

Search Solutions for the Enterprise

Three scenarios for implementing search

Deployments of search solutions for the enterprise can range from the simple to the complex.

INTRODUCTION: DEPLOYMENT TO FIT ENTERPRISE NEEDS

Many factors drive the requirements and scope for deployment of a search solution for the enterprise. Organizational size and complexity, the growing expectations of users for easy access to information and services, and corporate policies all play a role in deciding how a search solution will be woven into the enterprise technology fabric. BearingPoint has identified three scenarios that provide insight into the levels of potential complexity in deploying search solutions for the enterprise.

SEARCH SOLUTION ARCHITECTURES

Regardless of how complex and comprehensive a deployment will be, two primary elements provide the architectural foundation for organizationwide search: data stores that users wish to search, and the search engine powering the solution. The data can take many forms, from e-mails and Microsoft® Word documents to financial databases and customer records. The search solution requires an infrastructure environment comprised of a search engine and the related hardware, software and services needed to integrate search into the enterprise environment and deliver search capabilities to users.

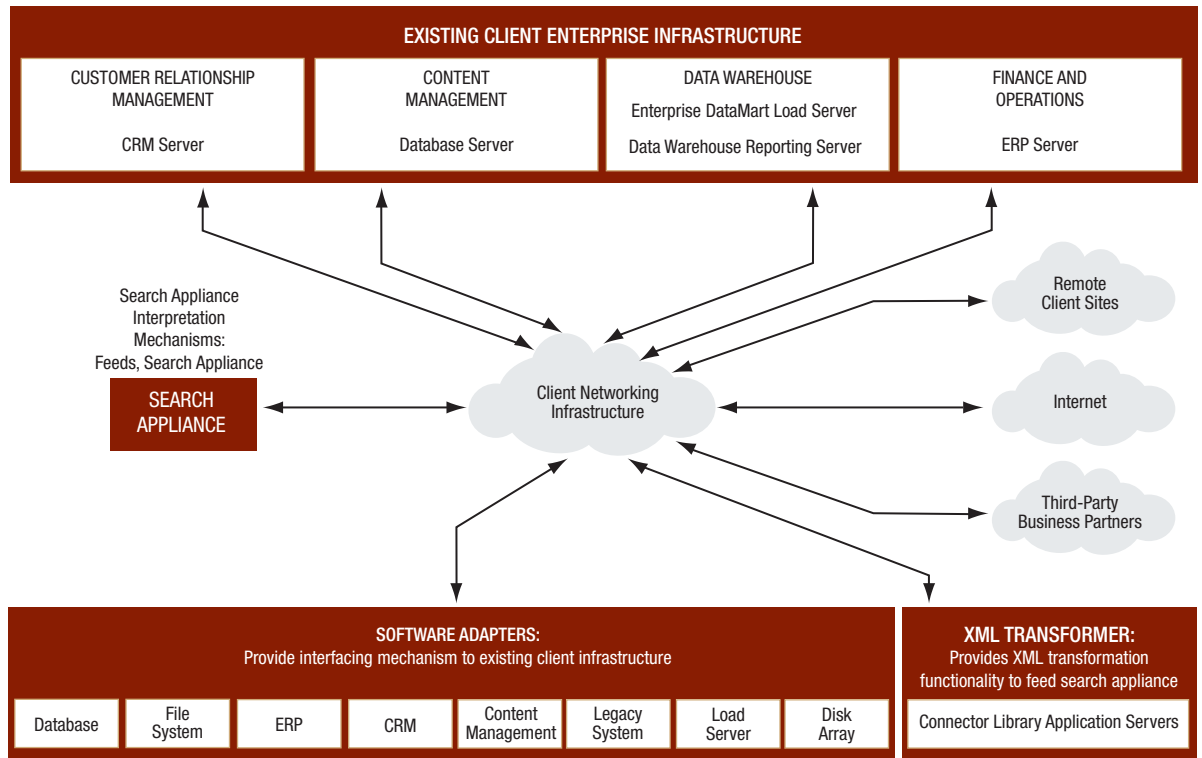
Figure 1 describes a high-level physical architecture typically used in deploying search solutions for the enterprise.

This paper describes the factors involved in deploying a search solution for the enterprise in each of three levels: basic deployment, advanced deployment and complex deployment.

