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# Client/Server Case Study Government: Canada's Department of Foreign Affairs and International Trade (DFAIT)

*Canadian diplomacy enters the 21st century with  
advanced communications network.*

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## 1. Need

### **Shrinking Budgets, Pressure to Act Quickly**

Advanced telecommunications has changed the face of diplomacy. Crises breaking anywhere in the world appear on television sets the same day, dramatically reducing the time available for official analysis and response by the countries involved.

Documents carried by couriers in diplomatic pouches, or even transmissions sent via telex, are far too slow and cumbersome for the quick responses demanded in the 1990s. Today, diplomats and analysts spread across the globe must work collaboratively with rapid exchange of documents and access to a common information base.

Canada's Department of Foreign Affairs and International Trade (DFAIT) had traditionally relied on a secure telex system to link its Ottawa headquarters and its 146 embassies, consulates and missions around the world. In addition to the pressures for faster responses to worldwide events, DFAIT's shrinking budget forced diplomats to do more work with far fewer support staff. Budgetary pressures also forced DFAIT to reevaluate its use of network bandwidth, which is an order of magnitude more expensive internationally than within North America.

Additionally, the costs and logistics of deploying traditional mainframe-based applications made it too difficult and expensive to get data out to the various missions, where the information was needed for local decisions. The home office had no practical way to track individual missions' budgets throughout the year, and no one could perform what-if scenarios or create ad hoc reports to support the fast analyses the diplomatic corps needed to make. An additional worry was that the continuing loss of clerical support staff might diminish corporate memory, which is essential to the operation of a foreign ministry.



*Garrett Lambert, assistant deputy minister for corporate management, Department of Foreign Affairs and International Trade.*



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Recognizing these realities, in 1991 Garrett Lambert, DFAIT's assistant deputy minister for corporate management, challenged his staff. He asked them to go beyond replacing the aging telex system to build a complete information technology infrastructure capable of taking DFAIT into the 21st century.

## 2. Process

### Strategic Plan Sets the Course

Lambert appointed Ron Hartling to be the project manager for the agency's global network and directed him to write a strategic plan for the new information technology infrastructure. The plan outlined three major components.

The first component was messaging. DFAIT needed to replace the old, 50 baud telex system with a much higher-bandwidth information transfer mechanism, to accommodate the rapid and cost-effective movement of documents with formatted text and graphics — not just uppercase ASCII text — around the world. Previously the only option for sending full documents securely was via diplomatic bags carried by couriers, which was both too expensive and too slow for DFAIT's needs.

The strategic plan next called for a consistent set of office automation tools for people to use everywhere within DFAIT. As with the military, the foreign ministry is a rotational service in which staff members move as they are re-assigned. To keep training costs under control, the department wanted to standardize on a consistent set of systems, software and tools throughout its operations.

"We face the same budget pressures as all public sector organizations these days, but magnified three or four times by the cost of keeping and training people abroad," explains Hartling. DFAIT employs 2,300 people in Canada and another 5,700 scattered around the globe. As a result, uniform office automation tools were a primary concern.

Finally, DFAIT determined that it needed corporate applications that would let it manage its dispersed operations more effectively with reduced resources. Unable to afford the support staff everywhere to do all the necessary administrative tasks, the department needed applications that would tie its 146 independent outposts into an integrated, efficient corporation.

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*DFAIT faced pressures for faster diplomatic responses to worldwide events.*

*"The client/server infrastructure is revolutionizing the way we do business."*



*Ron Hartling, project manager for the agency's global network, Department of Foreign Affairs and International Trade.*

DFAIT chose the X.400 standard as its secure global messaging solution; consistent office automation tools based on Microsoft Windows\* and running on Intel processor-based desktop platforms; and client/server-based corporate applications built around Microsoft SQL Server\* software running on a Microsoft Windows NT\*-based symmetric multiprocessing server. After putting out functional requirements and a Request For Proposal (RFP) for a standards-based server platform, DFAIT chose an Olivetti LSX 5040,\* which is based on the cost-effective Intel architecture.

### 3. Solution

#### **Instantly Accessible Information**

DFAIT calls its new information technology solution SIGNET, for Secure Integrated Global Network. The agency is implementing the solution in phases — first in the Ottawa home office, then in Canada's major hub missions (e.g., Washington, London, Paris, Tokyo), and finally in the smaller and more remote missions. As of April 1994, about half of DFAIT's worldwide users are connected to the X.400-based messaging system, with access to each other and to other Canadian government departments with interests

abroad. The rest will be connected by April, 1995.

Users now can send text and documents anywhere in the world in a matter of minutes.

"On the applications side, our first priority was financial information, which is the heart of any corporate database," says Hartling.

The agency is in transition from its legacy host to the new client/server solution. It maintains two Microsoft

Windows NT-based servers — one running the Microsoft SQL Server database, the other acting as a front-end transaction server to the legacy system. The corporate SQL Server database already holds all financial transactions from the last three years, and the transaction server keeps it up to date within seconds.

