SuperJANET 5

Gill Chester, SuperJANET 5 Communications Manager, UKERNA, discusses the results of the requirements analysis…

JANET is an advanced computer network that lets the UK educational sector share information and access the internet. It is run by the United Kingdom Education and Research Network Association (UKERNA), a not-for-profit organisation, through a service level agreement with the Joint Information Systems Committee (JISC).

At the centre of this network is SuperJANET, a high-speed backbone linking the Regional Networks that is periodically reviewed and updated. We are currently on SuperJANET 4, which went live on 1st April 2001. In June 2003, UKERNA launched a requirements analysis to identify the key requirements for its successor, SuperJANET 5. This analysis was completed at the beginning of 2004. This article gives an overview of the findings and how the SuperJANET 5 project is being taken forward.

Study findings

There were two distinct sets of requirements in mind in planning the analysis. First, feedback was needed from the user community on their use of the network, future requirements and potential issues. Second, to create a benchmark for SuperJANET 5, the marketplace had to be reviewed in terms of technology and telecommunications infrastructure and services. Other National Research and Education Networks (NRENs) also had to be surveyed.

User consultation

Our consultation activities included the distribution of a focus document, which was based on our experiences of running SuperJANET 4 and early discussions with users. Feedback from the document broadly fell into three areas:

Network reliability

The SuperJANET architecture is reliable and no failures in the core have resulted in a loss of service to sites. However, there is only one entry point to each Regional Network and that results in a single point of failure. Similarly, most JANET connected organisations only have a single connection to a Regional Network. The issue of resilience is therefore an important area to explore.

Additional feedback in this area, such as the dependence of sites on JANET and the steps they take to ensure against failures, also gave a useful insight into the expectations and needs of JANET user organisations.

We also carried out a review of operational service performance data, which showed that the two most significant causes of unreliability on JANET are problems with access circuits, and power problems at connected organisations and at sites hosting Regional Network infrastructure. These areas will be reviewed further in consultation with the Regional Networks.

Bandwidth demand and segregation

Current usage of JANET is doubling every nine to 12 months and this trend is expected to continue, and possibly increase, when developments within e-science mature. Large, sustained data flows are predicted by the e-science community. SuperJANET 5 will need the flexibility to meet these capacity demands and, if necessary, have the ability to add additional bandwidth in a timely and predictable manner to support them, while at the same time protecting other network users.

