Chapter 5

Design of System Network Architecture

Various activities are required to implement System Network Architecture concept for current Thai Airways International's Computer system. The following steps that should done sequentially during the implementation time are

1 Project plan
2 System requirement
3 System design
4 System generation
5 Application program development
6 Package test
7 System test
8 Field test
9 Production system
10 Post cutover

Task description[25]

From a project management standpoint, it has been found to be advantageous for a large project organization to devide project personnel into four major area or departments corresponding to four major group of task. The four groups may be divided as follows.

1 Administration group
2 Development group
3 Support group
4 Test group

These groups correspond to the four major types of tasks shown in the left margin of Figure 5-1. The administrative group is involved with activity step 1. The development groups is involved with activity step 2,3,5,and 6. The support group is involved with activity step 3,4,7,8,9,10,and 11. The test group is involved with activity step 3,7,8,9,10 and 11.

The support group is organized to support both development group an the test group. To do this, the support group requires certain inputs from the other groups. For instance, as shown in figure 5-1, the support group requires information from the development group and from the test group in order to accomplished unit, package,system and field testing. If the project is relative small, it may be

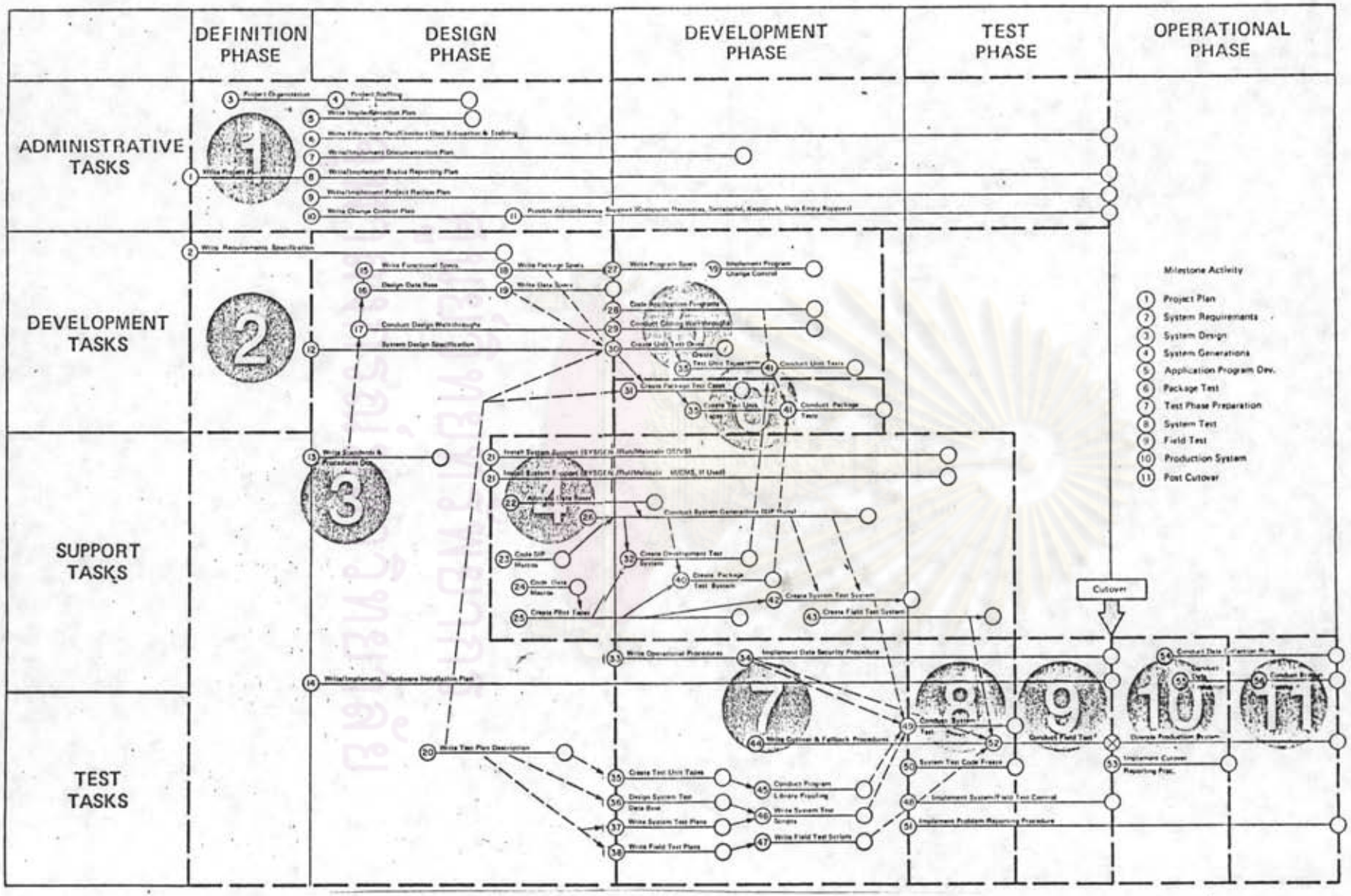


Figure 5-1 Task Sequence Chart

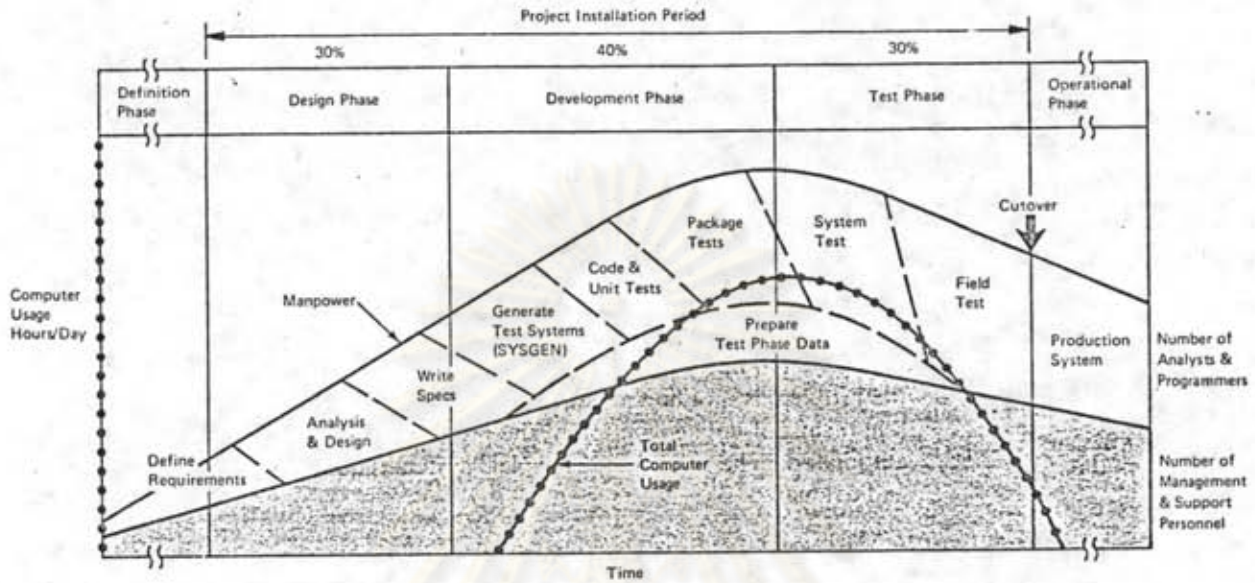


Figure 5-2 Manpower/computer usage profile chart (without seperate test groups)

