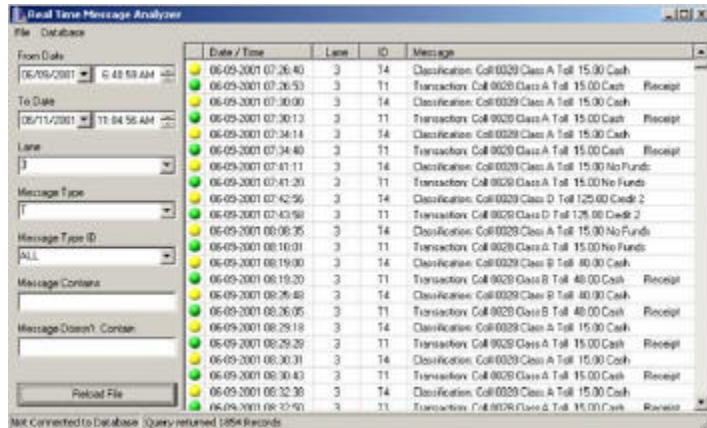




Tolltex Message Analyzer Software



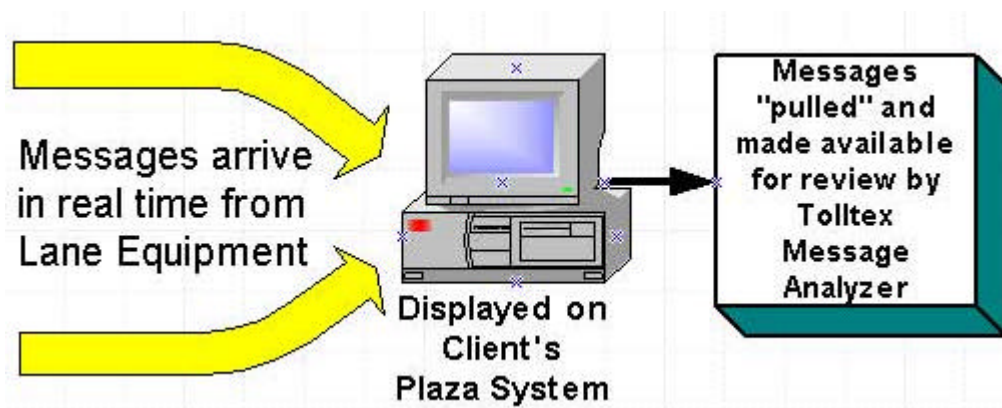
Most toll collection systems include real time monitors to display data from the lanes. Often this useful data scrolls off the screen or is not saved at all.

The Tolltex Message Analyzer software is designed to be added on to an existing system allowing the message data to be stored and made available for analysis.

Display screen with selection controls

Management, auditors, and maintenance staff can benefit from the analysis capabilities provided by this software.

The screens display message types highlighted by colored dots. In this screen, Yellow are classification messages and Green are transactions. Other screens use other colors to identify specific messages.



The diagram above shows the basis concept of the Tolltex Message Analyzer. On most toll systems, lane messages arrive at the plaza computer from the equipment in



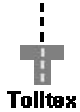
real time. They are then displayed on the plaza monitor. On some existing systems, these messages scroll off the screen and are lost. The Tolltex software is designed to be an add-on application that functions outside of the plaza system. The Tolltex software is shown above as the box on the right side of the illustration.

Obtaining the messages can be from a sequential log file or a via a communication link. Messages are first loaded into the Tolltex Message Analyzer from a sequential log file. From there, data can be reviewed by using a variety of "filters" that allow specific messages to be displayed. For example, lane events (open/close), errors, or data transactions. These filters operate by lane, collector, date, or time. It's also possible to select (or ignore) messages that contain specific words.

