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Regulating the Next Generation of Communications Services

A view from the ACTS Programme

ACTS is the Advanced Communications Technologies and Services programme of the European Union, and has produced a significant range of results that identify the future direction of the converging telecommunication, broadcasting and IT sectors. Several results impact the development of future regulatory policies, such as the blurring of the boundaries between core and access networks, and new flexibilities for charging related to quality of service, are identified, and the challenges they present to regulators discussed.

Introduction

The ACTS (Advanced Communications Technologies and Services) programme is the focus of the European Union's research effort in advanced communications and forms part of the European Commission's Fourth Framework Programme of research and technical development. It has made significant contributions to the development of information and communication technologies (ICT) in Europe. A major feature of the ACTS programme has been the testing and validation of advanced technology in trials and experiments, many involving real users. The

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impact on business, on societal and regulatory issues has also been analysed and contributions made to the economic, socio-political and regulatory debates.

Leading-edge users, service providers, network operators, broadcasters, manufacturers and academics have pooled their knowledge and resources in pursuit of specific research and trials objectives defined by the ACTS workplan. ACTS has brought together over 1000 such bodies from all over Europe, sharing a European Commission contribution of around 680 million ECU. A typical project receives 50% funding from the Commission and is carried out by a consortium of partners based in several different countries. The programme is directed by the Directorate DGXIII of the European Commission.

ACTS projects are grouped into six technical domains:

- Interactive Digital Multimedia Services (including interactive digital television),
- Photonic Networks,
- High Speed Networking (including ATM-IP integration),
- Mobility and Personal Communications Networks,
- Service Engineering, Security and Communications Management, and
- Horizontal Actions and Supporting Projects.

Projects also take part in *chains*. Chains are groups of projects from different parts of the programme and they are set up to examine issues of strategic interest. Relevant projects

bring together their experiences and formulate a set of messages concerning the issue. These messages are then published as ACTS Guidelines. The 20 or so chains are organised in five chain groups covering:

- broadband access evolution (BA),
- generic access to applications (GA),
- network level interoperability (NI),
- multimedia service integration (SI), and
- cable TV (CATV).

The chains have defined 80 guidelines on issues as diverse as sustainable development and interoperability of management systems. About 60 of these are now publicly available.

All the ACTS projects meet together regularly in a process known as *concertation* to review progress and pool ideas. The resulting consensus is valuable for Europe as a whole. Interoperability is an important aspect of ACTS and many projects are actively involved in developing or validating standards and open interface specifications.

The ACTSLINE project promotes the results of the ACTS programme to decision makers in business sectors, to public policy makers in politics, regulation and to administrations who have a role to play in the early launch or uptake of advanced communications services. Regulators will play one of the most influential roles in the evolution of electronic communications because they have to balance the consumers' interest in affordable services with

the suppliers' interest in a reasonable return on their investments.

Main Achievements of the ACTS Programme

The ACTS Programme has made significant progress in the development of both hardware- and software-oriented technologies. In some fields, Europe is leading or is taking a driving seat in the developments and in the setting of standards. A general rationale has been the development of open architectures and open interfaces, which are paramount for successful competition.

680 Million ECU buy a lot of research—the list of results is quite impressive. Highlights include:

- standards for digital broadcasting have been validated so effectively that commercial services are now up and running in several countries;
- millimetre-wave broadband radio systems are now a serious alternative to fibre or cable for broadband access;
- a range of new optical components has been produced, from wavelength multiplexing devices to high-speed transmitters and receivers;
- commercially viable strategies for delivering broadband access have been defined;
- a large number of interactive multimedia applications have been tested, often with real business or residential users;
- an architecture has been delivered for secure electronic commerce;
- ways have been identified for interworking between ATM and IP;
- management systems can now work across organisational and technical boundaries;
- an open services architecture has been defined; and
- standards for third-generation mobile services are now almost complete.

The Communications Environment

The communications environment has changed significantly over the past decade. A notable milestone was the advent of full competition at network and service level in most European countries at the beginning of 1998. This has resulted in the appearance of many new network operators and service providers. In addition, the market has reacted positively on both the supply and demand side. New products (services) and new pricing approaches are emerging and the expectations and demands of consumers are changing.

Many countries regard the Information Society as a critical issue and are developing detailed policies for supporting its evolution. These policies include regulatory, governmental and administrative frameworks, financial prerequisites, education, social and societal issues, micro- and macro-economic aspects, methods of work and employment, and the support and focus of directed research and development (R&D). Communications are often seen as the driving force in the evolving Information Society.

Background to Developing Regulation

Long-established paradigms are being superseded by new ones. For example, the previously distinct businesses of telecommunications, broadcasting and IT are converging with the advent of interactive multimedia services. Different types of distribution networks (for example, fixed and wireless switched networks, broadcast networks) offer various degrees of interactivity, so that the same, or similar, services can be delivered by a variety of platforms and infrastructure types. The capabilities of both the final delivery link to the customer and the core networks themselves, and innovation in the service provider area, are proceeding at different rates. This could lead to the development of new delivery bottlenecks. Globalisation of network infrastructures and the services provided over these networks is increasing. In these circumstances, regulation and standards development needs to be more uniform in effect and the technological neutrality of regulation generally maintained, in order to guard against artificial bottlenecks, or other forms of control, developing and being exploited.

