

The end of middleware: Direct Data Integration Services Mobile Enterprise Access (MEA) White Paper

March 2004

There's no question that the proliferation of mobile phones and wireless devices has fueled a major change in the way companies conduct business. The typical workplace is no longer a corporate office, and may now comprise just about any location from a vehicle or plane to a hotel room or customer location. As more workers have jobs in the areas of Field Services or CRM that require them to be away from a traditional base of operations, mobile business solutions have stepped in to take the corporate enterprise on the road. These solutions increase business productivity by shortening the data acquisition chain—the time it takes to obtain information, convert it into business intelligence, and act on that knowledge—thereby boosting worker efficiency, increasing opportunities for higher revenue and income, improving customer service, and optimizing business processes.

An effective mobile strategy delivers competitive advantage by creating a real-time information chain that links the corporate back office and the mobile worker, and retains centralized information management while extending key systems to the mobile environment.

Since the key to mobile workforce productivity, then, is enabling real-time connectivity to corporate systems, what solutions exist to enable mobile workforces to connect to corporate back office applications from the field using cell phones or wireless PDAs? Until recently, linking mobile workers with business-critical applications required complex mobile middleware.

Introduction: Mobilizing the Back Office

This white paper discusses ways in which mobile workforces can now access corporate enterprise applications using mobile devices and @Road MEA, a focused, open-standard solution that eliminates the complex middleware layer, enabling mobile applications to traverse complex corporate networks and integrate to legacy databases and back office applications.

Mobile middleware consists typically of proprietary software, residing on a mobile client or server, that gives users access to extensive applications and data—generally from some type of central information resource, such as an enterprise business application.

Because enterprise applications typically aren't designed for use in the field, the main benefit of middleware is to distill a given process to the critical elements required to successfully complete business in the field, enabling mobile users to retrieve or update

just that subset of function-specific information, without the overhead of dealing with an entire application or database.

Middleware servers also function as gatekeepers, restricting access and providing security to protect internal corporate data from direct hits that could affect the validity of the data.

Middleware has provided the missing link that delivers customer service and profitability, and makes the process changes necessary to increase information accuracy and timeliness, deliver point-of-need service, and leverage enterprise systems.

A Changing Market

The mobile middleware market today is segmented into several categories, ranging from complete solution vendors and technology platform vendors to services-oriented vendors and point solutions.

Research firm IDC includes mobile enterprise access as part of the mobile middleware market. Forecasts of this segment expect it to increase to \$1.6 billion by 2007. This growth is fueled by companies that recognize the value of providing effective communications vehicles to their mobile workforces, by making back office data available, and collecting time-sensitive data from the field.

These solutions typically use proprietary technologies and generally require a level of IT infrastructure that is costly—both to deploy and to maintain.

However, as the need for mobile middleware increases, new, more cost-effective, solutions leveraging XML and other standard technologies are emerging to simplify communications with mobile devices and back office applications.

Accessing the Back Office

Stuck in the Middleware

For as long as enterprises have needed to connect disparate applications, middleware has existed to bridge the gaps. Proprietary client/server middleware offers the promise of highly developed, tightly focused solutions designed to solve a specific business need. However, according to Aberdeen Group, “a general failure to execute [has] tainted user perceptions of mobile middleware solutions.” In addition, lengthy development cycles, complex software, and large expense to deploy and maintain proprietary middleware solutions render it difficult to quantify ROI and clarify the business value. This

Unfortunately, middleware, as just another layer of proprietary software, hasn’t always solved the problems it was designed to address, and because of its complexity is particularly unsuitable for connecting mobile applications to the enterprise.

Standards Deliver

Standards-based options provide better, more efficient links from mobile applications to the back office. Today, there are two popular standards-based approaches to provide back office data access, (1) browser-based and (2) client/server.

Browser-based solutions use a standardized set of communication protocols—such as WAP, or Wireless Application Protocol—that provide mobile users with access to back office data. The main benefit of browser-based solutions is that they typically don't require the installation of client software applications on the mobile device, bypassing completely the need for software upgrade, additional memory and additional storage.

WAP solutions work best for accessing Web-enabled back office databases and applications. By adding a translator that uses Wireless Markup Language (WML) to enable text portions of web-enabled databases and applications, mobile users can easily view information hosted over the Internet or intranet using their mobile phones or PDAs.

