

The ESA Information Highway

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Introduction

The evolution of ESA's corporate wide-area communications network, known as ESACOM, is driven today by two seemingly competing factors: the need to keep the IT/communications costs within reasonable bounds, and the ever-increasing user demand for network bandwidth and performance, as new network computing paradigms emerge to support the Agency's business processes. The challenge faced by ESA's Information Systems Department is therefore to respond to both of these

requirements by providing a new network infrastructure that ensures minimal cost per unit of traffic exchanged, whilst still delivering the quality and performance levels required by the customers, and by integrating the different communications services to derive maximum benefit from their inherent synergies.

The fact that by nature ESA is a distributed organization with a presence in many of its 15 Member States, but with a working environment in which its business activities are not constrained by the

conducted in 1999 to establish the basis for the future strategy for ESACOM. This study was performed by a consortium led by Vitrociset, with the participation of Cineca and Ernst & Young.

The main outcomes of that study were:

- the selection, as the preferred approach for the future of the ESACOM, of the IP (Internet Protocol) VPN (Virtual Private Network) model
- the definition of the strategic objective of integrating all of the different services, data, voice and video, on a single, IP-based wide-area network
- the proof that such an objective was technically viable, by demonstrating the envisaged technologies in a prototype environment
- the business forecast that the services' integration would also bring an economic benefit, as supported by the answers to a questionnaire that was sent to all of the major international service providers at the time.

In February 2000, an open Invitation to Tender (ITT) was issued based on a Statement of Work containing ESA's identified requirements and preferred strategic options along the lines described above. This Statement of Work foresaw a first phase with the implementation of the data services (the ESACOM Intranet, Extranet and Internet services, plus a Remote Access Service), followed by a second phase involving the integration of the voice and video communications services.

The ITT resulted in the submission to ESA of six proposals from the major telecommunications operators in Europe. After a thorough technical and financial evaluation, the contract was awarded to Equant in August 2000. The implementation and migration project (Phase-1) started in September 2000, with the objective of migrating the data connectivity of all 30 existing ESACOM sites by March 2001. The project team included representatives from ESA, Equant, Vitrociset/Terma and Serco.

In September 2001, when the new Equant-provided data service had been

operating successfully for several months, the next phase of the project (Phase-2) was launched, covering the integration of voice and video services. For this phase, the industrial team was expanded to include the switching-exchange (PABX) provider, Alcatel. After careful pilot testing, the voice service went live for the main ESA sites in April 2002, while the video service is presently in the final validation phase prior to releasing the service.

Making a Strategic Choice

One of the project's key objectives was to establish a converged network to respond to the ever-increasing demand for communications capabilities and services arising from both corporate and project-specific requirements, whilst at the same time complying with the strict budgetary guidelines. The integration of all corporate telecommunications services within a single infrastructure and the consolidation of project-specific services in the same corporate service was identified as the way

to achieve that, but its economic viability had to be demonstrated.

A business-case analysis was therefore conducted in two steps:

- Firstly, at the time of the ESACOM Information Highway study, the market offerings and pricings for advanced integrated services were investigated, and estimates of future cost trends for the various integration options were developed, showing the economic and technological viability of the integration approach.
- Then, through the competitive ITT and the subsequent awarding of the contract, the convergence strategy could also be defined in financial terms.

The cost objectives were identified in terms of:

- Minimisation of the unit cost for the wide-area-network capacity for data services, i.e. the guaranteed bandwidth of the connectivity, by: aligning ESACOM costs as much as possible with prevailing

Lessons Learnt

The ESACOM Information Highway implementation project was a complex undertaking involving many players and constraints. After its successful conclusion, it is possible to draw some important lessons:

- The selection of a strategic direction and the careful preparation of the ITT are essential to determine all the subsequent planning and execution phases. The IP VPN model and the services integration based on all-IP technology proved a winning choice, nowadays being implemented in the majority of new network projects. Such a strategy was not so recognised at the time it was embarked upon, and not all bidders were capable of offering it.
- The investment in the study phase and the build-up of in-house knowledge on the new technology through the study and prototyping certainly paid off and allowed the ESA staff and contractors to establish a peer-to-peer relationship with the very specialised personnel of the network provider.
- ESA's role is becoming more and more that of a service aggregator, as determined by the outsourcing policy. In this project, the most critical task was that of coordinating and focusing the various contractual parties towards the main ESA objectives of a smooth implementation of the new services within the schedule constraints. This can only be achieved when the various participants have clear responsibilities and roles, and can count on the full cooperation of their peers.
- An essential element for success was the cooperative spirit that could be established at the human level, which brought the engineers from different companies and locations together into a single team. Their motivation and commitment were fired mainly by the challenging and professionally rewarding task of implementing a new technology in a complex and demanding environment like ESA.

market trends, but still within a stable contractual framework according to ESA rules; and exploiting the benefits of consolidation of multiple services, thereby taking advantage of economies of scale, sharing of resources, and greater negotiating power with the service providers.