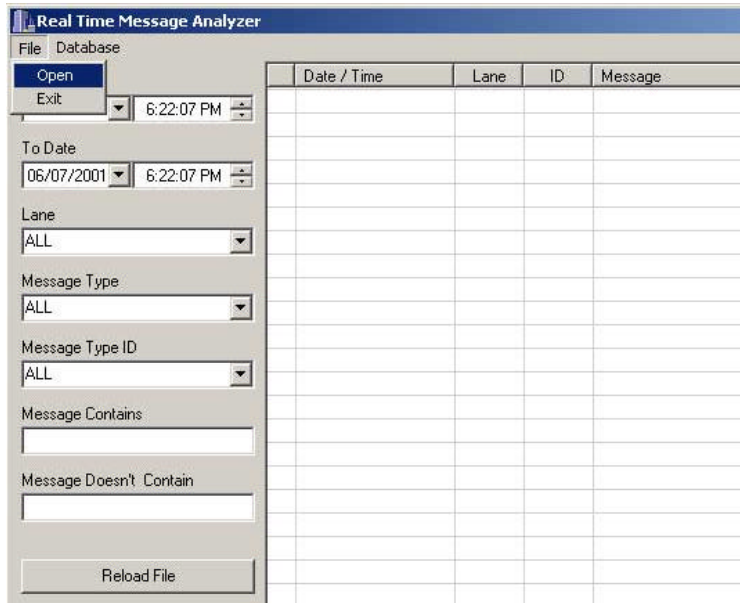
After reviewing the messages from the sequential log, the user has the option of loading the messages into an Oracle Relational database. This feature allows for archiving messages and for combining many individual sequential logs into a full-function database. Once in the database, the same "filters" can be applied to analyze the entire set of archived messages.

The sections below provide additional information and sample screens for the following:

- **Loading Message Files;**
- **Filtering Messages by date/time/lane;**
- **Filtering Messages by Transactions;**
- **Filtering Messages by Lane Events.**



Loading Message Files

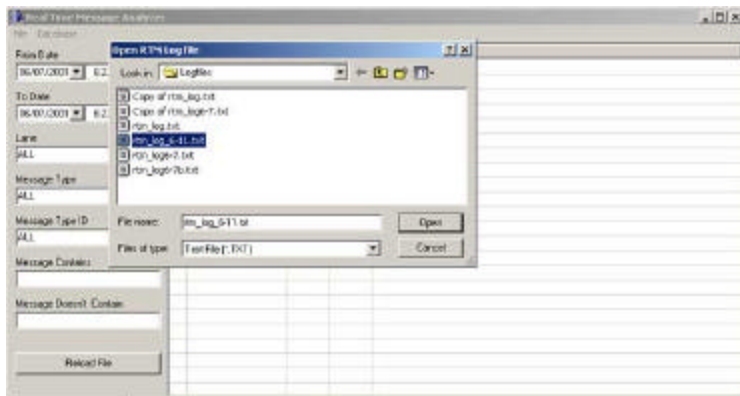


Blank screen with Load Messages Pull-down

This section describes how messages are loaded from sequential log files into the Tolltex Message Analyzer software. It also explains how to transfer the messages into the Oracle database for long term archival and analysis.

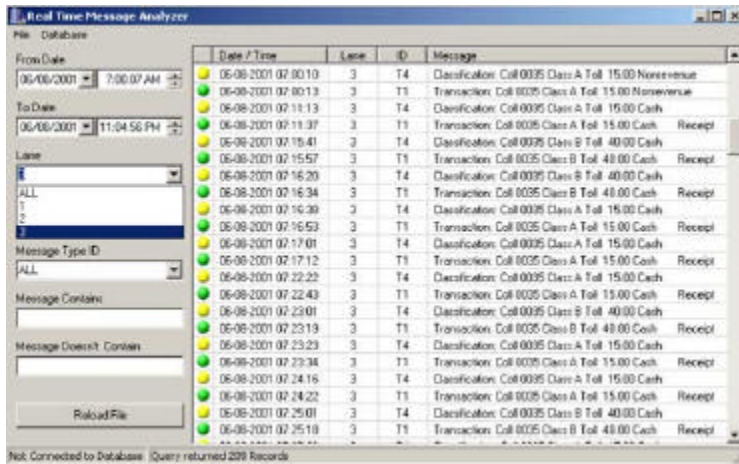
Files are loaded by using a simple control menu on the main screen. The blank screen on the left shows a small pull-down "File" menu located in the top-left corner of the screen.

