AIX Connections: Seamless PC Security

By Kay Chang and Rakesh Sharma

AIX Connections Release 1 supports PC LAN protocols in a workgroup environment. Its system software enables networked PCs running popular PC operating systems (such as Windows 95, OS/2®, Windows NT™, and Macintosh) to operate from a single server—the RISC System/6000® (RS/6000™). An additional new function provides a secure directory in which PC users, who access various domains and protocols, are authenticated to the enterprise system via DCE security. PC workgroup users now use the DCE domain for accessing DFS files, as well as AIX Server Journaled File System (JFS) files, even within the Web browser.

The goal of AIX Connections is a single system that controls and manages multiple networked PCs without requiring any modification of PC clients. The previous release of AIX Connections integrated diverse PC desktops onto a single AIX server. However, when a single AIX Connections server reaches its limit of PC clients (limit is based on the server's resource capacity), AIX Connections must merge multiple AIX Connections servers without interrupting PC clients, yet present a single point for administration and access for all PCs within its domain.[1]

Distributed Computing Environment (DCE) enables AIX Connections to provide high-level, integrated services for consolidating multiple AIX Connections servers.

AIX DCE provides the following functions:

- DCE security with full encryption and authentication
- Global file sharing with Distributed File Systems (DFS)
- Global Directory Services to integrate users and user groups
- DCE replication function that improves reliability of server applications

With AIX Connections, users can share files, printers, and even administration across different types of networked PCs. With enhanced DCE support, AIX Connections now incorporates DCE functions into the standard PC clients. AIX already provides a base AIX function to DCE clients. Enhancing AIX Connections with DCE provides an efficient environment for all PC clients that are gateways to the DCE domain and its services.

In AIX Connections Release 1, three well-known file and print servers (SMB, NetWare®, and Apple®) using their respective PC protocols (NetBIOS, IPX/SPX, AppleTalk®) matched access and permission to the AIX users and group permission. The new release with DCE enables AIX Connections to improve this capability by extending it to

Kay Chang

Rakesh Sharma

[1] Olszewski, Bret, R. and Chang, Kay. "AIX Connections." *AIXpert*, November, 1995. Pages 4-13.

the DCE domain, providing file extensibility and security. It uses DFS to provide distributed files and it also provides a single point of control for many servers.

