

High-Speed Integration of CICS Applications Using Verastream Bridge Integrator

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High-Speed Integration of CICS Applications Using Verastream Bridge Integrator

Uniting mainframe-based assets with emerging technologies is fundamental to competing in today's economy. That's why IT managers and business analysts are constantly researching better ways to unlock the data and business logic residing on their mainframe applications. In the process, they've found that web service technologies and service-oriented architecture (SOA) can help reduce costs, improve operations, and bring new customer-centric e-business applications into the mix.

But constraining factors remain. IT budgets continue to shrink while demands for business agility escalate. In addition, businesses cannot afford to adopt tools or technologies that could compromise their day-to-day operations.

This paper describes how you can use Attachmate® Verastream® Bridge Integrator to unite mainframe-based business processes with new composite applications. You'll learn that there is an economical, non-invasive approach to extend your host resources to newer technologies – at mainframe speeds.

The CICS Challenge

Application developers agree that integrating mainframe-based business processes within new applications poses one of the greatest IT challenges. This “last mile of connectivity” for accessing mainframe information and executing transactions is a key ingredient in virtually all business application development.

The job of integrating native business processes from multiple disparate systems – without disrupting existing business processes or rewriting mainframe application code – presents some unique complexities. And within these boundaries, application developers face the following integration requirements:

- ***Deliver mainframe-resident code that works within IBM's architecture, for web-enabling CICS applications.***

While mainframe data centers are large and complex entities, software providers must work within the confines of an individual organization's infrastructure, concerns, and responsibilities. Therefore, when web-enabling CICS applications, it's important to follow IBM's CICS Web Support.

- ***Access CICS 3270 applications that were not written to leverage COMMAREA communications.***
Unless the CICS application is modified so that it does not execute any terminal I/O within the business logic, it will not be eligible for access via the COMMAREA. And because so few CICS 3270 applications have a clear separation between business logic and presentation logic, they are often not candidates for access via the COMMAREA.
- ***Leverage existing business logic, data systems, and security without modifying CICS 3270 applications.***
CICS applications often have years (and sometimes decades) of accumulated business rules, security authentication, and database or file I/O processing that execute pursuant to corporate performance requirements. But business processes have evolved over the years, so existing security, performance, and robustness must be nimble enough to work with the requirements of a changing world. The ideal integration approach would apply this considerable investment in processing to current enterprise challenges. It's also important to note that some application systems have not been authored locally, so the source code is no longer available. When that is the case, you would want the ability to write front-end applications that can leverage these runtime systems, without modifying them.
- ***Provide a rapid ROI for new applications.***
The tools that are meant to make a developer's life easier should not come with a complex delivery process. You should insist upon easy-to-use APIs that provide direct access and control of CICS-resident applications and transactions.
- ***Implement a solution that blends with the existing infrastructure.***
Enterprises have varied preferences, sometimes even across divisions within the same company. Some prefer everything to be on the mainframe, while others prefer a three-tier distributed approach. Some like the requesting environment to be Windows-based, while others prefer an Open Systems method. CICS applications should not dictate middle-tier requirements, so seek out the ability to implement a two-tier or three-tier approach that supports both Java™ and Windows® environments.

- **Manage change control and performance issues associated with most multi-tier solutions.**

Well-structured CICS 3270 Bridge access methods enable interaction with CICS applications through symbolic names or by row/column positions. This approach eliminates common change control issues. It also provides access to the entire CICS application through the native CICS HTTP interface. And when you don't have to create sessions, you can reduce overhead on the mainframe, enhance throughput, and boost system performance.

An Advanced Solution for CICS Integration

Verastream Bridge Integrator is a native, mainframe-resident adapter that runs in the IBM CICS Transaction Server and delivers high-performance integration of CICS applications. It provides easy-to-use tools designed for corporate architects or developers who do not necessarily specialize in the mainframe.

Verastream Bridge Integrator strictly adheres to IBM CICS Web Support and CICS Link3270 Bridge architecture for seamless integration of existing applications in a CICS application environment. In fact, Verastream Bridge Integrator specifically addresses each of the CICS integration challenges discussed above. Using services that reside within the CICS region beside the application they access, Verastream Bridge Integrator provides screen-like access for intuitive use. But unlike traditional screen-based access, the interaction takes place via the direct programmatic manipulation of the CICS application's business logic that governs screen creation.

