Tlogs is inevitable because they can bloat³⁵, we strongly recommend keeping as many Tlog records as possible.
- We cannot over-emphasize how important Tlogs are to synchronization. Without the Tlogs, synchronization will be limited to record-level changes.

³⁴Further discussion on Tlogs mechanics will be made available as a separate document in the FRS Partner's site. ETR not available yet.

³⁵ See footnote 26 for the specific circumstances where purging/deleting Tlogs may be required.

NOTE: Since GoldSync 4.0 and above were designed to perform field-level synchronization, the Tlogs are the only mechanism available to track these field level changes.

It is good practice to keep **at least** 90 days worth of Tlogs. Assuming all users are synchronized within 1 or 2 days of each other, it is possible to reduce the quantity of Tlogs that are stored; however, FrontRange Solutions strongly recommends against the practice of reduction.

NOTE: Do not purge Tlogs, if at all possible.

- c) Always proceed with extreme caution if purging/deleting Tlogs:
- At some point, Administrators may be confronted with the need to purge Tlogs³⁶. Before doing this, ensure that all remote sites are current with their sync sessions.
 - In situations where an Administrator may need to delete Tlogs selectively³⁷, FrontRange Solutions strongly recommends a backup be made prior to the operation.

4. Don'ts

- a) Never purge Tlogs as a fix unless doing so is the only known option to resolve the issue³⁸:
- Purging the Tlogs can cause more serious issues, such as failure to retrieve record changes. Often, these discrepancies are not discovered until much later. Purging Tlogs can have very costly repercussions and is highly discouraged.
 - Earlier builds of GoldMine 5.0 contained a critical anomaly that was triggered by Tlog deletions, where deleting these records prevented synchronization from including linked documents in transfer sets. Thanks to the feedback received from our BETA team and other users, the issue was identified and resolved in the 5.00.909 build.
 - Deletions cannot be synchronized unless the Tlogs for those records exist. If Tlogs are deleted, GoldMine data deleted on the system is not deleted on the other sites that may have the same data. In addition, if the other systems have the deleted data in question, the data is synchronized back to the site where the Tlogs were purged on the next synchronization session including those records. As a result, it appears that deleted data is un-deleting itself or reappearing on the system, which has the deleted Tlogs.

³⁶ Ibid.

³⁷ Ibid.

³⁸ See footnote 26 for other circumstances where purging/deleting Tlogs may be required

NOTE: Do not purge Tlogs, unless it is the only option that can resolve an issue.

b) Never copy Tlog files:

- Consider a scenario where a remote site has damaged their Tlogs and they do not have a backup from which to restore the files. In addition, the server installation is a mirror copy of the remote GoldMine/GoldMine Sales and Marketing system. The ContTlog.dbf and GMTlog.dbf files are then copied to the remote.

The server had made some changes to the server data before the Tlogs were copied, and these changes have not been synchronized to the remote yet. The next time these systems attempt to synchronize with one another, the changes from the server will not be retrieved by the remote.

The server includes its changes in the transfer set, but when the remote system compares the incoming Tlogs with its own Tlogs, the date and time stamps are the same and the remote concludes that these changes are not current enough to overwrite what it has already and ignores the records.

c) Never "selectively" restore Tlog files from a backup:

- Restoring only selected database files from a backup may orphan records in the other GoldMine/GoldMine Sales and Marketing databases. This is also the case when restoring only the Tlogs file.

Consider an example where the Tlog file from last week's backup was restored; however, since the last backup date, records were added in the Contact1, ContSupp and ContHist databases. These records had corresponding Tlogs that are lost if the older Tlog file is restored. As a result, when creating a transfer set, these records may not be included regardless of the cut-off date used.

Therefore, when restoring files, we recommend restoring the full set of GoldMine/GoldMine Sales and Marketing databases instead of selected files³⁹ only.

³⁹ Though we do not recommend the selective restore procedure, scenarios exist where it is acceptable. One scenario is when the restored file contains the same information as the file that was replaced, and therefore does not give rise to the scenario described above.