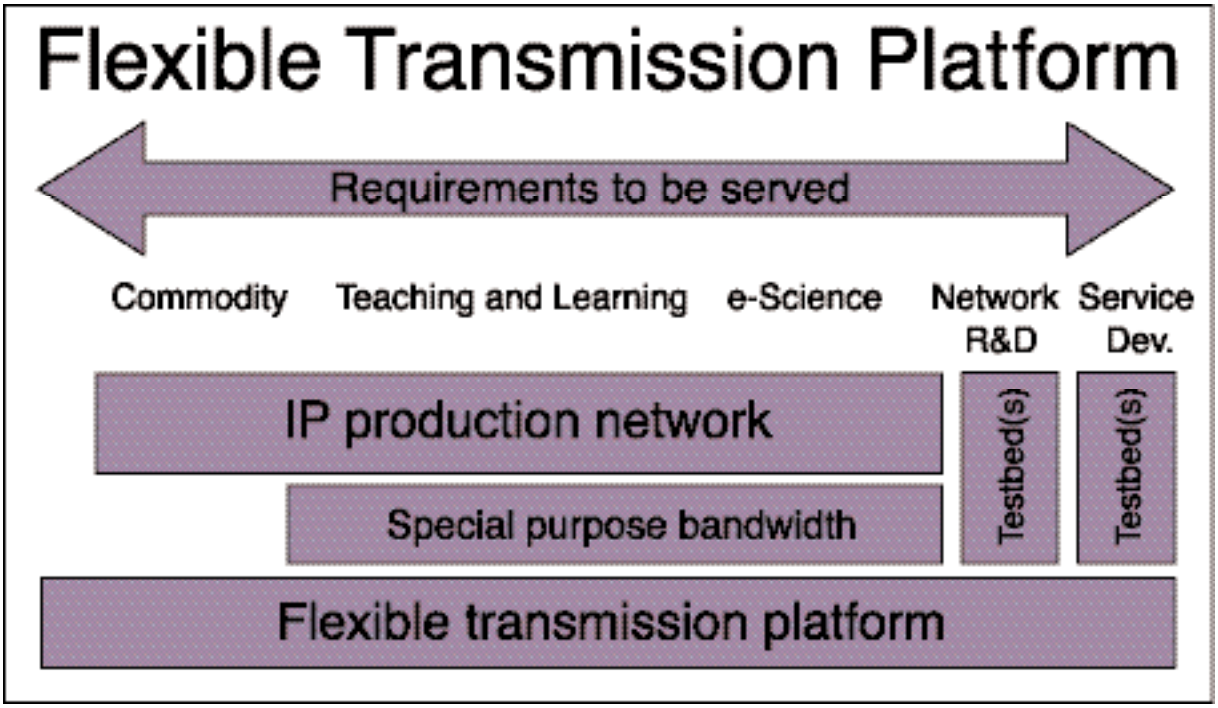
End-to-end delivery of service

To support users and applications from all sectors fully, the network needs to provide effective end-to-end delivery. Common standards will need to be implemented across the backbone to the Regional Networks and to organisations' LANs. Agreements will also need to be reached with peer education and research networks abroad if international delivery of end-to-end performance is to be achieved. These standards and agreements will need to be supported with end-to-end network performance measurement and support mechanisms. This will clearly require adequate funding, both nationally and regionally.

Technical work

Architecture

Within the existing model of a single IP production network, it may be difficult to balance the demands of production stability alongside future development requirements. Although the present overall architecture of a backbone connecting Regional Networks will be continued, an architecture must be defined for SuperJANET 5 to meet these demands.



A document describing some high level considerations for the architecture of SuperJANET 5 and the feasibility of delivering separate network services within a single architecture is available on the project website at http://www.ja.net/SJ5/architecture.html. The document draws on the results of the other technical studies carried out during this requirements process.

Transmission infrastructure

Technical advances, resulting in reduced cost and management, have led to a clear move towards the direct use of fibre-optic networks amongst other NRENs and some JANET Regional Networks. A report was commissioned to better understand the market, and the implications of implementing and managing this sort of technology. The results of this study are available on the project website.

Network equipment

Finally, a review of the high end router market was also carried out. A number of key points were identified, which have resulted in the release of a Request For Information (RFI) on IP routing equipment that might be suitable for deployment on the SuperJANET 5 backbone. This informal information gathering exercise will help us to examine the marketplace and determine the feasibility of deploying these systems in operational service.

Main conclusions

To bring these requirements together, the building block for the SuperJANET 5 architecture will be a 'flexible transmission platform', as shown in the diagram. This will accommodate routine and specialist data and applications, as well as network services development.

Achieving this flexible platform will depend on how much control is gained over the network transmission infrastructure. The requirements analysis has shown that the technologies are available, and it is feasible for UKERNA to procure and operate them. To support the delivery of services over the flexible transmission platform on an end-to-end basis across JANET, a key consideration will be how much this extends across the Regional Networks.

There are a number of technical and procurement options available for implementing the proposed architecture for SuperJANET 5. UKERNA, in consultation with the JISC, is now undertaking a detailed analysis of these options, with a view to reaching an agreed procurement strategy by the end of 2004.

Publication of results

The full results of this study have been published in a document entitled 'SuperJANET 5: An Architecture for Diversity'. Brochure copies of this document are available from JANET Customer Service (service@ukerna.ac.uk), or in electronic form from http://www.ja.net/SJ5/requirementsanalysis/intro.html.

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