This method is highly efficient and, with Attachmate's patent pending technology, provides unparalleled performance. Consider for example a task that requires navigating through 10 screens in a CICS 3270 application. Using Verastream Bridge Integrator, the task is completed in 0.100 of a second, compared to 4.570 seconds for screen access methods—a 1,668-percent gain.

To address the wide spectrum of non-mainframe applications, Verastream Bridge Integrator securely exposes CICS data and business logic as any of the following client interfaces:

- J2EE™ Connector Architecture Resource Adapter (JCA RA)
- Enterprise JavaBeans™ (EJB™) via JCA RA
- JavaBeans

- COM+ object
- .NET Web service

These components can be used and shared by multiple applications across the enterprise. With Verastream Bridge Integrator, enterprises can extract only the data and functionality needed and expose it in virtually any format required by the applications that will use it. The decoupling of business logic from presentation logic ensures that the overall infrastructure remains agile. Changes can be made to underlying components without affecting front-end applications.

To further simplify CICS application reuse, Verastream Bridge Integrator transparently manages application state of the CICS interactions going through it. This greatly reduces the complexity of the middle-tier application, allowing the use of CICS application extents without the need for complex coding, state, or conversation management.

The following sections describe how Verastream Bridge Integrator works within IBM CICS Transaction Server v2.2 to achieve the best performance.

Leveraging IBM CICS Web Support and Link3270 Bridge

The IBM-supplied infrastructure opens up CICS to web-based access via TCP/IP over sockets. Verastream Bridge Integrator enables requestors to bypass VTAM in their sessions with the CICS transaction monitor, setting the stage for improved performance and scalability while leveraging the security and business logic of your CICS 3270 applications.

The IBM Link3270 Bridge enables transparent interception of CICS 3270 application data when executing any terminal I/O (for example, *Send Map*, *Receive Map*). At this point, the data can be harvested on the way out or modified on the way in, enabling the creation of new front-end applications without changing the existing back-end applications.

Verastream Bridge Integrator takes advantage of this IBM architecture. The IBM Link3270 Bridge transparently intercepts CICS 3270 application terminal I/O, enabling the caller (client application) of the Link3270 Bridge to access the data coming from (and affect the data going to) the back-end CICS 3270 application. More specifically, when a CICS 3270 application running under the Link3270 Bridge sends data to a terminal (as in a *Send Map*), the back-end application works as if a successful send has

taken place. But in reality, the Link3270 Bridge has control. The caller of the Link3270 Bridge can then harvest the data that was bound for the terminal.

Conversely, when a CICS 3270 application running under the Link3270 Bridge issues a receive (such as a *Receive Map*), the Link3270 Bridge gets control, allowing the caller to send data values to the Link3270 Bridge and feed the back-end CICS 3270 application. The CICS 3270 application gets control back from the Link3270 Bridge, processing the data in what behaves like a successful *Receive Map*. In this way, callers of the Link3270 Bridge can be the front end for new applications that more closely mirror your current business processes. The result leverages the unmodified back-end CICS 3270 applications, their business rules, security, and data stores.

The straightforward Verastream Bridge Integrator approach provides value in the following ways:

- Runs within IBM CICS Transaction Server v2.2 or higher on OS/390/zOS. (Verastream Bridge Integrator v1 supports CICS Transaction Server v1.3.)
 - Works efficiently with IBM CICS Web Services (CWS).
 - Intercepts CICS 3270 Terminal I/O, bypassing VTAM and BMS maps as required.
 - Implements a simple API that provides objects for integration into client applications for synchronous interactions.
 - Does not require modifications to CICS 3270 applications.
 - Supports CICS 3270 applications with or without BMS maps.
 - Alleviates the need to manage Bridge vectors by letting the client application request just the information it needs (via native middle-tier objects like an EJB or a .NET web service).
 - Generates symbolic field names for unmapped fields.
 - Enables client applications to access the underlying terminal controls available through the Link3270 Bridge. (This is done natively without invoking an external session, as other solutions do.)
- Supports a range of client platforms including Java and Windows requestors to securely expose data and business logic as a JavaBean, stateful session EJB, data-driven EJB via JCA RA for J2EE-compliant application servers, JCA RA, COM(+), or .NET managed web service.