- d) Avoid use of *Non-Certified Third Party Applications* that update or write to the database:
- While it is not prohibited to use procedures or applications outside of GoldMine/GoldMine Sales and Marketing to manipulate the database from the backend, FrontRange Solutions endorses only Certified Third Party Applications that are tested to conform to standards set by FrontRange Solutions ISV program⁴⁰.

D. Linked Documents

5. Do's

- a) Always verify that the directory specified to retrieve linked documents has the proper user and access rights configured:
- When the directory specified as the default path for retrieving linked documents is not shared with full network Read and Right access, the linked documents may not be retrieved to that path, but instead, are retrieved into the Tmplinks directory. In the event that GoldSync cannot retrieve it to the Tmplinks directory, it may generate an Uncompression error 28 - Error creating output file.
 - FrontRange Solutions recommends that Administrators share the directory designated as the retrieval path for linked documents with “Full Control” access to prevent GoldSync from encountering problems when retrieving linked documents.
- b) To avoid path changes, plan the directory structure where linked documents are kept:
- Troubleshooting performed by the GoldSync Resolutions team has shown that changing paths on a regular basis increases the possibility of document retrieval failure for the path specified in GoldSync.ini through **Edit|Preferences|Sync**.
- c) Further study the linked documents retrieval function of synchronization:

⁴⁰ Please refer to the Technology Partners section of FrontRange Solutions web site (<http://www.frontrange.com/>) for a complete list of the GoldMine® Integrated Software Vendors

For further information on how the synchronizing of linked documents feature functions, please refer to "Linked Documents Retrieval Behavior"⁴¹ document.

E. Administration

The GoldSync Administrator must be able to use both non-technical characteristics and strong technical skills. The ability to see and anticipate the behavior of end users -- their impulses, reactions, and susceptibility to mistakes -- is invaluable in supporting and maintaining GoldSync. With this in mind the Administrator should develop plans and procedures to help mitigate end user issues. A good practice is to briefly train the end users on the proper use of the software, as well as the consequences of misuse.

Sometimes, however, Administrators must use a more deliberate strategy to be effective. In synchronization, this requires taking the control out of the users hands. The less interaction required on the part of the end user, the lower the risks of customers encountering problems. If it helps and fits the customers requirements, always encourage end users to just point and click when synchronizing, such as through the design of a custom macro. Do not be afraid to implement procedures and rules that can make usage easier to monitor and control.

6. Do's

- a) Listed below are a few of the best practices one can use as an Administrator after the initial analysis and configuration of both remote and host systems have been completed.
 - Verify that GoldSync's connection password for the site is the same as that which is being used by the remote user.
 - Confirm that the server and the remote are using the same encryption level.
 - When using e-mail synchronization, ensure that the POP server settings on both remote and host are correct.
 - Note any verification code error messages. This is an alert for Administrators to check for remote site initiated interference.
 - Turn on the Server's synchronization logs to monitor synchronization sessions. Regularly check the logs to verify if the synchronization session was successful.

NOTE: Turning this option on can cause the SYSLOGS file to grow quickly.

Become familiar with the use of *Sync Spy*, accessed through **Tools|Sync Spy**, and tools such as database file browsers, MS-SQL Enterprise Manager and MS-SQL Query Analyzer

⁴¹ At the time of this publishing, the document is still being drafted.

F. General

7. Do's

- a) Use the same version and build on the server and on the remote sites/users:
While it is possible to synchronize GoldMine 5.5 with GoldMine 5.0, we recommend that the server and the remote systems use the same version and build.
- b) Deploy a routine database maintenance plan.
Errors within the data can have a serious impact on the performance of synchronization⁴². Re-indexing and re-building GoldMine 5.x databases on a scheduled basis helps avert potential data-related problems and/or errors. These rebuilds and re-indexes are of primary concern to remotes and other systems using a dBASE backend.
 - On average, we recommend re-indexing dBASE systems be once a week and rebuilding once a month. Note that as the number of users and modifications to the database increases, the maintenance frequency will need to be increased as well.
 - MS-SQL users should **not** rebuild their database through the Maintenance Wizard. Changes to the database structure should be performed through MS-SQL administration tools, such as Enterprise Manager, in order to preserve table permissions. Re-indexing should not be required, either, as the database server will automatically handles this function.