The option selected is labeled "Open" and it opens the file selection window shown below.



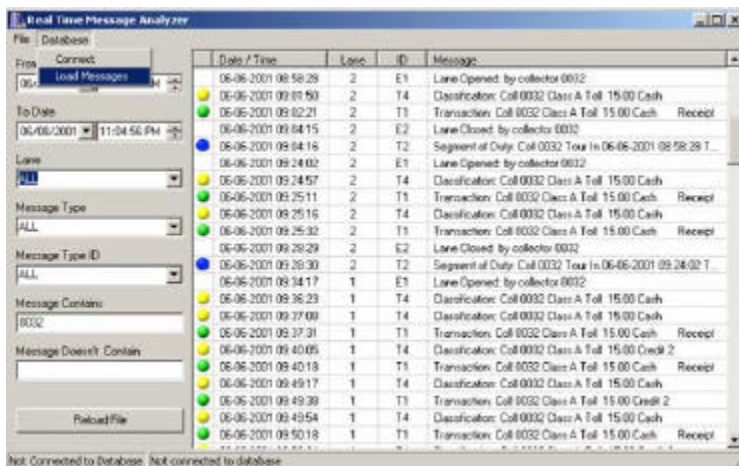
Pop-up File Selection Window

The file selection window is similar in function and appearance to a typical PC file open window. A default directory containing log files is shown along with the specific log files. The files are normal tab-delimited text files. Selection is made by highlighting the desired file and clicking on the "Open" button. Clicking on "Cancel" closes the window without loading a file. Upon completion, the file is loaded into the Tolltex Message Analyzer and the screen below is shown.



Main Display Screen

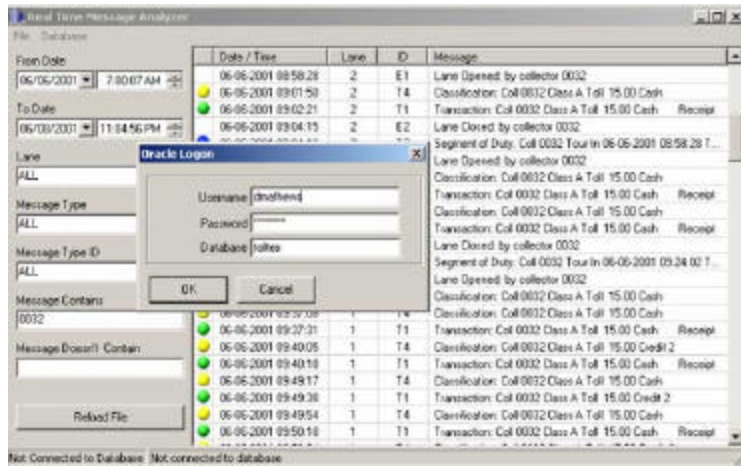
Upon loading a file, the messages are available for analysis using the various filtering techniques described later. At this point, the messages are not in the database. This allows the messages to be examined to determine if they should be archived for analysis with other messages in the database. Loading the messages into the database is optional, and is described below.