IBM Transaction Server v2.2 and Higher

Version 2.2 of the IBM Transaction Server supports Multi Region Operation (MRO) and Terminal ID (TermID). Verastream Bridge Integrator supports both of these capabilities as described in the following sections.

Multi-region support

Verastream Bridge Integrator supports MRO to call transactions in other Application Owning Regions (AORs).

Terminal ID Support

Verastream Bridge Integrator supports assignable TermIDs to manage communication between different regions and ensure that each conversation is unique. This allows you to track the state for each session as transactions are called in different regions. Verastream Bridge Integrator uses the standard method for applications to track MRO state (assigned passable TermIDs) and manages them behind the scenes for the user.

Verastream Bridge Integrator's implementation of TermIDs provides the following benefits:

- Support for applications with transactions that run across regions.
- Use of assignable TermIDs to track the state of MRO transactions that match the TermIDs expected by an application.
- Use of an intuitive web interface to control assignable TermIDs, which is multi-platform and highly secure. (ID management extends to manage TermIDs as unique identities or as members of pools that share TermIDs in any combination.)
- Completely transparent client use of the IDs once TermIDs are defined.

Diagram 1 below shows the flow of communication between Verastream Bridge Integrator components, MCS, session pools, the client application, and the mainframe.

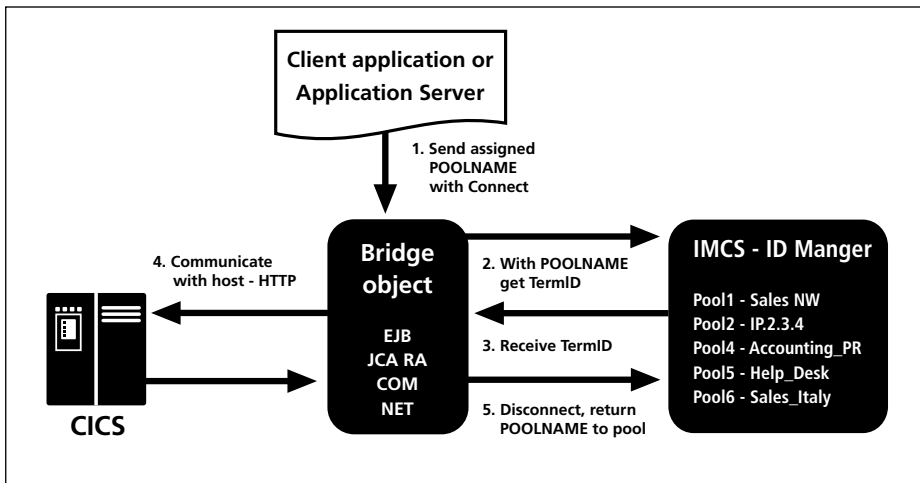


Diagram 1: ID Management

Verastream Bridge Integrator Functional Architecture

Diagram 2 below shows the functional architecture of Verastream Bridge Integrator. In this example, Verastream Bridge Integrator can access the transactions from those CICS 3270 programs located in CICS regions A, B, and C. (However, you need to install Verastream Bridge Integrator components only in a single CICS region.)

