

## **SIBIS – Workpackage 2: Topic research and indicator development**

Topic Report No.1:  
Telecommunications & Access

Tasks 2.1 (Update) + 2.2

Report Version:	Final
Report Preparation Date:	Dezember 2001
Classification:	Restricted
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Contract Start Date:	1 <sup>st</sup> January 2001
Duration:	30 Months
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Partners:	Work Research Centre (Ireland), Danish Technological Institute (Denmark), Technopolis (UK), Databank Consulting (Italy), Stichting RAND Europe (Netherlands), Fachhochschule Solothurn (Switzerland)



Project funded by the European Community under the "Information Society Technology" Programme (1998-2002)

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## 0 Overview

This document provides a digest of the most relevant policy documents relating to Telecommunications and Access (T&A) together with a brief literature survey and a focused look at available statistical indicators. In order to do that, it firstly focuses on the main T&A domains for indicator development, yet highlighting main existing gaps in available statistical indicators. Continuously, it proposes some possible ways forward for the future indicator work to be conducted and piloted under the SIBIS project.

WP1 gave an exhaustive list of indicators, and broadly defined their scope – ie the majority are indicators of the penetration of a particular technology, there are fewer indicators on use of particular technology or access mechanism, and even fewer on their impact. The indicators section of this report highlights 30 or so existing 'key indicators' which have been chosen for one of two main reasons:

- Either they are general purpose indicators which are widely cited and used OR
- They are indicators which might help meet some perceived indicator weaknesses (which will be discussed in more detail in WP2.2)

The latter group includes indicators of technological evolution (emerging technologies), indicators of behaviour (such as choice or motivation to use a particular form of ICT access or appliance), and some price indicators.

There is a brief discussion of emerging indicators (mostly composite indicators concerning Internet and Mobile technologies adoption and usage) which is followed by the policy collection section. In summary, this attempts to map available indicators onto the requirements of the eEurope initiative, and onto a number of other areas, highlighted in policy documents, which could usefully be explored by extending current data collection. These include:

- emerging technologies – eg xDSL, VOIP, Bluetooth, mobile data comms
- universal access – digital divide, universal access to broadband networks
- local access pricing, interconnection charges
- mobile pricing (particularly international roaming, and fixed to mobile tariffs)
- use and impact of technologies in different user groups
- regulatory progress, and the disconnect between technological convergence and regulatory convergence

Hence this document extends the work started in WP1, focusing on Telecommunications and Access (T&A), and aims :

- to discuss current and new indicators of T&A development, including gaps which have not been covered
- to provide cases of innovative tools, in the absence, or as substitutes for, traditional indicators, which might help to contribute to an improved perception of emerging patterns of telecommunications technologies among Member States;
- to assist in building a better understanding of the importance of traditional indicators.

As a result of the research and analysis on the topic area, the policy concerns outlined have been translated into a coherent set of Information Society indicators. Thus ultimately this work will be the basis of the questionnaire for the eEurope Surveys (WP3). Indicators specified in this task and recommended for piloting in the survey need to be translated into survey questions.

To build this Topic Report, existing policy and statistical documents available from EU member countries and the USA, were reviewed. In addition available indicators associated with T&A were assessed. As a result of the research new approaches to obtaining new indicators were investigated. Likewise, a brief literature survey, highlighting some key aspects was conducted.

It must be emphasised that the review of existing indicators, though representing a comprehensive and up to date situation at the time of the research, does not denote any definite technology, innovation or market trend that EU Member States will follow in the future. Any estimates or hypotheses made are based on technologies and regulations existing at the time of this research. However, due to the speed of change in the area any of these conjectures must be seen only as one out of many possible routes that technologies and markets can take in the next few years. Likewise, it is also important to highlight the fact that only some of the indicators we propose in this chapter will be further piloted in SIBIS GPS and DMS, not every indicator will be included in further work due to restrictions with time and space capabilities.

# 1 Framework for the development of new indicators:

## 1.1 Main Domains for future developments of Telecomms and Access indicators, following the eEurope priority areas

The work carried out in WP1 showed how most statistics in this topic area are captured to describe 'the numbers of something' such as market or technological penetration. However, less information is available on T&A usage, and even less material is widely published on the impact of T&A. There is also comparatively little information available on emerging technologies. Whilst some of these are weakly covered because technologies are not yet broadly available on a commercial basis (eg Bluetooth), other technologies are no longer radical, but are still not (relatively speaking) widely or consistently documented (such as the existence of xDSL networks).

Future development of indicators appears to centre around the concept of the composite index, which in a field where there are already hundreds of current indicators, albeit sometimes extremely diverse ones, is quite sensible. It appears that commentators and statisticians are as interested in deepening their understanding of existing topics, as much as discovering new ones. However, it is not entirely clear why the digital divide should be so much the focus. The most likely explanation may be that we still live in a world of information 'haves' and 'have nots' and until adequate infrastructure is in place, with some type of equality of access, then society as a whole will not benefit, and the competitiveness of nations will be impaired.

Lengthy investigation of the policy documents cited gives the following examples of topics which could be addressed, by extending current data collection methods. It is important to highlight that in some instances, it would be appropriate for the EU to collect data which is currently only available at either OECD or national level. To give some sort of framework to the following discussion issues have been grouped under some very broad headings:

- Broadband/High speed infrastructure and access technologies
- Mobile
- Internet
- Pricing/Costs
- Regulation

The latter two are obviously cross-cutting topics (eg one could usefully look at the pricing policies associated with broadband, mobile and Internet access), and so reference to them is made under their respective headings rather than at the level of the underlying subject.

### *Broadband/High speed infrastructure and access*

This topic encompasses the existence of infrastructure, the various technologies which could be used, the extent of access, numbers and types of players and the policy issue concerning the 'universal service' principle.

In the UK, the regulator states that "Given that we know relatively little either about the importance that consumers will place on bandwidth, or the extent to which bandwidth can be regarded as a proxy for overall "quality of service", it has not been possible to define a composite measure of "value for money" which enables us unambiguously to compare one service offering with another and determine definitively which is "better". This would lead to the conclusion that the creation of some sort of 'high speed index', and more investigation of user satisfaction, could be useful.

Statistics which could usefully be collected include:

- Access to technologies (to include xDSL, cable modems, fixed wireless access, satellite (these questions could be framed to users, suppliers, and/or regulators))
- Plans for introducing 'universal service' obligations to overcome access disparities
- Correlation of access/use/benefits with socio-economic-demographic variables (such as income, ethnic origin, age or education)
- Use of broadband access (to include location of access, purpose of access, and benefit of access). If combined with cost of access, it would be possible to construct a rudimentary cost/benefit scale
- Impact of broadband access/services
- Actual experience of high speed access technologies (customer satisfaction) including investigation of contention ratios for xDSL

### *Mobile*

For mobile applications, further work can be conducted now on mobile pricing (particularly international roaming, and on fixed to mobile tariffs). In the UK there are regulatory concerns about Significant Market Power and possibly uncompetitive markets. There is also a concern that consumers are not well informed enough by the players about mobile telephony and costs. This is particularly true with regard to roaming. For the short-mid term future, pricing analysis can usefully be conducted on 3G applications, including mobile access to the Internet, and how this effects the speed of take-up. In technology terms, as UMTS comes on stream there will be lots of statistics to collect on 3G-enabled applications, again, particularly concerning mobile internet, and mobile data comms. Although this technology is not widely available currently, it may be by the time the SIBIS project ends.

- Use of mobile technologies by socio-demographic groups
- Impact of use of mobile technologies
- Customer satisfaction with mobile technologies
- Access to mobile Internet applications
- Use of mobile Internet applications
- Barriers to use of mobile Internet applications

### *Bluetooth*

Bluetooth wireless technology has been developed to meet the increasing communication need for Personal Area Networks (PANs) which connect devices in a relatively small geographic area (home, business, on the move). Bluetooth enables both voice and data communication wirelessly, using a standard low-power, low-cost technology which can be integrated in all devices to enable total mobility. Cables are replaced by short range radio links. Bluetooth operates in the unlicensed ISM band at 2.4GHz. It is capable of transmitting data at 1Mb/s, with a combination of circuit and packet switching. It is also capable of transmitting audio at the same rate and of enabling automatic connection between devices. So, for example, an update to the information stored on a mobile phone can automatically be transferred to, for instance, a mobile PC or desktop when in range.

The technology has been developed through the combined expertise of five industry giants including Ericsson, IBM, Intel, Toshiba and Nokia. Originally developed by Ericsson, the core technology is being offered as an open standard to encourage global compatibility.

This technology is not yet widely or commercially available, although it may well be more relevant by the end of the SIBIS project. If not there may be another wireless technology for which the same type of indicators can be applied. Possible indicator areas include:

- Number of bluetooth enabled products shipped/purchased

- Use of bluetooth enabled products – we see that much public domain material is still in the ‘awareness raising’ stage – painting ‘idealised’ scenarios involving harmonious merging and blurring of domestic and business life where the mundanities of life are overtaken by ‘intelligent fridges’ and always-on communications abilities. It remains to be seen what this technology will actually be used for, whether there is predominantly business or consumer demand, and whether any so-called killer-apps emerge.
- Impact of bluetooth enabled products
- Barriers to purchase – financial, awareness, technological competence and adoption patterns

### *Internet*

Internet performance is an area in which work is ongoing, but patchy, particularly with regards to information across networks. However, it is difficult to construct sufficiently robust and useful performance benchmarks and to measure network performance across networks where no single entity has end-to-end responsibility. Moreover, there is a reluctance to share operational information between ISPs.

The OECD notes, in *Local Access Pricing & E-Commerce*, that more work could usefully be undertaken to locate the physical location of secure Internet hosts for e-commerce, as it is difficult to tell from the domain name where the physical hosting is conducted. The same applies to web-servers and the origination of web-content. Further analysis would contribute to understanding the development of physical infrastructure underpinning e-commerce and use of the Internet in general. In turn this would give a better picture of relative competitiveness of countries in terms of providing services, access and relative pricing levels.

Following the arguments outlined above, more work could usefully therefore be done in ascertaining the physical location of country code level website addresses or Top Level Domains, (ccTLDs) and generic website addresses (gTLDs). The Commission will be addressing this topic to some extent (although not totally) with the forthcoming study on the origination of European digital content<sup>1</sup>.

The OECD also states that the existence of robust performance measures is important, as the Internet is (currently) largely self-governing. If one ISP was ‘abusing its position’, then resolution of the dispute could be difficult.

Other than the above, the impact of Internet access could be more fully investigated, although in this project we deal with this under broadband/high speed access.

### *Internet Telephony*

Once again there are access and pricing issues, as well as policy issues concerning the number of providers and the regulatory approach. In this instance it would also be interesting to investigate quality issues, as these are still not adequately resolved for the widespread rollout of VOIP.

- Number of Internet telephony users/subscribers
- Tariff Structures
- Quality of service (speed, cost, quality of signal, reliability etc)

### *IPv6*

Some measure of the progress of IPv6 rollout and plans would undoubtedly be useful, but at the moment it is not quite clear how to achieve this other than by a commercial survey of networking firms such as Cisco.

<sup>1</sup> This will be included in the ‘Indicators for European digital content on the global networks’ project, to be undertaken by Technopolis.

### *Pricing*

Much work is already done on this topic by OECD, and the European Commission. For example, the latter has recently started its own study into telecoms tariffs and the OECD has concluded that more attention should be paid to the structure of local access pricing. This topic has come to prominence following an increasingly widespread tendency to offer un-metered access, and significant differences between countries which have offered this for some time, and those which have not. Interconnection charges are also interesting, given the difference between the bases on which they are calculated. In the UK and US for example, the Long Run Incremental Cost (LRIC) model is used. These countries have lower interconnection charges than others, and the OECD concludes that without cost-oriented interconnection charges, effective competition cannot develop.

In addition, private sector suppliers provide data on this topic. The overriding difficulty, however, concerns the comparability of information and the fast-moving nature of new telecoms tariff packages and approaches (eg flat rate billing, prepaid cards etc). More work could usefully be done on:

- Interconnection charges in PSTN – use of LRIC
- Interconnection charges between fixed and mobile networks
- International call charges for mobiles – roaming charges
- Price index for residential/business broadband services
- Un-metered access to mobiles, broadband – tendency (frequency) models (flat rate charges, pay as you go, etc) and costs
- SMS pricing and interconnection charges

### *Regulation*

Regulation is another area in which more work could be carried out. Convergence between telecommunications, broadcasting, internet, cable TV and other media forms and platforms is also causing changes in regulation and approaches to regulation, including competition regulation, market entry, market dominance, service obligations and inter-connection. Currently much policy making is treated 'vertically', but in fact technological convergence should mean that policy making needs to become more integrated and holistic as well. These topics are being considered at the European level (in other IST projects for example) and national level - for example in the UK there is the creation of OFCOM, a new regulator to treat all communications legislation.

Following on from this line of thought, DG INFSO and Eurostat have prepared a joint paper on *Statistical Indicators for the New Economy(SINE)*<sup>2</sup> to help IST projects. Suggested foci for future indicator development are given: ICT infrastructure, Internet infrastructure, digitalisation, virtualisation, multimedia and Internet penetration.

However, bearing in mind the existing strong policy orientation of the eEurope initiative, more regulation-oriented statistics are not included.