The Internet is introducing different paradigms from those of the traditional telecommunications and broadcasting worlds, in terms of charges, quality and the ability to search extensively for material and information.

The fast-growing mobile communications sector is having an impact on contactability, and creating demand from users for convergence in the facilities and services provided by fixed and mobile connections. These developments are helping to drive forward innovative service offerings and lower prices to users.

Market developments are causing the value chains of the different communication sector vertical markets to converge. The combined chain covers content origination, content and service packaging, services provision (including navigation/brokering), infrastructure (distribution network) provision, and terminal vending. Major players with market power have the ability (on their own or via partnerships) to acquire bottleneck control of the interface between any two elements of the value chain. Critical areas are access to the distribution networks and access to the customer via the capabilities embedded in set-top boxes. Regulators are increasingly taking action to promote market entry and to limit the ability of existing players to abuse a dominant position.

The increasing scope of services on offer and the increasing numbers of suppliers in the marketplace mean that there is a continuing need to protect consumers from fraud, deception and the infringement of their personal privacy. The social needs of particular communities, the disabled and other disadvantaged individuals will also need protection in the public interest. Regulators have a role to play in ensuring that consumer protection and social needs issues continue to be dealt with in the changing and converging environment.

Regulatory Considerations

Regulators are likely to face a wide range of new issues in the evolving competitive, converging, multi-network, multi-provider, multi-supplier telecommunications, broadcasting and IT domains. These issues can be grouped under a number of headings. Those issues that have an impact on market development are related to:

- open infrastructures—enabling interconnection and interoperability across competing networks of both similar and dissimilar types;

- charging and pricing—relating to new flexibilities for charging on offer in a multimedia services environment and potential conflicts with developing regulation;
- open access to services and content—enabling users to access and communicate with service providers of their choice as the range and type of services expands; and
- numbering evolution—the long-term approach to numbering in an environment where different approaches are in use in different domains. Although this is an important area, ACTS has very little to say about this!

There are also issues more related to consumer protection and the needs of society.

Implications of ACTS

Open infrastructures

ACTS projects and trials seem to be identifying a major trend in the evolution of the access network (or local loop)—that new technology will increase its reach from a few kilometres to over a hundred kilometres. In doing so, the access network naturally splits into two fairly distinct segments; a feeder (or shared) segment that links network nodes to a flexibility point near the customer (which can be over 100 km in length) plus a distribution (or dedicated) segment that covers the last few hundred metres. This blurs the boundary between access and core networks and may change the commercial relationships between access and core network providers—indeed in smaller countries it could virtually eliminate the core network.

There is currently no formal definition of access and core networks in regulatory circles, but there is a lot of discussion about *unbundling* the local loop and this may ultimately require a clearly specified interface. ACTS has made a useful contribution by helping to define the VB5 interface—an open interface between access and core networks provided by different operators, or using different technologies. The Iu interface takes this a stage further by including mobile networks and an ACTS guideline has shown how fixed and mobile operators might usefully share the 'feeder' segment of future access networks.

Although VB5 and Iu provide clear technical specifications for the access/core interface, it is not clear that these are enough. As new technology blurs the boundary between access and core networks—and indeed between fixed and mobile infrastructure—will the balance of market power between the various players be affected? Regulators may need to consider whether effective competition will need a new market model and whether defining and policing the commercial interfaces determined by that model will require a new technical interface closer to the customer.

There are also other implications for any policies developed in relation to unbundling the *copper* local loop as new technology and its application in the access network evolves. It seems that, just at the time when a number of regulators are implementing or considering mandating unbundling of the copper loop, all sorts of new multimedia access technologies are blossoming and being implemented by various players (not just wire—or cable—but fixed radio access and cellular mobile). Regulators will need to think sufficiently through how their current policies will dovetail into future scenarios where a whole range of different technologies are deployed and various players' market power change.

Interoperability is not just about physical connectivity—it also involves interworking between management systems—an important aspect to remember in an interconnection context. ACTS is working closely with the TeleManagement Forum and EURESCOM to validate 'X' interfaces—for exchanging management information across network boundaries (regarding for example fault handling, accounting, changes to routing, adding and deleting customers).

Several guidelines have been produced on asynchronous transfer mode (ATM) and Internet protocol (IP) evolution indicating that both sets of standards will eventually provide a similar range of capabilities and allow IP applications to demand appropriate quality of service across ATM bearer networks. This means that the Internet will be able to support services normally carried over conventional telco networks, while ATM will give those telco networks the flexibility required to handle the differing quality

requirements of individual services more effectively; for example, voice over the Internet, and multimedia over ATM. This again blurs the boundaries between regulatory environments—this time between the closely regulated telco world and the largely unregulated Internet.