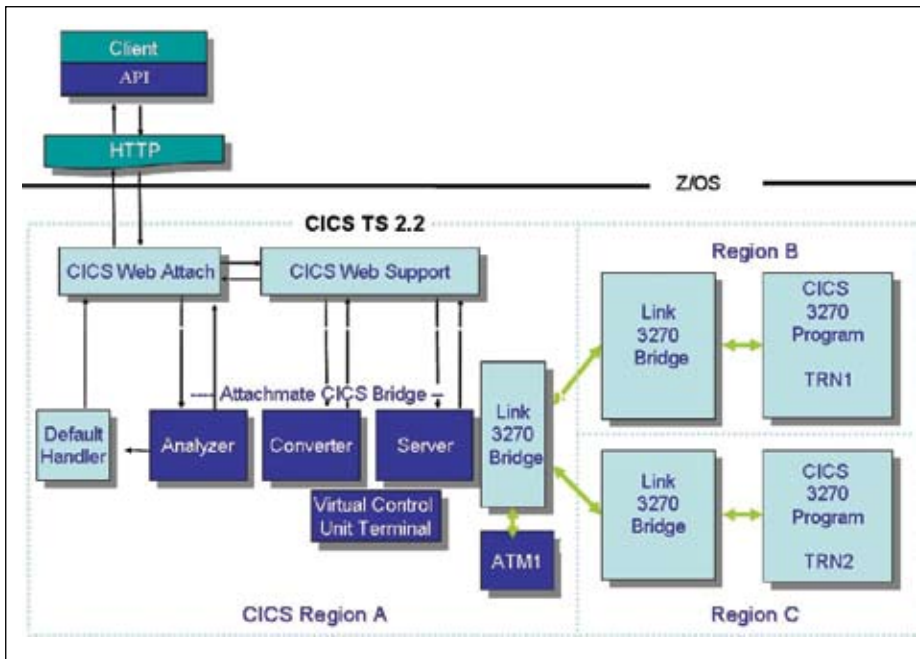


Diagram 2: Verastream Bridge Integrator Architecture

Verastream Bridge Integrator Process

Diagram 2 shows the Attachmate components and how they interact with the following:

- Client application, to request data from the CICS 3270 application via API.
- IBM technology, to process the request.
- CICS 3270 application, to perform the transaction and return the requested data to the client application.

The following sections describe the process.

Using the API

Verastream Bridge Integrator provides an easy-to-use API that enables session connection, HLLAPI-like processing, and symbolic BMS map field name processing of CICS 3270 screen applications and session cleanup. Because Verastream Bridge Integrator provides an easy-to-use and intuitive design studio, direct use of the API is optional.

If you want to take direct control, an understanding of the API is useful. The Verastream Bridge Integrator

API is mature and market-tested, having been successfully used in the Attachmate Host Publishing System (HPS) for years. It facilitates simple API-based application development allowing intuitive HLLAPI-style row/column processing or symbolic processing of mainframe screen fields by name and value.

In the latter case, some of the high-level functionality for this symbolic exchange of 3270 information is based on the BMS mapsets defined in the CICS 3270

application itself. To update the account number on a screen where the account number field is named "ACCOUNT" in the BMS map, the caller can exchange the information symbolically. For example, placing the value "2002" in the "ACCOUNT" field could be done by issuing a SetField ("ACCOUNT", "2002"). This capability frees the requestor from row/column dependency in the 3270 application, allowing a reference to information by name or index.

There is also a collection of API functions that work with fields by name or index instead of row/column positions. For example, the *GetAllFieldInformation* function retrieves field information from any requested CICS application screen. The field level APIs can then be used, freeing the application from xrow/column concerns. The requestor portion of the Verastream Bridge Integrator supports the Windows and Java environments as follows:

- **Windows requestors** provide COM+ and .NET client interfaces that run on Windows platforms. Applications for the .NET Managed Web Service import the web reference from the installed component, and can be written and compiled in Visual Basic,[®] Visual C#,[®] or Visual C++[®] programs, or be included in an ASP.
- **Java requestors** provide the following types of Java-based client interfaces to support Java applications (JSP[™] or servlets) for the UNIX[®] platform, including UNIX Systems Services (USS) and Linux for OS/390:
 - **JavaBeans.** Verastream Bridge Integrator uses its API to capture transactions as a standard JavaBean.
 - **EJB via the JCA RA.** Verastream Bridge Integrator uses a data-driven EJB via the JCA RA to support any J2EE-compliant application server (WebSphere,[®] WebLogic,[®] Oracle9i,[™] or Sun[™] Java System). A data-driven EJB is more flexible than a standard EJB because you can provide a generic set of inputs. However, this type of EJB requires that you know what data the mainframe application expects and what data you're going to get in response.
 - **JCA RA.** The API provides J2EE-compliant, low-level CCI access for developers to build their own EJB or not use an EJB at all.

Handling the API request

Each platform server is a thin runtime layer that packages the API Request function and its parameters into a request format expected on the mainframe.

On the return trip, the platform server parses the mainframe response and returns the function's response parameters to the client application.

Each request platform server formats the Verastream Bridge Integrator API request into an HTTP request packet that conforms to IBM CWI requirements. Inside that HTTP packet is a Verastream Bridge Integrator API packet that conforms to the Attachmate host-resident server requirements. This Verastream Bridge Integrator API packet within an HTTP packet is sent out through a socket conversation to the mainframe identified by IP address and port in the ConnectBridge function.

After the response is processed on the mainframe, the request platform server receives its HTTP packet response from the mainframe. The request platform server parses the HTTP response to harvest the Verastream Bridge Integrator API response packet, and returns the Verastream Bridge Integrator API response parameters to the client application.