### *Mapping Indicators to Priorities*

To conclude, it might be useful to look at statistical coverage for the T&A domain according to eEurope priorities, although many of the actions under discussion are in fact policy level implementation issues or decisions, requiring evolutionary change in the medium to long term. They do not lend themselves to exact numerical measurement.

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<sup>2</sup> European Commission, Eurostat, (2000) 'Statistical Indicators for the New Economy', Brussels

eEurope Action	Existing Indicators?
Achieve significant reductions in Internet access tariffs towards the lowest levels in the world by reinforcing competition and clear benchmarking at European and national level.	YES, OECD publishes 6 monthly data, some MS have conducted benchmarking
Adopt the five directives <sup>3</sup> for the new framework for electronic communications and associated services; Adopt the new Commission Directive on Competition in Communication Services <sup>4</sup> .	Unknown, but presumably YES – within the EC
Work towards introducing greater competition in local access networks and unbundling of the local loop.	Partial – OECD statistics, World Bank and national regulators. Work is certainly ongoing, but success is not yet achieved
Improve the co-ordination of the European frequency policy framework. (see next as well)	Yes, adoption of the new EC Regulatory Framework
Co-ordinated allocation of frequencies for multimedia wireless systems	Yes- New adoption of EC Directive for radio spectrum policy. Communication issued following World radio conference is also helpful
Where necessary, public financing instruments will give increased priority to supporting the development of information infrastructure, notably in the less-favoured regions.	Partial/Unknown. Some (not all) MS have universal service obligations. An EU study has started on the use of SPDs to support the development of the IS
Move towards full conversion to IPv6 through pilot implementation in Europe. Key telecom and manufacturer industries will be mobilised together with service providers and users.	Partial. Ad-hoc working group set up to accelerate adoption of Ipv6
Reduce prices for leased lines by increasing competition and ensuring implementation of the Commission Recommendation.	Partial. OECD, Regulators and consultancies

Following these lines, it might also be instructive to look at the choice of selected current indicators and map how they relate to eEurope priority areas. This table is followed by another which shows how the chosen indicators meet the requirements of other commentators on IST. Whilst neither of these tables is definitive – there are too just too many indicators in existence to take them all into account – they are indicative and therefore, portray interesting and instructive contents.

<sup>3</sup> These Directives concern the overall framework, access and interconnection, authorisation and licences, universal service and data protection.

<sup>4</sup> Full title: *Commission Directive amending and consolidating Directive 90/388 on Competition in the Markets for Electronic Communication Services.*

Ref	e-Europe topic	Number of chosen indicators <sup>5</sup>
1b1	achieve significant reductions in Internet access tariffs by reinforcing competition	3
1b2	adopt directives for new framework for electronic communications and associated services <sup>6</sup>	0 – but this is a policy objective
1b3	Introducing greater competition in local access networks and unbundling of the local loop	1
1b4	improve the co ordination of the European frequency policy framework.	0 - but this is a policy objective
1b5	Public financing instruments to support the development of information infrastructure and projects.	0 - but this is a policy objective
1b6	Full conversion of Ipv6	1
1b7	Reduced prices for leased lines by increasing competition	1
1bx	General indicator	30

**Table of areas of interest for future policy work**

Topic	Indicator available?	NONE, Whole or Partial?
<b>B r o a d b a n d / H i g h s p e e d n e t w o r k s</b>		
Existence of broadband infrastructure (eg xDSL, cable modems, fixed radio access)	TA18 Internet access by DSL in OECD Member countries, March 2000 (USD PPP) TA30 Internet access by Cable in OECD Member countries	Partial – need to cover all technologies and all EU MS
Existence of 'universal service' obligations to overcome access disparities	NONE found	NONE
Correlation of broadband access/use/benefits with socio-economic-demographic variables (such as geographical location, income, ethnic origin, age or education)	NOT really – partial statistics exist in some documents, such as Availability of Broadband Internet Access: Empirical Evidence, but this is for the US and incomplete	NONE
Use of broadband access (to include location of access, purpose of access, and benefit of access. If combined with cost of access, it would be possible to construct a rudimentary cost/benefit scale	NOT really, some included in US Digital Divide documentation, some in other policy documents (eg UK regulator's report on residential/business use of the Internet, but not disaggregated by use of high-speed networks, nor is the data comprehensive)	NONE

<sup>5</sup> These are all topic areas we highlight as interesting for further study. Nevertheless, many of these indicators could not be included in the final section for piloting due to lack of space. Yet they remain interesting for further work.

<sup>6</sup> These directives concern the overall framework, access and interconnection, authorisation and license, universal service and data protection.

Topic	Indicator available?	NONE, Whole or Partial?
Impact of broadband and other high speed access/services	NOT really, although some included in Economic Benefits of Broadband documentation, but this is econometric, forecasting data, not empirical data.	NONE
Customer Satisfaction	T37 SME satisfaction with Internet service	Partial – UK only, not only high speed networks and only Business
<b>I n t e r n e t</b>		
Physical location of secure Internet hosts, web servers and content	TA9 Internet hosts TA33 Secure Web servers for electronic commerce per 100 000 inhabitants	YES, but TA33 not fully up to date TA9 - full TA33 -full
Physical location of country code level website addresses or Top Level Domains, (ccTLDs) and generic website addresses (gTLDs).	TA29 Percentage of all World Wide Web links between TLDs and gTLDs (July 1998) Also work from Telcordia, Network Wizards, Netcraft and RIPE	Partial – this gives a figure for traffic, rather than locations. Private sector surveys have to be bought, not always in public domain
Number of Internet Telephone users	NONE found (not subject to regulation)	NONE
Investigation of Internet Telephony tariff structures	NONE found (not subject to regulation)	NONE
Quality of service	NONE found	NONE
<b>P r i c i n g</b>		
Structure of local access pricing.	TA19 for access to the internet. There are several other price indicators available for local telephone calls (EITO, OECD, NRAs and private consultancies etc) which are not highlighted here but which were detailed in WP1	YES
Interconnection charges	TA28 Diversity of Internet access offers in UK, Denmark, Germany, The Netherlands, Italy, Spain and Belgium	Partial – needs to cover all EU
Mobile - international roaming charges	TA35 survey of European roaming charges, also more up to date figures available from UK regulator, but only UK, France, Germany & US	YES

Topic	Indicator available?	NONE, Whole or Partial?
Mobile – fixed to mobile and vice versa charges	TA13 interconnection charges between fixed and mobile TA16 Price of calls between fixed and mobile networks There are also statistics available from UK regulator, but these are limited to UK, France, Germany & US	YES, but TA13 is not fully up to date
Price index for residential/business broadband services	NEWTA4 DSL/Cable modem Price/Speed Index	Partial, but for UK only, and does not take into account all determinants (only price & bandwidth)
Un-metered access to the Internet – tendency and cost	TA37 Business Access to the Internet	Partial – UK and business only
SMS pricing and interconnection charges	There is an INTUG survey of European roaming charges for SMS	Partial – only 1999
<b>M o b i l e</b>		
Impact of mobile telephony on different user groups	TA23 Factors describing the reasons to adopt/benefits from mobile technologies TA36 Business Satisfaction with Mobile Telephony There is some socio-demographic data on UK ownership and spend on mobiles in OFTEL's Consumer use of mobile telephony	Partial - one indicator applies only to Finland and is for business, the other applies only to UK and is on satisfaction, not use or impact
User satisfaction with mobile technologies	TA36 Business Satisfaction with Mobile Telephony – there is also an equivalent consumer indicator	Partial – UK only
Access to mobile Internet applications	NONE found (only WAP type applications available)	NONE
Use of mobile Internet applications (ie 3G)	NONE found (but not yet rolled out)	NONE
Barriers to use of mobile Internet applications	NONE found (but not yet rolled out)	NONE
<b>I P v 6</b>		
<b>Survey of rollout plans</b>	NONE found (not comprehensive)	NONE
<b>B l u e t o o t h</b>		
Number of bluetooth enabled products shipped/purchased	NONE found (but not yet rolled out)	NONE
Use of bluetooth enabled products	NONE found (but not yet rolled out)	NONE
Impact of bluetooth enabled products	NONE found (but not yet rolled out)	NONE
Barriers to purchase	NONE found (but not yet rolled out)	NONE

## 1.2 Gaps in the statistical coverage of the topic

This chapter describes the “gaps”, i.e. those areas within the topic where official statistics currently fail to provide adequate measures for the issues discussed in PART 1. It shows

- why the SIBIS project develops indicators in certain areas
- and how these indicators will complement existing statistics.

The majority of the ‘gaps’ in available indicators included below are derived from the review of the policy documentation included in the first part of the SIBIS research(WP1), which showed that the broad categories of missing data are as follows:

- Broadband and high speed network technologies, e.g. penetration rates for different broadband technologies, use and inhibitors to digital wireless broadband, use of cable modems, pricing, choices of access mechanisms (e.g. digital TV), choices of subscriptions rates and packages (such as premium services), socio-economic aspects of access
- Bluetooth and other emerging technologies – barriers to take up and success factors
- Mobile data services and usage. WAP technology penetration and usage.
- Internet technologies – use, barriers, location, multiple platforms, internet telephony ( VOIP is especially for business to business adoption)
- Use of alternative technologies (such as Powerline, although we have to acknowledge that this topic receives very little policy attention)
- Convergence Issues and regulatory progress.
- User behaviour – motivations, barriers to use and impacts of new technologies
- Composite indices – such as combining pricing and the use of one or multiple technologies
- Establishing the physical location of secure Internet hosts for e-commerce
- Pricing - local access pricing, interconnection charges, mobile pricing (particularly international roaming, fixed to mobile tariffs, SMS (mobile contents downloads: e.g. ringtones, logos, localised based services, etc...)

Because the area of Telecommunications and Access is so diverse, and so many indicators already exist, it is difficult to highlight only one or two areas to investigate. Because of this it is also tempting to try to create composite indicators to combine two or more items of information, rather than creating new indicators, to deepen knowledge and understanding of the topic. However, as T&A is changing so fast, if we only adopt this ‘composite’ approach then we risk omitting key data, such as the rate of progress of introduction of new technologies or new access mechanisms. This type of information requires ‘old fashioned’ methodology (such as counting the instances of something) but applied to new items (of technology, access appliance, pricing comparison, market share etc).

Therefore, we are pursuing two approaches:

- the development of composite indicators (either based on existing data or on existing themes but with new rounds of data collection to ensure consistency of approach), as well as
- the development of new indicators for which data can be collected via surveys of the population and establishments.

## 2 Suggestions for new or modified Telecommunications and Access indicators

### 2.1 The hierarchical system of SIBIS indicators

This chapter creates an overview “map” of key indicators already in use and the new SIBIS indicators that are considered worth piloting. In order to follow a systematic approach and to make clear WHAT the indicators developed in each of the topics do actually stand for, the indicators are organised in a **hierarchical way** by grouping them on different levels and relating them to sub-topics and issues.

Part A has provided a framework for the development of the indicators by breaking down the topic into a structure of several sub-topics and issues related to these sub-topics.

The structure is presented below in the form of “hierarchical trees” with several levels of branches, which allow us to define indicators that relate to one (or maybe several) of these branches. It becomes clear that, with regard to the costs of data gathering, an indicator is the more efficient the higher it is located in the hierarchy. On the other hand, indicators far down the hierarchy tend to be more precise and may allow more flexibility in composing indices.

A tree has the following levels:

- Topic level (A)
- Sub-topic level (e.g Use)
- Constructs: These are terms for theoretical concepts which can not be measured directly (e.g. satisfaction) but have to be operationalised via indicators that are capable of measuring key aspects of the construct).
- Construct dimensions: Sometimes, constructs need to be broken down into different dimensions to make operationalisation easier; e.g., the notion of ‘satisfaction’ might contain four dimensions: cost, quality, reliability, speed)
- Indicators: These are the indicators we might use to measure the construct dimension
- Sub-Indicators: These are more detailed indicators which address a particular sub-domain or aspect

It should be noted that these hierarchical trees are based primarily on gaps in current statistical provision – there seems little point in replicating large quantities of information which are already freely available, in the public domain.

