Web Services in the Travel Industry

Jim Peters
President and Chief Technology Officer
Datalex

Copyright Notice

Web Services In the Travel Industry

Doc. No. ATLI-WP0001.BB7

About the author

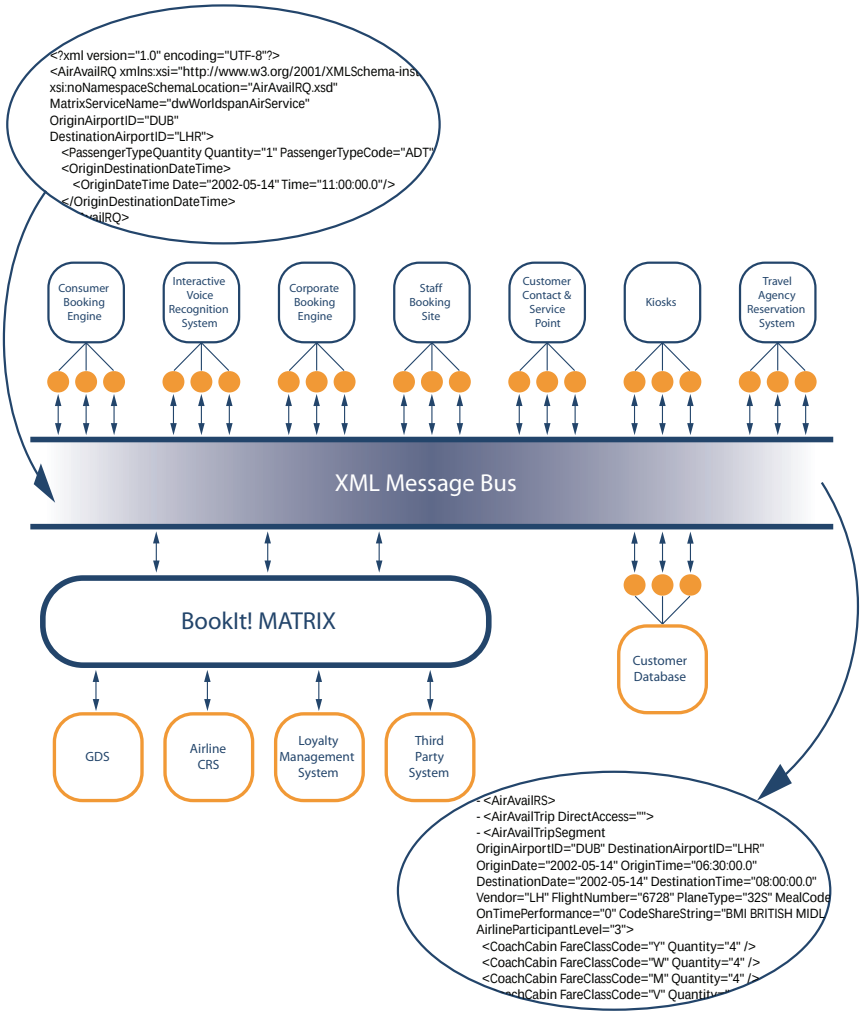
James Peters is the chief technology officer of Datalex and has responsibility for establishing Datalex's overall business and product strategy. He has extensive knowledge of technology systems, with more than 17 years of TPF experience in the airline and travel industry for clients such as Amadeus, Amdahl Inc, Carlson Wagonlit, Delta Air Lines, KLM Airlines, Qantas, Singapore Airlines, Thai Airways and Worldspan. He served as lead architect on the BookIt! Internet Booking Engine which provides a foundation for Datalex's suite of e-business solutions. Mr. Peters is Vice Chair of the ***Open Travel Alliance***. He holds a degree in philosophy from the University of Notre Dame.

Web Services in the Travel Industry

Introduction

This paper focuses on the potential for Web Services in the travel industry, with a specific focus on how they can be used to automate product distribution and customer service. Examples of the systems that are potentially affected include: reservations, loyalty, call center, self-service interfaces such as Internet Booking Engines, customer relationship management systems, as well as the underlying analytics, reporting, and operations of these systems.