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Figure 1. High-Level Physical Architecture



BASIC DEPLOYMENT

A basic deployment is used in a small enterprise or within a department or functional area of a larger enterprise. The purpose of this deployment is to gain access to unstructured data available on the organization’s intranet and in file systems, and possibly structured data from databases. Benefit can quickly be gained from such a solution by setting up a search engine in basic security authentication mode, such as NT LAN Manager (NTLM). Figure 2 outlines the architecture of this type of basic deployment of a search solution.

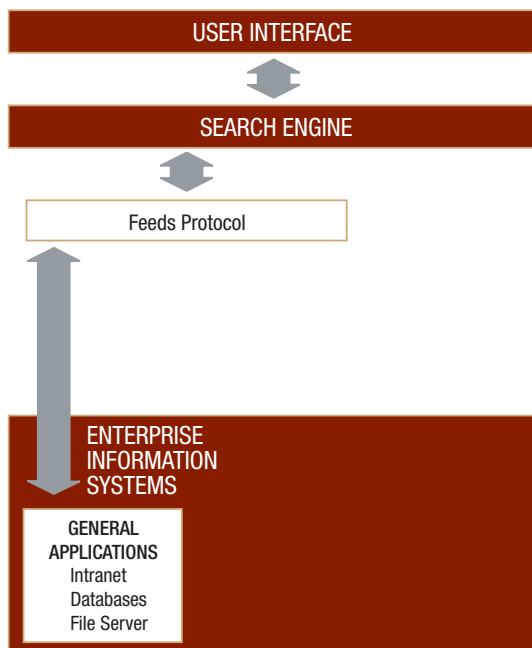
The steps involved in a basic deployment are:

Search Engine/Engine Setup

Search engine/engine setup requires network preparation and device configuration:

- Network preparation
- Internet protocol (IP) address
- Subnet mask
- Default gateway
- Domain name system (DNS) server
- DNS suffix

Figure 2. Basic Deployment of a Search Solution



- Simple mail transfer protocol (SMTP)
- SMTP server
- Network time protocol (NTP) server
- Device configuration
- Configuration of the search engine/engine setup with its IP address and other network settings
- Configuration of the search engine to crawl and serve content

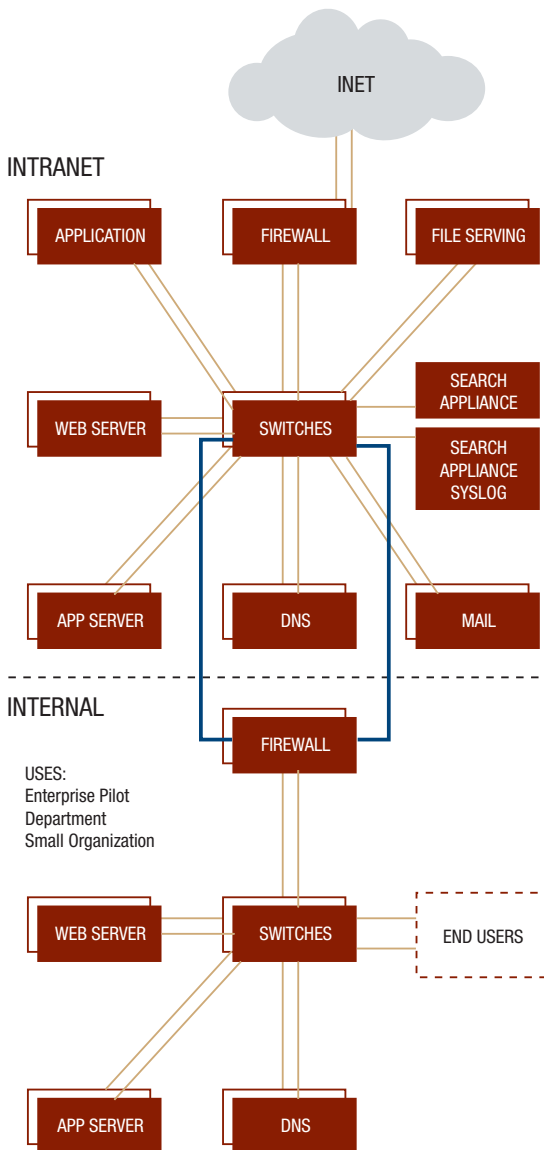
Indexing

In a basic deployment, planning and targeting of information sources that need to be “crawled” is a prerequisite to indexing. Unstructured information sources such as the intranet and file systems can be accessed and crawled by the search engine in order to be indexed. Structured information from sources such as databases can be pushed to the engine using extensible markup language (XML) feeds in a properly supported format. Indexing requires these steps:

- **Connecting to information sources.** This includes setting up the search engine to connect to and access information from both unstructured and structured sources. Unstructured content that is Web-enabled can be accessed directly. Access to other unstructured and structured information will be set up with appropriate connection parameters.
- **Retrieving data.** The search engine will retrieve information directly from some sources. For information that the search engine cannot retrieve directly, feeds will be built to export data from host systems.
- **Creating search engine-specific XML.** This involves transformation of exported content into an XML format that conforms to a specified search engine feed file. This feed can then be pushed to the engine for importing.
- **Sending XML to the search engine.** This step includes uploading the XML to the search engine using a Web form or a script. A script known as a “custom connector” can also be created, which then creates the XML data and pushes it to the engine.

Once these steps are completed, the search engine can be scheduled to crawl to create an index that will be used for serving content.

Figure 3. Basic Deployment Network for a Search Solution



Serving

When users issue a search request, results are returned by the search engine index. Serving of content involves interaction with the user through these steps:

- **Receiving a user request.** This step requires setting up an interface for the user to make a request. The look and feel of the user interface is controlled by XML and XML style sheet language transformation (XSLT). Minor changes to these files may be required to enhance presentation.
- **Returning results from index.** The search engine can fetch results based on the parameters or key words against which the search query has been initiated.
- **Validating security credentials.** The search engine can be configured to support basic and NTLM authentication, as well as more advanced controls. Search results may need to be run against the security credentials of the user requesting the search.
- **Serving results.** Results that are applicable to the request and the user's security permissions are served in the user interface.

Figure 3 provides a sample network diagram that may be typical for a basic deployment.

ADVANCED DEPLOYMENT

Advanced deployment is appropriate for mid-sized enterprises or departments of large organizations with significant information sharing. This deployment provides access not only to general applications as in a basic deployment, but also to structured content residing in functional systems, such as enterprise resource planning (ERP) and customer relationship management (CRM). Figure 4 describes advanced deployment of a search solution for the enterprise.

Advanced deployment includes all of the steps of basic deployment, plus the following:

Search Engine Setup

The search engine setup will primarily involve the same steps as basic deployment. Additional configuration may be required for connecting additional data sources.

Indexing

In an advanced deployment, content may be fed from structured and non-structured data sources, as well as from functional applications in XML feeds format. The following steps are required:

- **Connecting to information sources.** Beyond basic deployment requirements, indexing for advanced deployment requires using specific software modules to access information from different types of data residing in the specific functional applications.
- **Retrieving data.** Data is retrieved from databases using connectors that may be specific to each type of database.
- **Creating search engine-specific XML.** Exported content is transformed into XML that conforms to the search engine feed file. This feed can then be pushed to the search engine for importing.
- **Sending the XML data feed to the search engine.** The data is uploaded to the search engine using a Web form or a script. A script known as a “custom connector” can also be created, which then creates the XML data and pushes it to the engine.

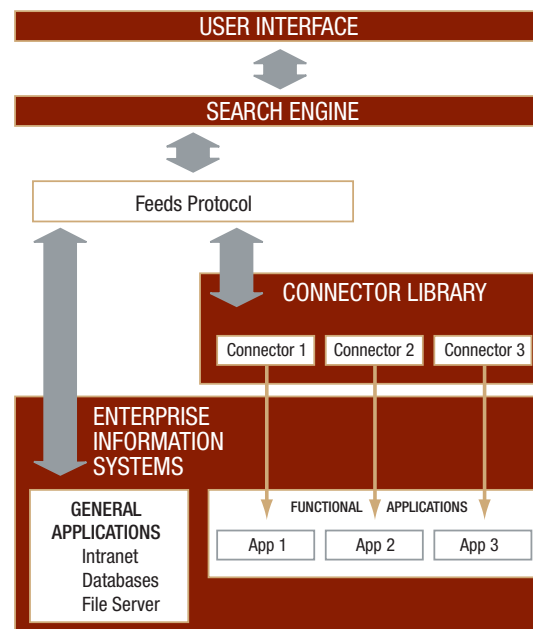
Once the above steps are completed, the search engine can be set up to crawl all data to create an index used for processing search requests.