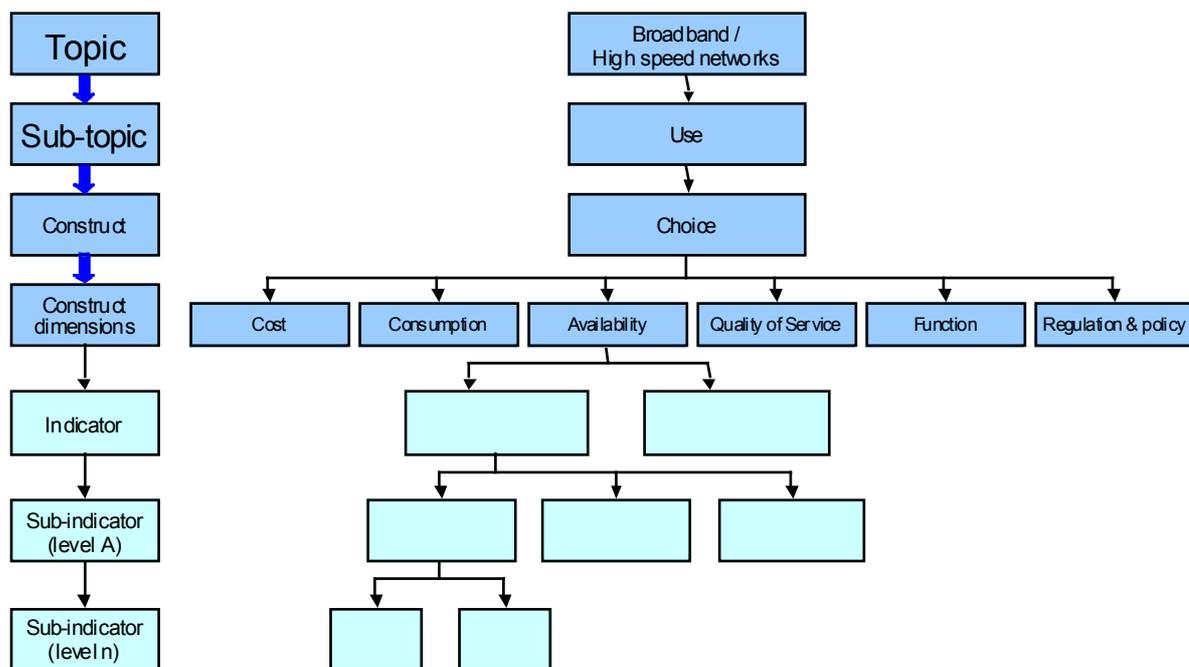
To summarise, the indicators are grouped into:

- Broadband/High Speed Networks – this is probably the single most important enabling technological development of the current time, and it is therefore imperative to measure who has access to it, and what it is being used for. The indicators here include cost, availability and consumption of broadband, the uses to which it is put, quality of service provision and regulation.
- Internet – Although in many cases the Internet is becoming pervasive, access and usage patterns do vary according to socio-economic-geographic factors. Proposed indicators include how the internet is being accessed (location and technology), purposes for which the Internet is used, quality of service provision, regulation
- Bluetooth – as an example of an emerging technology this is an important area. There are provisional indicators for public perception of the functionality of bluetooth, use of the technology, barriers to use and impact of use. There are also some indicators for sales of the technology, which are quite specific to the ICT industry
- Ipv6 – as an example of an effective emerging technical standard which will underpin the continuing expansion of the use of the internet, this is an important area. There are

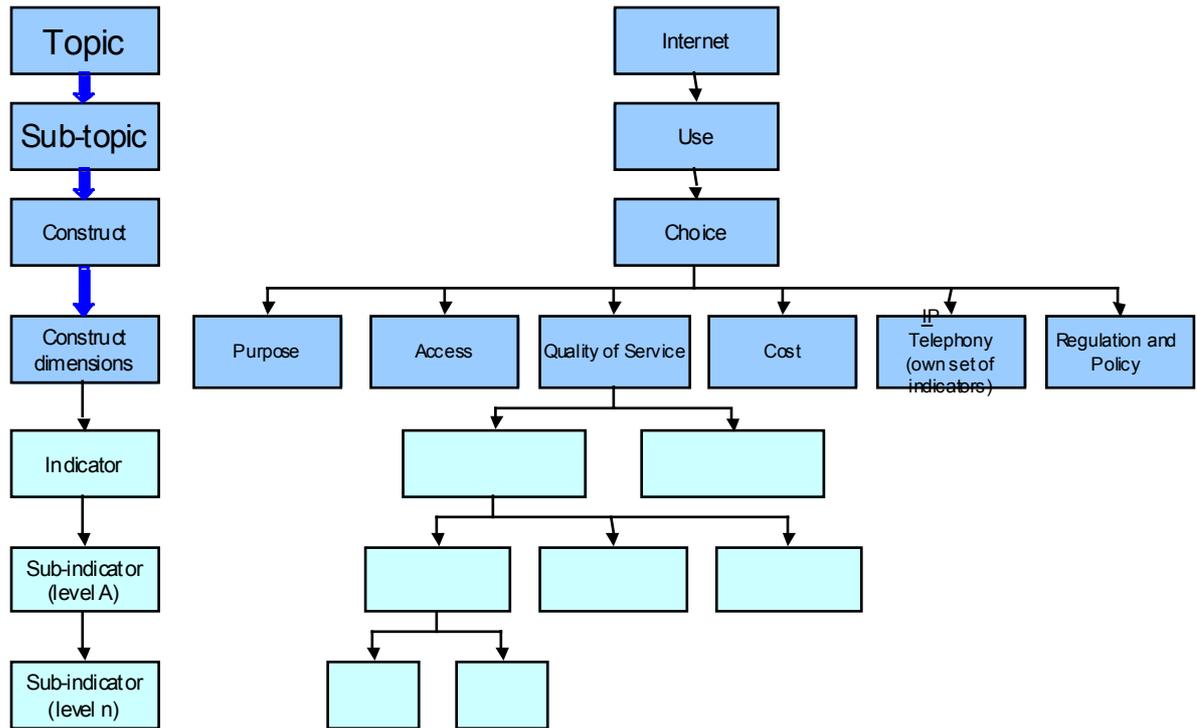
provisional indicators about the rollout of ipv6, barriers to adoption, benefits of adoption and the types of ipv6 enabled products

- Mobile – as an exceptionally fast-growing sector, mobile telephony is important. Indicators are shown for cost and awareness of cost, access, use and benefits of use, satisfaction with mobile telephony, access to, and use of 3G telephony, and regulation
- VOIP – as an emerging use of the Internet this is an interesting area. Indicators cover access to, and use of VOIP, pricing and user satisfaction.