The intended audience of this document is IT and executive personnel within the travel industry that are responsible for implementing and utilizing product distribution and customer service technologies.



What are Web Services?

In the grand tradition of Information Technology evolution and revolution, the “Next Big Thing” has arrived in the form of “Web Services”. Simply put, Web Services technology is the use of :

- **XML** (Extensible Markup Language) for driving application services
- **SOAP** (Simple Object Access Protocol) for communication
- **WSDL** (Web Services Description Language) as the service description language
- **UDDI** (Universal Description, Discovery and Integration) as the service discovery protocol.

Okay, maybe that’s not so simple. Let’s try that again!

The Web as we know it today comprises Web browsers for requesting documents and services from Web servers. This is accomplished using HTML for formatting the requests and documents and HTTP, a protocol for transmitting the requests over TCP/IP. The Web Servers store HTML files as well as applications that dynamically create HTML for display within a browser. This is the current generation of e-Business applications, characterized in the travel industry as “Booking Engines”, that enable consumers to make travel bookings through their Web Browser.

Web Services technology is a collection of standards for the next generation of e-Business applications that allows those server applications to “talk to each other” rather than to a person through a browser. Instead of HTML, the format used for requests and replies is XML , and they are transmitted using SOAP, which in fact can use HTTP underneath the covers. UDDI is the term that refers to the equivalent of a search engine server, but instead of using it to find a Web page, applications use it to find other applications. And much like Web Search engines that show a “snippet” or synopsis of the hits for a search request, WSDL is the description of the services provided by an application.

Getting past all the acronyms, the short-form of a Web Services definition is:

“A set of standards that allow applications to talk to each other over the Net.”

Where “the Net” could be the Internet, your company’s Intranet or the Enterprise Network internal to your data center.

Web Services and "The Next Big Thing"

Why are Web Services the Next Big Thing? It would, perhaps, be better to say that Web Services are not the Next Big Thing but the technology required to let the Next Big Thing happen. XML has been around for several years already and the addition of extra standards for its use may not seem that earth shaking. In fact, it is not the addition of these standards but the traction that XML is now achieving as a mechanism for application integration and interoperability that is the big deal. The new standards enable the broader use of XML as a tool for Enterprise Application Integration (EAI) and Business-to-Business Integration (B2Bi).

For the travel business, the main issue of concern is how Web Services will increase profits and reduce costs. As with all new technologies from mainframes, to PCs, to client-server, to the Web, the real answer is unknown until after it happens. The answer so far, however, remains consistent with what has been said of past technology advances as regards the following:

- Increasing customer satisfaction
- Decreasing the cost of customer service
- Increasing distribution opportunities
- Decreasing distribution costs

The introduction of Web technologies into the travel industry and the shift towards consumer-direct distribution strategies has driven the requirement to bundle multiple back-end products and services from different internal corporate departments and trading partners.

For example, within an airline, the Customer Loyalty group did not, as a rule, have to integrate and coordinate its developments with the Reservations Systems group. They each had their own systems, applications, user interfaces, reports, etc. But now, with Web access available to customers, there is an obvious need to combine loyalty and reservation information. On the Web, you cannot switch visitors from the Reservations Desk to the Loyalty Desk, as was done previously over the phone. Customers on the Web want to do simple things, such as make a booking using loyalty points, but due to a lack of interoperability between the systems, this has proven to be a difficult IT problem to solve. This is borne out by the fact that several years after introducing online booking, the majority of travel suppliers still do not offer this capability on their Websites.

The trend towards implementing a seamless customer service process comprising targeted customer marketing efforts, known generally as Customer Relationship Management (CRM), is now widespread. With it, the need has arisen for multiple systems and data sources to be interconnected in order to aggregate customer data and to turn it into useful information, while making it accessible at every customer contact point. The horror stories of the cost and risk of large-scale CRM implementations are now starting to float down the halls at your favorite travel conferences, relating the difficulty in connecting all these systems.