Although MS-SQL greatly reduces the risk of data corruption, especially when compared to dBASE, it is not guaranteed and may not always be the appropriate solution for the customer. Increased software costs, functionality differences⁴³, size of the database, number of concurrent users and expected extent of changes to the database are some of the factors that are important to evaluate when determining the best option.

Regardless of the choice made, FrontRange Solutions strongly recommends that a solid backup routine be deployed to compliment any maintenance plan. For dBASE users, a solid maintenance/backup routine may even eliminate the need to switch to SQL, unless other performance factors exist.

⁴² Data-related problems can manifest themselves in many ways, such as data not being included in a transfer set or not being retrieved. Often they appear as errors, for example, Windows Invalid Page Fault or a database error.

⁴³ A good example of this is the report writer, as it has not been optimized for MS-SQL. Because of this, in nearly all cases, it functions much slower than it would if the same data were stored on a dBASE backend.

- c) When synchronizing multiple contact sets⁴⁴, we recommend that these contact sets reside on the same MS-SQL server:
- Contact sets should be kept on the same SQL Server, especially when multiple databases are included in transfer set creation.
- NOTE:** Currently, an issue exists in which synchronizing multiple contact sets residing on different MS-SQL servers, generates a 208 error message during transfer set creation. This issue was reported to development and, while it will be addressed in future builds, it is considered best practice to implement it as described above.
- d) Always observe the same letter casing for the database alias on BDE and GoldMine Sales and Marketing's SPFILES:
- We know of one scenario wherein the letter casing in the SPFiles (**File|Open File**) is not the same as that of the BDE alias. This difference occurs when an Administrator has to manually attach the SQL database to GoldMine Sales and Marketing's SPFILES. When caught in this situation, be prudent and check the letter casing used in the BDE.
- e) Verify that the Regional Settings selected from your Windows system are appropriate for its location:
- GoldSync compensates for time differences in different time zones by adjusting the incoming timestamps according to the Regional Settings on the computer. If the remote has selected the Regional Setting inappropriate for its LOCALE, GoldSync still compensates for the time difference, but the timestamp adjustment will be inaccurate and may result in some records not being synchronized.
- f) When a usergroup is selected from the **Send Users Calendar** list of the **Send Options** window, always verify that the corresponding members of the usergroup are also selected from the **Send Users Calendar** list.⁴⁵
- Always verify that the members of the usergroup were also checked from the **Send Users Calendar** list, especially whenever the usergroup membership is modified (users added or users deleted to/from the usergroup).

⁴⁴ To synchronize multiple contact sets, one must define File Codes for the contact sets that are to be synchronized. Detailed information on the File Codes feature can be found in Chapter 2 of the GoldMine 5 Reference Manual (<ftp://ftp.goldmine.com/Public/Manuals/GM5-REF.PDF>) and Chapter 4 of the GoldSync Administrator Guide (<ftp://ftp.goldmine.com/Public/Manuals/gs5-admn.pdf>).

⁴⁵ Likewise, do this every time the user group membership is modified

- g) Always use UPPERCASE letters for the site name
- The use of lower case letters for the site name in a site license was historically linked to anomalies/errors such as "The site is an unregistered site". Although this issue was addressed, it resurfaces occasionally on newer builds. The use of proper casing for the site name, so far, has not tested positive for any issue or anomaly; however, we recommend that Administrators always use UPPERCASE letters for site names in site licenses.
- h) Use a mapped network drive path (D:\Apps\GoldMine) rather than a UNC path (\\Lolita\Apps\GoldMine) when referencing database locations (dBASE) in the GM.INI
- The use of UNC path in the GM.INI, specifically in the Sysdir line, has yielded compression errors. The behavior is not observable if a mapped network drive path replaces the UNC path. Additionally, when the UNC path is used to connect to the GoldSync server when synchronizing through the network, anomalies were also observed. Therefore, we recommend using a mapped network drive path over a UNC path in any function in GoldSync/GoldMine/GoldMine Sales and Marketing where a path reference is required.
- i) Evaluate the remote user's/site's cut-off date when synchronizing records for the first time to them.