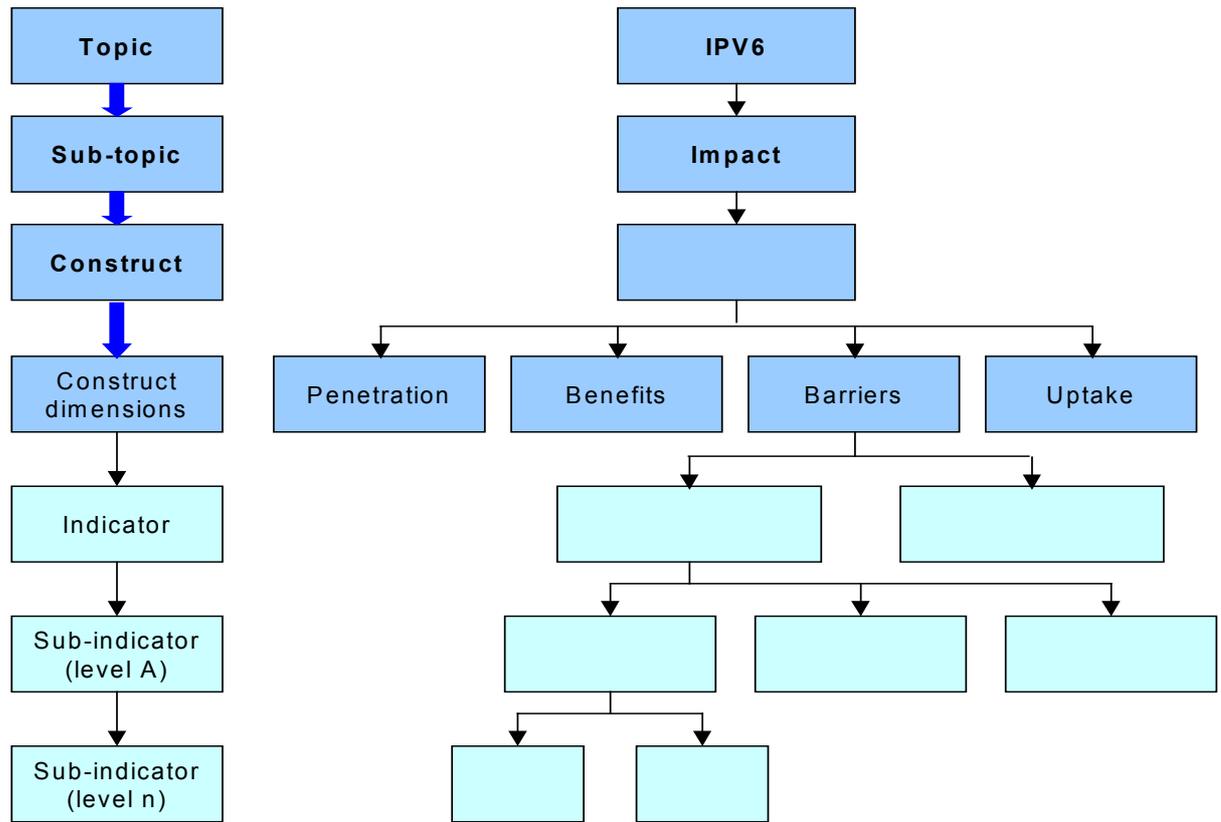
**Broadband:**



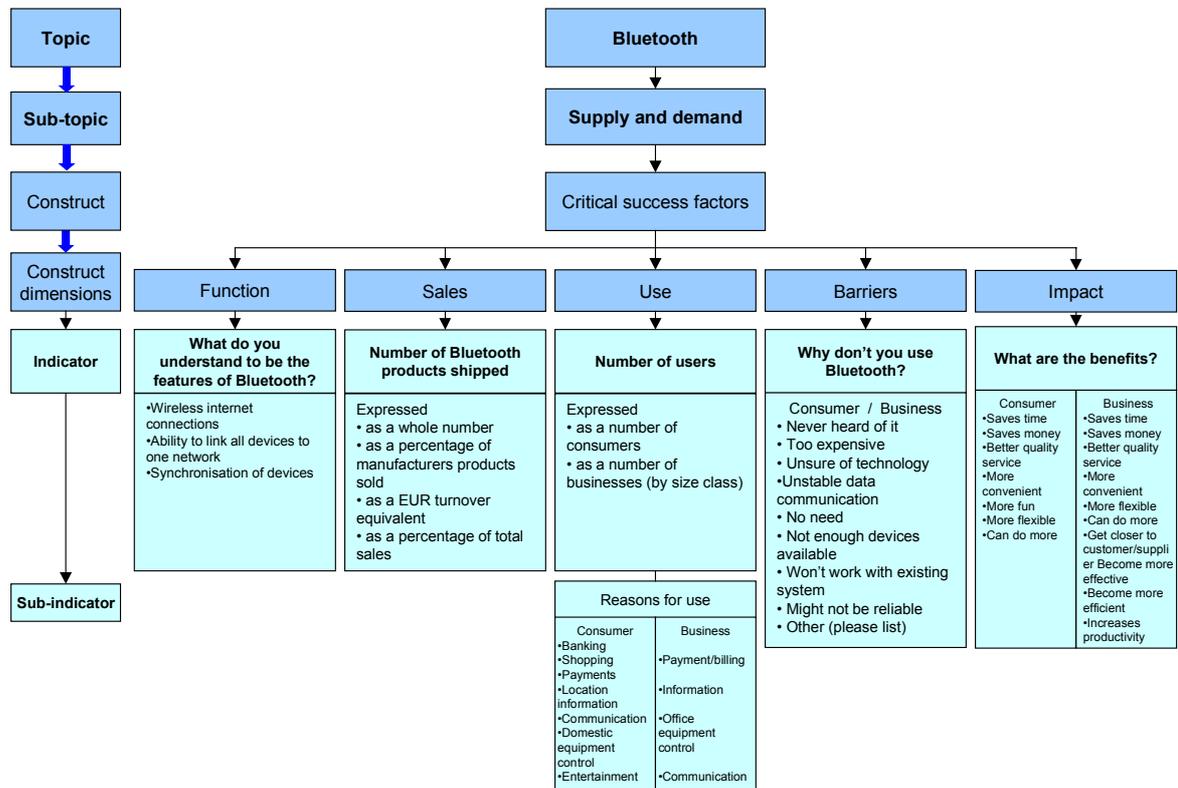
**Internet:**



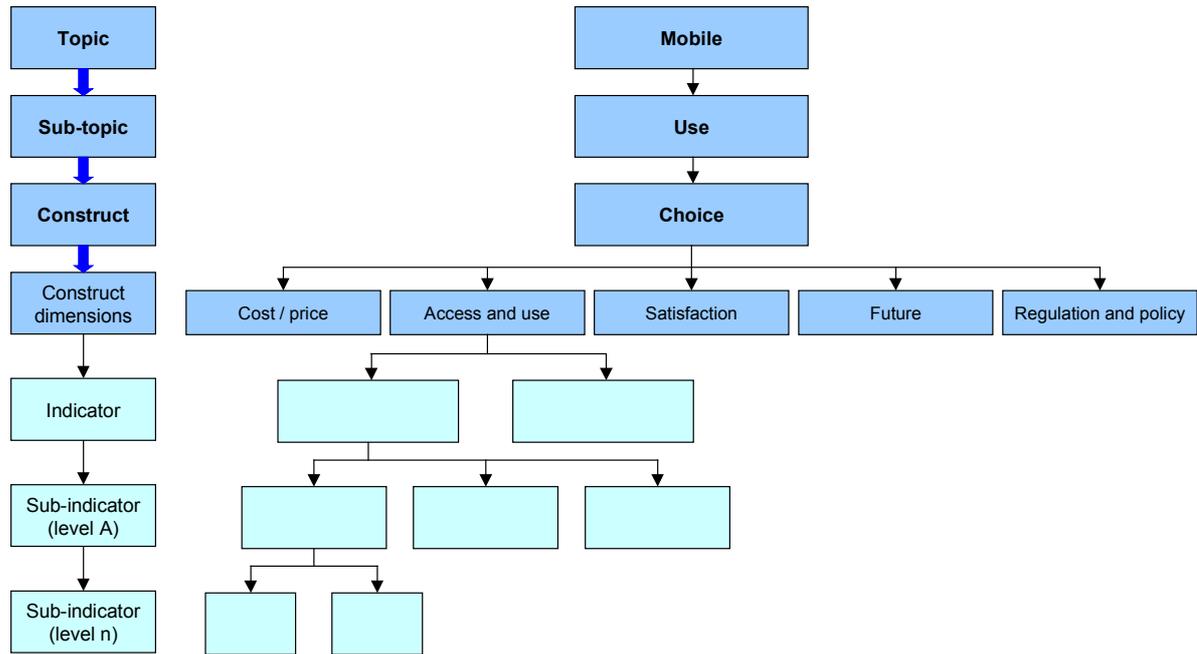
**Ipv6:**



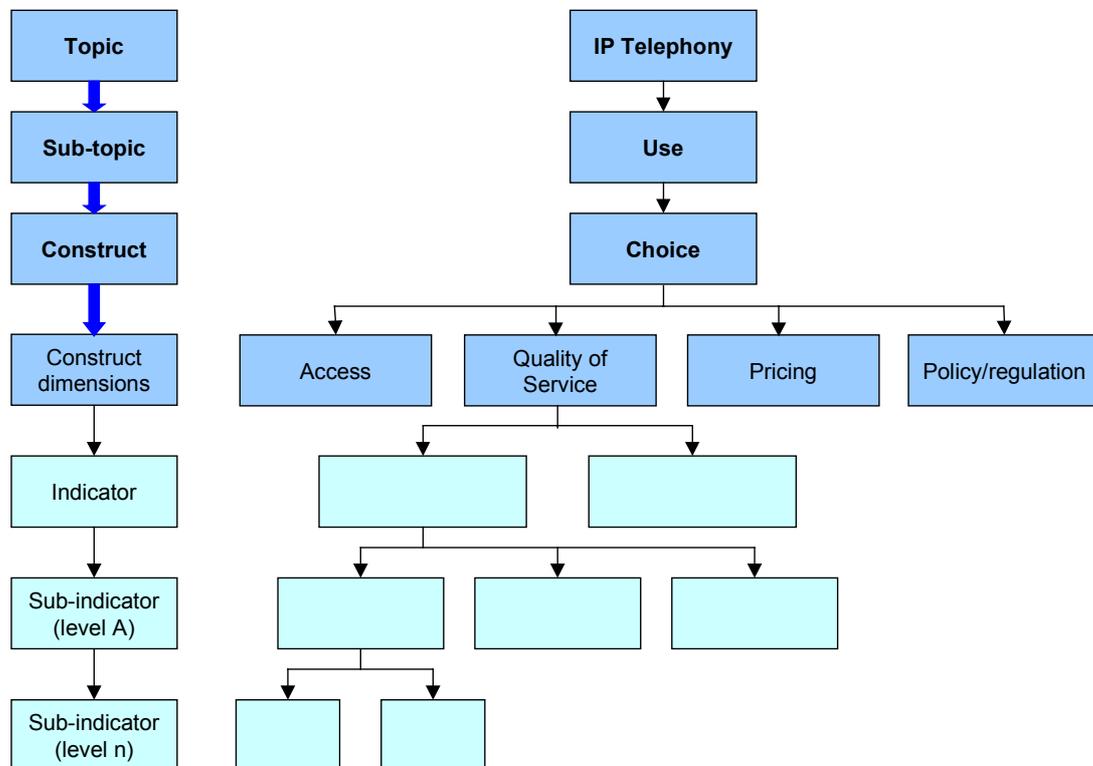
**Bluetooth:**



**Mobile:**



**VOIP:**



## 2.2 Definition of new SIBIS indicators

This section only presents SIBIS indicators which could be used (but not all of them will be finally selected due to time/space restrictions) in the GPS and DMS. Please note that there are several indicators under one broad heading.

There are also several other indicators which could be used using information provided by regulators or policy makers – asking about competition policy in telecoms, or questions about the speed and geographical bias of the rollout of xDSL for example. This type of indicator would help to answer eEurope benchmarking queries, but is not suitable for asking of the general population. As these are not suitable for use in a GPS, none of them are highlighted below. However, they were included in the logic trees in the previous section.

It should also be noted that based on our own market analysis it was decided not to promote the use of bluetooth indicators in the survey. This is because the rollout of bluetooth-enabled products across the EU is happening much more slowly than previously forecast. Indicators on ipv6 have also been largely excluded because they can only be answered by a highly specialised section of the IT population.

Consultation with our statistical experts<sup>7</sup> confirmed that questions to be asked in the GPS have to be extremely straightforward and simple to be effective. So, whilst the underlying premise or ideas may be quite complex, it is necessary to transform them into a series of single, easily understood questions in order to get robust data.

Finally, these indicators are presented for use with the GPS, but they could just as easily be used in the DMS with relevant changes to make them appropriate (ie some changes to possible response lists to include business-focused benefits).

In order to address the highlighted difficulties, the report suggests to use three general areas or domains for defining new indicators:

- Access to new technologies
- Usage of new technologies
- Impact of new technologies

Name of indicator	A1 Availability of broadband access
Definition	Share of households which have access to broadband networks, by type of network
Notes	Set of questions for homes that have access to a high speed link to find out usage. Use of connectivity within the home. Usage patterns.
Sources	SIBIS survey (GPS)
SIBIS survey: Q and group to be asked	Q1. Do you have access to a broadband network? YES, NO or DON'T KNOW If No, Why not? A: NEVER HEARD OF BROADBAND, IT IS TOO EXPENSIVE, I LIVE IN AN AREA WHERE BROADBAND IS NOT AVAILABLE YET If Yes: Q2. Do you have access to high speed network using cable

<sup>7</sup> The Office of National Statistics, London

	<p>modem? YES/NO</p> <p>Q3. Do you have access to a high speed network using xDSL? YES/NO</p> <p>Q4. Do you know what the contention ratio is on your network? YES/NO</p> <p>If Yes:</p> <p>Q5. What is it?</p>
eEurope relevance	General indicator for telecommunications and access

<b>Name of indicator</b>	<b>A2 Use of broadband and patterns of usage</b>
Definition	Location and duration of the use of broadband
Notes	Question for homes that have access to a high speed link to find out usage. Use of connectivity within the home. Usage patterns
Sources	SIBIS survey (GPS)
SIBIS survey: Q and group to be asked	<p>Q1. Where do you normally access broadband?</p> <p>a) MOSTLY AT HOME, b) MOSTLY AT WORK, c) BOTH EQUALLY</p> <p>Q2. On average, How much time do you spend online per week in total? (include broadband and also other narrowband methods like dial-up, ISDN etc combined)</p> <p>Q3. Since moving to broadband has the amount of time you spend on line per week: a) DECREASED, b) STAYED THE SAME, c) INCREASED</p> <p>Q4. If a) Why has your time on-line decreased? (offer alternatives, tick all which apply)</p> <p>MORE EXPENSIVE, CAN ONLY ACCESS FROM ONE LOCATION SO LESS CONVENIENT, FASTER AND MORE EFFICIENT ACCESS (THEREFORE NEED TO BE ON-LINE FOR LESS TIME), OTHER (please describe)/</p> <p>Q5. If c) Why has your time on-line increased? (offer alternatives tick all which apply)</p> <p>ALWAYS-ON CAPABILITY IS MORE CONVENIENT, FASTER TO ACCESS INTERNET, FASTER AND MORE EFFICIENT ACCESS (THEREFORE DO MORE THINGS ONLINE), OTHER (please describe)</p>
eEurope relevance	General indicator for telecommunications and access

<b>Name of indicator</b>	<b>A3 Use and benefits of broadband</b>
Definition	Stated purpose for which broadband is being used, benefits and impacts
Notes	Questions to assess what broadband is being used for.
Sources	SIBIS survey (GPS)
SIBIS survey: Q and group to be asked	<p>Q1. What do you use your high speed connection for? (tick all which apply) AUDIO/MUSIC DOWNLOAD, FILM/VIDEO DOWNLOAD, SHOPPING, VIDEOCONFERENCING, BANKING, GAMES, INTERNET ACCESS, OTHER, (please describe)</p> <p>Q2. What benefits has broadband access brought? QUICKERTO DOWNLOAD FILES, QUICKER TO SEND FILES,EASIER TO</p>

	SEND LARGE FILES, EASIER TO RECEIVE LARGE FILES, CHEAPER COMMUNICATIONS BILLS, FASTER ACCESS, MORE CONVENIENT ACCESS, MORE STABLE CONNECTION, MORE SECURE TRANSACTIONS, OTHER, (please describe)
eEurope relevance	General indicator for telecommunications and access

Name of indicator	A4 Quality of Service of broadband
Definition	Expressed satisfaction levels of being a broadband subscriber
Notes	-
Sources	OFTEL; SIBIS survey (GPS)
SIBIS survey: Q and group to be asked	<p>Q. Are you satisfied with the typical speed of accessing and downloading from the internet from your broadband network? a) SATISFIED, b) NEUTRAL, c) DISSATISFIED.</p> <p>Q. Are you satisfied with the level of charges from your broadband provider? a) SATISFIED, b) NEUTRAL, c) DISSATISFIED.</p> <p>Q. Are you satisfied with the level of customer support from your broadband provider? a) SATISFIED, b) NEUTRAL, c) DISSATISFIED.</p> <p>Q. Are you satisfied with the level of technical performance from your broadband network? a) SATISFIED, b) NEUTRAL, c) DISSATISFIED.</p> <p>Q. Overall, do you consider broadband access to be better than other forms of (narrowband) Internet access? YES/NO.</p>
eEurope relevance	General indicator for telecommunications and access

Name of indicator	B1 Internet Access Networks			
Definition	Share of households which have access to the Internet, by type of network and location			
Notes	Access to Internet - Question for consumers that use the Internet to explore choice of access.			
Sources	EITO digital main lines (TA 1), Cable TV subscribers (TA 2); SIBIS survey (GPS)			
SIBIS survey: Q and group to be asked	<p>Q1 Do you have access to the Internet? YES/NO</p> <p>Q2. If Yes, is your access: AT HOME, IN THE OFFICE, BOTH, OTHER (eg Internet café)</p> <p>Q3. Which methods do you use to access the Internet?</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 33%; text-align: center;">Home</td> <td style="width: 33%; text-align: center;">Office</td> <td style="width: 33%; text-align: center;">Other (eg café)</td> </tr> </table> <ul style="list-style-type: none"> <li>• PDTN/Dial-up</li> <li>• Cable Modem</li> <li>• Leased line</li> <li>• xDSL</li> <li>• ISDN</li> <li>• Satellite</li> <li>• 3G mobile</li> <li>• Other (describe)</li> <li>• Don't know</li> </ul>	Home	Office	Other (eg café)
Home	Office	Other (eg café)		
eEurope relevance	Encouraging access and take-up of the Internet.			

<b>Name of indicator</b>	<b>B2 Internet Access Mechanisms</b>
Definition	Share of households which have access to the Internet, by type of access mechanism and usage
Notes	Access to Internet - Question for consumers that use the Internet to explore choice of access.
Sources	EITO digital main lines (TA 1), Cable TV subscribers (TA 2) SIBIS survey
SIBIS survey: Q and group to be asked	<p>Target group : GPS</p> <p>Q1. How do you access the Internet most often? PC AT HOME, PC AT WORK, PC AT INTERNET CAFÉ, DIGITAL TV AT HOME, IN-CAR COMPUTER, PDA/PALMTOP, MOBILE/WAP PHONE, OTHER (please describe)</p> <p>Q2. How would you categorise your usage patterns: ACCESS THE INTERNET SLIGHTLY MORE AT HOME, ACCESS THE INTERNET SLIGHTLY MORE IN THE OFFICE, ACCESS THE INTERNET SLIGHTLY MORE ELSEWHERE (eg café), ACCESS THE INTERNET EQUALLY AT HOME, IN THE OFFICE, and ELSEWHERE, ACCESS THE INTERNET EQUALLY AT HOME AND IN THE OFFICE, ACCESS THE INTERNET SIGNIFICANTLY MORE AT HOME, ACCESS THE INTERNET SIGNIFICANTLY MORE IN THE OFFICE, ACCESS THE INTERNET SIGNIFICANTLY MORE ELSEWHERE (eg café)</p>
eEurope relevance	Encouraging access and take-up of the Internet.