Database Load Pull-down

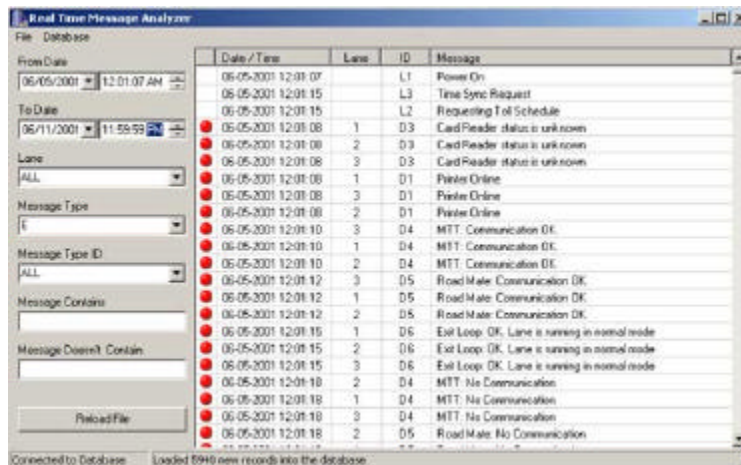
This screen shows a small pull-down in the top-left corner of the screen labeled Load Messages. This operation will update the database with the current messages that were loaded in the steps described above.

Although it is not necessary to load the database to perform analysis on messages, having messages in the database allows for queries to be made against all data rather than against just one log file.



Upon starting the database load operation, the user is first prompted to enter a user ID and password. Access to the database is restricted to authorized users only.

Database User ID and Password



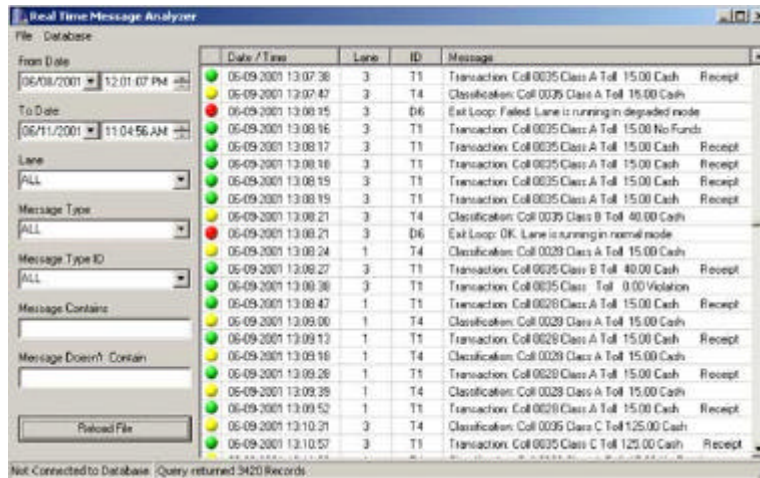
When the database load operation is complete, the screen will be refreshed with the messages starting from the earliest point in time. A message is also displayed on the bottom left area of the screen indicating how many records were loaded.

In the example, there were 5,940 records (messages) added to the database.

Database Load Complete



Filtering Messages by Date/Time and Lane



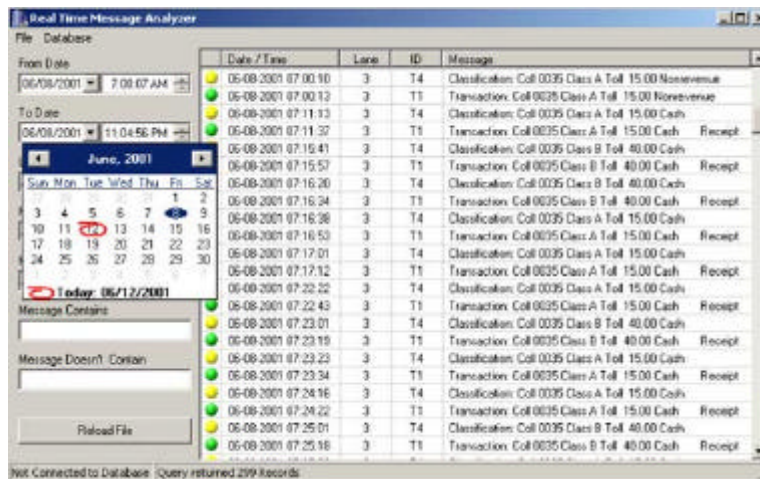
This material describes how messages are filtered for display on the Tolltux Message Analyzer. The focus is on date, time, lane, and specific text contained in each message.