SQL Server applications have exceeded all DFAIT's expectations for ease, flexibility and speed of viewing financial data, according to Hartling. On the legacy VAX system, for example, common queries were run against the system-maintained summary data. Ad hoc queries not covered by those summaries required custom coding and six hour runs that had to be scheduled on weekends. The SQL system, on the other hand, runs all queries against the raw transactions rather than summaries, enabling clients to view the data in any way imaginable.

"Even the most complex possible query posed by DFAIT takes less than two minutes, and typical queries return the requested data in a second or two," says Hartling. "Most impressively, we obtain these results with a Pentium™ processor-based \$40,000 server that's a fraction of the cost of a mainframe."

Over time, all current client activity will migrate to the client/server SQL systems. DFAIT will preserve the legacy applications as an accounting back-end, thus avoiding the cost of rewriting many person-years worth of intricate accounting logic. With the financial data accessible in an SQL environment, users worldwide will gain direct access to "live" financial information to review budgets and to complete a transaction — for example, to purchase new office automation equipment or make a grant to a United Nations agency for peacekeeping.

Having proven the client/server platform with its core financial data, DFAIT is now moving aggressively to migrate the remainder of its systems to the growing corporate database. Already, a significant portion of the personnel database has been brought in, along with

**Client/Server Solution Summary**  
**Canada's Department of Foreign Affairs and International Trade (DFAIT)**

**Server Platform:** Pentium™ processor-based Compaq ProLiant, Olivetti LSX 5030/LSX 5040 Symmetric Multiprocessor

**Server Operating System:** Microsoft Windows NT,\* UNIX

**Server Software:** Microsoft SQL Server, Olivetti IBIsys X.400 MTA

**Client Platform:** DEC, SIDUS and other PCs

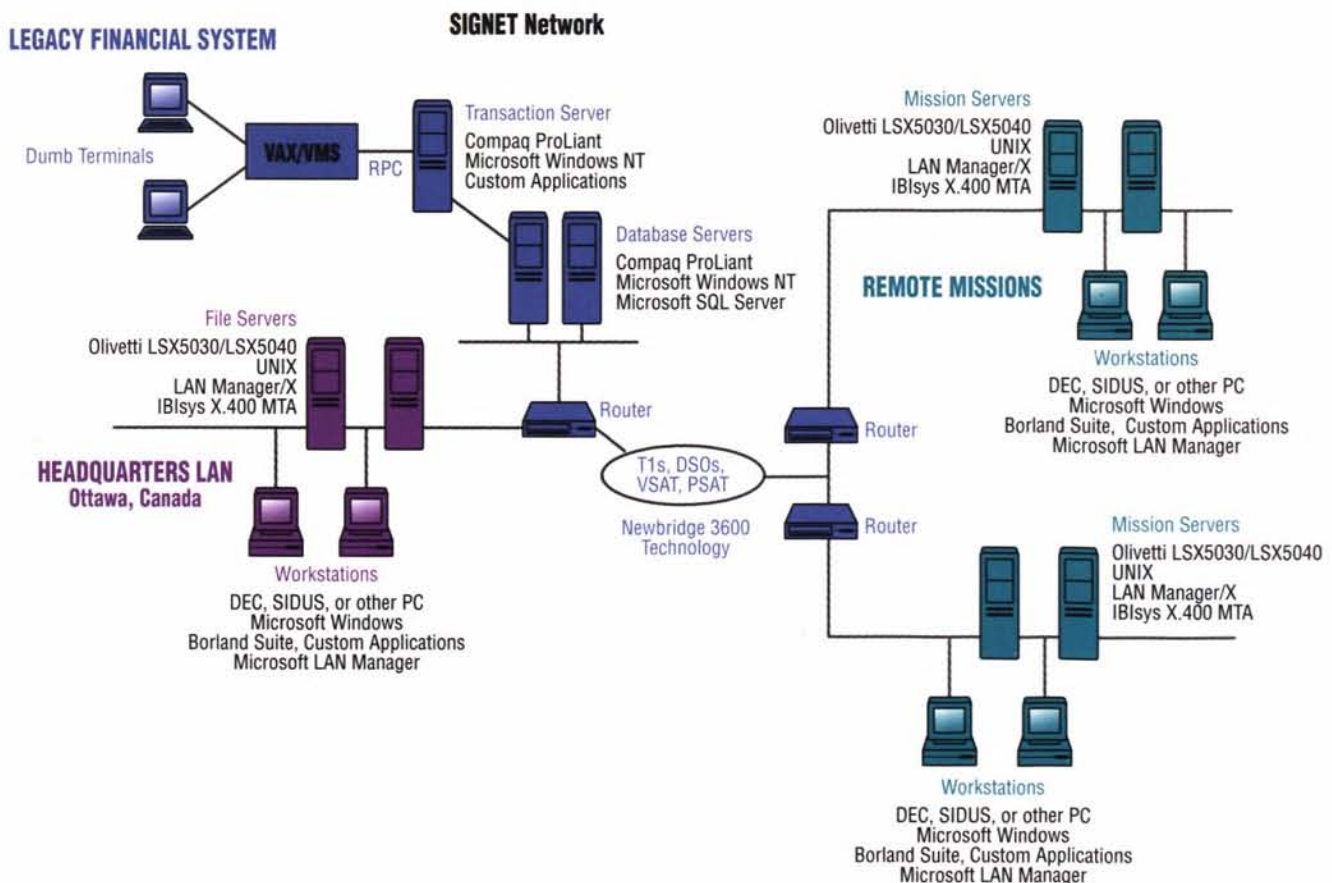
**Client Operating System:** Microsoft Windows\*