<b>Name of indicator</b>	<b>B3 Choice and use of ISPs</b>
Definition	Number of ISPs used by households with access to the Internet
Notes	Access to Internet - Question for consumers that use the Internet to explore choice of access.
Sources	EITO digital main lines (TA 1), Cable TV subscribers (TA 2); SIBIS survey (GPS)
SIBIS survey: Q and group to be asked	<p>Q1. How many ISPs do you use? 1, 2, 3, 4, more than 4</p> <p>Q2. If more than 1, why? IN CASE ONE IS NOT ALWAYS ACCESSIBLE, FOR DIFFERENT ALLOWANCES OF UNMETERED ACCESS, HOUSEHOLD MEMBERS PREFERENCES, FAILURE TO CANCEL OLD CONTRACTS, OTHER (please explain)</p> <p>Q3. Have you changed your ISP within the last 6 months? YES/NO</p> <p>If YES, Why? COST, TECHNICAL SERVICE QUALITY POOR, CUSTOMER SERVICE QUALITY POOR, RANGE OF SERVICES INSUFFICIENT</p> <p>Q4. What is your preferred payment package? FULLY UNMETERED (SUBSCRIPTION AND UNLIMITED FREE ACCESS), PARTIALLY UNMETERED (SUBSCRIPTION AND SOME FREE USE), PAY-AS-YOU-GO (USUALLY FREE SUBSCRIPTION AND PAY FOR CALLS), METERED (NO SUBSCRIPTION BUT PAY FOR CALLS)</p>
eEurope relevance	Encouraging access and take-up of the Internet.

<b>Name of indicator</b>	<b>B4 Cost of Internet use</b>
Definition	Average monthly cost of using Internet, and preferred payment package
Notes	
Sources	SIBIS survey (GPS)
SIBIS survey: Q and group to be asked	Q1. How much do you spend on using the Internet on average per month? (in Euro. NB in UK, Denmark will be in national currency). Q2. Which type of payment package do you use? UNMETERED NO SUBSCRIPTION, CALLS ONLY SUBSCRIPTION & CALLS
eEurope relevance	General indicator for telecommunications and access

<b>Name of indicator</b>	<b>B5 Perceived benefits and impacts of the Internet</b>
Definition	Perceived benefits and impacts for households using the Internet
Notes	Measure what consumers think the benefits/impact are for using the Internet
Sources	EITO Internet applications used in the past three months SIBIS survey (GPS)
SIBIS survey: Q and group to be asked	Q1. What benefits has the Internet brought you? IMMEDIACY, GLOBAL COMMUNICATION, MORE CHOICE, COST SAVINGS, REPLACE NUMEROUS INFORMATION SOURCES, (please describe) Q2. What has the impact been of the Internet on you? (please tick all which apply) CHEAPER COMMUNICATION COSTS, INCREASE IN AMOUNT OF COMMUNICATIONS, FEEL MORE INFORMED, FEEL INFORMATION OVERLOAD, FEEL WASTE TIME SEARCHING FOR INFORMATION, INCREASED COMMUNICATION COSTS, INCREASED ISOLATION, OTHER (please describe)
eEurope relevance	General indicator for telecommunications and access
Related indicator	What do you access the Internet for (TA 5)

<b>Name of indicator</b>	<b>B6 Satisfaction with Internet service</b>
Definition	Expressed consumer satisfaction with Internet service provision
Notes	Should be combined with B4 indicator to see if that makes any difference
Sources	SIBIS survey (GPS), OFTEL
SIBIS survey: Q and group to be asked	How satisfied are you with the following aspects of your Internet service provider? (Rank on 1 – 3 scale of Dissatisfied, Satisfied, Very Satisfied) <ul style="list-style-type: none"> <li>• Availability of information</li> <li>• Cost of calls/subscription</li> <li>• Speed of access</li> <li>• ISP customer care</li> <li>• Overall Satisfaction</li> </ul>
eEurope relevance	General indicator for telecommunications and access

<b>Name of indicator</b>	<b>C1 Access to mobile phone</b>
Definition	Mobile phones used per household.
Notes	Measurement of rates of penetration and importance of a mobile phone to businesses and consumers
Sources	MICT Finland, SIBIS survey (GPS)
SIBIS survey: Q and group to be asked	Q1. How many mobile phones are there in your household? 0,1, 2, 3, 4, 4+ Q2. Do you have access to a fixed line at home as well? YES/NO Q3. If yes, what proportion of your total phone use is accounted for by each? MOBILE %, FIXED %
eEurope relevance	General indicators for telecommunications and access

Name of indicator	C2 Reasons for the use of mobile telephony
Definition	Stated reasons for the use of a mobile phone compared to fixed phone use
Notes	Measurement of rates of penetration and importance of a mobile phone to businesses and consumers
Sources	MICT Finland, SIBIS survey (GPS)
SIBIS survey: Q and group to be asked	<p>Q1. Why do you use a mobile phone? (please tick all which apply)</p> <p>USE MOBILE MOST BECAUSE CHEAPER</p> <p>USE MOBILE WHEN FIXED PHONE BEING USED BY SOMEONE ELSE</p> <p>USE MOBILE INSTEAD OF FIXED TO USE UP FREE CALL MINUTES</p> <p>USE MOBILE EVEN WHEN MORE EXPENSIVE THAN FIXED, BECAUSE CONVENIENCE IS MORE IMPORTANT THAN COST</p> <p>USE MOBILE INSTEAD OF FIXED TO CALL MOBILE ON SAME NETWORK BECAUSE CHEAPER,</p> <p>USE MOBILE INSTEAD OF FIXED AT CERTAIN TIMES OF DAY BECAUSE CHEAPER,</p> <p>USE MOBILE INSTEAD OF FIXED TO CALL MOBILES ON DIFFERENT NETWORKS BECAUSE CHEAPER,</p> <p>Q2. Why do you use a fixed line phone? (please tick all which apply)</p> <p>USE FIXED MOST BECAUSE CHEAPER</p> <p>USE FIXED MOST BECAUSE MORE CONVENIENT</p> <p>USE FIXED WHEN MOBILE BEING USED BY SOMEONE ELSE</p> <p>USE FIXED INSTEAD OF MOBILE TO CALL A MOBILE BECAUSE CHEAPER</p> <p>USE FIXED INSTEAD OF MOBILE AT CERTAIN TIMES OF DAY BECAUSE CHEAPER</p> <p>Q3. Overall, has having access to a mobile changed your communication patterns? YES/NO</p> <p>Q4. If YES, DO YOU:</p> <p>MAKE MORE CALLS? YES/NO.</p> <p>Q5. If YES, roughly how many more? (express as a percentage)</p> <p>I SPEND MORE ON TELEPHONE CALLS. YES/NO</p> <p>Q6. If YES, roughly how much more? (express as a percentage)</p>
eEurope relevance	General indicators for telecommunications and access

Name of indicator	C3 Cost of mobile phone use
Definition	Average monthly cost of using mobile phone, and preferred payment package
Notes	
Sources	SIBIS survey (GPS)
SIBIS survey: Q and group to be asked	<p>Q. How much do you spend on your mobile phone on average per month? (in Euro. NB in UK, Denmark will be in national currency).</p> <p>Q. Which type of payment package do you use?</p> <p>PAY AS YOU GO</p> <p>MONTHLY SUBSCRIPTION</p> <p>ALL in ONE</p>
eEurope relevance	General indicator for telecommunications and access

Name of indicator	C4 Use of mobile phones abroad															
Definition	Share of households that use mobile phones for international calls															
Notes	Could be combined with an awareness of cost indicator and current roaming pricing (TA35) to see if that is a constraint to use															
Sources	SIBIS survey (GPS)															
SIBIS survey: Q and group to be asked	<p>Q1. Do you use your mobile abroad? YES/NO</p> <p>Q2. Do you use it for business? YES/NO For personal calls YES/NO</p> <p>Q3. If YES to either, on average what % of your calls made abroad will be from your mobile?</p> <table style="margin-left: 40px;"> <thead> <tr> <th></th> <th>Business</th> <th>Personal</th> </tr> </thead> <tbody> <tr> <td>• 75-100%</td> <td></td> <td></td> </tr> <tr> <td>• 50-75%</td> <td></td> <td></td> </tr> <tr> <td>• 25-50%</td> <td></td> <td></td> </tr> <tr> <td>• less than 25%</td> <td></td> <td></td> </tr> </tbody> </table> <p>Q4. Are charges for making/receiving calls abroad different to domestic tariffs? (tick one only)</p> <ul style="list-style-type: none"> <li>• MORE EXPENSIVE</li> <li>• THE SAME</li> <li>• CHEAPER</li> <li>• DON'T KNOW</li> </ul> <p>Q5. If a), does this change your calling behaviour? YES/NO</p> <p>Q6. If Yes, do you:</p> <ul style="list-style-type: none"> <li>• MAKE FEWER CALLS</li> <li>• MAKE MORE CALLS</li> <li>• MAKE SHORTER CALLS</li> <li>• MAKE LONGER CALLS</li> <li>• ONLY USE THE PHONE IN EMERGENCIES</li> </ul> <p>Q7. If No, why not? (tick one only)</p> <ul style="list-style-type: none"> <li>• NO CHOICE – I HAVE TO MAKE CALLS</li> <li>• SOMEBODY ELSE PAYS THE PHONE BILL</li> </ul>		Business	Personal	• 75-100%			• 50-75%			• 25-50%			• less than 25%		
	Business	Personal														
• 75-100%																
• 50-75%																
• 25-50%																
• less than 25%																
eEurope relevance	General indicator for telecommunications and access															

Name of indicator	C5 Satisfaction with mobile service
Definition	Expressed consumer satisfaction with mobile providers
Notes	Should be combined with previous indicator to see if that makes any difference
Sources	SIBIS survey (GPS), OFTEL
SIBIS survey: Q and group to be asked	<p>How satisfied are you with the following aspects of your mobile service provider? (Rank on 1 – 3 scale of Dissatisfied, Satisfied, Very Satisfied)</p> <ul style="list-style-type: none"> <li>• Cost of calls</li> <li>• Cost of calls to other networks</li> <li>• Cost of calls abroad</li> <li>• Network coverage</li> <li>• Frequency of call cut-offs</li> <li>• Customer Service</li> <li>• Overall value for money</li> <li>• Overall Satisfaction</li> </ul>
eEurope relevance	General indicator for telecommunications and access

Name of indicator	C6 Access to current and emerging mobile applications
Definition	Share of households that use advanced mobile appliances
Notes	
Sources	SIBIS survey (GPS)
SIBIS survey: Q and group to be asked	<p>Q1. Do you use a WAP enabled phone? YES/NO</p> <p>Q2. Do you use a 3G enabled devices? YES/NO/DON'T KNOW</p> <p>Q3. If YES, which ones? GLOBAL POSITIONING SATELLITE (GPS) TERMINAL, MOBILE PHONE, PALMTOP, LAPTOP, PERSONAL DIGITAL ASSISTANT (PDA), OTHER (please list)</p> <p>Q4. If NO, why not?</p> <ul style="list-style-type: none"> <li>• NEVER HEARD OF IT,</li> <li>• TOO EXPENSIVE,</li> <li>• UNSURE OF THE TECHNOLOGY,</li> <li>• NO NEED,</li> <li>• NOT ENOUGH DEVICES AVAILABLE,</li> <li>• WON'T WORK WITH EXISTING SYSTEMS,</li> <li>• MIGHT NOT BE RELIABLE, OTHER (please list)</li> </ul> <p>Q5. If YES, which 3G applications do you use? M-COMMERCE (BANKING/SHOPPING), M-LOCATION INFORMATION, (TRAFFIC, MAP, ETC), M-TELEMETRY, (REMOTE CONTROL OF DOMESTIC SECURITY, HEATING, ETC), M-COMMUNICATION (VOICE AND DATA) M-ENTERTAINMENT (MULTIMEDIA, GAMES, MUSIC, VIDEO, ETC), OTHER (please list)</p> <p>Q6. If YES, what are the benefits? SAVES TIME, SAVES MONEY, BETTER QUALITY CONTENT, MORE CONVENIENT, MORE FUN, MORE FLEXIBLE, CAN DO MORE, OTHER (please list)</p>
eEurope relevance	General indicator for telecommunications and access

<b>Name of indicator</b>	<b>C7 Use of emerging mobile applications</b>
Definition	Share of households that use advanced mobile applications
Notes	
Sources	SIBIS survey (GPS)
SIBIS survey: Q and group to be asked	(for those who answered YES to using 3G enabled appliances) Q. Which 3G applications do you use? <ul style="list-style-type: none"> <li>• M-COMMERCE (BANKING/SHOPPING),</li> <li>• M-LOCATION INFORMATION, (TRAFFIC, MAP, ETC),</li> <li>• M-TELEMETRY, (REMOTE CONTROL OF DOMESTIC SECURITY, HEATING, ETC),</li> <li>• M-COMMUNICATION (VOICE AND DATA)</li> <li>• M-ENTERTAINMENT (MULTIMEDIA, GAMES, MUSIC, VIDEO, ETC),</li> <li>• OTHER (please list)</li> </ul> Q. If YES, what are the benefits? SAVES TIME, SAVES MONEY, BETTER QUALITY CONTENT, MORE CONVENIENT, MORE FUN, MORE FLEXIBLE, CAN DO MORE, OTHER (please list)
eEurope relevance	General indicator for telecommunications and access

<b>Name of indicator</b>	<b>C8 Benefits emerging mobile applications</b>
Definition	Benefits of using advanced mobile applications as perceived by households
Notes	
Sources	SIBIS survey (GPS)
SIBIS survey: Q and group to be asked	(for those who answered YES to using 3G enabled applications) Q. What are the benefits of using 3G enabled applications? (please tick all which apply) <ul style="list-style-type: none"> <li>• SAVES TIME,</li> <li>• SAVES MONEY,</li> <li>• ACCESS to BETTER QUALITY CONTENT,</li> <li>• MORE CONVENIENT,</li> <li>• MORE INTERACTIVITY,</li> <li>• MORE FLEXIBLE,</li> <li>• CAN DO MORE,</li> <li>• OTHER (please list)</li> </ul>
eEurope relevance	General indicator for telecommunications and access

