1. Introduction

The South West Universities Regional Computer Centre (SWURCC) was established in 1975 to meet the needs of the 'big batch' users at University College Cardiff, the University of Wales Institute of Science and Technology and the Universities of Exeter, Bath and Bristol. All user work reaches SWURCC's twin ICL 2980 system via X.25 links. Apart from the mixed scientific batch workload a user terminal service based on X.29 offers editing and job submission facilities. Our basic philosophy includes the provision of a consistent and reliable user interface, comprehensive documentation, high quality software, adoption of standards and a strong inclination towards manufacturer supplied and supported solutions rather than the 'do it yourself' approach.

2. What is Network Management

In our context Network Management means the management of all the hardware, software, procedures and people involved in providing a service across a network. It includes:— network operation and control, network monitoring, fault management resource control, testing, user support, job management, user image, and the planning and execution of major changes in network topology.

2.1 Network Operations and Control

Users and operations staff should be able to determine the status of an object or site in the network. This needs to be not only the status of the hardware ie up or down but also the status of relevant services such as job transfer, terminal connection etc. Information must also be available regarding timetables ie test periods, maintenance etc.
A network wide change control system is essential, at least at the level of major host operating system releases. Time must be set aside for testing new versions of software using separate system queues whenever possible to avoid disturbing live user work. Unmanned operation of sites can present special problems, eg if all the work going to a site is failing or disappearing.

2.2 Network Monitoring

Tools must be provided to monitor network performance including the availability of systems and links, traffic volumes etc. A network model should be used to study the effects of changing topology, line speeds etc. Job turnround and terminal response time measurement are vital aids to monitoring the user perception of the service, at present only approximate figures can be made available, better solutions are needed.

2.3 Fault Management

Clear procedures must be established for proper fault management. It is vital to agree responsibilities for taking diagnostics, fault reporting and fault control. To aid diagnosis a hardware line monitor and operator friendly software trace facilities must be available. Fault control and management in an autonomous heterogenous network can be difficult to achieve.

2.4 Resource Control and Security

In our environment SWURCC must cater for about 2000 users spread over six sites. We provide a hierarchic structure with resources being made available to and controlled by the individual sites. The resources allocated include cpu time, filestore and size of file to be transferred over the network. As far as security is concerned normal manufacturer supplied features are used although problems have been encountered where remote PAD's fail to suppress echoing of user passwords.

Where PTT provided networks such as PSS are used in place of leased lines usage must be carefully monitored and controlled if high charges (volume related) are to be avoided.