**Client Applications:** Borland Suite: WordPerfect\* for Windows, Paradox\* for Windows, WordPerfect Presentations;\* QuattroPro\* for Windows; Visual Basic\* front ends to custom corporate apps; Olivetti ICONDesk\* native X.400 mail client

**Network Operating System:** Microsoft LAN Manager/X\* 2.1, Microsoft LAN Manager and FTP TCP/IP

**Network Topology:** Ethernet\*

*"Most impressively, we obtain these results with a Pentium™ processor-based \$40,000 server that's a fraction of the cost of a mainframe."*



applications such as profiles of overseas embassies and countries, travel entitlements and conference room bookings.

The implementation process has kept pace with the agency's accelerating experience with the new technology. In fact, many new requirements that previously would have required major, dedicated development efforts now can be added to the corporate database with a few person-days or -weeks of work.

The client/server platform fits the agency's pressing need to minimize the very high cost of bandwidth to most of its missions. Staff members can frame queries or generate transactions using Paradox\* for Windows or a custom, Visual Basic\* application running on their standard Intel processor-based client system.

The application translates the request into an SQL query, compresses it to the minimum number of characters and sends it out as an efficient packet of data. The request is received by an SQL Server engine, which currently is in Ottawa but in theory could be anywhere in the world. The request is validated against the authority of the person initiating it, then is either processed or denied. The answer is again compressed to conserve bandwidth and sent to the originating client application for presentation all within seconds instead of days.

## 4. Benefits

### Information Infrastructure Aimed at the Future

"The technology allows us to respond more quickly, which is key to doing our jobs well," says Lambert. Even with only half its users on board, DFAIT has noticed significant improvements in its major missions' abilities to stay on top of breaking world situations. Instead of wait-



*DFAIT already has been able to eliminate its weekly diplomatic courier runs to each of its missions abroad.*

ing hours or days for a courier, or for support staff to painstakingly transcribe and translate telex messages, everyone involved in a situation gets accurate information to work with, instantly.

Recent examples include the GATT agreement and the Canadian federal budget, both of which were sent to missions as full, formatted documents, ready for incorporation in press releases and other analyses within minutes of their being made available. Previously, missions would have had to rely on less informative, text-only telex summaries.

DFAIT already has been able to eliminate its weekly diplomatic courier runs to each of its missions abroad. In addition, most of the 130 communications support staff, who previously retyped every message on teletype machines, have been brought back to the home office.

With reliable financial information accessible promptly, missions are managing budgets more efficiently, and the Ottawa headquarters is able to track more precisely where its budgets are being spent. More and more applications are drawing from and contributing to the corporate database, so there is far less duplication of data and hence a significant improvement in data accuracy and integrity.

*"We have built a platform that will take us into the next century."*

Local processing adds an important measure of reliability to DFAIT's operations. If a country's network link goes down, for example, the local servers and intelligent clients can allow the mission to continue to operate. Pending messages are automatically exchanged when the link comes back up. In a worst case — where a LAN goes down at a particularly inaccessible site and there is no local support — the systems on each desk can continue to provide basic office automation services in stand-alone mode, and clients can access the head office's database using a modem through the public telephone system.

One of the most significant benefits of the client/server network is DFAIT's more efficient use of its precious bandwidth resources. "We simply couldn't afford the traditional dumb terminal/host applications, because sessions take up too much bandwidth," explains Hartling. "As a result, we still have scores of manual business processes that should have been automated long ago and that the new platform now allows us to tackle."

SIGNET takes care of these bandwidth concerns, both by distributing local processing to individual missions and by efficient compression of all the information that does traverse the network. By sending single packets of compressed data — instead of transmitting every single keystroke, as mainframe/terminal applications did — the SQL server frees up an enormous amount of the network's bandwidth. This allows the agency to develop a flood of new applications to make information as accessible to diplomats in the most remote outposts as to DFAIT's headquarters staff.

"So far, we've only scratched the surface in terms of what the SIGNET infrastructure can do for us," says Hartling. "Once this infrastructure is rolled out to all our global operations, it will revolutionize the way we do business."

Standardization on the Intel architecture means that DFAIT is ensured a wide choice of cost-effective client and server equipment that will continue to meet its information technology needs, far into the future. DFAIT feels it has made the right decision in its standards-based client/server network. Says Lambert: "We have built a platform that will easily take us into the next century."

*"Missions can manage themselves and we can see what's happening."*

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