Answering the API request on the mainframe

When the request arrives at the mainframe IP address/port for the CICS region, it is received by the CICS Listener task in the CICS Sockets Domain. Next, the Verastream Bridge Integrator components that reside in the CWS infrastructure take over.

Processing the request

The API request is processed using the following components:

Attachmate Analyzer. The Analyzer is an IBM-supplied User Replaceable Module (URM), and is replaced by the Attachmate Analyzer (Verastream Bridge Integrator Analyzer). The Attachmate Analyzer is configured at installation to receive requests coming in on the specified port. The Attachmate Analyzer reads the contents of the HTTP request packet and checks to see if it is meant for Verastream Bridge Integrator. If it is not, the Attachmate Analyzer hands it off to your default analyzer for that port so that the appropriate handling can take place for that request. When the HTTP request is for Verastream Bridge Integrator, the Analyzer informs CICS as to what modules to use for converting and processing the packet.

Attachmate Converter. The Converter is an IBM-supplied URM, and is replaced by the Attachmate Converter. The Attachmate Converter, identified by the Attachmate Analyzer, is scheduled by CICS and

given access to the unaltered HTTP request packet. The Attachmate Converter parses the HTTP request packet and pulls out the embedded Verastream Bridge Integrator API request. Then it formats that request into a CICS COMMAREA, and CICS hands it off to the Attachmate Server, which is identified by the Attachmate Analyzer.

Attachmate Server. The Attachmate Server is linked to by CICS via the COMMAREA, which is created by the Attachmate Converter. The COMMAREA is identified in the Verastream Bridge Integrator API request. The Attachmate Server parses the request and processes the Verastream Bridge Integrator API function. The Attachmate Server reads the session from information in the request header (from the client application) and uses it to retrieve the stored state data for this session. If the Verastream Bridge Integrator API request is to get some data from the current screen, that request is processed against the data and the attribute buffer. If the Verastream Bridge Integrator API request is to send data to a specific field (by name) in the current screen or to a row column position, it is handled by processing the corresponding data and attribute updates to the current data and attribute buffers. If the request is a *Sendkeys* with an Attention Identifier (AID) key, the Attachmate Server will communicate with the Link3270 Bridge for service.

Remember that transactions are executed using the Link3270 Bridge via Verastream Bridge Integrator. This enables the Attachmate Server (calling the Link3270 Bridge) to:

- Obtain control every time the back-end application issues terminal I/O.
- Intercept outbound data from the Link3270 Bridge.
- Send inbound data back to the Link3270 Bridge to respond to the back-end application's send and receive terminal I/O.

This is where the client application that uses AID keys is processed against the back-end application as if there were a terminal involved. In reality, the Attachmate Server maintains session data that includes the current data buffer, attribute buffer, and cursor position, among other data. This data is easily harvested and updated through Verastream Bridge Integrator API calls. It is also easily processed through Verastream Bridge Integrator API calls requesting AID key handling. After processing, the Attachmate Server stores the updated session state data and returns to the CICS environment on the mainframe.

IBM Link3270 Bridge. The Attachmate Server communicates with the IBM Link3270 Bridge. With version 2.2 of the CICS Transaction Server, the Link3270 Bridge has the ability to communicate with other Link3270 Bridges in different regions.

Sending the response back to the client application

On its journey back to the requestor, the Verastream Bridge Integrator API response COMMAREA is sent to the Attachmate Converter. On the way out, the Attachmate Converter takes that COMMAREA with the Verastream Bridge Integrator API response, and formats the HTTP request packet that the request platform server is expecting. After that, the Attachmate Converter returns to CICS and the HTTP request is sent back to the IP address of the caller, where it will be parsed, and the Verastream Bridge Integrator API response is returned to the client application. Note that the Attachmate Analyzer is not used for the response.

Verastream Bridge Integrator Benefits

Verastream Bridge Integrator was designed to provide benefits in the following specific areas:

Performance

- **Test scenarios prove significant performance gains.** HPS was one of Attachmate's original products to retrieve data from mainframe screens using a middle tier. It was script-based and ran through several steps for a single request, including establish a session, log into the mainframe and application, traverse through several screens to retrieve the data, and log out of the session. To determine if the mainframe was completely finished painting the screen, a time-out was used. HPS also used row, column, and length attributes to put data in fields and capture data from screens.