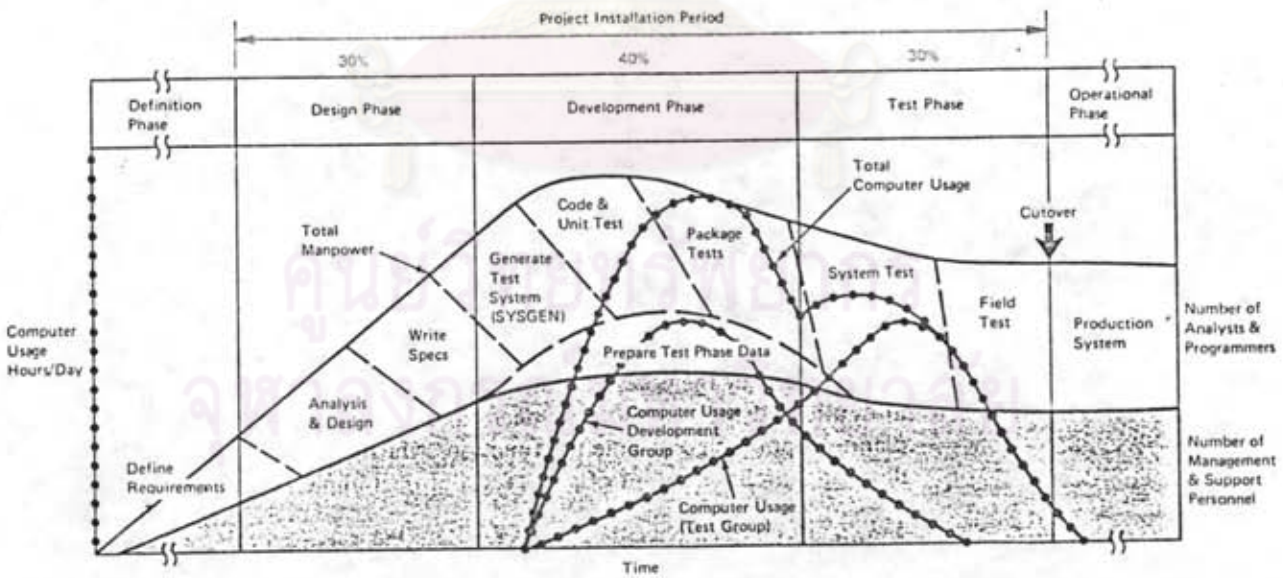


Figure 5-3 Manpower/computer usage profile chart (with seperate test groups)

more practical to have less than 4 departments doing the four different type of tasks. A separate test group acts as a check and balance on the development group. The decision to use a separate test group also results in different times in the project life for peak computer time usage and for peak man power levels. Figure 5-2 shows peak time for project with a saparate test group and figure 5-3 shows peak time for a project without a separate test group.

Project plan and system requirements can take place concurrently. The system requirements contain a definition of the technical problem and needs of a facility which desires and automated system. This step should be done by Thai Airways International personnel and, of course, not be a purpose of this thesis. However, some typical system requirements that should be documented and evaluated are:

1 Types of messages which are to be entered at the terminal.
2 Application functions which the system must perform.
3 Response time requirements of the system.
4 Service level defination.

Design Phase

This step can devide in 2 step: System design, which is the purpose of this thesis and System Generation (SYSGEN), which should be done by system programmers using appropriate documents.

System design activity includes both the hardware and the software conceptual design of the system. After the design specification and functional specifications are completed, the detail of the system can be started. Hardware and software for computer system grow very fast, with hardware advances, cost performance has shown rapid improvement. On the other hand, the increasing in software development requirements has led to an increased percentage of software costs in relation to total cost. The trends of the ratio of hardware costs in computer department is shown in Figure 5-4. The forecast that the ratio of hardware costs to software costs, which was 3:7 in 1970 ,will be 1:9 in 1985. Thus the ease of development will become increasingly important factor not only for reducing the total cost of system development, but for developing a high reliable system as well.

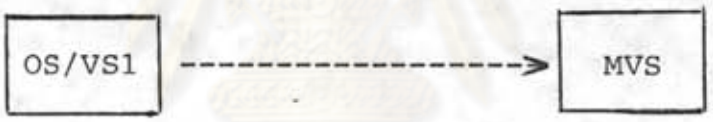
Operating system migration

This step is developed to enchance the operating systems in order to make them suitable for the complex tasks. Current operating system is OS/VS1 (Operating System/Virtual Storage 1) will be migrate to OS/VS2 or MVS (Multiple Virtual Storage). This new operating system will gives the capability of addressing up to 16 Megabytes for each users.

Although this step is not directly concerned about the design of SNA system, however, the migration will improve Overall system perfromance when the applications are more complex in the near future.

Since MVS supports TSO[22] (Time Sharing Option) through VTAM (Virtual Telecommunication Access Method), all terminals which were connected to VTAM would be able to use TSO to edit files or submit jobs to run in MVS, and also can use other application for example CICS/VS or IMS by appropriate logon.

OS/VS1 migrates to MVS will be done in phase 5.