Name of indicator	D1 Access to and use of IP Telephony <sup>8</sup>
Definition	Share of Internet users who have IP telephony; and types of use.
Notes	Useful in terms of measuring the potential impact of this technology should it remain reasonably unregulated. Also helpful towards measuring convergence.
Sources	SIBIS survey (GPS)
SIBIS survey Q and group to be asked	<p>Q. Do you use IP Telephony? YES/NO</p> <p>Q. If YES, what type of calls to you make using IP telephony? (tick all which apply)</p> <ul style="list-style-type: none"> <li>• ALL CALLS</li> <li>• INTERNATIONAL CALLS</li> <li>• LONG CALLS IN GENERAL</li> <li>• CONFERENCE CALLS</li> <li>• SEND FAXES</li> <li>• WORK RELATED CALLS</li> </ul> <p>Q. If YES, what proportion of your calls are made using IP telephony? (tick one only)</p> <ul style="list-style-type: none"> <li>• 75% - 100%</li> <li>• 50% - 75%</li> <li>• 25% - 50</li> <li>• 10% - 25%</li> <li>• LESS THAN 10%</li> <li>• LESS THAN 5%</li> </ul> <p>Q. If YES, why do you use IP telephony? (please tick all which apply)</p> <ul style="list-style-type: none"> <li>• CHEAPER</li> <li>• ALLOWS MULTI COMMUNICATION CHANNELS EG SURF/TALK/CONFERENCE ETC</li> <li>• MORE RELIABLE</li> <li>• MORE CONVENIENT</li> </ul> <p>Q. If you answered YES to a), on average how much cheaper is your phone bill using IP? (express as a percentage of your average phone bill)</p>
eEurope relevance	General indicator for telecommunications and access – emerging technology

<sup>8</sup> NB Eventually this may become obsolete as a way of measuring penetration of IP telephony. It is possible that if quality issues are sorted out, mainstream Telcos themselves may adopt IP telephony for phone to phone connections so they can continue to compete. This could mean consumers would not know if they were using VOIP as it would be tied up in the packages on offer from the operators. However, for now it is a valid indicator and will track how an emerging technology is becoming market-focused and actually used.

Name of indicator	E1 Awareness and use of Bluetooth
Definition	Share of households that are aware of Bluetooth, and share that use it.
Notes	-
Sources	SIBIS survey (GPS)
SIBIS survey Q and group to be asked	<p>Q. Have you heard of Bluetooth? YES/NO</p> <p>Q. Do you use Bluetooth? YES/NO</p> <p>Q. If YES, what for? BANKING, SHOPPING, LOCATION INFORMATION, (TRAFFIC, MAP, ETC), TELEMETRY, (REMOTE CONTROL OF DOMESTIC SECURITY, HEATING, ETC), COMMUNICATION (VOICE AND DATA) ENTERTAINMENT (MULTIMEDIA, GAMES, MUSIC, VIDEO, ETC), OTHER (please list)</p> <p>Q. IF NO, why not? NEVER HEARD OF IT, TOO EXPENSIVE, UNSURE OF THE TECHNOLOGY, NO NEED, NOT ENOUGH DEVICES AVAILABLE, WON'T WORK WITH EXISTING SYSTEMS, MIGHT NOT BE RELIABLE, OTHER (please list)</p>
eEurope relevance	General indicator for telecommunications and access – emerging technology

Name of indicator	E2 Shipping of Bluetooth
Definition	
Notes	Question for Bluetooth-enabled product manufacturers
Sources	DMS
SIBIS survey Q and group to be asked	<p>Q. How many Bluetooth enabled products have you shipped? Expressed as:</p> <ul style="list-style-type: none"> <li>• as a whole number</li> <li>• as a percentage of manufacturers products sold</li> <li>• as a EUR turnover equivalent</li> <li>• as a percentage of total sales</li> </ul>
eEurope relevance	General indicator for telecommunications and access – emerging technology

Name of indicator	F1 Barriers to uptake of Ipv6
Definition	Expressed barriers to the uptake of Ipv6
Notes	Types of reasons which mean that Ipv6 might have a slow penetration rate
Sources	DMS
SIBIS survey Q and group to be asked	Q. Have you implemented Ipv6? YES/NO Q. If NO, why not? NEVER HEARD OF IT, NOT READY YET, UNAWARE OF ADVANTAGES, WON'T WORK WITH EXISTING NETWORK SYSTEMS, MIGHT NOT BE RELIABLE, HIGH INVESTMENT COSTS, COST OF LICENCES, WILL WAIT UNTIL IT IS A UNIVERSALLY ACCEPTED PROTOCOL, OTHER (please describe)
eEurope relevance	General indicator for telecommunications and access

### *Other DMS Questions*

Assuming that the DMS survey is going to be a random sample of businesses we have not included any 'professional' questions that could be asked of telecoms companies only. Instead we have included questions which could be asked of any firm, regardless of sector or geographical location. Effectively they are questions of business use of, and demand for, telecommunications services, and can be seen as mirrors of many of the consumer (GPS) questions in the survey. The following could all be used:

- A1, A2, A3, A4 – all with text slightly adapted for business
- B2, B4, B5 (adapted), B6
- C1 adapted, C2, C3, C4, C5, C6, C7, C8
- D1 and E1

## 2.3 Suggestions for composite indices

Consultation with the **UK Office of National Statistics** confirmed that it is acceptable to construct composite indices, providing:

- The data is from recognised and acknowledged sources
- And that it represents sample sizes/time periods which are sufficiently large/close in order for the analysis to be meaningful

Firstly, one way of creating composite indices is to use the concept of eReadiness/digital divide, which is already the subject of several studies including from the World Bank and OECD. These often concentrate on developing countries and access to basic ICT. Under the terms of this study it could be instructive to look at patterns of access to emerging technologies across the EU and whether there is a correlation with say wealth, educational or employment status.

In addition, a second way of structuring composite indicators is to go back to the conclusions of WP1 which showed that there are already many indicators measuring the **existence** of something, fewer measuring the **use** of that technology and fewest measuring the **impact** or **benefit** of that technology. Thus combining them together can give us a 'snapshot' index.

Thirdly, the way the individual indicators have been grouped in the previous section could also provide composite indicators – just by asking all the questions under one of the headings. Further analytical work would need to be done to combine the proposed indicators in such a way that the answers made sense (for example, some responses involve percentages, or other numbers, whilst others are YES/NO binary responses or involve ticking those items which apply in a list). However, by assigning numerical scores to the alphabetical variables, this could easily be overcome.

Since, as stated above, e-readiness indices have been already developed elsewhere, a second approach to compound indicators construction can also be undertaken. This is through combining variables together which have shown to be relevant to provide a 'snapshot' index. Variables to include in this analysis will be derived from the SIBIS GPS, and will include innovative indicators regarding use and adoption of new technologies.

In order to combine the variables and study their interactions, a multivariate analyses of the data will be carried out. Multivariate analysis such as Factor and Cluster Analysis, are designed to look for a small number of higher-level 'factors' consisting of combinations of strongly correlated groups of variables from the original dataset. In this way the original set of variables may be simplified, and the results may suggest a usable set of 'composite' indicators made up of combinations of 'raw' measures.

The principal advantage of this approach is that it does not rely solely on subjective judgement (it does not involve weighting of variables), but is primarily dependent on groupings of statistically similar entities. This confers a degree of objective validity to the procedure which is at least beneficial as a starting point, although there is certainly a place for using judgement as to the utility of the results obtained, and for use of 'manual' modifications as appropriate.

The purpose of this methodology is to:

- Improve understanding of the relationships between various aspects of ICT access and usage
- Determine whether the various indicators implicit in the survey questions are closely correlated, and can be combined to form 'composite indicators'
- To assess whether the survey responses contain information which can be used to 'explain' variations in ICT usage in terms of, for example, differences in individuals' social and economic attributes

- to test for statistically significant differences between countries, and whether there is evidence for distinct 'clusters' of nations with similar ICT characteristics within each cluster, but significant differences between clusters.

**-Internet Snapshot:** The first compound to explore comprises Internet access and usage ( for both narrowband and broadband connections). The following four original variables are the main components of this factor:

Indicator Source	Description
SIBIS GPS	Percentage using a PC in the previous 4 weeks
SIBIS GPS	Percentage sending or receiving an e-mail in the previous 4 weeks
SIBIS GPS	Percentage with access to the Internet at home
SIBIS GPS	Percentage using the Internet in the previous 4 weeks

**-Mobile snapshot:** A second compound indicator to explore comprises mobile telephone ownership and what might be termed 'basic' patterns of usage and communication which do not involve the Mobile Internet.

The following three original variables are main components of this factor are:

Indicator Source	Description
SIBIS GPS	Ownership of a mobile telephone
SIBIS GPS	Having a high proportion of family/friends owning mobiles
SIBIS GPS	High use of SMS messages for communication with other people.

**-Bimodal penetration and usage (read mobile data) snapshot:** It comprises mobile data services access and usage, such as SMS's and WAP.

This third factor combines aspects of the central themes of the first two factors i.e. use of the Internet and mobile telephone usage

Indicator Source	Description
SIBIS GPS	proportion of those using the Internet who have accessed it in a way other than via a PC or Mac
SIBIS GPS	proportion of those owning a mobile with WAP or 2.5G capability, who have used it for viewing WAP pages or web pages, or for e-mail, in the previous 4 weeks
SIBIS GPS	proportion of those with such a mobile who used it for making purchases via the Internet
SIBIS GPS	proportion of those with a mobile who have used SMS messages for receiving financial information, sports results or other subscription services.

Additionally, and in the interest of examining the extent to which ICT usage can be associated with an individuals social and economic circumstances, different demographic variables, such as 'Terminal education age', 'Occupational status', and

'age group', will be selected as independent variables to conduct a Multiple Regression statistical data analysis. Hence, these three variables will be used in an attempt to 'explain' plausible variations in different dependent variables related to access, use and impacts of Internet and mobile technologies, such as

- use of a PC in the previous 4 weeks
- sending or receiving an e-mail in the previous 4 weeks
- Time spent using the Internet at home
- Time spent using the Internet at work
- ownership of a mobile telephone
- Use of mobile to access the Internet

## 3. Annexes

### 3.1 Literature review:

#### 3.1.1 A Brief Introduction to the Topic

The area of Telecommunication and Access encompasses a large area of research. It is important to highlight the importance of this topic in a global context. Telecommunication networks are the infrastructure by which the entire new economy is enabled. In their raw state they provide the infrastructure over which increasingly large proportions of national economic wealth is generated; they have to some extent taken over from traditional infrastructure – road and rail – as the carriers of national prosperity. In order to give a framework to the research being done through SIBIS, a definition of Telecommunications and Access has been taken as:

- **Telecommunications:** Conveyance of speech, music and other sounds, visual images or signals by electric, magnetic, electro-magnetic, electro-chemical or electro-mechanical means
- **Access:** The ability to retrieve data, graphics, sound, text etc whether on-line or offline

However, within these broad, and yet rather bald, statements there are myriad of aspects which might be consider. For example, in terms of telecommunications we can look at (de)regulation, convergence, different technologies, the existence and distribution of telecommunications networks, the status of a nation's competitiveness, the propensity to invest in infrastructure, and market players, shares, dynamics etc. In terms of access we can look at universality, access mechanisms, speed, quality, applications, existence of content, education and skills, socio-economic or demographic influences etc.

Access is a term used to describe the various mechanisms by which citizens, business, and the public sector interact with the networks. They include computers and telephones, and increasingly new devices such as interactive TV, multimedia kiosks and Internet-enabled wireless appliances.

The issue of 'content' (such as e-commerce, e-health, e-government) is covered by the other SIBIS Topic areas, to be outlined in the following chapters of this document.

For reasons of 'data manageability' we have chosen to focus the scope of our investigations on issues which are:

- directly correlated with eEurope priorities OR
- concerned with emerging technologies (on the basis that the detailed information on the distribution of their existence, let alone their use and impact, is still patchy) OR
- concerned with pricing (this topic is still at the forefront of national and European policy attention, especially as a determinant of equality of access) OR
- concerned with regulation (however, although of great interest, this topic is more rigorously treated in the policy documents section. Also, bearing in mind that SIBIS focuses on new statistical indicators for which data can be gathered through representative population and business surveys, measurement of regulatory matters seems to be outside the reach of the project)

### 3.1.2 Main issues from the literature

The main aim of this chapter is to review some of the masses of relevant published literature. It focuses on two principal issues:

- The main issues which emerge from the published literature.
- The existing indicators which are to be found in the published literature

The documents collected gave us an interesting and comprehensive framework of general and specific issues related to Telecommunications and Access. Some papers focused on socio-economic analysis of the impact of telecommunications and access. Others analysed the technical features of the present and forthcoming technologies. One by-product from this analysis is to estimate incumbents' strategies towards the exploitation of new market opportunities, as well as assessing potential new entrants and market winners. Other papers analyse policy implications both from new standards developments and the impact of regulations on market efficiency and competition.

