

**Client** St Ives plc

**Date** 2001 - 2004

**Project** Global Wide Area Network

**Role** Project Manager

**Background** St Ives plc was a multinational printing group that had grown over 35 years by merger and acquisition and was comprised of over thirty production sites in seven countries, collected into six divisions, with each division facing a particular printing market, such as books, city financial, magazines, music and catalogues. Each division had an independent information technology structure with a data centre at its divisional headquarters and a divisional wide area data network. As most of the divisions needed a London sales force, the group head office site in London was a natural hub for interconnection of the divisional wide area data networks.

As the IT Manager for the financial printing division based in London, I could see that there were technical and commercial inefficiencies and security inadequacies with the existing wide area network structure. I could foresee that there would in future be a demand for divisions to work together and that the separate divisional networks would be a barrier to co-operation. I proposed that a single secure global IP private network be constructed and that all Internet connections should be brought up to a common security and performance standard. Ideally there should be a single hardware manufacture and a single global service provider to provide a simple and reliable infrastructure. Mail relays, DNS and access servers should be provided at divisional data centres but should be of unified design and their configuration centrally managed. Costs would be allocated site by site, as before.

**Investigation** The board accepted the proposals in principle and in mid-2001 instructed me to prepare a more detailed report. I held meetings with each of the divisional Managing Directors and IT Directors to gather views on their future requirements. As this was the time of the "dot com boom" there was a heightened awareness of the potential for e-commerce and Internet data communication with the company's clients although very little had been actually implemented. I collected operating cost information and identified the existing UK networks running costs to be £900,000 per annum. I analysed traffic volumes and response times as far as was possible with the limited tools readily available to me. I held discussions with each of the incumbent service providers and a large number of would-be providers and networking consultants.

My conclusion was that a private IP network would deliver the reliable performance and security that the company needed for its internal communications and that single Internet access standard would deliver the security and reliability needed for the company's links with its clients. It became apparent to me that no single service provider met all of the company's requirements. This was mainly due to St Ives' operations in USA being too reliant on regional data networking to be well served as remote nodes on a UK-based network, and vice versa. An acceptable compromise would be that the USA and UK regional networks would each be from domestic providers. The choice of regional service providers then became much easier. The company's EU sites were part of UK-centred divisions, so they would be satisfactorily served by a UK-centred network. The management of the multi-vendor global network would of course be more complex than for a single provider solution. I proposed therefore to purchase unmanaged network services from the regional providers and overlay global network management and support services from a third party.

**Design** In early 2002, Intergraph Technology Services was appointed as network design consultant with a view to it later managing and supporting the network. ITS had previously been involved in the design of the London data centre and LAN so it had a good track record as network engineers.

ITS performed a more detailed traffic analysis and together we produced a high level design. ITS performed an audit that found £400,000 of USA annual costs. ITS was appointed main contractor for the network implementation in late 2002. I was placed on secondment to St Ives Head Office to manage the project from the client side. We planned that the new network would not just replace the divisional networks but would offer increased bandwidth to all sites, with better resilience and reliability, lower costs and with better network, service and contract management.

**Selection of service providers** St Ives' USA sites and six UK sites already used a magazine publishing industry specific file transfer service from a company called WAM!NET. This service was considered a prerequisite so consideration was given to the installation of a central WAM!NET node linked to all sites via the proposed private network. USA service provider Savvis purchased WAM!NET in 2003 and offered St Ives a competitive solution for the USA and the six UK sites having WAM!NET nodes at each site and an integrated backbone that gave transatlantic connectivity. Although Savvis' network

was technically less than ideal for St Ives' purposes, they were able to provide bandwidth management that made a combined private/WAM!NET solution more economic than other options. Savvis was uneconomic for those UK sites that did not need the WAM!NET service. Savvis was selected as the service provider for the USA and six UK sites with bandwidth of 4Mbps to the UK sites and 5.8Mbps to the USA sites.

BT Wholesale was selected as the most economic network provider for the remaining UK sites. The key factor for this choice was that the BT IP Clear tariff was priced independent of the distance from the customer to the nearest point of presence, St Ives having a number of semi-rural production locations. Bandwidth was 512Kbps to 2Mbps depending upon the needs of the site.

