SpeedScreen Latency Reduction Explained

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Background

ICA connections across high latency WAN, Internet and Wireless connections can be painfully slow, lowering the overall usability score for published applications across such connections.

Feedback from customers identified two main problem areas with high latency ICA connections.

- Keyboard input — significant delays between when text is typed at the keyboard and when it is echoed or displayed on the screen.

- Mouse input — users click the mouse multiple times because there is no visual feedback that a mouse-click resulted in an action.

Investigation into these problems resulted in the technology known as **SpeedScreen Latency Reduction**.

What is it?

Speed Screen Latency Reduction (referred to as **SLR** throughout the rest of this document) is a collective term used to describe two separate technologies, namely Local Text Echo and Mouse Click Feedback, which help enhance the user experience over a high latency connection.

- **Local text echo:** On high latency connections, users often experience significant delays between when they enter text at the keyboard and when it is echoed or displayed on the screen.

  Local text echo is the technology that accelerates the display of the input text on the client device, effectively shielding the user from experiencing latency on the network.

- **Mouse click feedback:** On high latency connections, users often click the mouse multiple times because there is no visual feedback that a mouse-click resulted in an action.

  Mouse click feedback provides visual feedback for mouse-clicks. When the user clicks the mouse, the ICA Client immediately changes the mouse pointer to ⌛ which indicates that the user's input is being processed in the background. When the mouse click has been processed at the server, the client reverts the cursor to its previous form, indicating to the user that the mouse click has been processed.

Product Availability

SpeedScreen Latency Reduction is a standard feature of the new MetaFrame servers (Feature Release 1 and later), and the ICA 6.*x* Clients.

How does it work?

There are two parts to the SpeedScreen Latency Reduction technology: a server side component, and a client side component.

On the Citrix ICA Client

The SLR component on the ICA Client accelerates the display of the input text on the client device.

Suppose you were typing an email in Outlook. Ordinarily, on a high latency connection, you'd notice a substantial time lag between when you typed text, and when it appeared on your email on the screen. This is because, the input text is transmitted to the server over the high latency connection, and the server then sends the screen image back to the ICA client device.

However, when SLR is enabled, you'll notice a much faster response time. This is because the SLR component on the ICA Client intercepts input keystrokes from the keyboard, makes a 'best-guess' at the font type and content, and echoes the information locally on the client. However, the input keystrokes are also transmitted to the server as normal, and the server echoes the screen image back to the client. The screen image sent from the server is used to replace the locally displayed image produced by the local text echo technology. The 'replacement' is fairly quick and transparent, and the user rarely, if ever, detects that a change has occurred.

To echo fonts locally, the SLR component on the ICA Client needs information about the font and the input field being used in the application. Information such as font type, font size, font color and the color of the input field background is required. The server side SLR component provides this information.

SLR provides full support for the text input fields, that ship with the Windows Operating System, namely the **Edit**, and **RichEdit** input fields.

All other input fields are classed as Generic input fields. Two generic levels of SLR support are provided, namely, **Medium** (Generic#1) and **Low** (Generic#2). These generic settings enable administrators to configure minimal SLR support for applications that contain input field types other than Edit and RichEdit.

See Appendix A for a summary description of the various types of input fields and the level of support that SLR provides for each.

On the MetaFrame server

The server side SLR component provides additional information to connected ICA clients about input fields (for example, text boxes that a user can type into) within a published application or desktop connection on the Citrix server.

The SLR component on the server provides this information to the ICA Client by dynamically querying the current application about fonts, and/or input fields.

When an application uses input fields of type '**generic**', SLR might be unable to correctly determine font or input field information. As a result, what the client-side SLR component initially displays may be different from what is displayed when the screen update comes back from the server. SLR tries to predict what a particular font will look like on the screen and displays it on the client while it waits for the screen update from the server.

This is why SLR provides a perceived reduction in latency; it displays something on the screen while waiting for the screen update to arrive from the server. The screen update from the server gets displayed when it arrives. The screen update from the server is usually identical to what SLR displays.

How do I enable SpeedScreen Latency Reduction?