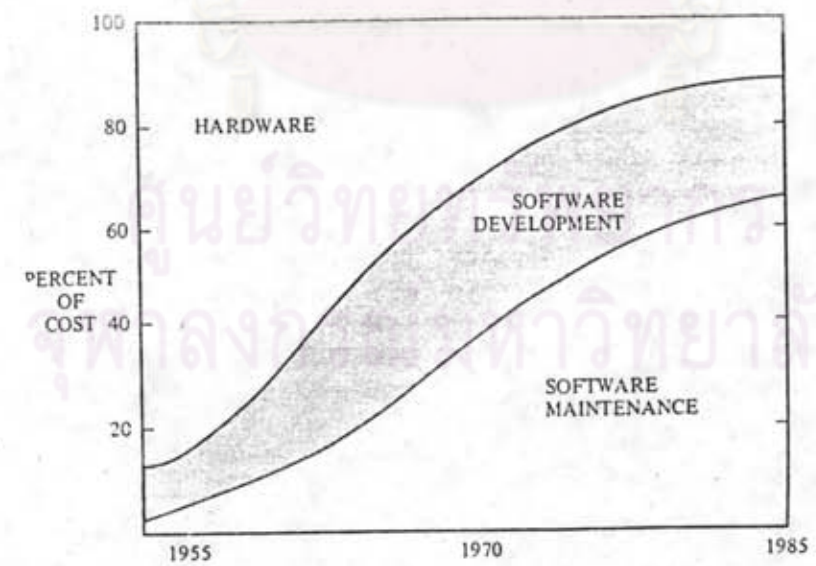


Figure 5-4 Trends of Hardware and Software costs

Phase 1, consists of upgrading 3705 communication controller storage from 32 K to 256 K, converting 3705 Emulation Program (EP) to NCP.[18] Install IBM 3274 model 31C Remote terminal control unit including IBM 3278 display terminal, and customize the control unit to operate under BSC.[23] Generate logical unit for BSC 3270 to use with new BSC terminals. Converting BTAM in OS/VS1 which run under VM/370 to VTAM*, generating VTAM for 3270 non-SNA local attachment terminals. The beneficial results expected in Phase 1 were host offload, alleviation of sub-channel and line address limitations, release host load from line control and error recovery to 3705 NCP job. Testing of BSC 3270 under VTAM has to perform because it is necessary to handle PTS terminals, since they can operate only BSC protocol, and a lot of old PTS terminals can be used under VTAM, i.e under SNA environment. This phase will be done on CICS/VS test system under VM/370 for ease of debugging and testing.