To improve performance, session pooling and event-based navigation were added. By logging several sessions into the mainframe and maintaining them as a pool, new requests needed only to traverse the few screens in the mainframe application that contained the data, rather than reconnect and log in. Event-based navigation immediately traversed to the next screen after the screen was complete, instead of having to wait for a timeout. Today, this is considered a best-practice approach to mainframe interactions when session-based access is required.

Verastream Bridge Integrator represents a significant leap forward in terms of performance for CICS-based mainframe applications. By accessing the mainframe via CWS and the Link3270 Bridge, there is no need for the mainframe to render the 3270 screen and data stream. Bypassing VTAM and Telnet far surpasses the performance of session-based access methods. To illustrate performance gains, a mainframe application was 10 screens in from the point of login, and the same task was executed five times for the three connectivity methods. The results are below.

- HPS: 4.579 seconds.
- Session access with session management and pooling: 1.668 seconds (275-percent gain over HPS).
- Verastream Bridge Integrator: 0.100 of a second (4,579-percent gain over HPS and 1,668-percent gain over the best-practice method for session access known to date).

- ***The bulk of processing is shifted to the mainframe for more power.***

Verastream Bridge Integrator requestors are application versions of protocol converters. They communicate with your requestor application via the platform implementation of the API; and they pass it on to the mainframe-resident part of Verastream Bridge Integrator via known request/response packets. Most of the actual processing occurs on the mainframe, where the real performance and scalability are achieved. The remaining performance concern is to place the requestor platform as close to the mainframe as possible, reducing the network latency that comes with the requests for service. Requestors executing in the USS region or the Linux for OS/390® region of the mainframe display the best performance potential in this regard.

- ***CICS 3270 Terminal I/O is intercepted, bypassing VTAM and BMS maps as required.***

Verastream Bridge Integrator enables requestors to bypass VTAM in their interactions with the CICS application, providing significantly improved performance and scalability while retaining the security and business logic of your CICS 3270 applications.

- ***Requestor performance is built for the client application's specific platform.***

This is preferable to using layers of wrappers to provide a one-size-fits-all schema. The Windows requestor is available in COM+ or as a .NET-Managed Web service. The Java requestor is written

in Java (JavaBeans, stateful session EJB, data-driven EJB via JCA RA). This approach delivers better runtime performance and scalability than a single “least common denominator” requestor.

- ***Multiple text and commands are bundled into a single request.***

Network latency is the main performance concern. Reducing the trips required for a given collection of API requests can significantly reduce latency. All client requestor platforms support the ability to stack consecutive command requests into a single API request. This bundling increases the performance of an individual application and its aggregate scalability by decreasing the number of concurrent requests during peak times.

- ***Array of SetFields are bundled into a single request.***

The Open Systems and .NET-Managed Web Service requestors provide the ability to send an array of SetField requests for the current mainframe screen. This reduces the number of discrete API requests, enhancing performance of the individual application while helping aggregate scalability.

- ***Configurable auto clean-up transaction can disconnect abandoned CICS sessions.***

Although the Verastream Bridge Integrator API provides a request to disconnect, signaling the mainframe-resident code to clean up resources associated with the CICS session, there is no guarantee that every application will actually make that call. To provide a fail safe against an accumulation of abandoned resources, Verastream Bridge Integrator provides a configurable clean-up transaction. After a pre-defined period of inactivity, session resources are cleaned up. Further requests for this session are given an invalid return code since the session and its state data no longer exist. This inactivity timeout is set at mainframe installation and can be reset later.

- ***Memory is freed up for quick availability.***

Verastream Bridge Integrator components release memory as soon as they complete any request or response transaction.

- ***State management ensures transaction completion.***

Unlike other solutions, Verastream Bridge Integrator provides state management of the sessions on the mainframe. State management controls the logical 3270 connection status of a given 3270 virtual terminal for the duration of that connected session. Maintaining the connection ensures the execution of each transaction in a chained task.