Although there are different issues emerging from the literature reviewed, there are four main domains that are highlighted which have been analysed in the documents collected:

- Broadband
- Wireless infrastructure
- Pricing
- Convergence and regulation

#### Broadband

Broadband is generally characterised as the provision of high speed services (typically at 2Mbps or more), over a variety of infrastructures including wireless, dedicated lines, leased lines or xDSL. The emergence of pervasive broadband is relatively recent (say 1999 onward). The current policy issue is not whether broadband is a 'good thing', but how it can be provided - using which technology and whether there is a need for direct intervention to provide services where there is a market failure.<sup>9</sup>

Although written in 1999, and therefore already somewhat outdated, a Goldman Sachs<sup>10</sup> report concludes that there are six key themes to the creation of a sustainable broadband network. Possibly the most interesting is the assertion that there will be a market driven 'digital divide' as providers choose to target lucrative target audiences with higher value added services (thereby requiring some form of 'control' to ensure equality of opportunity and access), and that many households will have dual broadband access – to the PC via cable or DSL and to the TV via cable. The latter will be lower priced and lower revenue generating, but represents additional subscribers, not substitute subscribers.

A US study conducted in 2000<sup>11</sup> found (rather unsurprisingly) that high-speed access to the Internet is more likely to be available in urban areas. It also concluded that the higher the population density the greater the number of services available, and the higher the average fixed cost, the less likely it is that advanced technologies are employed. It also stated that advanced telecommunications services are not being deployed in low-income and rural areas.

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<sup>9</sup> See Single Programming Documents of a number of EU Member States.

<sup>10</sup> The Race to Build the Broadband Kingdom: A Primer on the Broadband Access Market

<sup>11</sup> Gabel, D and Kwan, F, Accessibility of Broadband Telecommunication Services by Various Segments of the American Population

The study is particularly interesting as it looks at factors influencing providers (telephone and cable TV operators) decisions to provide broadband services, with a focus on xDSL and cable modems. These included costs of supplying service, the cost of accessing Internet backbone as well as regulatory impact. The report ponders whether tax incentives could be used to deploy technology equably, but to do this a Government would need to create a model to estimate the cost of providing advanced services, and some sort of universal service obligation (as in telephony) would need to be enacted. There are acknowledged technical and temporal problems with this. The topic is complicated, and in a fast-moving environment, regulatory delay may well be unacceptable. Auctions are also highlighted as a possible solution but have problems associated with possible monopolies, geographic scope of licences, and associated bidding costs.<sup>12</sup> The recommendation is that the US Government adopt a 'wait and see' strategy.

More recently, (2001), McKinsey<sup>13</sup> estimate that by 2005, 25% of homes in France, Germany, Italy, the Netherlands, Sweden and the UK will have a broadband connection (here defined as one which support a one-way videoconference with two way sound). These are much lower than many other forecasts. The paper discusses how changes in marketing, pricing and timing strategies could affect these projections. Having categorised the countries into early tier adopters (NL and S), medium tier (UK and D) and late tier (I and F), the report concludes that where early competition amongst access providers has occurred, and broadband take-up is relatively strong, price competition (increasing or decreasing price by 25%) will have significant impact in the short term but little impact on take up in the long term. The reverse would be true in late tier countries. Other scenarios are built depending on the technology employed (for example cable is set to outstrip DSL only in the Netherlands. But DSL could still gain market dominance if it was cheaper and coverage wider). Whether one buys into this model or not, it is interesting to see how different levers could effect the development of markets.

Another report, this time from the US<sup>14</sup>, attempts to estimate the eventual economic benefits of broadband access to the Internet using 2 different methods – calculation of the demand function over the next 15-25 years, and calculation of the associated 'consumer surplus' and associated consumer benefits accruing from non-broadband use of higher specification equipment. The estimated benefits range between \$300 bn pa if there were universal diffusion of broadband, but only \$100bn if there was 50% penetration.

## Wireless Networking

### *Mobile*

As of the year 2000/01 we can say that mobile telephony has become a mature technology, in at least some Member States – for example the UK regulator OFTEL reports that for the first time there are more cellular subscribers than for fixed lines. The widely held promises of mobile telephony – easier, faster, cheaper and more convenient – have largely been realised at 2G level for voice services, but it remains to be seen the extent to which promised 3G benefits – speed, quality and the inclusion of data services – will transpire within the predicted timeframes.

In 1999, Goldman Sachs<sup>15</sup> predicted the following key enabling technologies for the 'Mobile Information Society':

<sup>12</sup> The recent wireless internet licence auctions in the UK are good illustrations of this, where demand was so low the majority of licences remained unsold. The UK government has recently (July 2001) relaunched the bidding process.

<sup>13</sup> The Dynamics of European Broadband

<sup>14</sup> Crandall, R.W and Jackson, C.L , *The \$500bn Opportunity – the Potential Economic Benefit of Widespread Diffusion of Broadband Internet Access.* (2001)

<sup>15</sup> Wireless Wave II – the Data Wave Unplugged

2000	WAP	Concentrated industry attention on connectivity/interoperability. Stimulated consumer awareness
2001	GPRS	Started shift to packet-based systems. Provided initial support for business wireless email
2002	Bluetooth	Simplifies connectivity between wireless devices. Supports a wide range of consumer and office applications
2003	3G	Data speeds reach 'meaningful' levels. Platforms and technologies evolve for mass market rollout

In an article issued in 2001, the Mobile Virtual Centre of Excellence<sup>16</sup> looks forward, to 2010 and the advent of 4G mobile. This will use embedded radio chips to provide short-range communication between objects. Whereas the transition from 2G to 3G was characterised by mono-media to multi-media, the transition from 3G to 4G will be characterised by machine to machine interaction and the so-called intelligent machine with the capacity to operate autonomously, and to 'learn'. It is perhaps, salutary; however, to reflect on recent market announcements (from Vodafone), that long-promised technological enhancements from 3G (such as faster download speeds) are not going to be forthcoming for some time.

### *Bluetooth*

Information on Bluetooth is apparently limited to technological descriptions and some imaginative and optimistic pictures of seamless domestic and working life scenarios which are improved by Bluetooth applications. This type of output is designed to raise awareness – typical and indicative of new technologies.

A short description may be helpful here. Bluetooth is an open industry grouping founded by Nokia, Ericsson, IBM, Intel and Toshiba. Now 1,000 organisations participate. It is a 'wireless personal area networking standard' (WPAN). It enables low power, short-range communications using unlicensed microwave spectrum (at 2.45GHz). The idea is that eventually the need for cabling between devices. These include traditional ones such as TV, PC etc as well as non-traditional appliances which will be Bluetooth-enabled to offer email, telephony or Internet access. The latter include domestic appliances such as fridges, as well as printers, fax machines and other more 'obvious' user interfaces. Original estimates foresaw commercial Bluetooth applications available in 2000, with over 100m appliances enabled by 2002. Once again, these market estimates have proved overambitious.

## **The Internet**

### *Internet Access*

According to MIT<sup>17</sup>, the premise of most users accessing the Internet via the computer is outdated, and the world is changing into one where 'Internet Appliances' (IA) make up the majority of access mechanisms. These are basically categorised as 'intelligent end-nodes' which allow users freedom of choice (which ISP to use, which new software to download) in exchange for dealing with increased complexity, which, in most cases, the IA successfully masks from the user. The paper considers whether this has implications for the industry structure which in turn may have regulatory implications. For example, will IA threaten 'the fully disaggregated business model that helps drive the rapid pace of Internet innovation'? This considers topics such as increased switching costs and whether certain types of IA are more pro-competition than others. The paper defines three classification of IA (Class 1 – fixed function, with little adaptability, Class 2 – fixed function but with some adaptability, and Class 3 – fully flexible). The paper argues that Class 1 and Class 2 IA may end up excluding users from full and free choice of access to the Internet and how they choose to use it, although the devices may be easier to use.

<sup>16</sup> Mobile Communications in 2010: Visions of 4G.

<sup>17</sup> A Taxonomy of Internet Appliances

### *Internet Telephony*

The Internet and IP-based networks are increasingly being used as alternatives to the public switched telephone network. Internet Telephony Service Providers (ITSPs) can provide voice and fax services which are close to becoming functionally equivalent to those provided by public telecommunication operators (PTOs). However, national authorities license few ITSPs and they generally do not have any universal service obligations. In fact, several countries<sup>18</sup> ban IP telephony completely, yet IP calls can be made to almost any telephone in the world. Many PTOs are establishing their own IP telephony services, and/or using IP-based networks as alternative transmission platforms.

In the longer term, as more and more voice traffic travels over IP, there will be little to distinguish between IP telephony and circuit-switched telephony. However, many telecommunications regulatory schemes depend upon such a distinction, both physically and as a matter of policy and law. As these trends continue, the telecommunications framework will come under increasing pressure to adapt.

In real terms, Internet telephony has been evolving since 1996. The term usually describes the provision of single point to point voice telephony using Internet Protocols (VOIP), but it can be extended to enhanced services such as multi-party, multi-country calling. MIT's *Taxonomy of Internet Telephony Applications*<sup>19</sup> discusses 3 classes of Internet Telephony applications – Class 1 (international/long distance POTS using Internet technology), where the user continues to use the local phone system to connect, although the voice signal is then carried over IP. The advantage is lower cost. Class 2 (hybrid) is a medium-term option between Class 1 and Class 3 and Class 3 (long-term Internet based communication) where there is computer to computer communication, including voice and data applications, and many to many (multicast broadcasting). The differentiating characteristics of Class 3 are that it is not reliant on, or constrained by POTS functionality, there is a 'migration' of functionality towards the end-node (ie the computer) rather than being in the network, and, allegedly, ease of use. The report notes that improvements need to be made to the Internet to enable all these developments – quality of service, differentiated pricing, reliability, 'always on' connectivity, universal service.

It has now reached a stage where according to MIT<sup>20</sup>, divergent market models are emerging. Some companies are becoming IP carriers and service providers whilst others have refrained from expanding into infrastructure. The report goes on to discuss various national markets and their potential attractiveness to investors, arguing that the rate of increase of per capita spending on ICT is more important an indicator than the absolute rate of investment. It ends by concluding that Europe's lack of fixed infrastructure, over supply of mobiles and relatively high prices (compared to the US) may fuel the market for VOIP extremely rapidly.

The OECD report<sup>21</sup> does not address this forecasting topic specifically, but agrees that the potential global market is huge - although it states that market estimates vary enormously, depending on whether they are based on numbers of PC users or the number of telephone subscribers. It surmises that both Internet telephony quality and costs will rise, and competition will be feature-based rather than price-based. There will be an impact on telecom revenues (particularly on international revenues and in countries where there are flat rate local calls). It is anticipated that decreasing revenue from international calls may be offset by increasing volumes of calls. Tariff structures are also likely to need addressing.

<sup>18</sup> but not any EU MS, as these all fall outside the regulatory definition of 'real-time' and hence do not come under these particular regulatory constraints

<sup>19</sup> Clark, D. D, *Taxonomy of Internet Telephony Applications*, 1998

<sup>20</sup> McGarty, T.P., *The Evolution of Internet Telephony*, 2000

<sup>21</sup> OECD, *Internet Voice Telephony Developments*, 1998

## IPv6

IPv6 is the new generation Internet protocol. It allows all (based on current growth estimates) Internet-enabled appliances to have their own IP address. The current generation of IP (IPv4) is perhaps already half used-up, and the problem is particularly acute in Europe, where demand for IP enabled appliances, the development of wireless is rapid, and use of networks is huge. IPv6 uses 128 bit addresses as opposed to 32 bits, and is therefore exponentially bigger. This is important because the current size and strength of the wireless market is high, and 3G technologies will only increase demand for access to IP address space.

However, it is apparent that the rollout and changeover to IPv6 is happening slowly and in a fragmented fashion. There is no definitive regulatory imperative to do so, although the European Union is pushing for adoption, and it is widely accepted that economic and business necessity will force the rollout. Estimates vary, but initial early signs of adoption of IPv6 are current in Japan and Scandinavia, with predictions that 50% rollout will be achieved in Asia by 2005. The first wave of widespread deployment is likely to occur when large numbers of personal computers make the changeover to IPv6 – this may occur before the end of 2001, when Microsoft Corporation launches Windows XP, the next version of its Windows operating system. Widespread mobile access using IPv6 is predicted around 2003, by Ericsson, amongst others.

## Convergence and Regulation

### *Regulation – Interconnection and Unbundling*

The impact of regulation on the telecommunications industry is a complex and complicated issue. Although the majority of information on regulatory activity is contained in regulatory documents (and hence there is more detail on regulatory approaches in the policy documents section) and reports from National Regulatory Authorities (NRAs), discussion of regulatory *impacts* is contained in other types of report.