GoldSync updates the cut-off date for users and sites it believes are synchronizing successfully. If a record is being synchronized to one of these users or sites for the first time, there exists a possibility that the user's/site's cut-off date will cause data that is associated with the contact record to not be synchronized, because it was entered on a date prior to the cut-off date.

For example, assume that record X is entered on January 1 at the main system. On this same date, several calendar activities are added to record X. On February 15, the record is assigned to user Y, who synchronizes on a daily basis. When user Y synchronizes on February 16, the cut-off date that is applied to their transfer set is February 15, thus ignoring all corresponding data for the record entered between January 1 and February 14.

The Territory Realignment feature can be used to update the calendar records to include them in the synchronization. Tools such as GoldBox or BeyondGold can be used to update other data.

8. Don'ts

- a) Never use the system designated as the RRAS server to run GoldSync
 - Based on recent testing conducted by an independent group⁴⁶, running GoldSync on the same computer that is designated as the RRAS server causes problems.
- b) Define a user name of “GoldSync”
 - The GoldSync application stores various settings within the GoldSync.INI file. GoldMine stores user specific settings, such as Internet preferences, in a file that uses the following naming convention: <GMUserName>.INI. Creating a user of “GoldSync” would cause the GoldSync.INI file used by GoldSync to be constantly modified, potentially causing problems with the synchronization process, as sync specific settings could be lost.

⁴⁶ eTesting Labs reported this during their independent testing on GoldSync. The issue will exhibit itself if a RRAS server is running on the same system acting as a GoldSync server and the GoldSync server is configured to accept incoming calls via modem. The RRAS and GoldSync applications are unable to share access to the same modem. Thus, GoldSync is unable to initiate its process to accept connections via modem.

VI. TEST SCENARIOS

In order to give Administrators a basis for building the GoldSync model, this section of the document describes the results obtained from several scenarios tested in-house. Please note that the statistics provided below may vary depending on the mixture of resources, data and OS performance.

A. Using Windows 98 system as a GoldSync server with 128 MB RAM

OBJECTIVES:

- a. To test the capability of a Win 98 system as a GoldSync server
- b. To determine if the minimum RAM requirement of 128 MB is sufficient to handle at least 10 concurrent sites

Tests were run on a Windows9x system with 128 MB of RAM serving as the GoldSync server. The system was configured to handle 10 concurrent sites, with each site using a filter and building transfer sets sized 3-10 MB. Database is SQL with a total size of 1.2 GB. See Exhibit A-1 for a breakdown of records on some of the database's tables. See Exhibit A-2 for the test environment disclosure.

RESULTS:

While all processes finished successfully, the amount of time it took for all 10 sites to process was lengthy (See Exhibits A-3 and A-4). It was also observed that the sites whose transfer sets included fewer records and updates finished earlier.

B. Running GoldSync on a comparable system that has twice the amount of RAM and is using WIN2K Advanced Server

Using the same database, a test was run to determine the impact of doubling the amount of RAM and using an NT-based system to run GoldSync on a comparable system. See Exhibit 4-5 on the conditions of the test.

RESULTS:

The amount of time it took to process the same number of sites was significantly decreased. It is believed that the robust way by which WINNT-based systems handle multiple processes, as well as the increase in available memory, contributed to this behavior. See Exhibits A-6 and A-7.

NOTE: Although it is tempting to make a matrix of the results, the many variables involved and the lack of constant factors used in the two tests do not allow for graphing a straight-line equation.

C. Running more than 10 simultaneous processes on GoldSync

Using the same GoldSync server and database in Scenario C, the number of sites processed was increased to 12.

RESULTS:

The processes finished successfully.

To test it further, the number of sites processed was increased to 15.

RESULTS:

The processes finished successfully.

Using the same number of sites (15), the filters used for each site were changed to filters that included more records/updates, which subsequently created bigger transfer sets for each site.

RESULTS:

The processes terminated without error messages.