Serving

Serving results for search requests can be set up for specific needs using filters, or collections, KeyMatch and other features that search engines provide. Advanced deployments may involve the following techniques:

- **Receiving the user request.** An interface is set up for a user to make a request. In addition to refin-

Figure 4. Advanced Deployment of a Search Solution

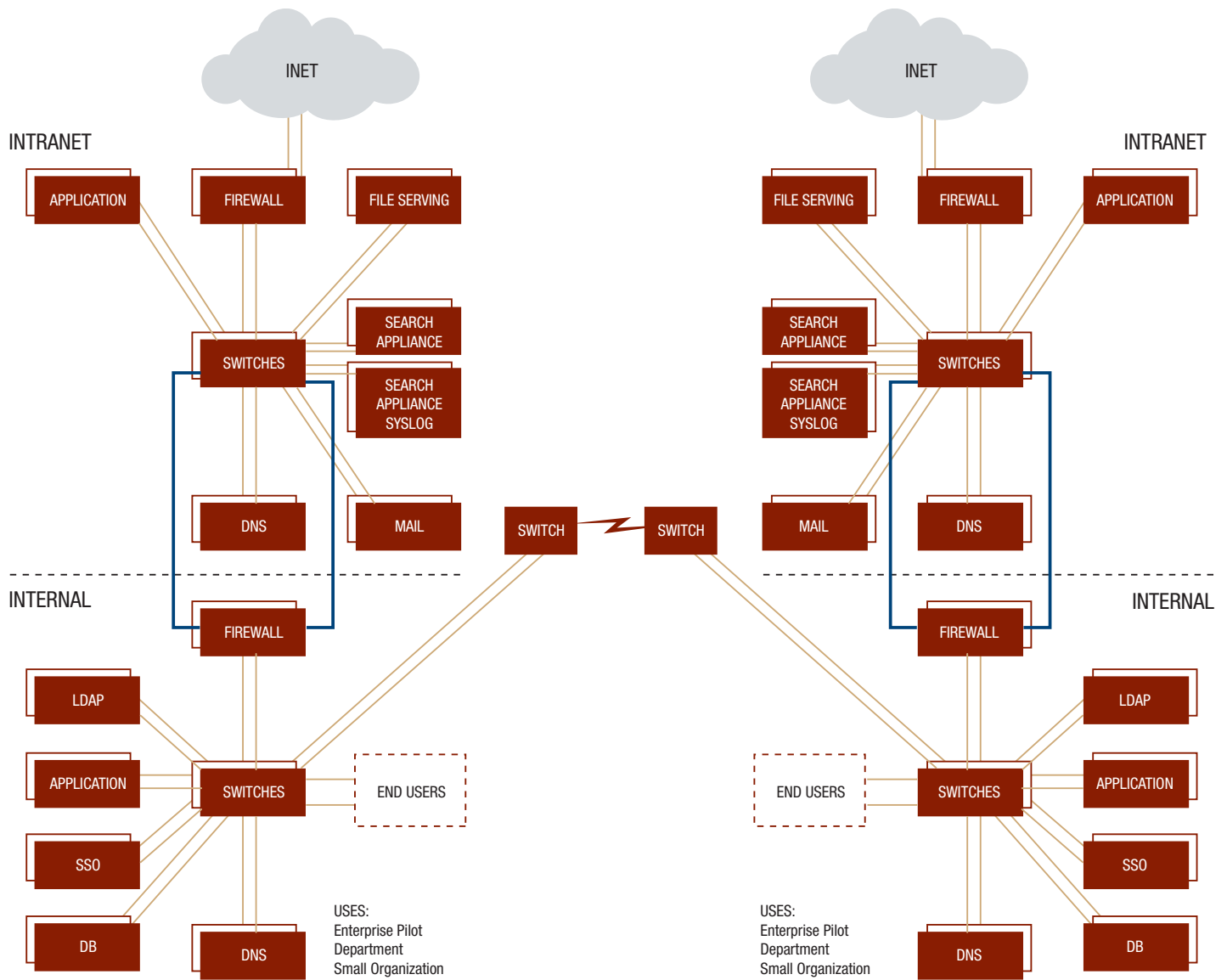


ing look and feel using XML and XSLT, additional customization may be required to integrate the user interface with existing presentation infrastructure.