However, WAP, or browser-based solutions suffer from two critical drawbacks: high cost and process inefficiencies:

1. **High cost.** Enabling WAP requires Web-enabled databases and specific applications, as well as additional IT infrastructure and resources to deploy and maintain the solution.
2. **Process inefficiencies.** Accessing databases requires retrieval of specific fields and forms, a process that often proves cumbersome and inefficient using WAP-based solutions. Browser-based solutions require a connection for each request to the Web server. After each request is carried out, the connection terminates. This cycle of establishing and terminating multiple connections is inefficient and results in sluggish performance. The problem is due to a lack of intelligence on the client application.

To see this in action, let's say that you need to look up a customer's address and phone number using your mobile device. The mobile device establishes a connection to your CRM system. Once the connection is established, it requests the address information and terminates. The device will initiate another connection to retrieve the phone number. The added latency often results in a sub-optimal user experience.

On the flip side, client/server solutions yield several advantages over WAP. First—as opposed to the WAP-standard requiring a new connection for each page—client applications maintain an open connection, resulting in faster performance. By employing the XML, XMPP, and JEP-004 protocols, standards-based client/server models provide improved flexibility with respect to content delivery, as well as tighter integration through bi-directional communication between the client and server, processing more messages and transactions efficiently and securely. Further, the intelligent mobile client user interface performs data input validation to ensure data integrity at the source of the field data capture and integrates location-specific and time-critical information not available through WAP.

Contrasted with proprietary client/server middleware and WAP, a standards-based client/server solution offers high-level performance, while remaining both cost- and time-effective to deploy and maintain.

The @Road Mobile Enterprise Access (MEA) Client/Server Solution

The @Road Mobile Enterprise Access (MEA) solution delivers convenient, end-to-end mobile workforce access to enterprise data using standards-based client/server enabling technologies to deliver data to mobile workers when and where they need it most.

The @Road MEA is designed to:

- ?? Improve communication with field employees
- ?? Reduce field service operation errors
- ?? Lower costs by direct integration with back-office applications
- ?? Automate and streamline business processes

The @Road MEA solution provides a standards-based, Java-enabled handheld device that enables mobile workers to bi-directionally access data from back office database applications, Enterprise Resource Planning (ERP) systems, Customer Relationship Management (CRM) systems, and other mission-critical systems and Web services. @Road MEA empowers mobile workers to incorporate time-sensitive data collection from the field, to solve field service issues with real-time back office data, and to make off-site decisions with dynamic business intelligence available at their fingertips.

Piecing Together an Enterprise Solution

To deliver dynamic data transactions linking mobile networks and corporate networks, @Road Mobile Enterprise Access platform comprises three essential components:

Mobile Enterprise Gateway

The Mobile Enterprise Gateway comprises the core engine of the @Road MEA. The gateway, which consists of a set of Extensible Messaging and Presence Protocol (XMPP) server components, manages and delivers secured end-to-end transactions between client mobile devices and the back office applications. In addition, the gateway tracks and reports transactions for each mobile connection and delivers time, location, and content information.

Mobile Enterprise Client

The mobile enterprise client provides the user interface for back office transactions. This JAVA application resides on any J2ME-compliant mobile device, such as the Motorola i730 phone, and can be easily downloaded.

Mobile Enterprise Adapters

The Mobile Enterprise adapters run as applications on the servers that host the customer's database, ERP or CRM applications, and are the translation layers that communicate with the back office applications and the Mobile Enterprise Gateway. They are XML-based Extensible Messaging and Presence Protocol (XMPP) compliant plug-in applications that configure easily and require no programming.

The combination of these components delivers fast and convenient data entry and retrieval to the mobile work force with minimal configuration. *Figure 1* illustrates the three-component architecture diagram with reports.