Using the same number of sites (15) and the same filters used in the last test, the processes were distributed between two GoldSync servers (1 server handled eight sites while the other handled seven sites).

RESULTS:

The processes finished successfully.

The number of sites was increased to 20. The same filters in the last test were used plus an additional five filters were created for use in the five sites that were added. The processes were distributed evenly to two GoldSync servers. A test run was conducted.

RESULTS:

The processes finished successfully.

D. Test Summary

Below is a summary of the recommendations derived from the results gathered through performing the test scenarios in the previous section:

- a. Although GoldSync will run on a Windows98 system, FrontRange Solutions strongly recommends that the GoldSync server be installed on a Windows NT-based system.⁴⁷
- b. Although GoldSync can function on a non-dedicated server, we strongly recommend that the computer running GoldSync be dedicated for GoldSync functions exclusively.
- c. Although 128 MB RAM is sufficient to run 10 concurrent processes with a total transfer set size⁴⁸ of 61.25 megabytes⁴⁹, it is standard practice to have at least 256 MB on any machine designated to perform server functions for any application. FrontRange Solutions recommends at least 256 MB of RAM on the GoldSync server.
- d. The minimum requirement of Pentium II 350 for a GoldSync server is sufficient to support 10 concurrent sites with a total transfer set size of 60-100 megabytes⁵⁰.
- e. Although smaller transfer sets may allow a GoldSync server to process more than 10 sites simultaneously, the recommended number of processes for each GoldSync server is 10⁵¹. Having fewer sites processed simultaneously on the GoldSync server, however, does not guarantee successful transfer set creation. The total amount of records and updates being simultaneously processed by the server has the greatest influence on GoldSync's failure or success.
- f. The maximum amount/size of records that GoldSync can successfully process may vary depending on the resources⁵² available to the GoldSync server.
- g. The size of the SQL database affects the resources of the SQL server more than it does the GoldSync server; however, it does create overhead for GoldSync's processing time.
- h. When processing multiple sites, the Administrator can balance the load by distributing the processes among different GoldSync servers. If the process still fails, it is likely that the SQL server caused the failure.
- i. GoldSync's performance responds more to a change in the system's processing power more than it does to the amount of memory added to improve performance. Overall, though, the performance of GoldSync is dependent on the ability and speed of the SQL server to answer the requests.

⁴⁷ See Exhibits A-3 and A-6

⁴⁸ Size of all transfer sets created simultaneously (total amount of records /updates processed simultaneously)

⁴⁹ Total size of all the transfer sets processed in Exhibit 4-4

⁵⁰ See Exhibit 4-4 - There was another test conducted on the same system that had a total combined size of over 150MB

⁵¹ Again, this is influenced by the total amount of records/updates processed simultaneously relative to the GoldSync server's resources

⁵² processing power, memory, disk subsystem and applications installed

- j. When the Administrator processes sites using Filters, the amount of time to build a transfer set that has a filter run for the first time is longer. This is because, on the first run, GoldSync has to build the GSFILTER table where the filtered records will be kept for subsequent use.

- k. For purposes of the GoldSync Primer, linked documents were not included in the testing because simultaneous tests for this functionality were being independently conducted by eTesting Lab's facilities.

VII. CONCLUSION

Requirements, best practices, and rules exist that must be observed in order to effectively implement and use GoldSync. For the application to successfully address customer requirements, the Administrator must carefully analyze the variables involved and the client's infrastructure.

In addition, customers and Administrators must be cognizant and open to accepting the limitations of GoldSync, prior to committing to its deployment. If GoldSync is the right solution, there are also ways to capitalize on its strengths by adhering to best practices that have been proven to work and are applicable to the client's situation. Attempting to force GoldSync/GoldMine/GoldMine Sales and Marketing to perform outside of the scope of these recommendations can quickly lead to frustration and/or failed implementations. Awareness of, and consistent compliance, to the requirements, best practices and rules provided herein are the best remedy for the potential GoldSync problems.

A. Practical Considerations

1. Data Integrity

Applying the best practices outlined within this document can be a very effective way of increasing the potential of success of any GoldSync implementation. Also critical to the success rate are awareness and adherence to GoldSync's requirements.