This filtering can be performed from either messages loaded from individual sequential log files, or from data contained in the Oracle database.

The screen on the left shows data from all lanes displayed.

Data for all lanes

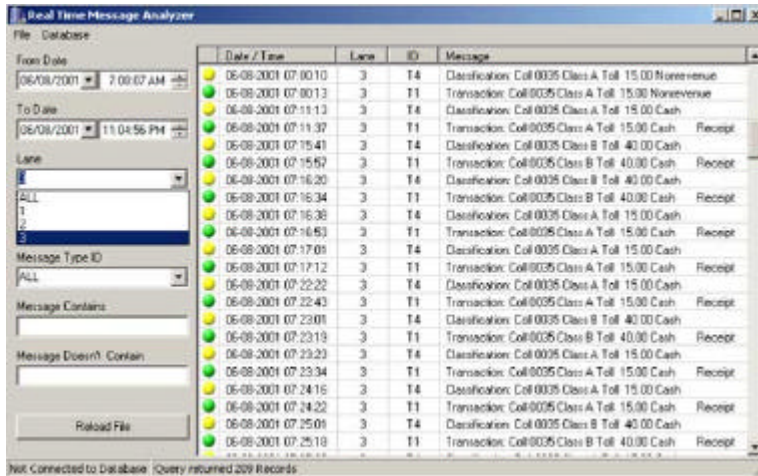
Selecting specific dates/times is made using the selection fields located on the left-side of the screen and clicking on the "Reload File" button. This is described below.



To select by date, a pull-down calendar is presented in both the From Date and To Date selection fields. This eliminates typing errors associated with entering data through the keyboard. The current date is highlighted with a Red circle. Left and Right arrow keys move through the calendar by month and year. Clicking on a date automatically sets the date filter.

Time is also part of the filtering and Up/Down arrows allow hour, minute, second, and AM/PM to be set automatically.

Pull-down Calendar

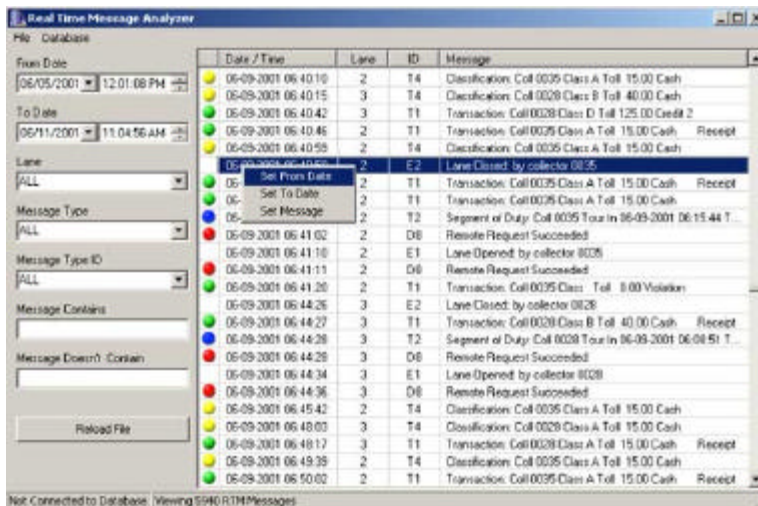


Lane Pull-Down Selection

Messages can also be filtered by lane through the use of a pull-down list of lane numbers.

In this example, only messages for lane 3 are displayed according to the From Date and To Date periods within the time range of 7:00:00 AM to 11:04:56 PM. This allows data to be examined for very specific date/time ranges and lanes.