On the ICA Client

You can configure SLR settings on the client using UI controls, or through settings in an ICA file:

Configuring UI settings for SLR

The ICA Win32 implementation is explained here as an example. For specific clients, refer to the online Help for platform-specific GUI controls)

To configure SpeedScreen Latency Reduction for an ICA connection:

1.   In Program Neighborhood window, select the custom ICA connection or Application Set to configure.

2.   In the Program Neighborhood toolbar, click the **Properties** icon.

3.   Click the Options tab in the dialog box to display the **Options** page.
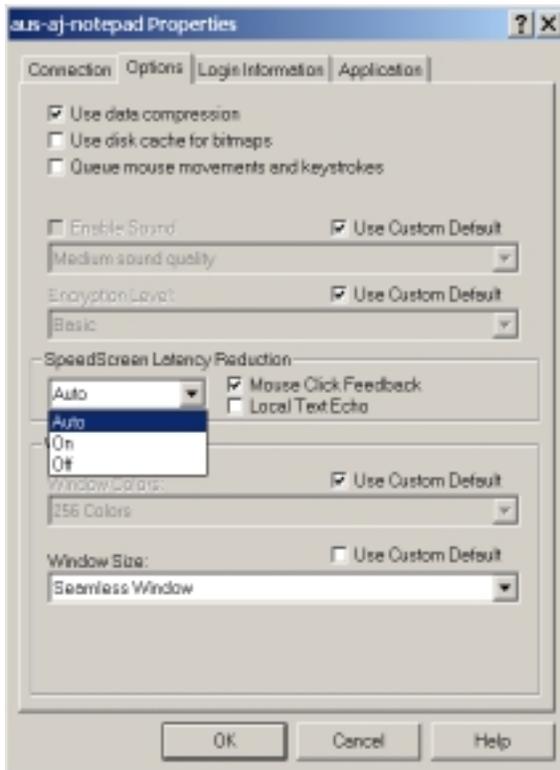
Figure 1: ICA Win32 Client Properties

4.   In the SpeedScreen Latency Reduction section, select a mode from the drop-down list.

   ▪ For slower connections (for example if you are connecting over a WAN or a dial-in connection), set mode to On to decrease the delay between user input and screen display. Turn on both local text echo and mouse click feedback.

   ▪ For faster connections (for example, if you are connecting over a LAN), set mode to Off.

   ▪ If you are not certain of the connection latency, or the connection latency varies over the life of the connection, set the mode to Auto to turn SLR on or off depending on the current connection latency. You can override Auto mode using the **Toggle Latency Reduction** hotkey (available in Program Neighborhood under **Tools|ICA Settings|Hotkeys**).

   Note
   In Auto mode, the default setting for Local Text Echo is Off. If you are setting SLR to Auto, edit connection Properties and explicitly set Local Text Echo to On.

Configuring SLR through ICA File Parameters

For setting SLR parameters through an ICA file the following parameters are used:

▪ The **ZLKeyboardMode** parameter is used for Local Text Echo. The permitted values are

   ZLKeyboardMode=0   [off]

   ZLKeyboardMode=1   [on]

   ZLKeyboardMode=2   [auto]

▪ The **ZLMouseMode** parameter is used for Mouse Click Feedback. The permitted values are

   ZLMouseMode =0   [off]

   ZLMouseMode =1   [on]

   ZLMouseMode =2   [auto]

On the MetaFrame Server (MF FR1 or later)

SLR is On by default for mouse click feedback. It is Off by default for local text echo. The settings can be set using the SpeedScreen Latency Reduction Manager utility. Please refer to the Online Help for help on using this utility.

SpeedScreen Latency Reduction Manager

Use this tool to set server-wide settings for SpeedScreen latency reduction. Use this tool to configure Latency Reduction settings for single or multiple instances of an application, as well as for individual input fields within an application.

The SpeedScreen Latency Reduction Manager utility is installed and available on every MetaFrame for Windows (Feature Release 1 or later) server in the farm. SpeedScreen configuration settings are server specific, and cannot be applied across a Citrix farm.

To access this tool click on the ▨ icon on the MetaFrame toolbar, or click **Start**>**Programs**>**MetaFrame Tools**>**SpeedScreen Latency Reduction Manager**.