Further, GoldSync's functionality and performance can be adversely affected by the integrity of the data. Oftentimes, data-related issues are difficult to diagnose and troubleshoot -- and potentially can cause many hours of frustration. A good maintenance and backup routine can help prevent this type of scenario.

2. Development Issues

FrontRange Solutions is committed to providing world-class competent solutions such as GoldSync; however, development issues will arise from time to time. To balance and reduce the potential adverse effects of the anomalies, FrontRange Solutions has appointed a team handling the task of making the information available to the Partners in a timely manner. Descriptions of anomalies are accompanied by recommendations known to circumvent the problem whenever possible.

The list of known issues is made available to Solutions Partners via BITS⁵³. The public can access some of the issues from the GoldMine Knowledgebase.

⁵³ Bug Issue Tracking System (BITS), is a password protected system available to Solutions Partners. Partners wishing to access BITS must contact their respective Channel Account Managers to attain a username and password. Once login information has been attained, navigate over to <http://bits.goldmine.com> to view the list of known anomalies.

GLOSSARY

BDE	Borland Database Engine, the data access engine used by GoldMine to connect to the database systems it supports, such as DBASE and MS-SQL
BLOBS	A term used in database management systems to refer to a binary large object (for example, memo field)
DISK I/O	Disk reads and writes
DISK QUEUING	A condition when I/O requests are forced to wait for disk access due to the heavy read and write activities that the disk subsystem is handling
DISK SUBSYSTEM	The technology used by the disk system (for example, disk using IDE or SCSI controllers, software or hardware based RAID solutions, and so forth)
FIREWALL	A system that enforces an access control policy between two networks. It works two ways - it can block and/or permit traffic
HASH	A function that maps all the possible associations between keys and values so that, given a key, the system can find the value quickly
IN MEMORY HASH JOINS	A SQL join operation that first scans and computes the entire build input and then builds a hash table in memory
MAX DBPROCESSES	The maximum number of concurrent open MSSQL DBLIB client DBPROCESSES
MERGE JOINS	A SQL join operation that typically scans an index, if one exists on the proper set of columns, or places a sort operator below the merge join. The merge join requires that both inputs be sorted on the merge columns, which are defined by the equality (WHERE) clauses of the join predicate
NESTED LOOP ITERATIONS	A type of SQL join operation that uses one join input as the outer input table and one as the inner (bottom) input table. The outer loop consumes the outer input table row by row. A nested loop join is particularly effective if the outer input is quite small and the inner input is pre-indexed and quite large. In many small transactions, such as those affecting only a small set of rows, index nested loops joins are far superior to both merge joins and hash joins

PROCESS MONITOR LOGS	The logs that record the activities and details of a process
QUERY COST	The optimal strategy of processing a query
RECID	The encrypted, 15 character long field that is used to uniquely identify a record in the database. The first 7 characters store the timestamp value showing when the record was created, and the last 8 characters are filled with unique values to ensure that no two records ever have the same recid
RECID METHOD	A transfer set creation method allowing records with no existing TLog entries to be included in the transfer set, provided that their RECIDs fall within the cut-off date
RRAS	Routing and Remote Access Service, a Windows NT service that allows users to securely connect to their network to access files and even run applications using a phone line
TLOGS	Records that keep track of the field-level changes made to records in the GoldMine/GoldMine Sales and Marketing database. Each time a record is created or modified, the Tlog records the change, as well as the time of the change -- down to the millisecond -- in the appropriate Tlog file (GMTlog for files in the GMBase folder and Conttlog for contact set-specific files).
UNC	Universal Naming Convention, a method for accessing files on a network drive without using a "mapped" drive letter, but instead using the name of the computer being specified. They typically appear as: <i>\\server\volume\path\filename</i>

APPENDIX A

List of Exhibits

- A-1 Partial Breakdown of records per table in the 1.2 gig SQL database used in the test
- A-2 Exhibit 4-2 Specs of the first Goldsync server
- A-3 Results of Test Scenario (VI-A & B)
- A-4 Size of Transfer set created per site and the amount of time it took to process them
- A-5 Specs of the second GoldSync server
- A-6 Results of the second Test (VI-C)
- A-7 Size of Transfer set created per site and the amount of time it took to process them in the second Test