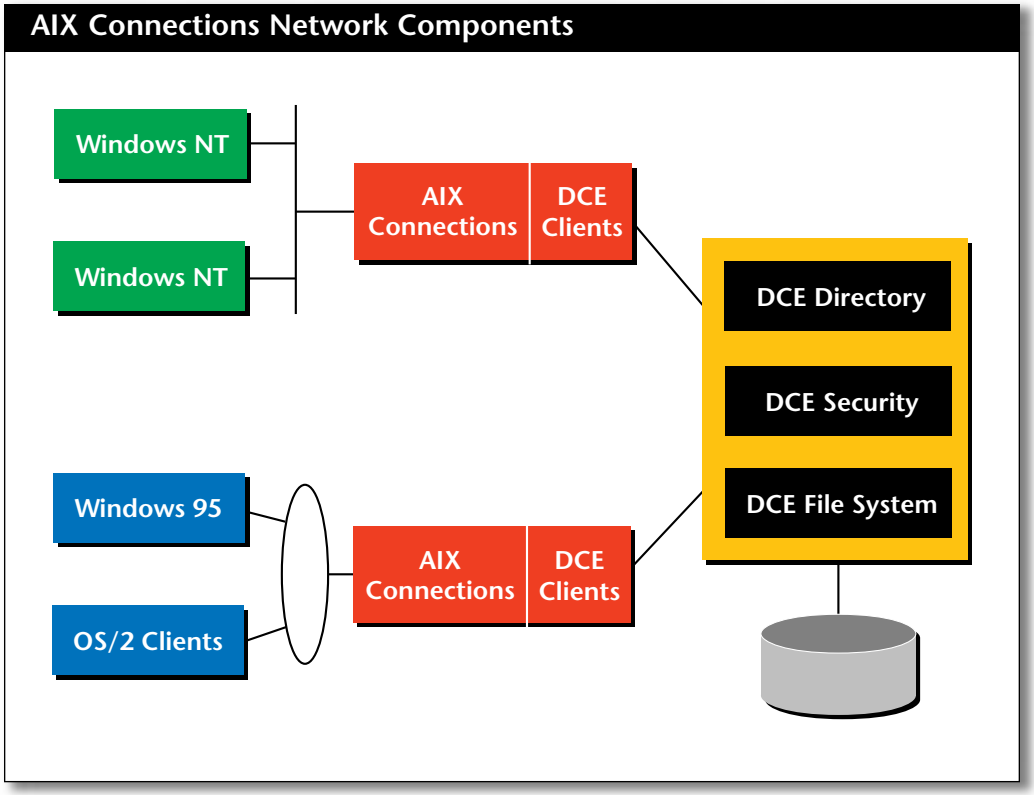

Figure 1. PCs, AIX Connections servers, and DCE components in networks

AIX Connections—DCE for PCs

The following sections describe the details of the new AIX Connections with DCE capabilities.

PC Clients

AIX Connections requires no changes for existing PC clients. It supports PC Server Message Block (SMB) clients, in which each user password is intercepted by AIX Connections and authenticated by the DCE Security service.

AIX Connections uses DCE `Cell_Admin` services to set up PC users and groups before the PC clients log in. The DCE-provided Extended Registry attribute schema also needs to be set up. A PC client accesses network resources by "mapping a drive," which triggers the AIX Connections server to set up a session. AIX Connections authenticates the user and user groups for the DCE realm, which allows the requested PC clients to access required resources, such as shared applications or data files, or shared printers. AIX Connections can be used to change PC client passwords within the DCE security environment.

Web DFS Support via SMB-Enabled Browser

Microsoft Internet Explorer supports the SMB-based file Common Internet File System (CIFS) in Windows 95 and Windows NT. The result is AIX Connections having DFS file support within the browser. This is important because it uses a file protocol rather than a HTTP Web server protocol to access and update Web pages. This browser can also access pages in a server that is not a Web site.

For example, in Internet Explorer, the URL may look like the following: file://SMBSERVER.austin.ibm.com/sharedDFSVolume/filepath. The SMB server is integrated into the AIX Connections SMB support, then mapped into the DFS file space. This function can be done without modifying a single line of the PC client's function. This feature requires a CIFS-supported browser.

AIX Connections—DCE Components

The `DCE_LM` file process performs the PC client login validation. The DCE administrative cell opens the administrative process. Figure 1 shows the integration of PCs, AIX Connections, and DCE.

Networked Environments

Networked PC environments, particularly Microsoft networks and the IBM LAN Server domain, use NetBIOS and SMB protocols for file access and system administration. The most common protocols are NetBEUI, NetBIOS over TCP/IP, and various levels of LAN Manager protocols. Today, AIX Connections handles NetBIOS protocols and some SMBs. Although new, extended SMBs, especially those that deal with OS/2 LAN Server Domain Controller and Windows NT Trusted Domain are not yet implemented, AIX Connections proxy services can provide interoperability with OS/2, Windows NT, and Domain Controllers.

AIX Connections already supports underlying network protocols, such as NetBEUI, NetBIOS over TCP/IP, and IPX/SPX2. It also supports some service protocols, such as file and print SMBs and NetWare Core Protocols (NCPs). AIX Connections also supports additional features, which are now required, such as user login validation and user and group permission rights in a global enterprise.