Security

- **Implementation of TermIDs supports applications with transactions that run in multiple CICS regions.**
Verastream Bridge Integrator uses assignable TermIDs to track the state of MRO transactions that matches the TermIDs an application expects. Using a web interface, Verastream Bridge Integrator manages TermIDs as unique identities or as members of pools that share TermIDs in any combination, and controls access to TermIDs.
- **CESN Logon and CESF Logoff procedures are available.**
Attachmate's patent-pending technology allows the use of CESN Logon and CESF Logoff procedures. This is important for many security-enabled CICS applications.
- **The mainframe can emulate CESN or bypass CESN.**
The IBM Link3270 Bridge does not support processing of the CICS sign-on transaction. Verastream Bridge Integrator supports an emulated version of this transaction, enabling applications written for HPS to run against the Java or Windows requestor without changing the sign-on logic of the ASP. For more modern applications, the userid and password can be passed in the ConnectBridge function, and the CESN emulation is skipped altogether.
- **Concurrent sessions with the same userid and password are supported.**
The requestor-supplied userid and password are authenticated with the mainframe installation's External Security Manager (ESM), typically RACF. However, since a physical logon does not take place, simultaneous logon restrictions do not apply.
- **Configurable IP filtering can restrict requestor address.**
The Attachmate Analyzer contains configurable IP filtering logic that enables the developer to restrict the requestor IP addresses CICS will process. This filtering supports discrete listing of supported IP addresses as well as the use of wildcards in any or all of the four parts of the IP address structure (for example, 123.123.123.*). Note that the wildcard applies to the entire segment, not to an individual digit within the segment.

Compatibility

- **CICS Transaction Server and CWS architectures are followed.**
Verastream Bridge Integrator adheres to IBM CICS Transaction Server and CWS architecture to fit within existing CICS environments.

- **Conformity with CWS infrastructure uses messaging standards.**
The Verastream Bridge Integrator mainframe-resident components conform to IBM CWS infrastructure using standards for messaging such as HTTP packets.
- **The IBM web-enabling architecture is followed.**
Verastream Bridge Integrator adheres to IBM's web-enabling architecture for CICS, for optimal interoperability.
- **MRO support enables calls to other AORs.**
Verastream Bridge Integrator supports MRO to call transactions in other AORs. Unlike other products, Verastream requires installation of the mainframe resident components in only one region.
- **CICS-resident code is installed via SMP/E.**
This Verastream Bridge Integrator approach enables you to do managed installations on the mainframe as well as track and coordinate patches.

Flexibility

- **Installation can be in either a two-tier or a three-tier model.**
Since the Verastream Bridge Integrator requestor can run on the mainframe in the USS or Linux region, a fully host-resident two-tier approach is available. In addition, Java and Windows requestors can participate in a distributed, three-tier approach.
- **Attachmate Analyzer can be configured to recognize partners' products.**
Attachmate partners can send known XML tokens to Attachmate Analyzer, which recognizes their request and schedules their modules within the IBM CICS Web Support environment. The tokens are configurable at mainframe installation and can be reset later.
- **Exceptions in the Link3270 Bridge are logged.**
The Attachmate Link3270 Bridge module writes a trace entry to the CICS internal trace table whenever an exception or abnormal condition occurs.
- **API is mature and market-tested.**
Attachmate's API implementation is a subset of the familiar QACOM used for years in HPS.
- **Support for applications with or without BMS allows independent movements of fields on host screens.**
Verastream Bridge Integrator supports applications with BMS maps, without BMS maps, or a combination of the two. Interaction with the CICS application is based on the use of name/value pairs in the maps instead of row/column positions on the rendered terminal screens. The Verastream

Bridge Integrator approach provides these additional technical benefits:

- **Bridge vectors.** Most Bridge-based applications interact with all mapped data as a bounded set of vectors. This information is basically the entire Bridge vector for the requested screen (map). Using this standard approach, a client application would have to call the application to parse this data and retrieve the required information, such as field data. If a client application wants only one field from a screen (map), it would have to parse through the entire Bridge vector returned in the XML packet and retrieve the one field it wants. This adds complexity and processing to the client application.

Bridge vector information includes these features: Erase Unprotected Fields, Unlock Keyboard, and Alarm and Reset Modified Data Tag. This information is very difficult to interact with and only adds to the complexity of building a client application. This complexity is one of the reasons most organizations do not create their own 3270 Bridge applications based on IBM's Bridge samples.