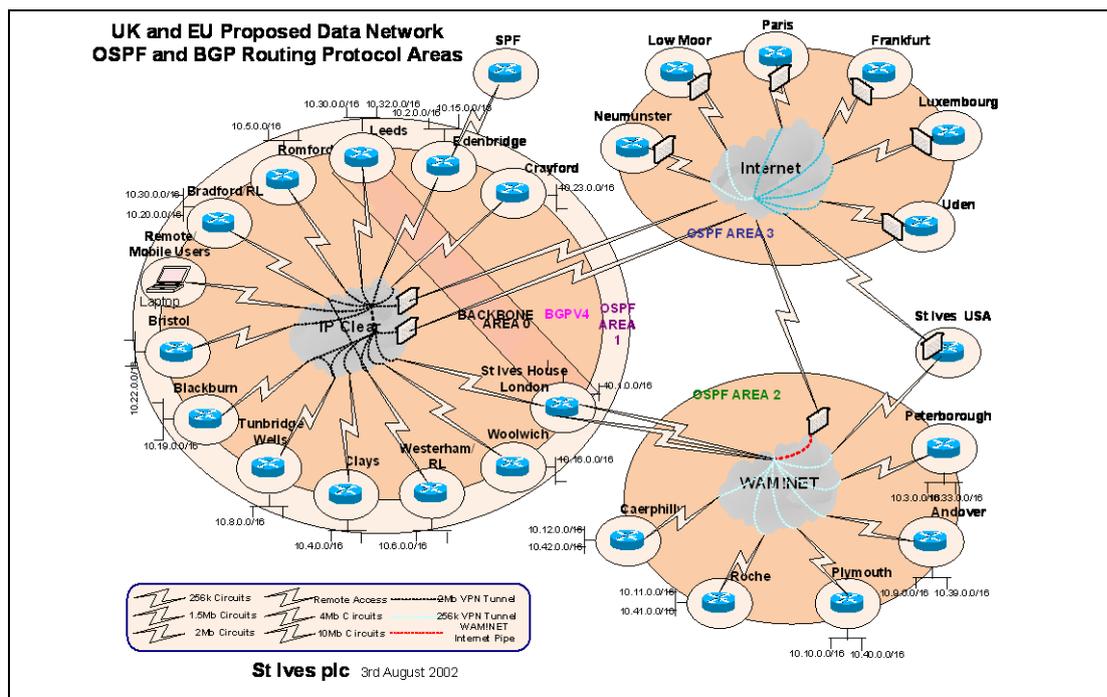
BT promised that IP Clear would soon be available to St Ives' EU sites, so secure Internet VPN tunnels were installed between the EU sites and their UK divisional data centres as a temporary measure.

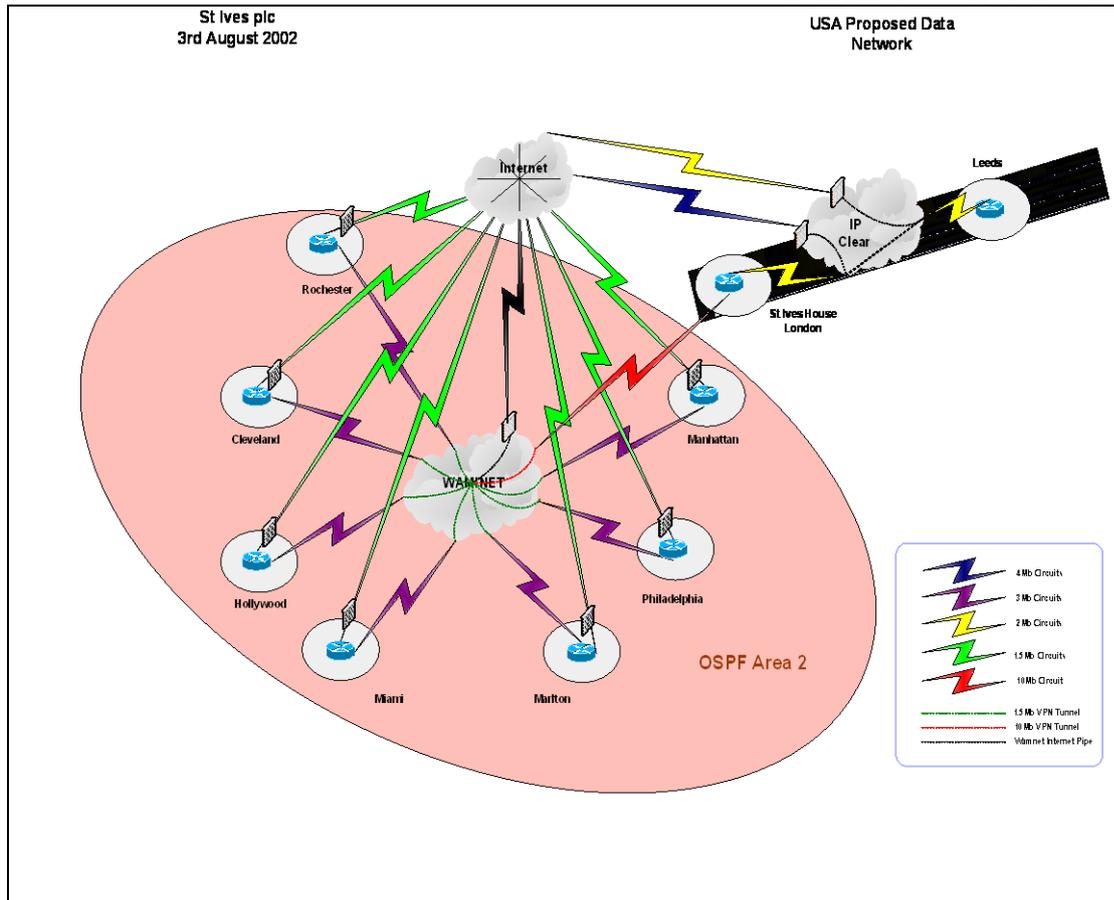
Videoconferencing was implemented between London and four USA sites, using a dedicated Savvis PVC at 640Kbps per channel under a fixed price tariff.