- **Returning results from the index.** The search engine can fetch results based on the parameters or keywords against which the search query has been initiated.
- **Validating security credentials.** In addition to security around basic deployments, the search engine can be configured to interact with form-based authentication sites using cookie forwarding or full user impersonation. The results from the search may need to be run against the security credentials of the requesting user.
- **Serving results.** Results that are applicable to the current search request and user security credentials are returned by the search engine to the user interface.

Figure 5 shows a sample network diagram for this deployment.

Figure 5. Advanced Deployment Network for a Search Solution



COMPLEX DEPLOYMENT

A complex deployment is for large enterprises that want to search dynamic data and content from databases and other applications, as well as the intranet, structured file systems and databases. In addition to the advanced deployment capabilities already described, complex deployment may require access to dynamic content using application programming interfaces (APIs). Figure 6 shows the architecture for a typical complex deployment of a search solution.

Complex deployment includes all steps required for advanced deployment, plus the following:

Search Engine Setup

The search engine setup will involve the same steps as advanced deployment along with additional configuration of software interfaces to data sources not normally searched by the search engine.

Indexing

In complex deployments, searchable content is accessed from many heterogeneous data sources from different applications. Dynamic content is presented directly from functional applications using APIs supported by search engines.

Complex deployment indexing requires these steps:

- **Connecting to information sources.** Beyond advanced deployment requirements, complex deployment requires setting up software connections to access information dynamically from databases in different functional applications using specified database interface modules.
- **Retrieving data.** Data is retrieved from functional applications using software connectors specific to each type of database or application. Dynamic data is retrieved directly using APIs and presented in the search results screen to the user.
- **Creating search engine-specific XML interfaces.** In addition to standard XML feeds protocols used to push content to the search engine, further customization may be required for access to customized applications.

For data that is indexed using the feeds protocol, the search engine should be configured to crawl all data to create an index used for serving content. Indexing may not be required to display dynamic content from functional applications that is accessed directly using the APIs.

Serving

In addition to serving pre-indexed content, complex deployments serve information from dynamic databases through the use of direct calls via APIs. Complex deployment involves:

- **Customizing user interfaces.** This includes setting up an interface for the user to make a request, with the look and feel of the user interface controlled by XML and XSLT. Integrating the interface with the existing presentation infrastructure could involve additional customization.
- **Returning results from the index.** Search engines can return customized results based on the parameters or keywords against which the search query has been initiated. A mix of results can be delivered from the index as well as from functional applications using APIs, which can be tuned for the specifics of a particular implementation.
- **Validating security credentials.** In addition to security required for advanced deployment, the