Verastream Bridge Integrator alleviates the complexity so the application developer does not have to understand and manage these Bridge vectors. With Verastream Bridge Integrator, the developer only needs to have the client application request just the information it needs via a simple library verb from one of the Verastream Bridge Integrator clients (Windows requestor, EJB, data-driven JCA RA, COM+ or a .NET-Managed Web Service). If only one field is required, the client application can request one field, either by mapped name, generated symbolic name, or row/column/length. When the client application needs all the fields on the screen, Verastream Bridge Integrator supplies a verb to return all fields. If extended field information, such as attributes, is required, this can also be returned with the data.

Verastream Bridge Integrator provides a simplified approach with a great deal more flexibility when accessing CICS information. Application developers need not see the complexity of the Bridge vectors, yet they have all the control of interacting with mapped or unmapped information.

- **BMS maps.** BMS maps enable the use of map screen names and field names. Use of mainframe information is as easy as calling the symbolic names of screens and fields. Because interaction with the CICS application is based on the use of name/value pairs in the maps, movement of fields on mainframe screens do not force changes downstream, and client applications developed against the BMS maps are unaffected. This is because the applications are coded to either post or receive data from the named value of these mapped fields.
- **Name/Value pairing.** Verastream Bridge Integrator dynamically imports the BMS maps and automatically generates name/value pairs based on the underlying terminal controls for all unmapped fields on the screen. Developers can use these unmapped fields by calling the generated name. This approach enables a client application not only to use name/value pairing, but also to work against any screen and any field whether a full BMS map has been generated or not.
- **Unmapped mainframe fields.** Verastream Bridge Integrator allows access to unmapped mainframe fields whenever required. This ability means that client applications can interact with every field on a screen, not just the mapped fields. Verastream Bridge Integrator uses a unique approach that allows a client application to access the underlying terminal controls available through the Link3270 Bridge. This is done natively through the Bridge in CICS, not by invoking an external session as other solutions do.
- **Interaction with screens that never had a map.** Verastream Bridge Integrator enables interaction with screens that have never had a BMS map. This means that even if a CICS application does not use BMS maps, a client application can still take advantage of the performance of the CICS Bridge and use CICS without invoking a middle-tier based screen scraping infrastructure. When Verastream Bridge Integrator encounters unmapped screens and fields, it dynamically creates a map with generated names for all fields that it can make available. (Note: Verastream Bridge Integrator can also suppress the use of non-mapped information.) Every field is included in this map and the developer can either request data from or post data to specific fields.

- **Interactions using row/column/length commands.** Verastream Bridge Integrator supports interactions using row/column/length commands. And rather than being limited by BMS map-only interactions, it allows CICS interaction through the Attachmate Link3270 Bridge in any way required by the corresponding CICS application.

The Verastream Product Line

Verastream Bridge Integrator is part of the Attachmate Verastream legacy integration suite, a complete range of mainframe, desktop, and web modernization tools. Our solutions deliver the full spectrum of basic rejuvenation to customized presentation and sophisticated high-performance integration. Verastream-generated services can be mixed, matched, and reused selectively to extend legacy functionality to new applications or new users.

By providing a wide range of standard interfaces to mainframe-based data sources, programs, and applications, Verastream solutions enable any client to access any mainframe asset, without modifying legacy application code. With the Verastream integration suite, you can optimize the following resources and more:

Applications

CICS/TS

IMS/TM

CICS 3270 Bridge

3270 & 5250

VT420

HP700/92 & HP2392A

Web/HTML

Desktop (Windows, Java, DOS, web-based)

Data sources

Adabas

DB2®

DB400

IMS/DB

SQL Server

VSAM

Programs

COBOL

Natural

RPG

About Attachmate

Attachmate helps businesses extend, manage, and secure their IT investments. We offer a broad range of solutions—from terminal emulation, legacy integration, and PC lifecycle management products to innovative systems and security management tools. With our technology, more than 65,000 customers worldwide are putting their IT assets to work in new and meaningful ways. Learn more at www.attachmate.com.



Corporate Headquarters
1500 Dexter Avenue North
Seattle, Washington 98109
TEL 206 217 7500
800 872 2829
FAX 206 217 7515

EMEA Headquarters
The Netherlands
TEL +31 71 368 1100
FAX +31 71 368 1181

Asia Pacific Headquarters
Australia
TEL +61 3 9825 2300
FAX +61 3 9825 2399

Latin America Headquarters
Mexico
TEL +52 55 9178 4970
FAX +52 55 5540 4886

WEB attachmate.com
E-MAIL info@attachmate.com

For regional office information, visit www.attachmate.com.