SpeedScreen Latency Reduction Manager icon
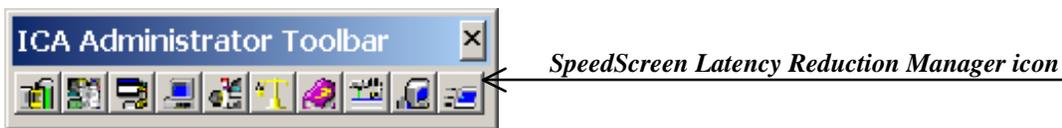
Figure 2: MetaFrame Tools

The Latency Reduction Manager window is displayed. Use the configuration wizards to configure latency reduction settings for the server, an application (or all instances of the application), or input fields within an application.
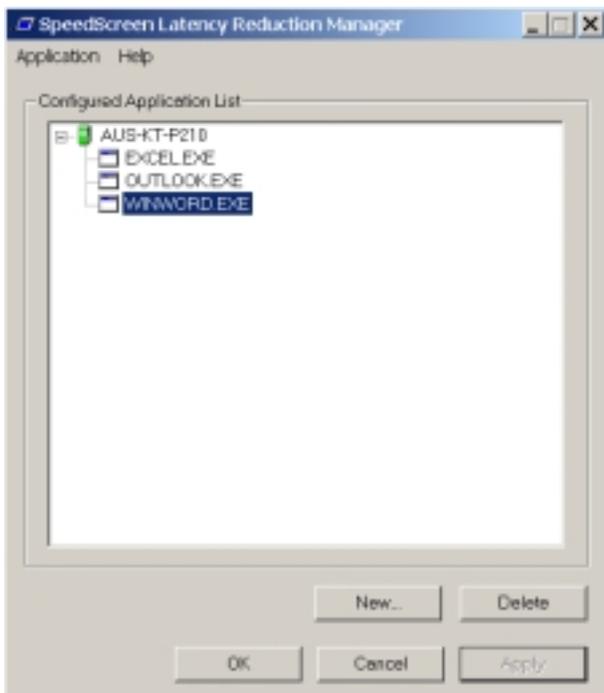
Figure 3: SLR Manager window (shown with configured applications)

Extensive online Help is available for the SpeedScreen Latency Reduction Manager utility, and can be accessed by clicking the Help button in the window.

How do I use the SLR Manager utility?

Windows applications that use the standard input fields types (Edit and RichEdit input fields) that ship with Windows Operating Systems, work consistently with SLR. So, most compatibility problems occur with applications that use input fields other than of type Edit or RichEdit. SLR treats inputs fields that are not of type Edit or RichEdit, as Generic input fields. See Appendix A, for a summary description of input fields types.

Use the SpeedScreen Latency Reduction Manager utility on the MetaFrame server to create exception entries for applications that contain Generic input fields. Once exception entries have been created, SpeedScreen functionality is modified or turned off on the server when the configured application is running in order to protect the user from experiencing unpredictable behavior when local text echo is used.

Figure 4: SpeedScreen Wizards

The SpeedScreen Latency Reduction Manager utility provides wizard-driven screens to help guide you through the process of configuring SpeedScreen settings for an application or an input field. Click on **Help** at any time to get context-sensitive Help with a command or option in the wizard

Deployment

On the client-side

For WAN, dial up, Internet and wireless users, enable SLR on the client for both mouse click feedback and local text echo. Configuration of the client-side settings for SLR is platform-specific in the cases where an ICA file isn't being used to launch the client. Refer to platform-specific client documentation for details. Click here for a description on enabling SLR on the ICA Win32 Client.

For users connecting over the LAN or a high speed, low latency connection, it is recommended that both local text echo and mouse click feedback be set to **Off**.

On the server-side

1. Run the SLR Manager utility.

2. Configure SLR settings for each published application on the server.

3. If you are aware of input fields (text-entry fields) within the application that are not of type Edit or RichEdit, use the Advanced Input Field Configuration wizard in the SLR Manager to reduce or disable SLR functionality for that particular input field/s.

4. Quit the SLR Manager.

As a final step, ensure that your users have enabled SLR on their respective client machines.

Latency Thresholds

In a typical MetaFrame environment use the following guidelines for SLR settings:

- If latency is greater than 250 milliseconds, set SLR to **On**.

- If latency is between 150 and 250 milliseconds, set SLR to **Auto**.

- If latency is between 50 and 80 milliseconds, set SLR to **Off**.

Trouble-shooting

How does a user determine if SLR is enabled on a particular connection?