Web distribution and CRM are two prime examples of today's business drivers that need technology, such as Web Services, if they are to succeed. Web Services provide a set of

standards and mechanisms for getting systems to talk to each other, and if successful, make it easier to solve these kinds of integration and interoperability problems.

So it may be true that Web Services are not the Next Big Thing, but rather the technology that opens the door for the Next Big Thing, taking your company to the next generation of e-Business.

Web Services Under the Covers

So how are Web Services going to let your systems talk to each other any better than they do now? To answer that question we need to look deeper under the covers at the architecture of the applications and systems to see how they are deployed in this brave new world.

The “Services” part of Web Services is indicative of the service-oriented nature of application communications. Expanded from the functionality one might expect from a “subroutine”, “function”, or “procedure” (the common programming terminology of the recent past), a “service” provides an interface for other applications that is multi-purpose in its design and flexible in its implementation - sufficient to do several things well for different types of clients. A service can combine multiple backend application functions into what is known as a “composite application interface”. An example is a “Travel Itinerary Booking Service” that might provide bookings for multiple suppliers within a range of search and filter options, using back-end connections to multiple reservation systems. A Website, a kiosk, call center and/or a voice recognition system might use this service generically, without the service needing to be aware of the differences between these applications.

Web Service interfaces are defined using XML in the form of a “schema” that describes the request and response data formats, types, and relationships. XML and the schema definition language are both standards published by the overseers of Internet standards, the W3C. Defining a schema in order to use XML and Web Services is not required, but it is a best practice since the schema definition “binds” the data contract of the service interface. It helps to explicitly define what the service will and will not do, so that developers of applications that use the service will know what to expect.

Using the SOAP standard to send and receive requests allows everyone to agree on how to move the messages between the applications. This permits developers working on different operating systems and different programming languages to have their applications communicate with each other. SOAP, like HTTP, is not operating system or language specific. Interoperable implementations of SOAP across multiple platforms are a key enabler to the success of Web Services as a technology. (Initially, two SOAP implementations were created, one by Microsoft and one from the Apache Software Foundation. It was at a now historic series of joint design and development sessions in the summer of 2001 that staff from both groups came together and worked out the incompatibilities.)

For applications within the travel enterprise to receive the benefits of interoperability promised by Web Services, the use of XML, Schemas and SOAP are the main required standards. This is because within one’s own enterprise, a service’s network name, address and data definitions will normally be shared between developers, architects, and operations. But when one or more enterprises want to have their systems interoperate, there needs to be a place for all the services to register their names, addresses, and definition information. This is where UDDI and WSDL come into play. These are standards for registering and defining a Web Service including its associated network address and schema. These are both still developing standards, which are being extended with additional potential specifications including:

- **WSCM** Web Services Component Model. OASIS (Organization for the Advancement of Structured Information Standards) initiative for composition and presentation of Web services.
- **WSFL** Web Services Flow Language. Proposal for workflow standard.
- **WSIL** Web Services Inspection Language. Enables the inspection of a site for available Web services.
- **WSXP** Web Services eXperience Language. Submission to WSCM.

We won't go into the detail of these proposals, but hopefully the message is clear that the basic infrastructure of Web Services is provided by XML, the schema definition language, and SOAP. UDDI and WSDL, as well as several other standards, are under development to enable the use of Web Services between companies rather than just within the enterprise.

Before we go on to look at how Web Services technology is deployed in the travel industry, let's briefly summarize its key benefits:

- Web Services technology supports increased operational efficiencies and improved service by allowing multiple applications to interoperate.

- XML, the language of Web Services, is simple and non-proprietary. It is adaptable, extensible and supported by industry-developed standards.

- Web Services and XML messaging standards help IT managers resolve technology decisions by devolving application issues from infrastructure, and the limits otherwise imposed by proprietary protocols and features.

- This layer of abstraction also allows applications and the middleware platform to embrace new technology and the current and future standards of multiple vendors. Using the interface, software developers can concentrate on creating the best business solution, without concern for the complexities of the underlying middleware.