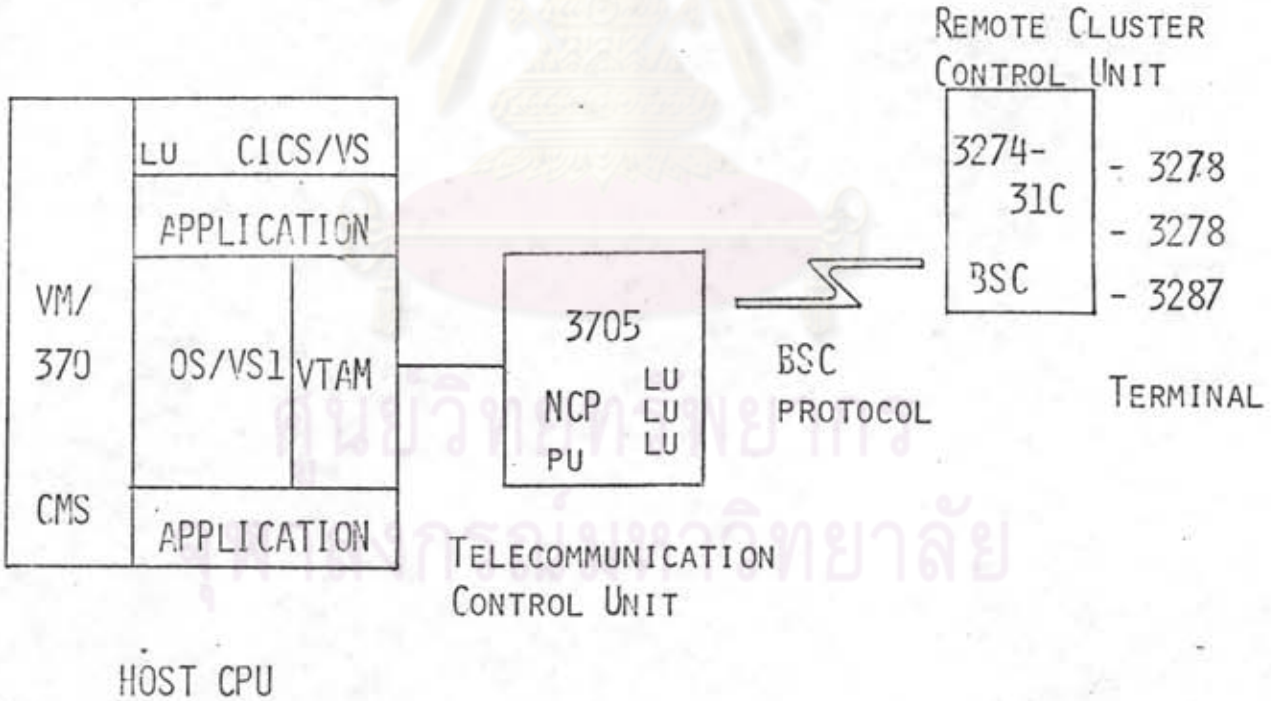


Figure 5-5 Phase 1 system configuration

* See Appendix D

Phase 2, this phase start testing SDLC terminal by using the cluster which was installed in phase 1. The 3274 remote cluster controller has to re-customize for SDLC operation. At this phase , all of the hardware used is the same as phase 1, except the configuration of 3274 was changed. This is the advantage of using 3274 because it can be customize to work with BSC or SDLC by just changing the microcode on the diskette. The 3274-31c are connected to host via SDLC links. Utilizing true SNA concept for terminal attachment. Modifying of VTAM and NCP for new set of SNA terminals are required. This phase are still in OSVS1 which run under VM/370 for testing purpose. Expected benefits are separation of communication from application and addition host load relieves. [24]