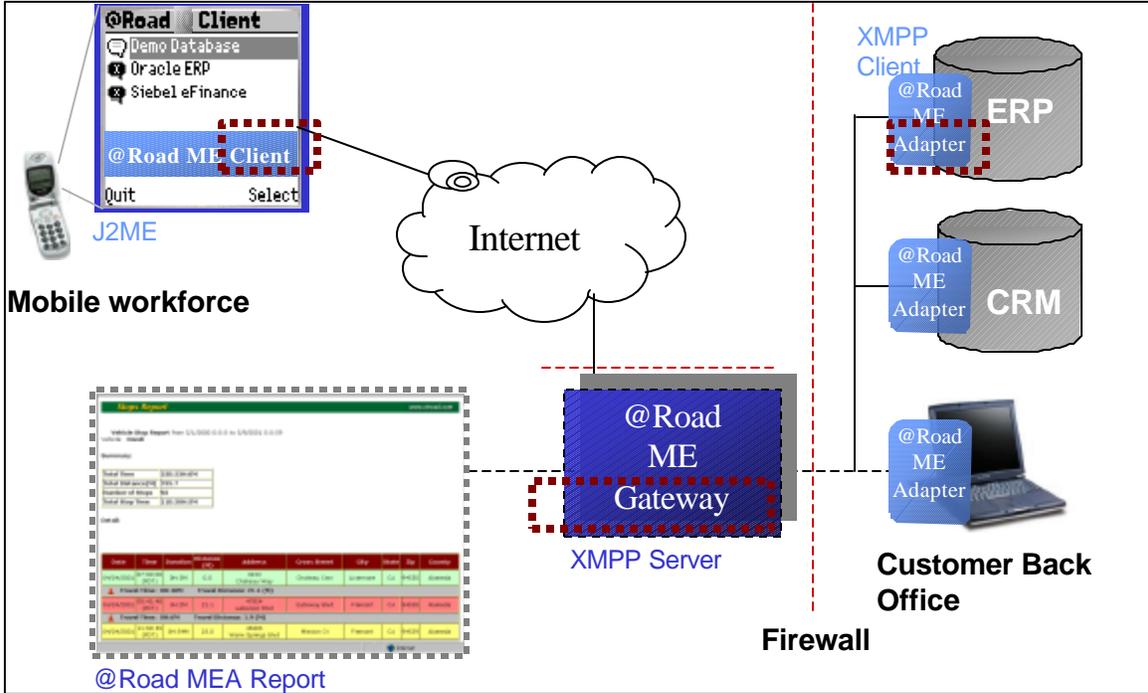


Figure 1

Leveraging Standard Technologies

Mobile Enterprise Access platform employs open standards including the Extensible Messaging and Presence Protocol (XMPP), an XML-based open protocol for instant messaging with millions of users worldwide. By supporting XMPP, MEA is compatible with thousands of Jabber servers worldwide, as well as a vast array of client and server implementations, both commercial and open source.

This open, standards-based environment provides a number of benefits resulting in lower costs and faster ROI:

First, XMPP provides a simple and effective means of exchanging transactions.

The XML document protocol enables administrators to easily and effectively control the format and content of transactions between MEA and other enterprise apps.

MEA eliminates programming with flexible, standard-based architecture that enables rapid customization and fast integration to any standard database, including ERP and CRM systems. (see *Figure2*).

In addition, security is not compromised between end-to-end transactions. The Mobile Enterprise Gateway negotiates XML streams between client and server over Secure Socket Layer (SSL) using strong data encryption. By leveraging proven security and open standards, MEA is trusted, flexible and powerful, designed for back office access by the mobile workforce.

```
<sqlQuery name='View Ticket'>
  <x xmlns='jabber:x:data' type='form'>
    <title>View Ticket</title>
    <field type='text-single' label='Ticket Number' var='tcknum'>
      <required/>
    </field>
  </x>
  <x xmlns='jabber:x:data' type='result'>
    <title>Ticket Details</title>
    <reported>
      <field type='text-single' label='Ticket Number' var='tcknum' />
      <field type='text-single' label='Category' var='category' />
      <field type='text-single' label='Item' var='item' />
      <field type='text-single' label='Description' var='descr' />
      <field type='text-single' label='Priority' var='priority' />
      <field type='text-single' label='Status' var='status' />
    </reported>
  </x>
  <sql>select ticket_number, category, item, description,
    DECODE(priority, 1, 'Medium', 2, 'High', 'Low'), status
    from iqcdemo_ticket where ticket_number = '$tcknum'
  </sql>
</sqlQuery>
```

Figure 2

Employing the @Road MEA Solution Across Multiple Industries

Using the Mobile Enterprise Access platform, a variety of applications can be quickly developed without additional programming.