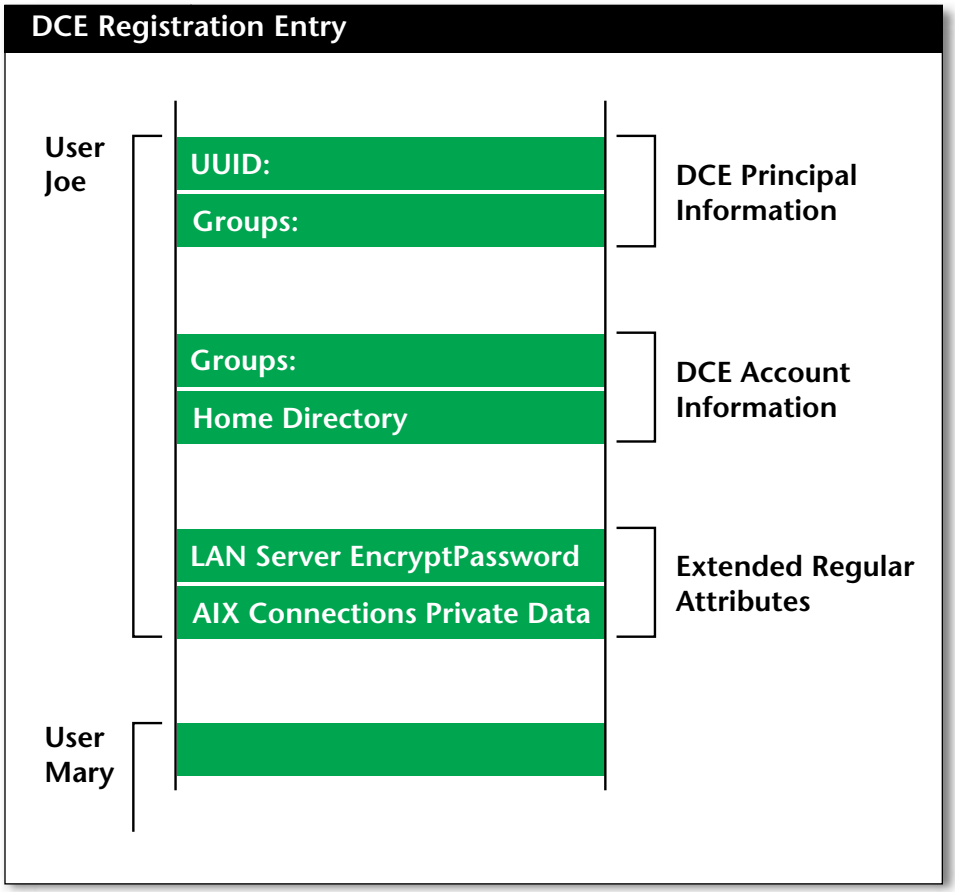

Figure 2. DCE registration entry for AIX Connections-based PC users

DCE Registration of PC Users

The AIX Connections administrator registers PC users to the DCE registry by using the Extended Registry function. Using the acesetup.dcecp script, AIX Connections administration principal, groups, and Extended Registry attributes objects are created for a secure DCE environment. Once the AIX Connections principal is created, the DCE System Management Interface Tool (SMIT) can set up users who will participate in a DCE domain. Both establishing initial passwords and changing user passwords are done using `tndcepasswd` by either the `cell_admin` or by a DCE user who is already logged in.

Figure 2 shows an example of a user's DCE registry entries.

> ***These new functions of AIX Connections bring the robustness of services that have never existed for PC clients.***

PC User Session Setup

Figure 3 shows the user authentication process for PC clients during a session setup request. The flows between the clients and AIX Connections LAN Manager server are well-known, non-modified SMB flows

between SMB clients and servers. The AIX Connections server uses the DCE Extended Registry to retrieve the LAN Server encrypted password and the "clear" password to authenticate a PC user. The LAN Server's encrypted password verifies the PC user password, and the "clear" password is used for DCE login in the DCE cell domain.

Putting It All Together

Figure 4 shows the actual components and their interactions when a PC client tries to access a DFS file. The scenario includes DCE user authentication and file access permission grants. Note that step in `tndcepasswrd`. The DCE Security server is invoked when a password must be changed.

The DCE enhancement positions AIX Connections to provide services for non-modified Windows clients.