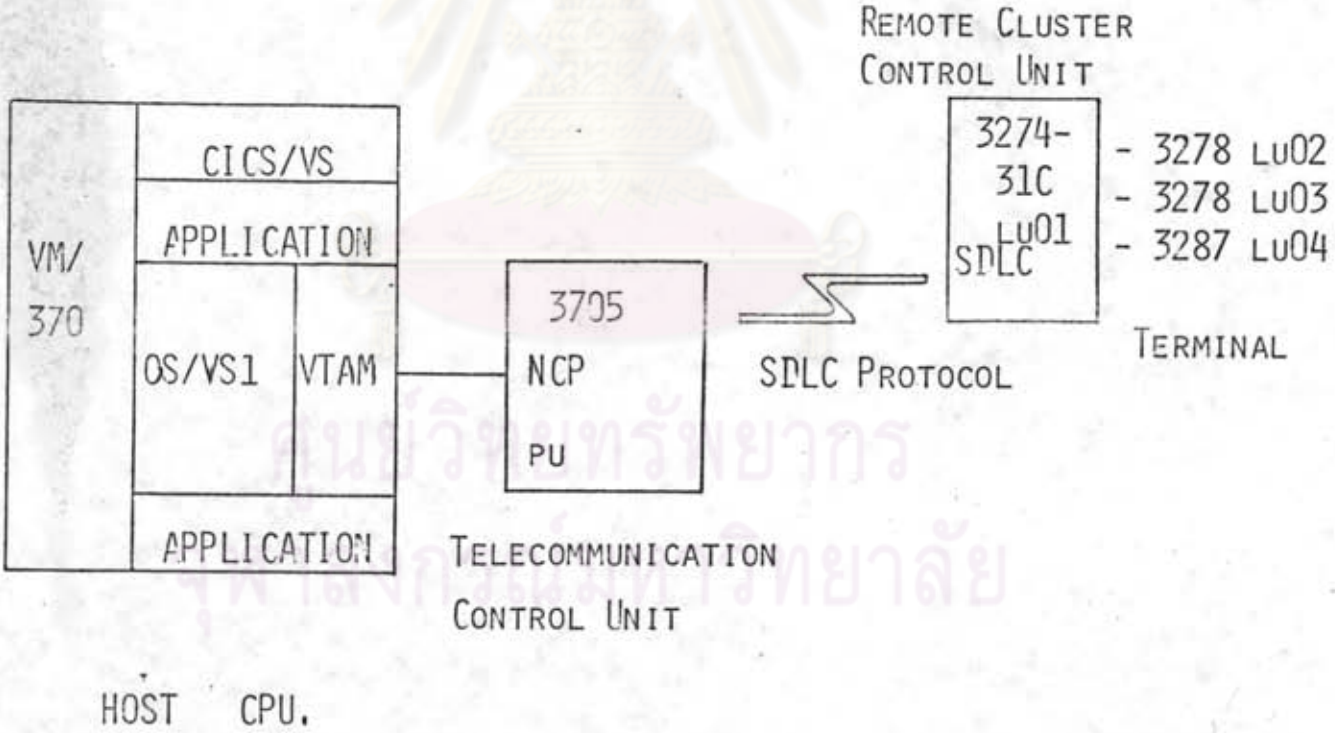


Figure 5-6 Phase 2 system configuration

Phase 3,originally same as Phase 2, but imply on real production system which run on native OSVS1. The whole set of software and hardware had been tested in the VM/370 test system. The only hardware change is to upgrade 2nd 3705 from EP to NCP, 3705 storage have to be increase from 32K to 256 K. At this phase, the performance of the system and response time will be increasing satisfactory. New SNA terminals and new application can be added to this system with minor modification to the existing system. Changing of terminal type will not cause any change in CICS, the only change will be done in VTAM and NCP table for matching the new configuration.

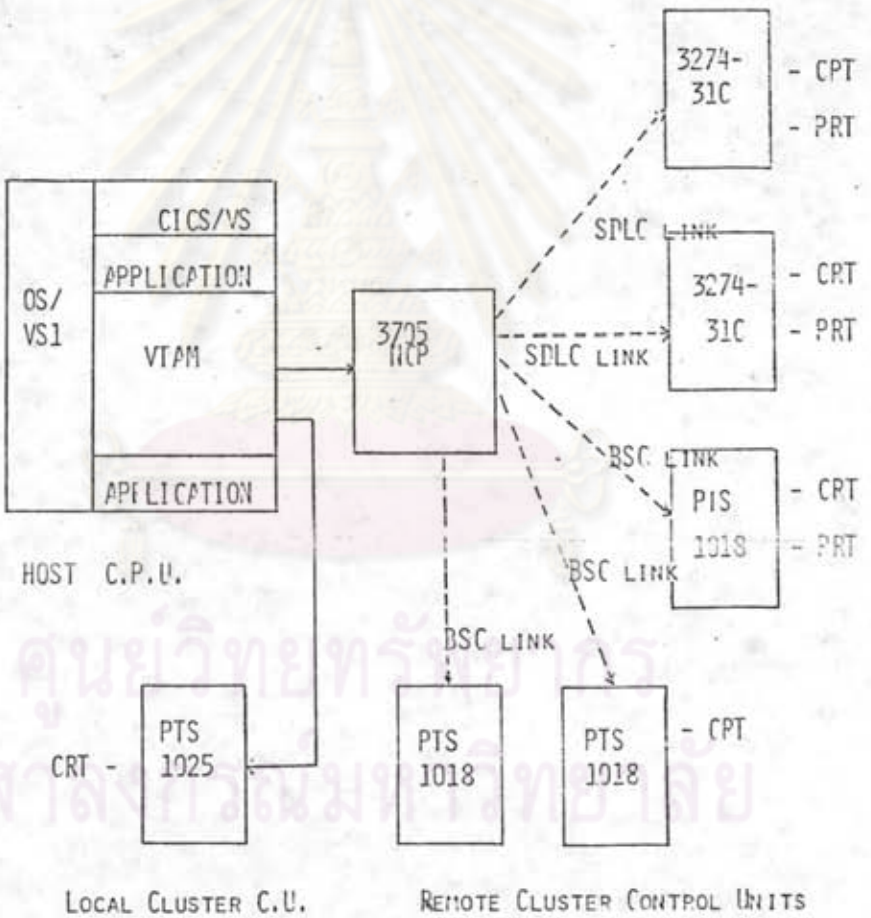


Figure 5-7 Phase 3 system configuration

Phase 4 , is the installation of 4 processor switches in each 3705 and install 2 modems to communicate from one 3705 to another 3705 using SDLC link, line speed of 9600 BPS can be used for this link. Install Cross Domain Resource Manager in each host, this modification are mainly done in VTAM and minor change in NCP and adding more logical unit and physical unit to CICS. This phase may be called multitails NCP which allow up to 4 CPUs (hosts) to access one 3705 at the same time. The benefit of this step is to share or expand number of terminals to be connected to any host for application accessability or in the case of any failure in the corresponding host. Both VTAM in production system and test system must be modified. VM/370 should be migrate to VM/SP before phase 4 start.