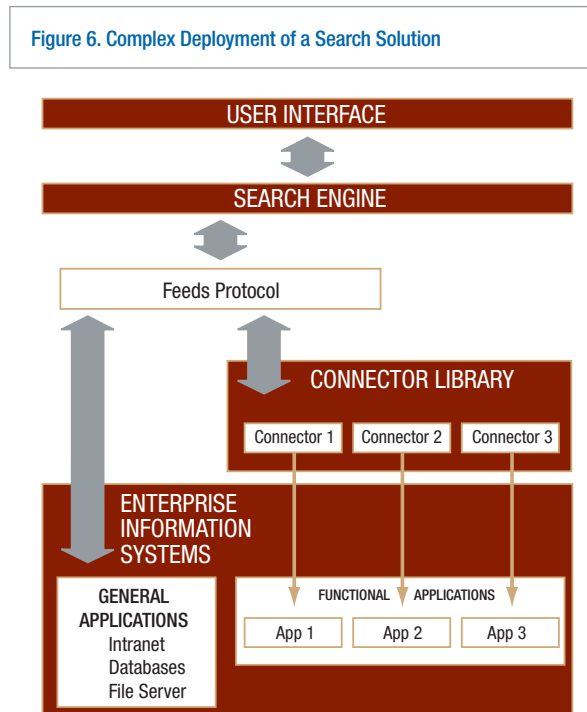
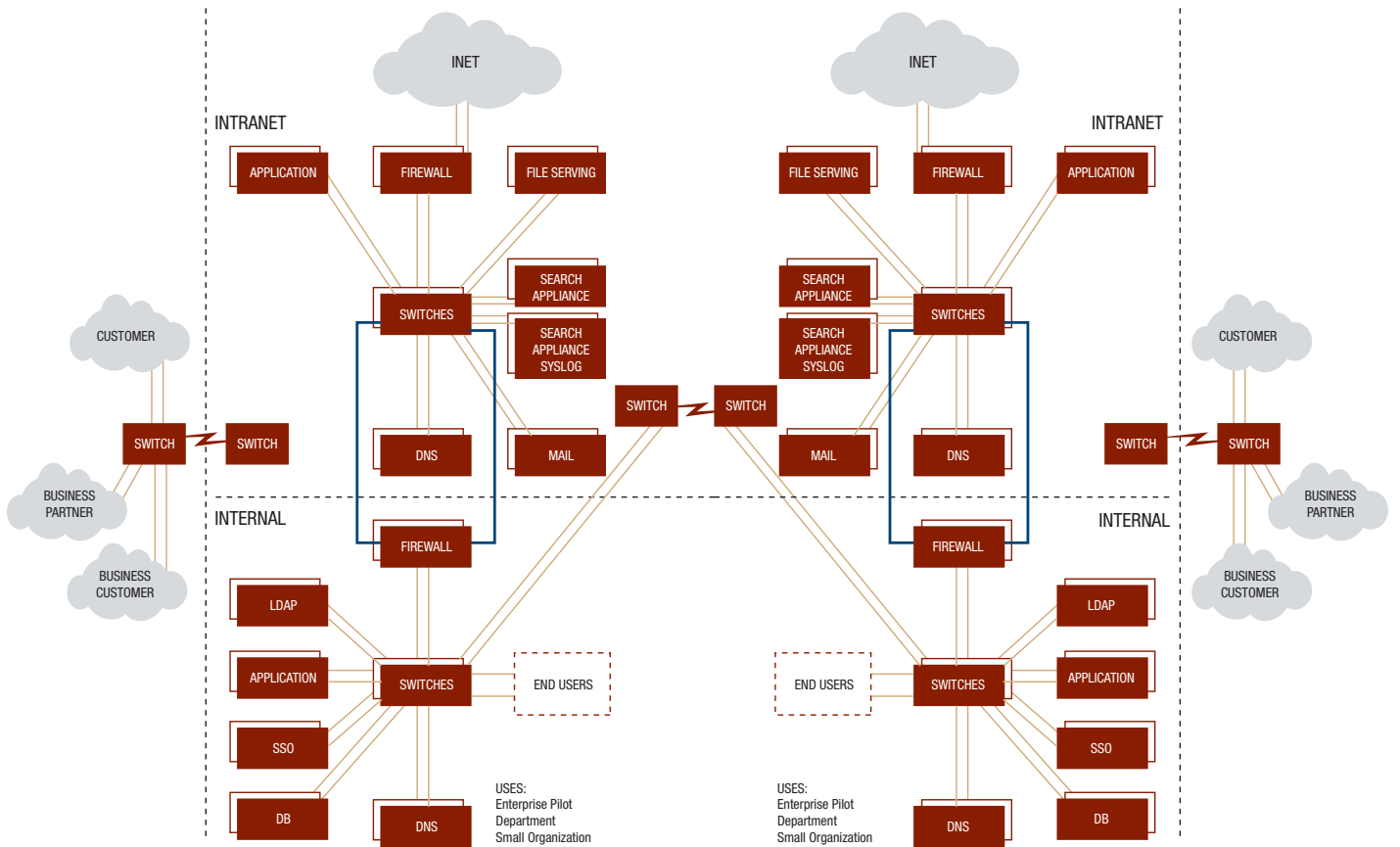


Figure 7. Complex Deployment Network for a Search Solution



search engine may need to be configured to interact with the customized security requirements of the functional applications.

Figure 7 describes a sample architecture and network diagram for this type of deployment.

TAILORING SEARCH SOLUTIONS FOR THE ENTERPRISE

Determining the scope of search requirements is necessary to deploying an effective search solution for the enterprise. Which information stores will be searched and who will have search permission will dictate the complexity of the search solution. By clearly establishing organizationwide search needs and technology requirements, an organization can design the appropriate solution that capitalizes on the power of this emerging tool.

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