Since the search is not performed until the "Reload File" button is clicked, any combination of filter selections can be made.



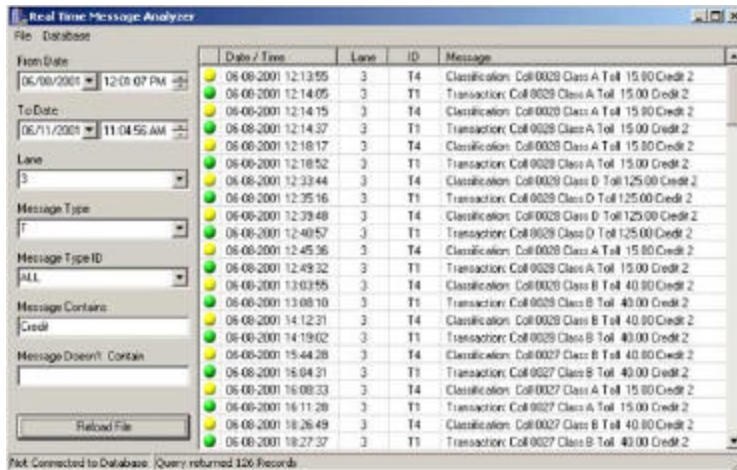
Setting Date/Time from Message List

Date/Time can also be filtered by selecting messages from the body section of the screen. In this example, a message is highlighted and the "right mouse" button is pressed which allows that message to be set as either the From Date/time or the To Date/time. This allows the user to set the From date, then scroll through the list to select another message and set that to the To Date.

This screen also shows some messages with "Blue Dots". These are summary segment of duty record messages.



Filtering Transaction Messages

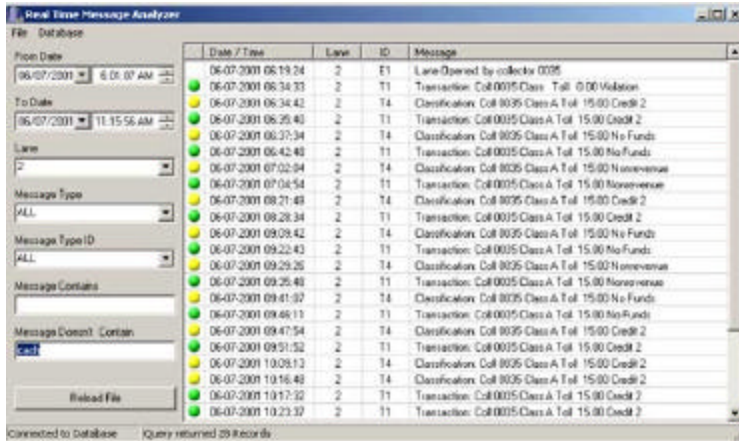


Reviewing transaction messages is a common use of the software. The "Message Type" pull-down is used to select only transactions and other messages that relate to transactions.

There are methods to filter transaction messages further by specific text contained in the messages themselves. This is performed by using the two text criteria input fields located above the "Reload File" button.

Filtering by text in the messages

In the example above, the word "Credit" was entered into the Message Contains input field. Therefore, only the credit card transactions were displayed for lane 3 within the date/time. The transaction messages were selected by the Message Type pull-down. In this case it was set to "T" rather than "All".