Exhibit A-1 Partial Breakdown of records per table in the 1.2 gig SQL database used in the test

DATABASE	RECORDS
CONTACT1	47754
CONTACT2	47754
CONTHIST	128854
CONTSUPP	67225
CONTTLOG	721955
CAL	2238
GMTLOG	13716

Exhibit A-2 Specs of the first GoldSync server

SYSTEM	Intel P2
O/S	Win 98 SE
CPU	Pentium 2
CLK/BUS	333
L2 CACHE	512
MEMORY	128
VIDEO RESOLUTION	Rage II C AGP (1024x768x60)
DISK SUBSYSTEM	WD IDE 20 gig
NETWORK SUBSYSTEM	100MB

Exhibit A-3 Results of Test1 - Using Windows 98 as a GoldSync server

IST RUN RESULT	Successful
TIME IT TOOK TO FINISH ALL PROCESSES	4 hours and 10 minutes
ERROR MESSAGE	None
COMMENTS	
2ND RUN RESULT	Successful
TIME IT TOOK TO FINISH ALL PROCESSES	4 hours and 29 minutes
ERROR MESSAGE	None
COMMENTS	

Exhibit A-4 Size of Transfer set created per site and the amount of time it took to process them

SITE	SIZE OF TRANSFER SET	TIME
UUSER 21	3.76MB	2:29:56
UUSER 15	4.35MB	2:43:55
UUSER 13	4.78MB	3:13:48
UUSER 17	5.45MB	3:23:28
UUSER 16	5.79MB	3:32:29
UUSER 22	6.16MB	3:40:34
UUSER 18	6.98MB	3:57:17
UUSER 19	7.27MB	4:02:46
UUSER 20	7.42MB	4:05:06
UUSER 14	9.29MB	4:10:05

Exhibit A-5 Specs of the second GoldSync server

SYSTEM	Intel P2
O/S	Win2k Advanced Server
CPU	Pentium 2
CLK/BUS	300
L2 CACHE	512
MEMORY	228
VIDEO RESOLUTION	Trident 9680 (800x600x60)
DISK SUBSYSTEM	Maxtor IDE 10 gig Maxtor IDE 4.3 gig
NETWORK SUBSYSTEM	100MB
VIRTUAL MEMORY	764MB

Exhibit A-6 Results of the second Test

TEST RUN RESULT	Successful
TIME IT TOOK TO FINISH ALL PROCESSES	2 hours and 16 minutes
ERROR MESSAGE	None
COMMENTS	

Exhibit A-7 Size of Transfer set created per site and the amount of time it took to process them in the second Test

SITE	SIZE OF TRANSFER SET	TIME
UUSER 21	3.82MB	1:37:37
UUSER 15	4.44MB	1:51:56
UUSER 13	4.84MB	2:07:40
UUSER 17	5.42MB	2:12:27
UUSER 16	5.76MB	2:12:59
UUSER 22	6.18MB	2:14:16
UUSER 18	7.02MB	2:14:19
UUSER 19	7.17MB	2:14:24
UUSER 20	7.45MB	2:14:40
UUSER 14	9.35MB	2:15:59

APPENDIX B

Supplemental Information

- B-1 Sync Table Id
- B-2 Sync Record Types
- B-3 Linked document Retrieval Behavior
- B-1 Sync Table Id

The Table Id represents the GoldMine database that was change. This TableId is located in the separate TLOGs. The Table Ids for GoldSync 5 are as follows:

TABLE NAME	TABLE ID
Contact Data	
Contact1	&
Contact2	'
ContGrps	*
ContHist)
ContSupp	(
Conttlog	%
ContUDef	0
GMbase Data	
Cal	"
Fields5	6
Filters	+
Forms	#
FormsFld	8
FormsQue	J
GMTLog	\$
GSLogs	l
GSServer	H
GSSites	G
ImpExp	2

InfoMine	3
LeadDbfs	D
LookUp	!
MailBox	;
OpMgr	B
OpMgrFld	C
PerPhone	/
Report32	:
ResItems	1
ScriptsW	4
SpFiles	-
SysLog	=
Tracks	7
UserLog	9
Users	.
Root GM Data	
DataDict	,
SyncLock	A
SyncTask	@
Users	.