Conclusion

The DCE enhancement for AIX Connections is a first step for including PC users for Windows 95 and Windows NT clients that participate in the enterprise directory and security. This enhancement positions AIX Connections to provide services, such as DCE directory and security for non-modified Windows clients. It also enables Windows

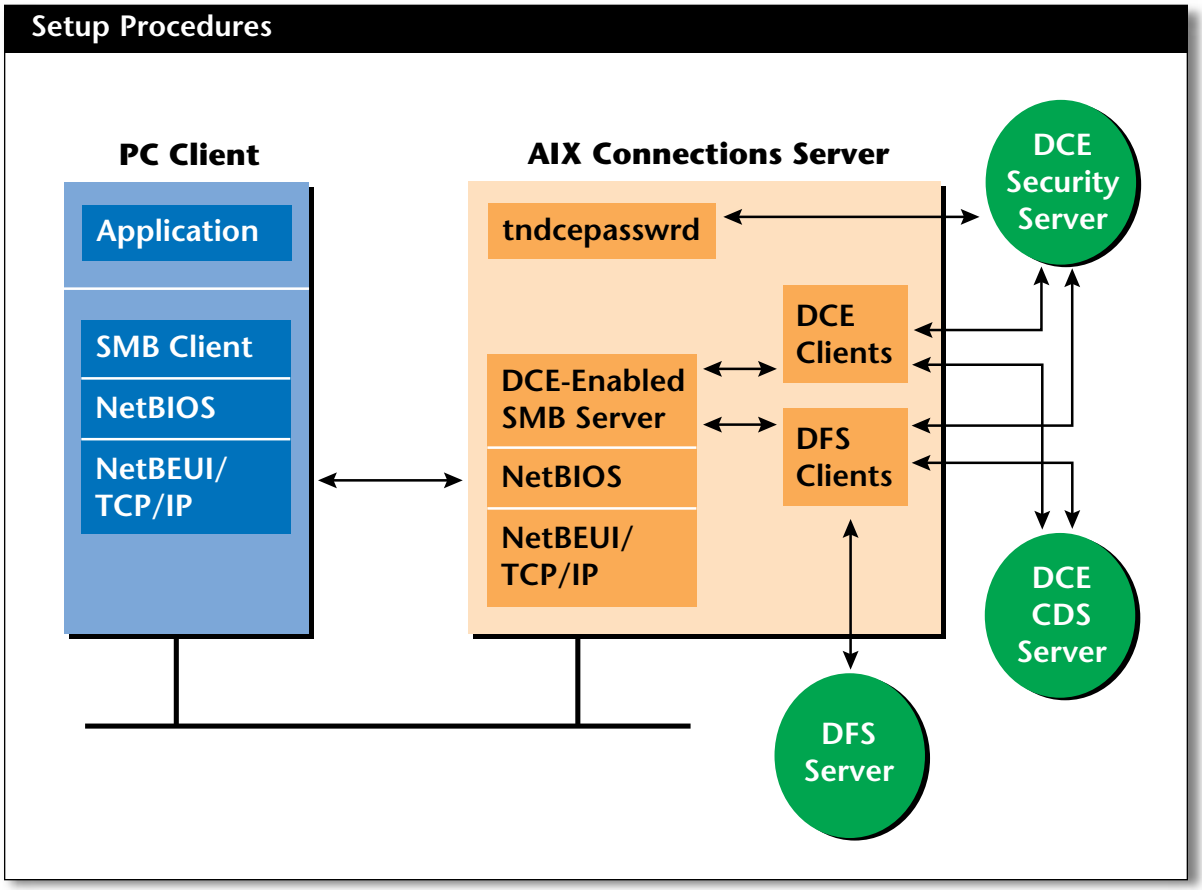

Figure 3. Session setup procedures between PCs, AIX Connections, and DCE Security server