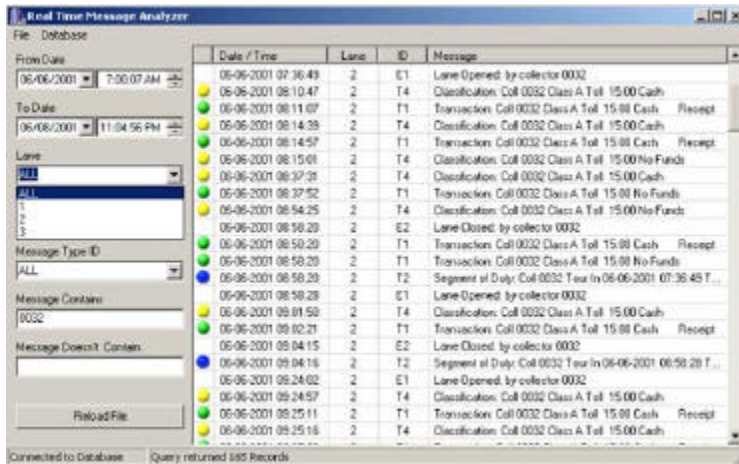


It's also possible to "filter-out" messages by ignoring certain text. In this example, all messages containing the word "Cash" were filtered out by using the "Message Doesn't Contain" text input field.

The result is a list of non-revenue, no-funds, and violation transactions for lane 2 within the specified date/time range. All cash transactions were filtered out.

Filtering text Not in the Messages

This type of filtering is useful to remove unwanted messages from the result list.



In this example, all transactions for a specific collector are displayed. This includes all lanes in which the collector worked for the date/time range selected.

This is performed by using the pull-down for lane number and by entering the ID of the collector into the "Message Contains" text input field.

Filtering by a specific collector ID

The search could be further restricted by filtering down to only one lane.

The types of transactions displayed are according to the messages produced by the system. In the examples shown above, there are three types of transaction messages. Each is identified by a colored "dot" to improve readability. The rows identified by yellow dots are classification messages, which represent the vehicle class as entered by the collector. The rows identified by green dots are the transaction messages themselves. Transactions arrive after the classification message at the time when the vehicle exits the lane. The rows identified with blue dots are summary Segment of Duty records. These are generated when the collector logs off, when a toll schedule change is made,



or at midnight. Specific messages of course are dependent on the messages produced by the toll collection system.

Filtering Lane Event Messages

Date/Time	Lane	ID	Message
06-05-2001 12:01:15	3	D6	Exit Loop OK, Lane is running in normal mode
06-05-2001 12:01:18	2	D4	MTT: No Communication
06-05-2001 12:01:18	1	D4	MTT: No Communication
06-05-2001 12:01:19	3	D4	MTT: No Communication
06-05-2001 12:01:19	2	D5	Road Mate: No Communication
06-05-2001 12:01:18	1	D5	Road Mate: No Communication
06-05-2001 12:01:18	3	D5	Road Mate: No Communication
06-05-2001 12:01:28	1	D4	MTT: Communication OK
06-05-2001 12:01:28	1	D5	Road Mate: Communication OK
06-05-2001 12:01:30	3	D4	MTT: Communication OK
06-05-2001 12:01:30	3	D5	Road Mate: Communication OK
06-05-2001 12:01:33	2	D4	MTT: Communication OK
06-05-2001 12:01:33	2	D5	Road Mate: Communication OK
06-05-2001 12:03:34	2	E8	Lane Controller Configuration In Use Event
06-05-2001 12:03:34	2	E7	Road Mate Configuration In Use Event
06-05-2001 12:03:35	2	E5	Employee List In Use Event
06-05-2001 12:03:35	2	E6	Nonrevenue List In Use Event
06-05-2001 12:05:02	2	E3	Date Set Event: Phase sent 06-05-2001 12
06-05-2001 12:14:20	3	D9	Card Reader status is online
06-05-2001 12:14:20	3	E1	Lane Opened by collector 0032
06-05-2001 12:14:55	3	T4	Classification: Coll 0032 Class A Toll 15.00 Cash Receipt
06-05-2001 12:15:15	3	T1	Transaction: Coll 0032 Class A Toll 15.00 Cash Receipt
06-05-2001 12:16:12	3	T4	Classification: Coll 0032 Class A Toll 15.00 Cash Receipt
06-05-2001 12:16:20	3	T1	Transaction: Coll 0032 Class A Toll 15.00 Cash Receipt

Lane Events are actions that occur in every lane. Common examples are lane open, lane close, and device status information. Each system has their own unique set of events. When analyzing a set of messages, it's desirable to view these occurrences.