- While enterprises may have some control over their internal technology infrastructure, they cannot always control the architectures adopted by current and future external partner organizations. The use of a universal, industry-developed communications protocol ensures forward and outward compatibility, as well as the longevity of investments in technology.

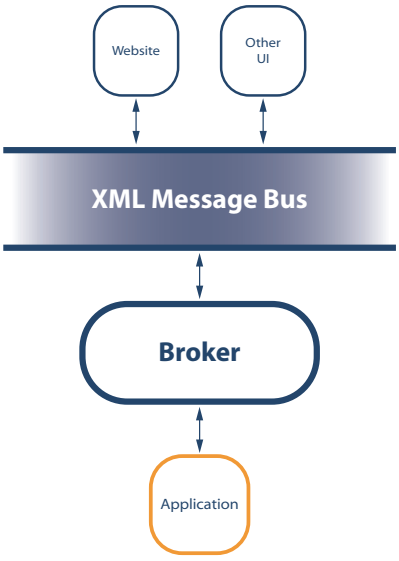
Now that we know a little more about Web Services, lets look at the two different scenarios mentioned above: intra-enterprise, where internal applications are involved; and inter-enterprise, where applications of different trading partners are involved. As you will see, there are different issues to resolve in each case and different potential benefits to the travel industry.

Web Services in the Travel Enterprise

The key use of Web Services technology within the enterprise is for Enterprise Application Integration (EAI). The problem mentioned above, involving connecting your Website to both your loyalty system and reservation system, is an example of an EAI problem. The problem gets worse when combined with your colleagues' CRM project down the hall because they need to connect to those systems as well. As you will often find, multiple groups within IT are all individually trying to discover, analyze and design ways to connect to different legacy systems and data sources at the same time, creating redundancy, overlap, and reducing the chance for success.

There are several ways to use Web Services to solve this problem. The first is to enable the existing systems with Web Services technology by either updating the application, or by placing an EAI "adapter" in front of the application to make it look like a Web Service. The choice of rewriting the application is usually not financially viable so the adapter approach will be the focus here.

There are two types of adapters, the first is an extension of the application itself that can be custom built but is often based on utilities provided by the vendor of the platform upon which the application resides. Companies such as SAP, PeopleSoft, Oracle, as well as specialist third party EAI providers, supply adapters for common Enterprise Resource Planning (ERP) systems and database applications. These application-side adapters usually require some modification to the existing application to be enabled or plugged in.



Broker solution

The second method is to create an outboard application broker that resides on its own platform and requires little or no application modifications. The broker can sit in between multiple back-end systems where it provides a consolidated, consistent and normalized view of those systems and data-sources. For many EAI problems in the travel distribution and customer service arena, this is the preferred approach. Applications can then avail themselves of flexible services such as "AirBooking" where the only difference for loyalty bookings is a change to the Form of Payment field. In this way your Website and your CRM systems do not need to have an awareness of the subtleties and intricacies of the individual back-end systems. Rather, they can enjoy the use of higher-level services defined in a neutral and explicit fashion via XML schemas and accessed using a standard protocol, SOAP.

Whether to use an adaptor or a broker will be determined on a case-by-case basis. You probably do not want to "broker" your SAP ERP system with your Oracle Financials system since adapters are readily available. You might, however, require a common broker in order to enable Web Services on your customer, product, inventory, content, and supplier systems, and associated

data sources in order to provide next-generation composite services for your website and at other customer contact points.

Web Services in the Travel Industry

There is a different set of drivers and issues to consider when looking at the use of Web Services between trading partners within the travel industry. The first issue is the need for consensus on XML Schema to avoid the proverbial 'tower of Babel', in which every company talks a different lingo. To that end, the Open Travel Alliance (OTA) was formed in 1998 and now has a global membership of over 150 travel companies from suppliers, such as airlines, hotels, car rental, rail, and tour companies, to intermediaries including Global Distribution Systems (GDSs) and travel agency groups, to technology providers, such as Datalex. The OTA's mission is to create an agreed set of schema specifications that can be shared throughout the travel industry.