Internet service providers were reviewed with the aim of finding a single global provider, or failing that a single UK and a single USA provider. Neither option proved feasible because of the patchy national coverage of Internet service providers. Additionally, there didn't seem to be too much of a problem in using two or three ISPs as they could be rolled into the third party network management regime quite easily. The use of multiple service providers allowed St Ives to create some price competition between them. Service providers were Broadwing in the USA and BT, Star, Savvis, Easynet, GX, Via, LuxTel and Clara in the UK and EU. Bandwidths to sites were 512Kbps to 4Mbps.

Secure Internet VPN tunnels were configured at each site to act as back-up routes to the divisional data centres. When needed, these were activated under central command. Internet access could also be delivered to sites from their divisional data centre in case of a local Internet service fault.

**Selection of hardware** Cisco routers and WatchGuard firewalls were already widely and satisfactorily used within St Ives. As a result, it was more economic to upgrade existing routers and firewalls than replace with another brand. Mail relays, DNS and other servers were Sun Microsystems Netra, selected for their reliability and the security of their Solaris operating system. These were located in divisional data centres in the UK and USA, providing a resilient solution.





**Implementation** A budget of £375,000 was set for implementation which commenced in 2003. Network management was set up first, using a round-the-clock network operations centre based at Trend Communications in Hemel Hempstead and via a leased line to St Ives' London office. The London office was the interconnection point for the UK and USA networks and so BGP and OSPF router discovery were homed at that site. Roll-out of the network was accomplished division by division using duplicate equipment so that disruption of divisional communications was minimised. Both private network and Internet services were rolled out together so that engineer site visit costs were minimised. The BT IP Clear implementation phase was performed between March and June 2003 and the Savvis implementation was performed between January and March 2004.

**Financial Impact** The total project one-time costs were £331,000. The total installation and running costs over the first three years were £2,900,000 saving £1,000,000 during that period compared to the previous networks' costs.

**Technical impact** The initial applications of the network were simple migrations from the previous divisional networks, so the network was initially underutilised. When the company decided to reorganise its divisions and relocate teams between sites, the network made the transitions much easier. New applications that depended upon the network, such as group-wide digital asset management and disaster recovery planning were developed both by head office and the divisions. The company then started to move customer facing applications into co-location data centres; again the network facilitated the change by delivering universal secure access to all sites and its customers. The evolution of the company's unified customer interface, *DNA*, has benefitted from the trustworthy underlying infrastructure of the global wide area network.

**Post-implementation** The network provided a reliable platform for Active Directory, e-commerce and supply chain management projects. A number of sites received bandwidth upgrades as traffic levels increased, so that the regional data centres now have 10Mbps and even small offices have 2Mbps. The global network performed well and continued to serve the company's needs until the USA and EU operations were sold in 2008.