▪ For non-seamless connections, the message "**SpeedScreen Latency Reduction On**" is appended to the title bar contents of the ICA session window.
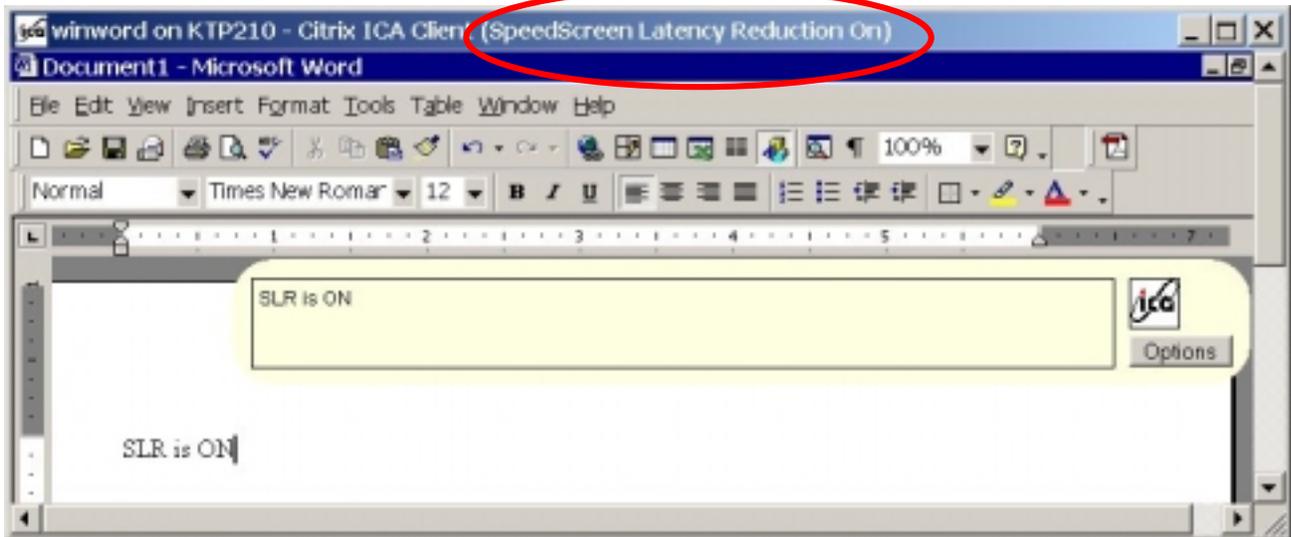
▪ Open the ICA Connection Center; and check the properties for that particular connection. If SLR is enabled, the user will see the flag for SpeedScreen Latency Reduction is **ON**.
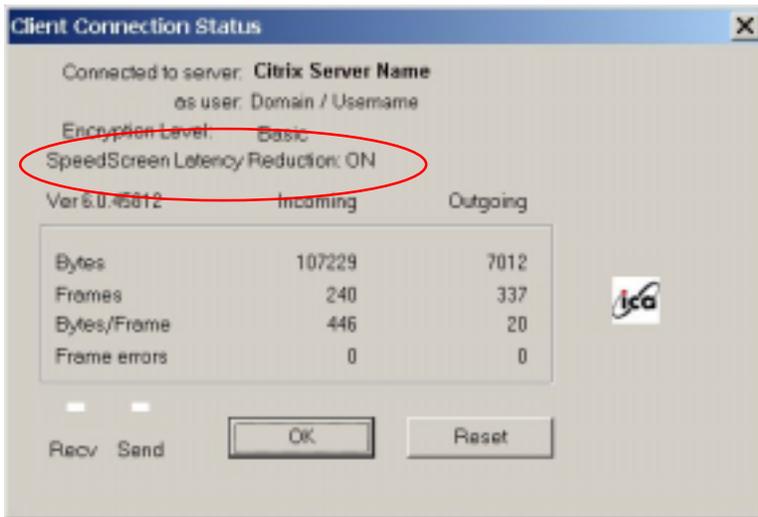
▪ On connections to Windows NT TSE MetaFrame servers the caret (cursor that indicates the insertion point when a character is typed at the keyboard) will flash when Local Text Echo is enabled. On Windows 2000 MetaFrame servers this is configurable on a per user basis so it provides no useful feedback.
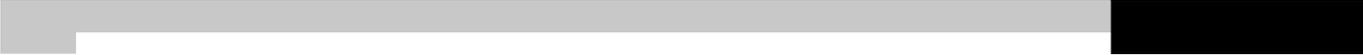
- Check the Custom Connection or Application Set properties to make sure that SpeedScreen Latency Reduction is set to On or Auto. If set to Auto, check that there is sufficient latency for Latency Reduction to start automatically. Speak to your administrator to find out the High and Low Latency Threshold settings. The default high threshold is 500ms and the default low threshold is 50ms.