Since the shared information is likely to go over the public Internet, a more secure and robust communication implementation is required. The OTA has chosen ebXML, which is a UN/CEFACT-backed, open standard that uses XML, schemas, and SOAP, but adds additional support for security, recovery and performance. The ebXML and Web Services standards efforts are to a large part closely aligned and complimentary. Where Web Services is focusing on solving interoperability issues, ebXML is focusing on delivering full support for an e-Commerce communications framework between companies using XML.

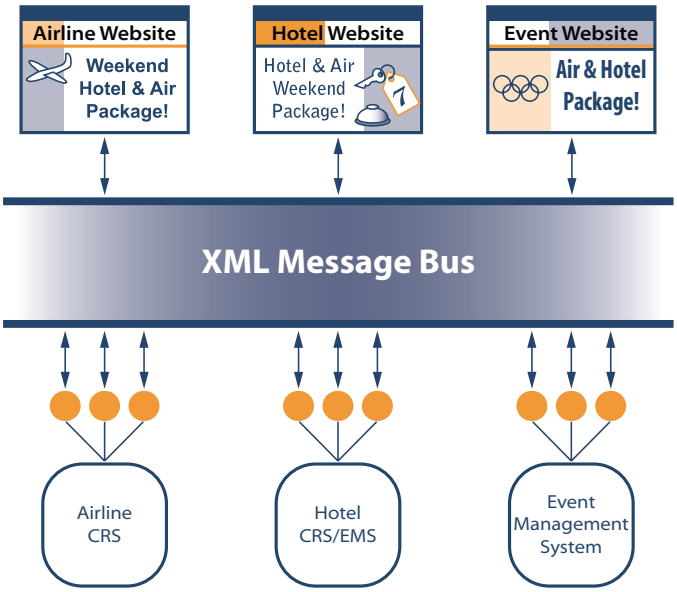
What can be done with Web Services (I use the term generically here to include ebXML) in the travel industry, given a common XML "dialect" from OTA? Quite frankly, the mind boggles at the possibilities! What happens will not only be driven by the technology and its capabilities, but also by the shifting commercial realities that companies face.

One might imagine a scenario in which every travel supplier in the world makes their product available via Web Services. These products can then be purchased, bundled, packaged, and redistributed by anyone that has a Web Services- enabled application attached to "the XML Message bus", thus giving a whole new meaning to the Internet!

For example within corporate travel, a purchaser has a self-booking tool that is Web Services-enabled using OTA XML formats, and can look at suppliers' inventory and product directly, down to the level of each city, each hotel, each room, each car, each flight etc.

A more mundane but closer to home example might be two travel suppliers, say an airline and a hotel group, that want to cross-market each other's products and sell them in value-priced packages directly over their websites and call centers. A dynamic packaging application could sit over a broker that allows access to the product and inventory of each supplier, provides a combined view of the package reservation and manages the individual reservations within each supplier's own databases (see diagram below).

While this scenario might sound fairly mundane, it would be a fairly revolutionary change to the way in which travel products are combined and distributed. It also serves as an example of Web Services as a technology enabling The Next Big Thing. Web Services offers the opportunity for travel suppliers to securely offer their inventory to a range of retail and wholesale channels through the agreed use of the OTA specifications and the Internet as the XML Message Bus backbone.



Example of travel packaging using Web Services technology on an industry-wide basis.

Web Services and Datalex

Since the arrival of Internet-based technologies, Datalex has been working with travel suppliers and intermediaries to provide solutions that capture new distribution opportunities and increased efficiencies. During this period, it has created the premier EAI brokering platform for the travel industry, which is today called BookIt! MATRIX. It is a mature platform that will introduce support for Web Services in its third generation release, available in spring, 2002.