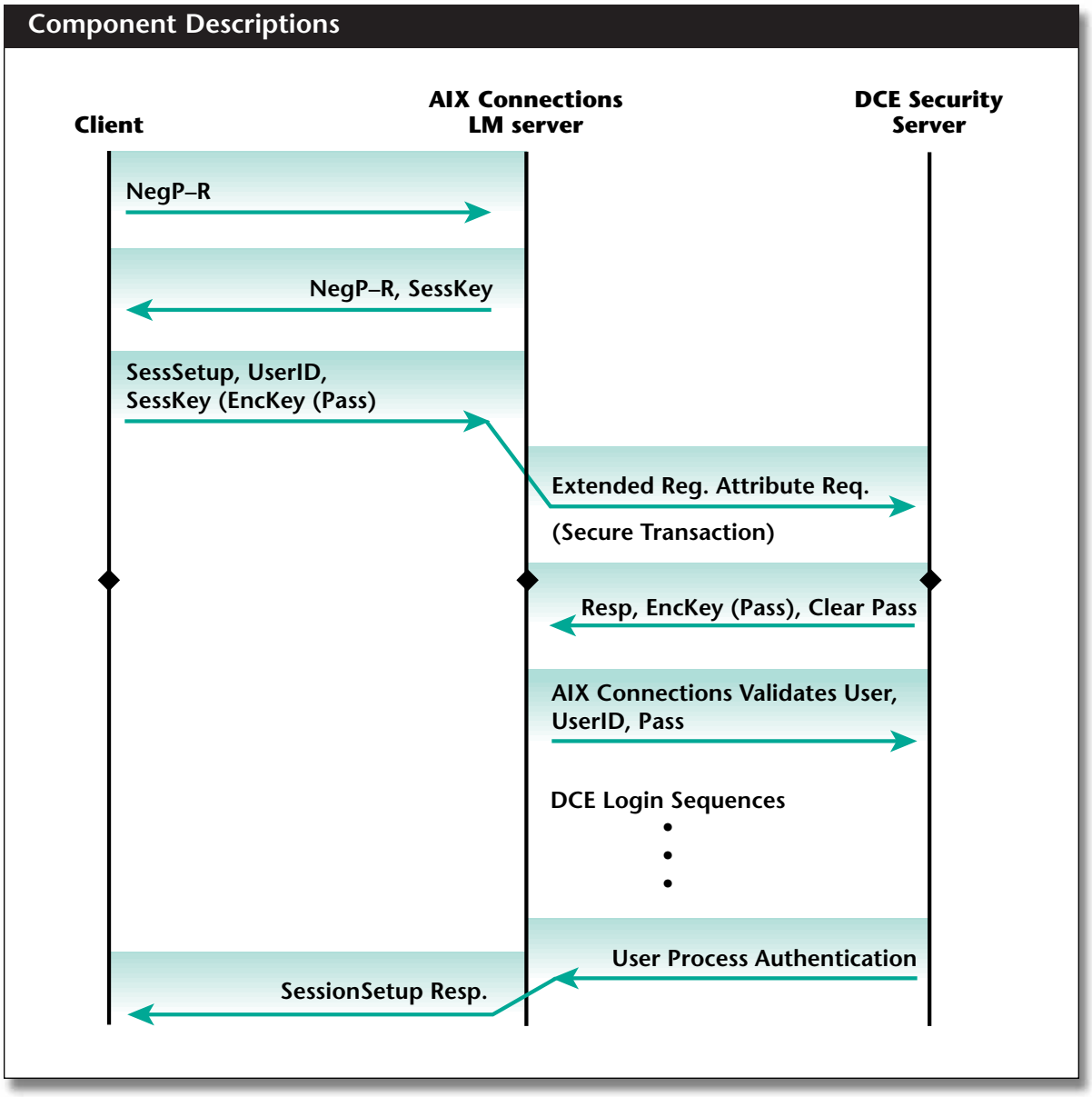

Figure 4. PC client accessing DFS file

clients to access the DCE file systems, which are secure, reliable, and distributed. These new functions of AIX Connections bring the robustness of services that have never existed for PC clients.

***Kay Chang**, IBM Corporation, 11400 Burnet Road, Austin, TX 78758. Ms. Chang is a senior programmer in AIX communication architecture working on AIX Connections and the Network Computer. She has an MS in Computer Science from Wright State University in Dayton, Ohio.*

***Rakesh Sharma**, IBM Corporation, 11400 Burnet Road, Austin, TX 78758. Mr. Sharma is an advisory programmer with a specialty in networking protocols, TCP/IP, and UNIX interoperability with PCs. He is currently working with NT/PC interoperability for AIX. He has a BS in Electrical Engineering from ITT Kanpur in India and an MS in Computer Science from North Dakota State University.*