In order to make the cross domain session in operation, the VTAM will be upgraded to ACF/VTAM with MSNF (Multi System Networking Facility). NCP has to be upgraded to ACF/NCP. CICS/VS Intercommunication facilities should be installed

- ISC (Inter System Communication) provide :
  - Function shipping
  - Distributed Transaction processing
- IRC (Inter Region Communication) provide :
  - Function shipping
  - Transaction routing

After phase 4 is complete, we can summarize all of the advantages that can be gain from the network:

1. Increased end user accessability both application and information
2. Extended resource sharing with a potential decrease of communication cost.
3. Elimination of system redundancies, both application program program and hardware.
4. Increase access to host processing.
5. Transparency of location of an application program to end user
6. Improve back up capabilities of critical application and devices.

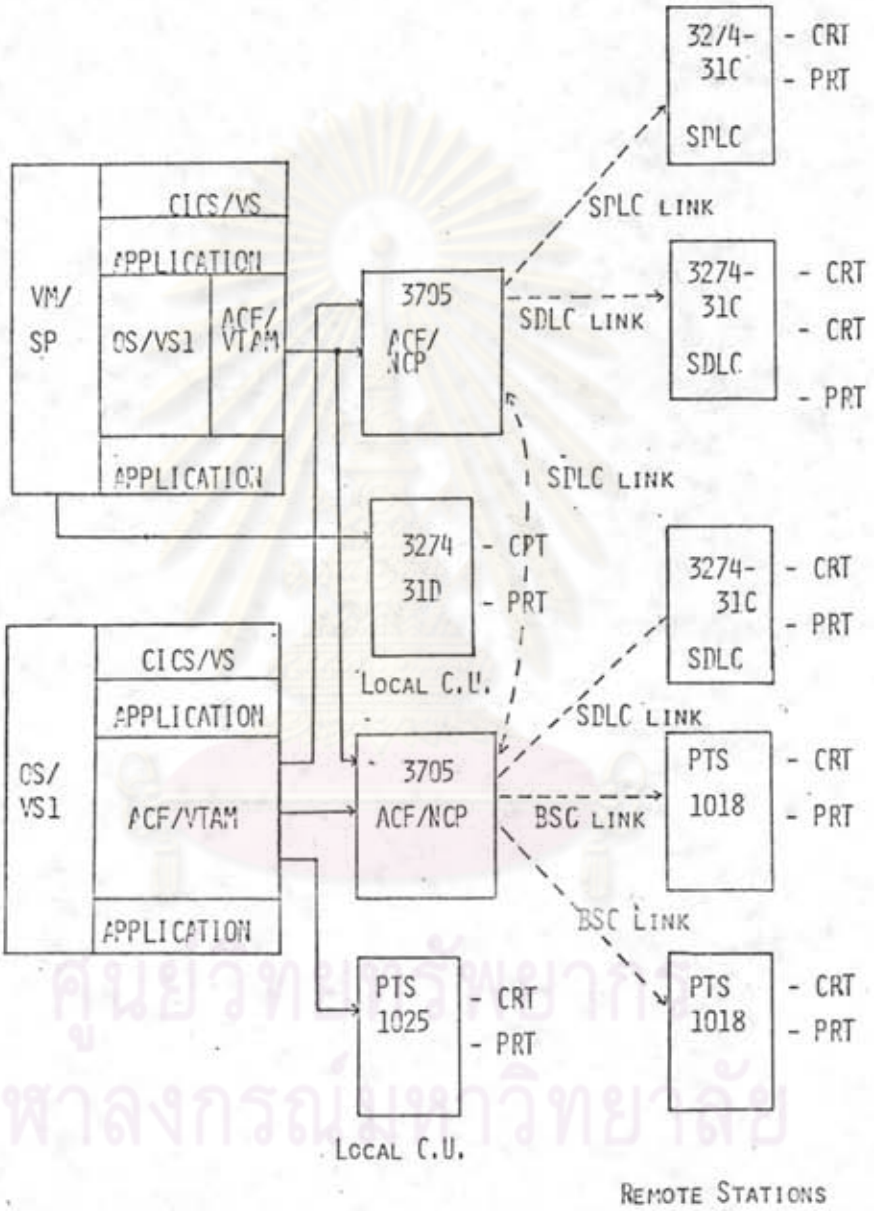


Figure 5-8 Phase 4 system configuration

Phase 5, This phase , there are no major change in the hardware component except increasing number of terminals and application programs in OS/VS1 under VM/SP, or native OS/VS1. VM/VCNA* is installed in the test system. The purpose of installing VCNA is to enhanced VM/SP. All of the terminals that were connected through VTAM can access VM/SP and can use CP/CMS. The beneficial of this phase is to make VM/SP participate in SNA network and end users can access more application. This phase is a good phase to start the migration of OS/VS1 to MVS and has TSO*(Time Sharing Option) running under MVS.