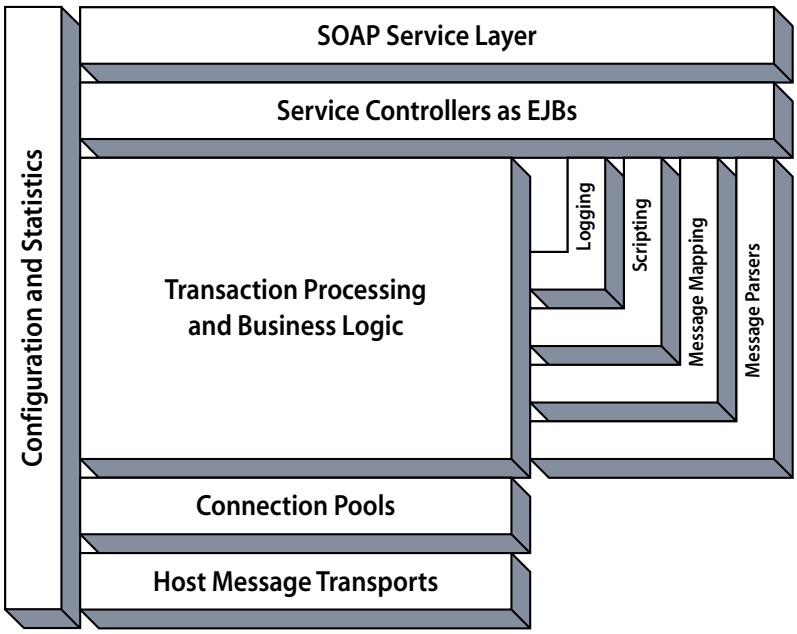
Web Services technology is already in use within Datalex as the basis for its future product offerings within the leisure travel distribution arena. The first project to go live was at www.snow.com for Vail Resorts, distributing its four resort brands over the Internet. Using Enterprise Java Beans in combination with XML messaging, a Web Services component model was created that formed the basic framework for the application architecture and product development. This architecture is now being used to upgrade Datalex's current product set to take advantage of the new component deployment model with Web Services as the messaging backbone and interface contract definitions.

The next product to implement this architecture is BookIt! MATRIX which provides connectivity to all the major GDSs and other supplier Central Reservations Systems (CRSs), and exposes the transactions of these systems with a Service Oriented Architecture (SOA) via a common set of request/reply XML documents, transported over SOAP. This, in effect, puts all these systems "on the bus" for other suppliers and intermediaries looking to dynamically package and distribute travel products to both leisure travelers and corporations.

As an EAI platform, BookIt! Matrix comes with a full Direct-Connect Developers Kit (DCDK) that allows organizations to use it as a brokering platform for their internal integration requirements, as well as interconnecting with trading partners for new distribution opportunities. Working closely with the OTA, from the Board level through the architecture group to the Non-supplier Working Group, Datalex is very actively involved in the development of the OTA specifications, allowing the quick adoption of the associated XML schema formats within BookIt! Matrix.

Support for Web Services and OTA XML is implemented using the Java server standard J2EE (Java 2 Enterprise Edition) using Enterprise Java Beans (EJB's) and running within the common application server containers such as BEA's WebLogic and IBM's WebSphere. BookIt! Matrix's use of the J2EE standard allows it to piggyback on the reliability, availability and serviceability (RAS) characteristics being built into BEA's and IBM's application servers.

While the production version of BookIt! Matrix with Web Services and the Direct-Connect SDK is due for release in Spring 2002, companies such as Singapore Airlines and Vail Resorts already enjoy the benefits of these Datalex technologies as early adopters of the new features. Their production use proves the basic infrastructure is sound and demonstrates that a return on investment can be achieved by riding the next wave of e-Business technology.



Architectural diagram of BookIt! MATRIX

Conclusion

Web Services technology is the next step in the evolution of e-Business applications. It offers a platform-neutral approach to integrating diverse systems, based on XML and its supporting standards. Driving its adoption are the many benefits of real-time access to multiple information sources, such as improved ways of interacting with customers.

Why then would you look to Datalex to help you reap these benefits?

Industry experience: There's more to integration than just knowing how to exchange data between applications. Datalex's extensive domain expertise in travel, and its in-depth understanding of the associated business and operational processes, is a critical foundation supporting our deployment of solutions deeply and widely within an individual enterprise, a multi-enterprise alliance and across the entire industry.