- Clicking on a menu should cause the cursor to change to an hourglass quickly, if not immediately on high latency connections with Mouse Click Feedback enabled.

How can a MetaFrame server administrator determine if SLR is enabled?

- Check that Feature Release 1 or later is installed.

- Check that the Feature Release 1 license has been installed and activated

- Check that SLR has been enabled on that server using the SLR Manager.

- Check that SLR has not been disabled for a particular application using the SLR Manager.

- For connections where Latency Reduction is set to Auto, check that the Latency Thresholds are reasonable for the types of connection users will use to a particular server.

Known Problems

The following applications are known to exhibit incompatibility with SLR:

1. **Problem: Microsoft Project 98**

    This application crashes unless native mode is used.

    Workaround: Enable native mode for this application. To do this:

    a. Run the SLR Manager utility, and add Microsoft Project to configured application list.

    b. Right-click on the entry (for MS-Project) in the configured application list and select **Application Properties**.

    c. In the Application Properties window, click the **Advanced** button.

    d. In the Advanced Application Settings window, check **the Force SpeedScreen to treat all input fields in this application in native mode** option.

2. **Microsoft Word 95/97**

    SLR support is not available for these applications.

    Workaround: None.

3. **Microsoft Word 2000**

    The main input field (document window) is supported in Generic#2 mode only. This means a floating text bubble will be displayed just above where the user is typing and will contain the echoed input keystrokes.

    Note: You have to specifically add MS-Word 2000 to the SLR Manager's configured application list to enable Generic#2 support for the main window.

    Workaround: None

4. **Powerpoint**

    The main input field (document window) is supported in Generic#2 mode only. This means a floating text bubble will be displayed just above where the user is typing and will contain the echoed input keystrokes.

    Workaround: None

5. **Lotus Notes**

    In Lotus Notes, hidden characters typed into password fields are displayed as plain text when SLR is On.

    Workaround: Configure password input fields to display hidden characters as '* (asterisks)' or 'spaces'.

Input Method Editor (IME) input

SLR support is not available for IME input.

Workaround: None

Appendix A: Types of Input Fields

SLR categorizes input controls (also called input fields, or text entry fields) into 4 broad behavioral categories.

▪ Edit ▪ RichEdit	Edit and RichEdit input fields are standard Microsoft Windows controls that ship with Windows operating systems
▪ Generic#1 (generic text input field) ▪ Generic#2 (ToolTip style window)	SLR treats all input fields that do not fit into the Edit or RichEdit categories as Generic. Generic controls can be configured using the SLR Manager on the MetaFrame server to be either of type Generic#1 or Generic#2

Input field types supported by SLR are described below to provide an understanding of the sort of compatibility problems input fields might exhibit and how you can overcome them.

Edit Controls

An Edit control is the most basic text input field available in Windows applications. An example of this control is the document editing area of Notepad, that is, the page that is displayed when you click **File|New**.

Edit controls can display different fonts, but can only display one font per control. For example: if the user types half the line in Courier font and then switches to Arial font to type the rest of the line, the initial part in Courier also switches to Arial. This is the normal behavior under Windows, and remains the same when SLR is enabled.

If you edit a Notepad document over a high latency connection to the MetaFrame server, you'll find that the time it takes for the screen to display the characters being typed, is almost equal to that when using Notepad locally. This is because with an Edit control, SLR gets very accurate font information and is able to provide instant feedback. SLR has full built-in support for Edit controls.

RichEdit Controls

The RichEdit control is quite similar to the Edit control, except for a few additional features. The RichEdit control removes the limitation of a single font per control. RichEdit controls also provide information such as font colors, bullets, and indentation formats being used in the input field. This is the normal behavior under Windows, and remains the same when SLR is enabled.

RichEdit controls provide SLR with accurate font information, and so SLR is able to provide instant feedback. SLR has full built-in support for Rich Edit controls.