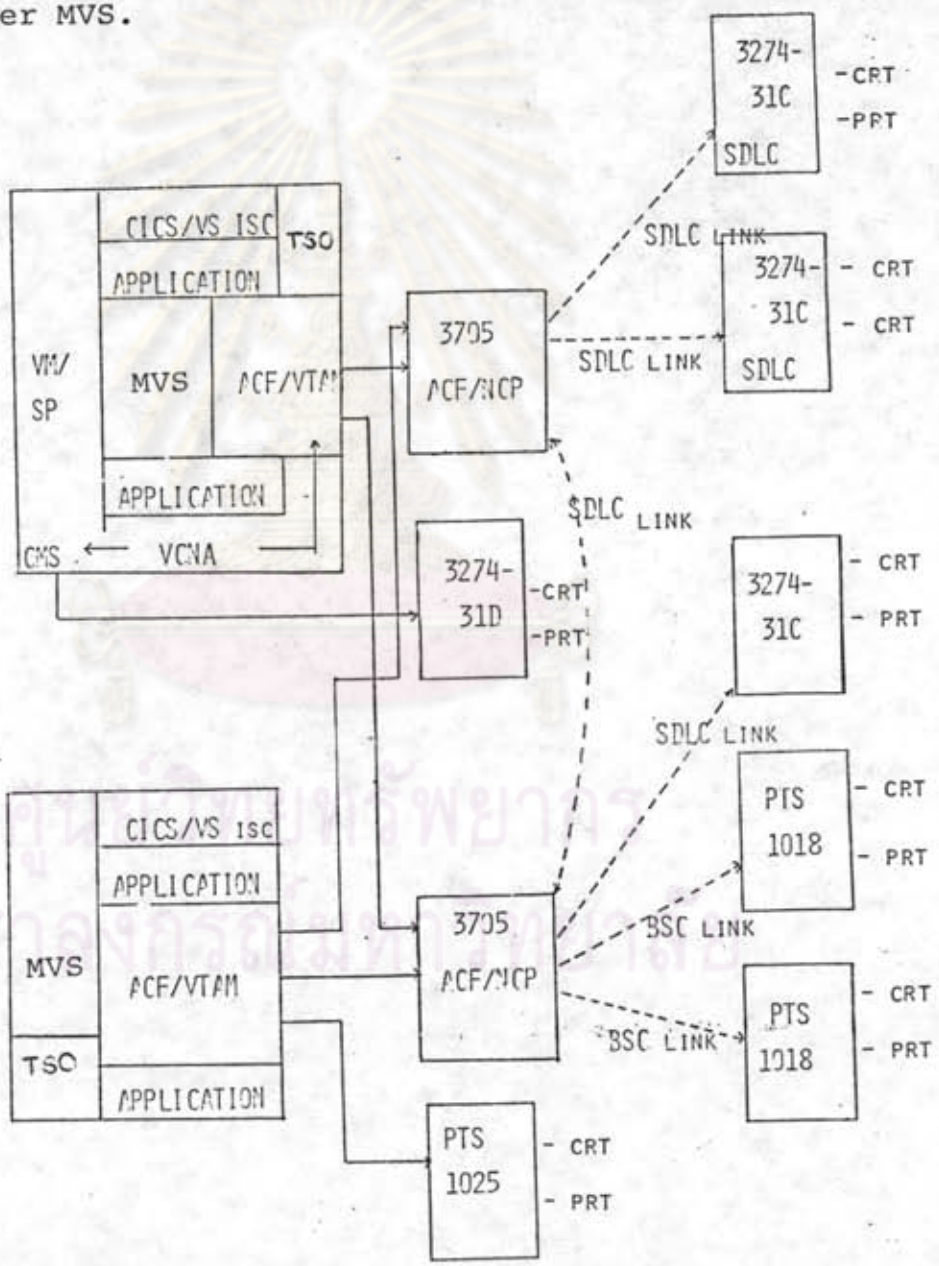


Figure 5-9 Phase 5 system configuration

* See Appendix D