IBM System/370
New Product Announcement

IBM ADDS NETWORKING FACILITIES: On November 9, 1976, IBM announced a series of software products and hardware enhancements that permit System/370 computers to be effectively linked together to form a multicomputer networking facility.

Networking is the linking together of multiple computer sites via communications lines for the purpose of efficiently sharing computational resources. In practice, networking provides two important capabilities:

- A user at a terminal has access to more than one computer site for his processing needs. He may or may not be aware of which computer his processing is being performed on.

- An applications program running in one computer has access to the resources of another computer site.

The first function, access to multiple computers by one user, is an everyday occurrence for users of time-sharing or remote batch processing services. Such a user typically has a great variety of services to draw on, all equally accessible from his terminal. But the user manually performs the tasks of deciding which service to use and of establishing the connection. In essence, the user has available to him many interfaces to which he can establish a connection. In networking, the user has access to only one interface. Depending on the system implemented, he may or may not have the capability to specify a particular computer for the execution of his request.

The second capability, making available the resources of a second computer site to an applications program running on a remote computer, is the basis for implementing distributed processing. But in distributed processing, interchanges are usually accomplished within a rigid allocation of application tasks. A typical implementation uses an intelligent terminal or minicomputer system at a branch location to perform routine processing, with recourse to the central computer for special tasks not implemented on the branch system. Such a system arrangement is still a monolithic design that operates within specific, predesigned rules. Networking opens the door for sharing of computer resources on a nonpredetermined basis.

IBM's new network-oriented program products were released under the name Advanced Communications Function (ACF), which is not to be confused with the 1972 Advanced Function announcement (virtual storage) or the 1974 Advanced Function for Communications (SNA and SDLC). In a nutshell, the announcement included expanded versions of TCAM, VTAM, and NCP (for the 3705 Communications Controller) that include the capabilities for establishing linkages among a group of computers. Also announced were a couple of hardware enhancements for the 3705 to make this possible. At about the same time, the Network Job Entry facility for JES2 (OS/VS MVS) was upgraded to provide some networking-like features.

The specific products announced include:

- ACF/NCP/VS--runs in conjunction with NCP/VS on a 3705-I or 3705-II; supports concurrent channel attachment to up to four processors; supports cross-system message routing without going through an attached processor; supports local/remote reconfigurability.

- SSP for ACF/NCP/VS—runs on a System/370 to generate an ACF/NCP/VS program.

- ACF/TCAM–runs with TCAM/VS under OS/VS1 or OS/VS2; supports ACF/NCP/VS; provides extended support for SDLC terminals; supports a remote 3705 processor; provides system tuning enhancements; separate feature supports multicomputer networks.

- ACF/VTAM--runs with VTAM/VS under DOS/VS, OS/VS1, or OS/VS2; supports ACF/NCP/VS; enhances support for remote 3705 processor; provides system tuning enhancements; provides network control enhancements; separate feature supports multicomputer networks.

- Network Operation Support Program--provides enhanced operator network control functions for ACF/VTAM networks.

- 3705 enhancements--support for concurrent connection and information transfer to up to four channel-attached System/370 processors; support for concurrent installation of channel

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adapter and remote program loader for reconfiguration from local to remote attachment to reconfigure a network; support for full-duplex SDLC communications links at up to 56K bps.

- Network Job Entry Facility--System Control Program (SCP; no cost) for JES2, OS/VS2 MVS; supports up to 99 nodes (System/370 computers); job entry, program execution, and job output can be performed at any terminal/node. Release 1 supports BSC Multileaving protocol; Release 2 adds support for SDLC 3790 remote terminals; Release 3 adds support for ACF to permit information transfer among nodes (computer systems) without intermediate store/forward at the intervening nodes.

In IBM's concept of multicomputer networking with ACF, each local System/370 computer would have one or more 3705 Communications Controllers attached to an I/O channel of the host processor. Remote 3705's could function as remote concentrators feeding into one of the local 3705's. The local 3705's could be connected to a 3705 at one or more remote sites through communications lines operating under SDLC procedures at up to 56K bps.

Once the system has been initialized, terminal traffic that is destined for a computer site other than the one to which its 3705 is directly attached would be forwarded withut intermediate storage; i.e., the only host processor involved in the exchange would be the destination host processor. All message handling would be performed by the 3705 processors. Alternate routing in case of line failure could be implemented provided that alternate communications links are installed.

All of these actions are automatic; neither operator control nor user programming is required. In addition, an appropriately equipped 3705-II that is channel-attached to one host processor can be re-IPLed to function as a remote concentrator to another host processor if the first processor becomes inoperative; this capability requires the concurrent installation (but not operation) of a channel adapter and the remote program loader.

With the NJE facility under JES2/OS/VS2 MVS, a node can receive a job request and either execute it or forward it to another node for execution or forwarding. The exact paths available depend on network interconnections. The output from the executed job can be returned to the originating node, output at the execution node, or forwarded to another node. Each node can be a single System/370 processor, a tightly coupled multiprocessing system, or a multi-access spool system. In Release 1 and 2 of NJE, the host processors perform some of the communications processing. Under Release 3, ACF/VTAM with the Multicomputer Networking facility can be employed to reduce the host system's involvement with communications processing. The Channel-to-Channel Adapter is supported under NJE as a "short" communications link.

ACF, then, is a generalized facility enabling communications among multiple computer systems; the terminals and applications programs can treat the resources of remote systems as extensions of the local system. NJE is a specific facility for job entry to any of a group of interconnected computer systems.

Program Product	Operating System	Availability
ACF/NCP/VS	DOS/VS; OS/VS	12/77
SSP	DOS/VS; OS/VS	12/77
ACF/TCAM	OS/VS1	6/78
	OS/VS2 SVS	4/78
	OS/VS2 MVS	2/78
ACF/VTAM	DOS/VS	12/77
	OS/VS1	4/78
	OS/VS2 SVS	6/78
	OS/VS2 MVS	2/78
NOSP	DOS/VS	12/77
	OS/VS1	4/78
	OS/VS2 SVS	6/78
	OS/VS2 MVS	2/78
NJE/JES2—		
Release 1	OS/VS2 MVS	Now
Release 2	OS/VS2	3/77
Release 3	OS/VS2 MVS	3/78 ■