Generic#1 Controls

When SLR is unable to categorize an application window as Edit or RichEdit, it applies a lower level of compatibility to the control and treats it as a Generic#1 control.

SLR support for a Generic#1 control is similar to RichEdit, but lacks certain capabilities. Due to lack of sufficient information available about font attributes, approximation tends to be slightly weaker. This means SLR is unable to detect some font attributes. SLR makes a 'best-guess', and echoes a close approximation to the real font. When the MetaFrame server responds with the real data, the approximation is corrected (if necessary) with the accurate font information.

Generic#2 Controls

If input fields provide little or no information about their font attributes, SLR treats such controls as Generic#2 controls.

As SLR is unable to get sufficient font information from Generic#2 controls, the approximation of what was typed by the user (or local text echo) is provided in a tool-tip that appears as a floating bubble above where the user is typing. The font attributes of the echoed content bears no resemblance to the type or size of font being used in the input field.
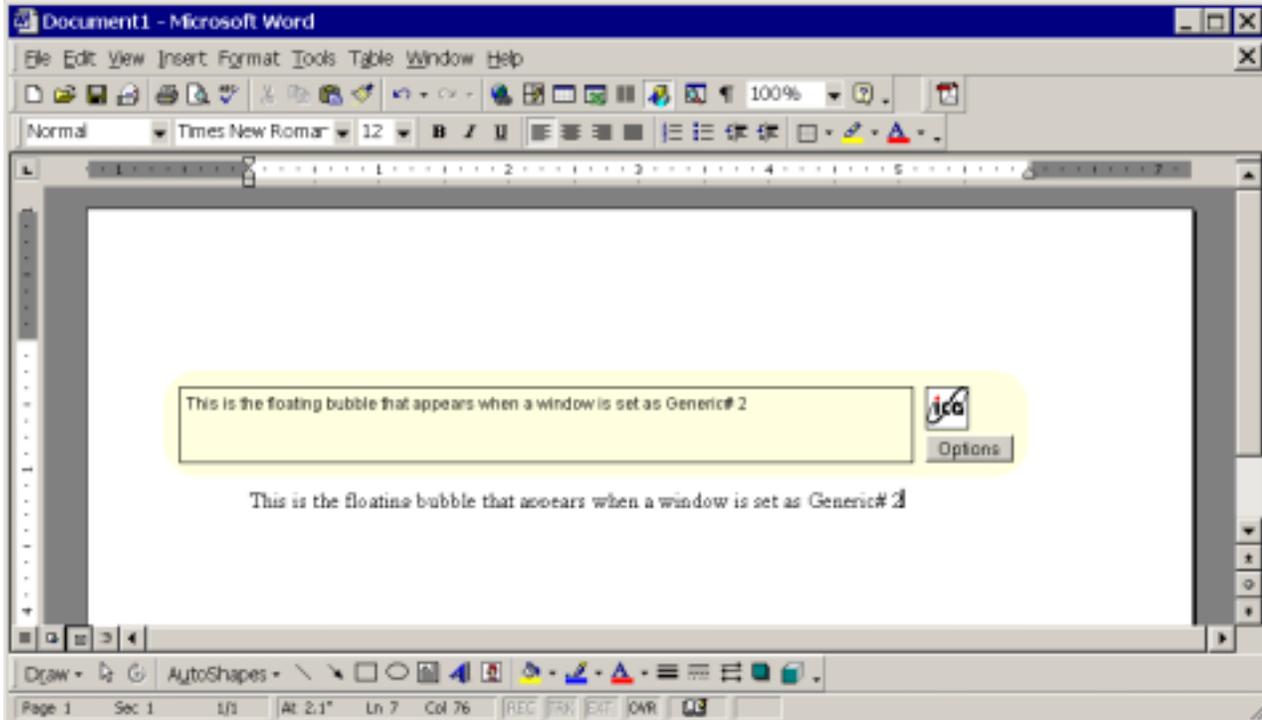
Figure 5: Floating text bubble for Generic# 2 input fields

Although this style of feedback alters the behavior of the application while typing, the feedback does allow the user to type under conditions of high latency. You can configure the behavior of the tool-tip bubble to follow the point of text entry, or it can be made static on the screen.

Because Generic#2 controls modify the way in which an application behaves, they can only be enabled if you, as a MetaFrame administrator, specifically designate an input field as Generic#2. You can do this using the SLR Manager.

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