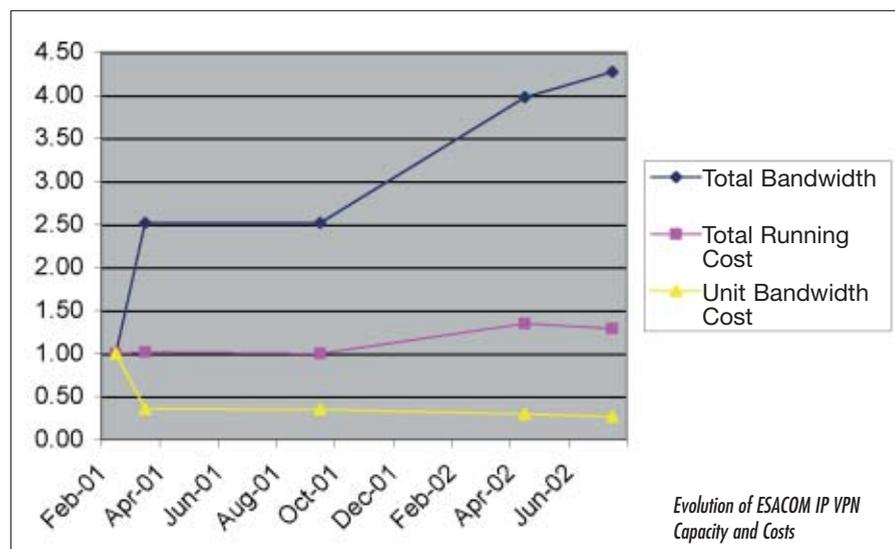
- Minimisation of the unit and overall costs for voice telephony and video-conferencing on-demand services, in order to provide an economically more attractive service than was available from the existing provider.

Reaping the Benefits

As the accompanying graph confirms, the objectives that were set for the new ESACOM Information Highway are clearly being achieved. At the outset in March 2001 when only the data service was implemented, the total running costs of the new IP VPN service were almost at the same level as for the previous service contract, but the capacity was 2.5 times higher, resulting in a dramatic 60% drop in the cost per unit of bandwidth. Also, the new network was sized from the start to accommodate future traffic requirements.

The next important milestone was achieved in April 2002, with the operational introduction of the Voice over IP service. The addition of this service, together with the capacity increase to accommodate Video over IP and other services, raised the overall capacity to four times the pre-2001 level, bringing a further reduction in unit cost.

In addition, the new contract foresees a price-revision clause that requires the service provider to propose a price reduction on an annual basis in line with market trends, with the possibility also for ESA to request an independent benchmarking exercise. This ensures that ESA will benefit from any competitive pricing reductions, whilst at the same time maintaining a stable relationship with its existing service provider, which is essential to ensure a reliable operational service and to satisfy the Agency's own specific requirements. In fact, after the initial successful experience, an extension beyond the initial contract duration has



already been negotiated. This has implied a further reduction in costs since July 2002, which has been converted into additional bandwidth.

In addition to these purely financial advantages, the new converged network has brought several less obvious, but equally important benefits, including:

- the possibility of dynamically sharing network resources between different applications, whilst still ensuring priority and guaranteed service for the most critical ones; one example is the exploitation of unused voice/video-class service capacity on the Intranet links at night for database replication traffic
- a single interface to the network provider, which eases management tasks and provides the opportunity to build a stable and mutually beneficial relationship
- the possibility to implement new applications in the areas of multimedia communication, unified messaging and mobile computing, foreseen by ESA for the near future.

Conclusion

The ESACOM information Highway has now been operational for almost two years. The regularly monitored service levels are compliant with the agreed yardsticks, and the cost trends are sustainable. Experience is therefore confirming that the IP VPN solution selected is the correct one for ESA's present and upcoming connectivity requirements, combining the simplicity of

the Internet model with the guaranteed quality and security that our customers require. The mid-term perspective for ESACOM foresees the addition of Internet-based VPN for particular classes of service that can tolerate a lesser, or at least less predictable, service level in exchange for significant cost savings. The longer-term perspective, if confirmed by the market trends and supporting technological evolution, will be the later merging of the IP VPN and Internet backbones into a single class of service-enabled infrastructure.

Acknowledgements

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