Charging and pricing

Both ATM and new developments in IP provide for different categories of network service. This means that real-time video, where delay and latency are important, can demand better treatment than e-mail, where they do not matter. The problem is that it costs network operators almost the same to provide the 'gold plated' network service as it does to provide the 'bargain basement' one. However, efficient use of network capacity needs a mix of the different types of service. If everybody chooses the 'gold plated' service, irrespective of whether their applications need it, networks will quickly become overloaded. Additional capacity will have to be installed and paid for, even though it is not really needed. New types of charging schemes, which give customers an incentive to choose the quality of service best suited to their applications, may be needed.

ACTS projects have investigated and tested such charging schemes and the message is that they should not be cost-based, and probably not distance-based either. They define new parameters for an environment where quality is an important feature of the network service. Apart from challenging the principle of cost-based pricing, these schemes raise other questions for regulators. One is that the balance of market power between actors is very sensitive to some of these parameters.

Another is that they offer the possibility of a real-time auction of network capacity. Customers are familiar with peak and off-peak tariffs but ATM charging parameters could be adjusted second by second in response to demand for capacity to control network congestion at least at the wholesale level. It is not clear whether such an approach would be good or bad, as it might drive peak usage prices up significantly, for example. There is general recognition that ordinary retail customers should be shielded from instantaneous fluctuations in this 'spot market' for network capacity, as they would not be able accurately to predict their

charges—but the possibility does exist!

Moving from network services to multimedia applications, there can be a large number of players involved in the value chain. This raises the question of who is charging whom and for what. Customers are likely to be confused if too many of the individual players charge piecemeal for their part of the service—however, it will be difficult to provide transparency if one provider puts all the charges together in a single bill.

Open access to services and content

In this area ACTS probably offers regulators comfort rather than challenges. The programme has conducted many trials of new multimedia services over a range of network infrastructures—in fact multimedia is one of the technical domains of the programme.

The message is that this work has been strongly based on the principle of open standards at all levels of the delivery chain and the ACTS work has made significant contributions to the development and validation of these standards. DVB and DAVIC are two of the fora where contributions from ACTS players have been influential and it is interesting to note that these are not the traditional 'official' standards bodies but fast-track industry groupings, which agree pre-standards in time to meet windows of market opportunity.

However, it is clear that new services may well combine content with delivery and interactivity taking place using components from broadcast, fixed and mobile networks, and using IP or ATM protocols. Hence regulators will have to ensure a degree of conformity between the various regulatory regimes in this converging services environment if the marketplace is to develop competitively without artificial bottlenecks being generated and affecting players adversely who elect to deliver particular services in different ways.

Consumer/social needs

In the area of e-commerce, ACTS has been active in exploring how to implement proof of identity, payment security, etc; it has also been addressing issues of privacy, copyright and content screening. It made significant contributions to the work of the MoU group on e-commerce for small and medium enterprises (SMEs). Regula-

tors will need to review this, and other work in this area, in order to ensure that consumers are being protected sufficiently by the developing technical capabilities. ACTS has also looked at the socio-economic impact of advanced technologies. Among a range of topics, it has produced a paper discussing whether today's strongly-established traders are likely to dominate the cyberspace marketplace also, a topic of significant interest to regulators and competition authorities.

ACTS has also been looking at the provision of advanced services to remote regions. There are no simple answers for providing multimedia services to remote areas but broadband wireless may provide an economic solution. Here, alas, there is no magic bullet. The problem of whether to, or how to, pay for such services remains a question that individual national regulators will have to consider.

Conclusions

The paper has identified a number of areas where ACTS results have an impact on the development of future regulatory policies. Generally, the continuing convergence between telecommunications, broadcasting and IT technologies and services seen in the ACTS work implies a continuing need for regulators to look more widely across the electronic communications marketplace in their deliberations on policies for the future. More specifically, the blurring of the boundary between core and access networks and the new flexibilities becoming available in respect of charging are two areas where the work done within ACTS can assist evaluation of future regulatory directions.

Further information on results from ACTS, tailored to the regulatory sector, can be found by accessing the ACTSLINE web site: www.actsline.org.

Biographies

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Dr Dave Newman joined the UK Post Office (now BT) in 1963. After carrying out research on new materials and optoelectronic devices for telecommunications use, he became responsible for optoelectronic device development and, in 1984, for switching-related research and development, within BT Laboratories. Later, he managed BT Laboratories' network systems R&D; this was followed by a period of responsibility for software development for some of BT's major internal network management and customer facing systems. He joined Oftel in 1995 as Deputy Technical Director. Since 1998, he has been a telecommunications consultant, which includes working on the ACTSLINE project within the ACTS programme.

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Dr Hill Stewart joined the UK Post Office (now BT) in 1972. After carrying out research on optical communications technology and systems, he moved to technology forecasting and strategic planning and managed BT research programmes on architecture and standards and network and service management. His final job with BT was producing the first release of an integrated architecture for the company's networks and systems. During his time with BT he was active in supporting EU activities in collaborative R&D and, since leaving BT, has worked as a consultant on European RTD. He is currently managing the ACTSLINE project for Italtel.