Product suite: Datalex's products and solutions components are designed with open standards to be extensible, scalable and portable. XML data communications is built into our products along with forward support for industry standards as they are developed. Web Services provides the foundation for our next-generation products and solutions. Datalex's connectivity platform, BookIt! Matrix, plays a key role in brokering external and legacy applications, enabling them to interoperate with systems and services that are designed with Web Services technology.

Driving the standards: Datalex is an active and prominent member of the Open Travel Alliance and is working with industry leaders to define the XML standards that will be adopted by travel enterprises globally.

Proven technology: While these latest technologies are still evolving, Datalex is committed to taking those that are proven and reliable, using them in the areas of customer service and product distribution to reduce costs and increase revenues.

For more information on Datalex products, services and solutions, please visit www.datalex.com

Resources

Sun Microsystems/Java	http://java.sun.com/webservices
IBM	http://www-3.ibm.com/software/solutions/webservices
W3C	http://www.w3.org/2002/ws
Open Travel Alliance	http://www.opentravel.org
Web Services Architect	http://www.webservicesarchitect.com
Webservices.org	http://www.webservices.org

Corporate & Regional Headquarters

Web site: www.datalex.com

Europe, Middle East, Africa

Datalex Ltd (Corporate HQ)

Howth House
Harbour Road
Howth
Co. Dublin
Ireland

Phone: +353 1 839 1787
Fax: +353 1 839 1781

Americas

Datalex Communications USA, Inc.

2325 Lakeview Parkway
Suite 600
Alpharetta, GA 30004-1976
USA

Phone: +1 770-255-2400
Fax: +1 770-255-2500
Toll free, within the USA: 1-888-234-1890

Asia-Pacific

Datalex Singapore

80 Raffles Place
#36-01 UOB Plaza 1
Singapore 048624

Phone: +65 6248-4777
Fax: +65 6248-4531

Global Sales & Operations Centers

E-mail: sales@datalex.com

Europe, Middle East

Datalex United Kingdom

3rd Floor, Bank House
9 Charlotte Street
Manchester
M14EU

Phone: +44 0 161 244 7200
Fax: +44 0 161 244 7201

Datalex Deutschland

Messeturm
Friedrich-Ebert-Anlage 49
60327 Frankfurt
Germany

Phone: +49 69 - 9754 4917
Fax: +49 69 - 9754 4900

Datalex France

54-56 Avenue Hoche
75008 Paris
France

Phone: +33 1 5660 5233
Fax: +33 1 5660 5600

Datalex Netherlands B.V.

Parlevinker 21
1186 ZA Amstelveen
The Netherlands

Phone: +31 20-647-6161
Fax: +31 20-647-4256

Americas

Datalex California

625 Second Street
Suite 101
Petaluma, CA 94952
USA

Phone: +1 707-769-9146
Fax: +1 707-769-1432

Datalex Minnesota

5151 Edina Industrial Boulevard
Suite 200
Minneapolis, MN 55439
USA

Phone: +1 952 253 7456
Fax: +1 952 806 9914

Asia-Pacific

Datalex Melbourne

Suite 9
334 Highbury Road
Mount Waverley, Victoria
3149
Australia

Phone: +61 3 8847 4300
Fax: +61 3 8847 4301

Global Consulting Services

Datalex Communications USA, Inc.

2325 Lakeview Parkway
Suite 600
Alpharetta, GA 30004-1976
USA

Phone: +1 770-255-2400
Fax: +1 770-255-2500
Toll free, within the USA: 1-888-234-1890

Datalex Melbourne

Suite 9
334 Highbury Road
Mount Waverley, Victoria 3149
Australia

Phone: +61 3 8847-4300
Fax: +61 3 8847-4301

Datalex Netherlands B.V.

Parlevinker 21
1186 ZA Amstelveen
The Netherlands

Phone: +31 20-647-6161
Fax: +31 20-647-4256