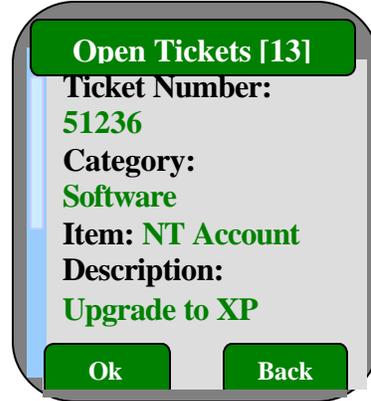
For Field Services

Use the @Road MEA to manage and exchange key information with field service employees.

Field service employees can use mobile devices, such as the Motorola i730 phone, to:

- ?? Access customer trouble-tickets
- ?? Update tickets directly from the field, eliminating the need to return to the office
- ?? Search for specific issues
- ?? Open additional tickets, or close tickets

Managers can track and confirm the information entered from the field.



For CRM

Use @Road MEA to deliver secured end-to-end transactions between field employees, suppliers, partners, and customers.

- ?? View Contact Relationship Management information from mobile devices
- ?? Access customer information
- ?? Enter field notes after customer visits
- ?? Look up part numbers, pricing, or invoices
- ?? View supply chain status
- ?? Schedule orders or update transactions from the field



For Field Research

Send real-time specific fields and attributes of field data by entering information directly into the mobile device. Automatically submit the information to one or more databases.

@Road Direct Integration family of services

As one facet of the Direct Integration Services offered by @Road, MEA provides the capabilities to send and receive data from any customer back office application in addition to providing location based @Road resource management data. The summary matrix below displays the differences between the @Road API, MEA, TCP Connect Direct Data, and integration options (see *Matrix 1*).

	@Road API	MEA	TCP Connect	DirectData
Overview	SEND and RECEIVE specific @Road data and integrate programmatically with back office applications	SEND and RECEIVE @Road data and configurable back office application data to and from the mobile device	Allows an external IP-enabled device to use the wireless modem within the @Road iLM to remotely access applications over the Internet	SEND all @Road data to the back office application
Data flow	Bidirectional	Bidirectional	Bidirectional	Unidirectional
Technology	HTTP/XML based	XML, XMPP, JEP-004	TCP/IP, Layer 3	XML-based
Application Use	Query @Road data and integrate the data to specific 3 rd party or other @Road systems	Access back-office application data and collect data from the field	Connect PCs, PDAs and other mobile devices to corporate networks	Deliver @Road data directly to 3 rd party databases and applications
Benefits	<ul style="list-style-type: none"> - Complete control - Customization flexibility 	<ul style="list-style-type: none"> - No programming required - Fastest time-to-market 	<ul style="list-style-type: none"> - Connection flexibility (supports variety of mobile devices) 	<ul style="list-style-type: none"> - Reduces data entry tasks and separate reports

Matrix 1

Summary: the @Road Advantage

Today, enterprises require end-to-end mobile solutions that offer real, measurable business benefits for a range of mobile operations needs. @Road meets this demand by delivering a family of direct integration services linking mobile devices to corporate networks, third party databases, and other applications. @Road Mobile Enterprise Access provides a unique, standards-based, end-to-end solution to the growing need for connecting mobile employees to critical back office enterprise applications.

@Road MEA offers a number of distinct advantages all resulting in a cost-effective and easily manageable solution.

Location-based data. @Road MEA leverages @Road LocationSmartSM technology to collect on-demand location-based information using GPS-enabled mobile devices for use in back office applications. As a result of this tight integration with LocationSmart, the @Road MEA also facilitates back office access to a variety of @Road mobile resource management services.

Open standards = fast deployment. The @Road MEA employs a secure, standard platform that's easily configurable to a variety of business requirements. By eliminating complex programming, @Road MEA optimizes the deployment process, delivering business intelligence quickly and effectively.

Powerful and simple integration to multiple applications. The @Road MEA Enterprise Adapter can be configured to work with any number of databases, including ERP and CRM systems, and other critical enterprise applications. Bi-directional access enables users to look up information, create new records, and update existing records—quickly and in real-time.

@Road has years of success developing and marketing mobile resource management solutions. With MEA, @Road is able to extend our solutions to the corporate enterprise.