B-2 Sync Record Types

The following is a list of Sync Record Types seen from the Send and Retrieve Options. The corresponding table where these record types are associated as well as the Table Id and Rectype are likewise mapped.

*Note: Selecting a numbered option will also select the other checkboxes with the same corresponding number.

OPTION	RECORD TYPE	TABLE	TABLE ID	RECTYPE
	Contact Records			
	Primary Contacts	Contact1 and Contact2	& and '	
	Additional Contacts	ContSupp	(	C
	Scheduled Activities			
	Appointments	Cal	"	A
	Calls	Cal	"	C
	Next Actions	Cal	"	T
	Literature Requests	Cal	"	F
	To-Dos	Cal	"	D
❶	Messages/E-mails	Cal	"	M
	Forecasted Sales	Cal	"	S
	Events	Cal	"	E
	Other Actions	Cal	"	O
❶	Queued E-mails	Cal	"	Q
	Completed Activities			
	Appointments	ContHist	)	A
	Calls	ContHist	)	CC, CI, CM, CO
	Next Actions	ContHist	)	T
	Literature Requests	ContHist	)	F
	To-Dos	ContHist	)	D
❶	Messages/E-mails	ContHist	)	MO
	Forecasted Sales	ContHist	)	S
	Events	ContHist	)	E
	Others	ContHist	)	O
	Forms	ContHist	)	L
❶	E-mail Center			
❶	Mailbox records	Mailbox	;	
❶	Linked attachments	Mailbox	;	
	Linked Documents			

OPTION	RECORD TYPE		TABLE	TABLE ID	RECTYPE
		Links Tab Records	ContSupp	(	L
		Linked Documents	ContSupp		
		Template Records	Forms, FormsFld	#, 8	
		Linked Templates	Forms and FormsFld		
		Report Records	Reports32	:	
		Linked Report Layout	Reports32		
2		Records	OpMgrFld	C	
2		Linked Details	OpMgrFld		
3		InfoCenter Links	Infomine	3	
3		Linked Attached Files	Infomine		
Related Contact Info					
		Alerts	ContSupp and InfoMine	(and 3	A and n/a
		Details	ContSupp	(	P
		Referrals	ContSupp	(	R
		Group Membership	ContGrps	*	
		Organization Chart	ContSupp	(	O
Customizations					
		F2 Lookups	Lookup	!	
		LookUp.Ini File			
		Resources	ResItems	1	
		Custom Fields	ContUDef	0	
		Custom Views	Fields5	6	
		Headers	ContSupp	(	H
Sales/Marketing Tools					
		Scripts	ScriptsW	4	
3		InfoCenter	Infomine	3	
2		Oppty/Project Manager	OpMgr	B	
		Automated Processes			49
		Processes/Tracks	Tracks	7	
		Attached Processes	ContSupp	(	F

OPTION	RECORD TYPE	TABLE	TABLE ID	RECTYPE
	Completed Activities	ContHist)	
	E-mail Center	Mailbox	;	
	Related Contact Info			
	Additional Contacts, Details, Referrals, Links	ContSupp	(
	Group Membership	ContGrps	*	
	Customizations			
	F2 Lookups	Lookup	!	
	Resources	ResItems	1	
	Custom Fields	ContUDef	0	
	Custom Views	Fields5	6	
	Reports	Report32	5	
	Templates	Forms	#	
	Sales/Marketing Tools			
	Scripts	ScriptsW	4	
	InfoCenter	InfoMine	3	
	Oppty/Project Manager	OpMgr and OpMgrFld	B and C	
	Automated Processes	Tracks	7	
	Utilities			
	Filters	Filters	+	
	Import/Export-Merge/Purge	ImpExp	2	
	Personal Rolodex	PerPhone	/	
	System Logs	SysLog	=	
	User Logs	UserLog	9	