During startup of a system or re-boot of a lane, many events occur as the devices and systems establish communications. The messages that occur are identified with Red dots.

Events during System Start-up

In the sample screen above, all messages are displayed, so the lane event messages are followed by normal transaction messages after the lane is up and opened by the collector.



Date / Time	Lane	ID	Message
06-05-2001 12:03:34	2	E8	Lane Controller Configuration In Use Event
06-05-2001 12:03:34	2	E7	Road Mute Configuration In Use Event
06-05-2001 12:03:35	2	E5	Employee List In Use Event
06-05-2001 12:03:35	2	E6	Nonrevenue List In Use Event
06-05-2001 12:05:02	2	E3	Date Set Event Plaza sent 06/05/2001 12
06-05-2001 12:14:20	3	E1	Lane Opened by collector 0030
06-05-2001 12:31:11	1	E1	Lane Opened by collector 0001
06-05-2001 12:36:35	1	E2	Lane Closed by collector 0001
06-05-2001 12:52:29	3	E2	Lane Closed by collector 0032
06-05-2001 12:52:29	3	E1	Lane Opened by collector 0029
06-05-2001 12:54:59	3	E8	Lane Controller Configuration In Use Event
06-05-2001 12:57:23	3	E8	Lane Controller Configuration In Use Event
06-05-2001 13:43:54	3	E2	Lane Closed by collector 0029
06-05-2001 13:44:52	2	E1	Lane Opened by collector 0032
06-05-2001 14:04:37	3	E2	Lane Closed by collector 0032
06-05-2001 14:06:25	3	E1	Lane Opened by collector 0029
06-05-2001 14:10:04	2	E1	Lane Opened by collector 0032
06-05-2001 15:00:10	3	E2	Lane Closed by collector 0029
06-05-2001 15:01:35	3	E1	Lane Opened by collector 0029
06-05-2001 15:01:42	2	E2	Lane Closed by collector 0032
06-05-2001 15:02:21	2	E1	Lane Opened by collector 0030
06-05-2001 15:03:36	3	E2	Lane Closed by collector 0029

Lane events are selected by using the Message Type pull-down which targets event messages only. Further filtering of specific types of events is performed by using the Message Type ID pull-down. In the sample, "All" Type IDs are selected which lists every event message within the date/time range.

Results can be further restricted to a specific lane by using the Lane pull-down.

Lane Event filtering by Message Type and ID

Date / Time	Lane	ID	Message
06-05-2001 12:03:34	2	E8	Lane Controller Configuration In Use Event
06-05-2001 12:03:34	2	E7	Road Mute Configuration In Use Event
06-05-2001 12:03:35	2	E5	Employee List In Use Event
06-05-2001 12:03:35	2	E6	Nonrevenue List In Use Event
06-05-2001 12:54:59	3	E8	Lane Controller Configuration In Use Event
06-05-2001 12:57:23	3	E8	Lane Controller Configuration In Use Event

In this example, downloads of system data and configuration files to all lanes are listed. This is performed by selecting "All" in the lane field, "E" (events) in the Message Type field, "All" in the Message ID field, and by entering "In Use" in the Message Contains field. On this system, each message related to downloading files from the plaza to the lanes has the text "In Use" contained in the message.

Filtering Events by Text in the Message

The search above could be further restricted by filtering down to only one lane using the same filters described earlier.

Formats of the lane event messages are specific to the system on which it is being used. In the sample screens, lane events are identified by an "E" followed by a number. For example, a new Non-revenue ID list sent to a lane is identified as "E6". Other systems will use other formats. Therefore, the Tolltex Message Analyzer software will need to be modified to match the message formats and codes produced by the target system. The software was designed to support this type of modification.