For example, a US report<sup>22</sup> concludes that it is imperative to have facility-based competition (ie infrastructure-based competition) in the telecoms market, to ensure long term efficiency in a market dominated by technological change. It goes on to report that facility based competition can be inter-modal (between different transmission media such as copper wire or fibre optic) or intra-modal (between different operators who use the same transmission medium). It concludes that inter-modal competition particularly supports long term efficiency. The following are particularly important:

- Cost orientation of incumbent operators interconnection rates; basically all prices particularly those from those with Significant Market Power (SMP) need to be cost-oriented – ie matched by the construction of more efficient/faster/better quality access and networks
- Different interconnection rates should be charged to infrastructure providers, service providers and resellers (ie ascending) to allow everybody in the supply chain to operate efficiently and to provide an incentive for investment in infrastructure
- Access to unbundled network elements – this should be limited to essential facilities, and should be based on actual incremental cost rather than Total Element Long Run Incremental Cost

### *Convergence*

Again, the key documents on this topic appear in the policy documents section – led by the EC's Green Paper on Convergence, which argues that as technology is increasingly converging, there is a need for a more streamlined and coherent vision of regulatory policy making. In some Member States (such as the UK) a 'converged communications regulator' is

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<sup>22</sup> Kiessling T. and Blondeel Y., The Impact of Regulation on Facility-based Competition in Telecommunications: A Comparative Analysis of recent developments in North America and the European Union, 2000

being created. There are various aspects to this topic. For example, MIT's paper on IA outlined above, concludes that Class 3 devices may support innovation but may lead to further blurring of the boundaries between Telecommunications, Broadcasting and Regulation – convergence of technology will lead to the convergence of policy making. Also, if more people access the Internet, through more simplistic devices such as Class 1 and Class 2, then privacy and security policy protection may need to be improved.

Regulation of Internet Voice Telephony is briefly discussed by the OECD, which highlights different approaches in different countries – some believe that telecoms regulation should apply to VOIP, others believe this would hamper innovation. Discussions centre on definitions of 'voice telephony' and whether these apply to IP. It argues that concepts such as 'commercial provision of service', 'real-time' and 'switching' need to be carefully considered in the light of IP development.

## 2 Policy documents

### Overview: Policy documents on Telecommunications and Access

The following chapter covers a variety of policy documents at supra-national and national level, which contain information on regulation, legislation and important national policy directions and priorities. It must be noted that this is a subset of the longer policy documents table already supplied in WP1. It contains both those documents which stand out as particularly important or central to the topic, and those documents which have been collected and analysed since the delivery of WP1.

### Policy documents at European level

This section provides a textual overview of the main EU policy documents in the topic area, concentrating on identifying the main issues. Obviously the universe of available documents is enormous, but we have selected relevant publications on the basis of universality and authority, and relevance to eEurope priorities.

In summary, the majority of documents from the **European Commission** relate to legislation and regulation. In the era of open telecommunications access and the Single Market it is obviously imperative that there is harmonisation of legislative approach. This is most appropriately achieved at the level of the European Commission, rather than at Member State level. Key topics under consideration include inter-operability, inter-connection, unbundling of the local loop, convergence and allocation of the radio spectrum.

From the **OECD** there are possibly more 'reflective' pieces concerning particular aspects of technologies, markets or policies, rather than documents which will directly help set the regulatory framework for Europe. Topics include mobile telephony, aspects of the Internet (technological and regulatory) and Interconnection.

### Key supranational policy documents relevant to Telecommunications and Access

**A review of market openness and trade in Telecommunications**, September 1999, OECD

The document develops indications of areas where further consideration and actions might be required. A policy and regulatory evaluation of developments in telecommunications market openness following liberalisation in 1998/99.

**CEPT/ECTRA Recommendation on Use of Special Network Access**, March 1999, ECTRA

The Recommendation outlines policies for the adoption of measures related to SNA (Special Network Access) specifications. In order that NRAs facilitate the provision of SNA or access on request in accordance with the principles outlined in the voice telephony directive and interconnect directive referenced in the document.

### **Commission Recommendation on leased lines interconnection pricing in a liberalised telecommunications market, 1999, European Commission**

The document recommends that national regulatory authorities take steps to implement parallel measures that will stimulate competition in the local access network, in particular to meet users' needs for competitive leased line provision and high-speed Internet access.

DIRECTIVE COD/2000/0186: Title: Electronic communications: access to networks and interconnection: The new regulatory framework (Within this framework there are 5 new directives included and related to Telecommunications and access): Framework directive, Access and interconnection directive, authorisation directive, directive on Universal service users' rights and a Decision of the European Parliament and of the Council on a regulatory framework for radio spectrum policy in the European Community (Radio Spectrum Decision) (3674/01): the package makes a number of provisions for the continued use of the Internet in the EU. It is supplemented by a Directive on protection of personal data, which should have been introduced in May 2002. The Framework Directive harmonises the way Member States regulate the market between suppliers of telecoms networks and services. It gives 'technology neutral' rules which can be applied in specific geographical areas to identify problems between suppliers of access and interconnection. It provides legal certainty for players by establishing clear criteria for their rights and obligations, and for causes of regulatory intervention. It imposes limits on access and interconnection obligations, whilst ensuring enough flexibility to allow NRAs to deal effectively with problems and issues.

In addition, the Framework Directive provides a framework to allow the development of pan-European electronic networks and services to allow businesses and consumers to take advantage of the Single Market through the harmonisation and simplification of authorisation rules and conditions. This includes the allocation of radio frequencies and numbering. Likewise, it regulates Access to and Interconnection of Electronic Communications Networks and Associated Facilities. It regulates all electronic communications networks, including powerline networks. Media convergence should lead to regulatory convergence. A new regulatory framework is desired to do this. The new framework consists of several directives: this one, the authorisation of electronic networks and services, interconnection of electronic networks and associated facilities, universal services and user rights to electronic networks and services, and the processing of electronic data and personal privacy as well as the Regulation on unbundling access to the local loop. The framework does not cover content. Its success will depend on the degree of regulatory harmonisation across the EU.

General issues related to Radio Spectrum, its economic value and importance for the EU, the EU's policy situation and further comments to be developed by stakeholders. Identify how best to approach and implement Spectrum Policy at Community level. The Radio Spectrum Directive will help to identify how to accommodate in a practical way the specific needs of this sector in terms of co-ordination modalities and protection of radio spectrum within the overall framework of a generic approach to radio spectrum policy, i.e. covering all sectors.

The Directive is designed to ensure harmonised availability and efficient use of limited availability of radio spectrum. Better institutional arrangements for spectrum management are required to identify how best to approach and implement Spectrum Policy at Community level. The Green Paper on Radio Spectrum Policy has helped to inform this process. This proposal aims to set in place a policy platform, which is responsive to technological, market and regulatory needs and to safeguard Community interests at an international level. The proposal aims to get framework agreement to keep the policy decision making process short.

**Results of the World Telecommunications Conference, in the context of radio spectrum policy in the European Community**, COM (2000) 811 final, European Commission

The WRC is held every 2-3 years and is the mechanism by which the Radio Regulations (global obligations concerning use of radio spectrum) are made. This communication identifies how well the WRC satisfies Community objectives with regard to radio spectrum policy, assesses the significance of its results and evaluates its negotiation process. The Communication concludes that WRC satisfies Community objectives fairly well with regard to 3G, satellite navigation and broadcasting, broadband satellite and fixed wireless. Other issues were less well aligned. The results give added regulatory certainty for investing and licensing 3G (possibly the most significant outcome) and the negotiation process was seen as largely positive and workable.

**Green Paper on the Convergence of the Telecommunications, Media and Information Technology Sectors, and the implications for regulation towards an Information society approach** COM(97)623, European Commission

The document analyses the converge phenomenon, its technological underpinnings, current market developments. Moreover it identifies the barriers and how they can hold back technological and market developments.

**Implementation and functioning of the mobile communication frequency directives**., 1998, European Commission

This Communication:

- reports on the implementation and functioning of the three Council Directives which reserved frequency spectrum for the co-ordinated introduction of GSM, GPRS and DECT and reviews the extent with which Member States have complied with the requirements of the Directives;
- assesses the impact of the frequency directives on the development of the markets for each of these three technologies.
- considers additional action needed to ensure full compliance of the national regulatory framework with the requirements of the directive, in order to further encourage the development of the market.

Following this Communication, the Commission has initiated a wide discussion on the appropriateness of the current regulatory framework for frequency allocation in the Community, with a view to considering the need for additional Community measures in the area, where appropriate.

**Local Access Pricing and E-commerce**, 26 July 2000, OECD, DSTI

The document examines the performance of different OECD countries, in the development and usage of the Internet, in relation to the pricing of access. The available evidence suggests that there is a growing 'international digital divide' emerging between OECD countries. This conclusion is contrary to a widespread view that the gaps between countries in the development of electronic commerce are narrowing. The reports suggests actions for policy makers or regulators

**Regulation (EC) n. 2887/2000 on unbundled access to the local loop**, December 2000, European Commission

The document addresses access to metallic local loops, without prejudice to national obligations regarding other types of access to local infrastructures.

**Sixth Report on the Implementation of the Telecommunications Regulatory Package**, December 2000, European Commission

This report looks at the state of implementation of the EU regulatory framework., sketching out the major **developments in the market**; analysing the implementation of the **key regulatory principles** covered by the current framework; and drawing conclusions which are intended to contribute to the attainment of the eEurope objectives set at Lisbon and Feira during the transition to the new regulatory framework.

**Telecommunications Regulations: Institutional structures and responsibilities**, May 2000, OECD, DSTI

The liberalisation of telecommunication markets has required a new set of regulatory principles that can ensure fair competition in the marketplace. As a result, OECD Member countries have changed their regulatory frameworks for the telecommunications sector as liberalisation in the telecommunications market was implemented. Consequently, together with the changes in regulatory rules, there have been changes in the role of regulatory institutions in the telecommunications sector. This paper aims to stimulate reflection on best-practice regulation by undertaking a comparative examination on the role of regulatory institutions and the relationship between them.

**The Introduction of Third Generation Mobile Communications in the European Union: State of Play and the Way Forward**, 20 March 2001, European Commission

This Communication briefly takes stock of the situation and identifies in particular four critical layers which may impact on the successful deployment of 3G services over the forthcoming years:

1. The regulatory environment
2. The financial context
3. Gaining experience with the new market
4. Outstanding technical issues

The document does not cover the full range of topics related to the introduction of advanced mobile data service in the EU, such as the social implications, the protection of users or the legal issues relating to content. It focuses instead mainly on some regulatory and technical issues critical to the success in the EU of 3G technology, the system which will allow the introduction of these new services. The document proposes several actions to address these issues at Community level.

**The results of the public consultation on the 1999 Communication review and Orientations for the New Regulatory framework**, 26 April 2000, European Commission

The document draws conclusions with regard to the content of its forthcoming proposals for the new regulatory framework.

**Commission calls for rapid move towards new generation Internet Protocol to secure success of future wireless services**, 24 April 2001, European Commission

The paper communicates the results of the first meeting of the European industry led task force established to develop a comprehensive action plan by the end of 2001 to ensure the timely availability of the next generation of the Internet Protocol (Ipv6).

**Interconnection and Local Competition**, 7 Feb 2001, OECD

The report discusses the extent to which new entrants are entering telephony markets, taking interconnection charges into account. If these are too high new entrants are discouraged, if they are too low incumbent operators cannot reclaim investment in infrastructure etc. The

report argues that interconnection charges should be calculated on the basis of forward looking incremental costs.

#### **Internet Traffic Exchange: Developments and Policy, 1998, OECD**

The report discusses Internet traffic exchange as it is the subject of various regulatory issues. For example, some local telcos believe that there are inequalities for dial-up users in respect to telecoms regulation which is applied to the final part of the service delivery, some small ISPs are complaining about interconnection charges, and there is a need for better (private sector) management of the Domain Name System (now ongoing).

#### **OECD Workshops on the Economics of the Information Society: A synthesis of policy implications. March 1999, OECD**

The report is a synthesis of a number of workshops on Economic and Social Effects of Information Infrastructures, Network Economics, Electronic Commerce, HR in the Information Society, Govt. Responses to the Emerging IS and Market Competition and Innovation in the IS.

#### **Interconnection and Local Competition, 7<sup>th</sup> February 200, OECD**

The report looks at the competitiveness of the local telecoms market, where despite unbundling, most MS still have dominant incumbents, and in many cases no prospect of sufficient margins to encourage new entrants. This is caused by a so-called 'price squeeze' situation where retail tariffs are not fully balanced, and interconnection charges are not cost-oriented. The report examines interconnection charges. If they are too high new entrants are barred, too low and incumbents cannot recover infrastructure investment costs. The report concludes that Long Run Incremental Costs (LRIC) is the best model to adopt

#### **Cellular Mobile Pricing Structures and Trends, 16 May 2000, OECD**

The report discusses mobile pricing structures and trends, looking at changing market dynamics, increasing penetration rates, convergence with fixed networks and prepaid cards. The main points arising are that there is a strong correlation between market growth and market openness, mobile prices have been reduced dramatically, but they still remain high in some countries/market segments, there are high mobile termination charges, prices for international roaming bear little relation to cost, greater regulatory attention needs to be paid to mobile to fixed networks, and to mobile-enabled services such as ecommerce.

#### **Internet Voice Telephony Developments, 1998, OECD**

The report discusses internet telephony in terms of technology, service options and enhancements, how this new form might effect call patterns and charges.

The report concludes that the market potential is high, that price is currently low (compared to other telephony), but so is quality, so prices may rise as quality improvements are made and infrastructure investment is made. Tariff structures may also change.

### **Policy documents at Member State level**

This section provides a textual overview of the main national policy documents in the topic area, concentrating on identifying the main issues, which are described in the overview table below. Please note that there is a separate table for the US given at the end of the chapter.

In the **UK**, many policy documents relate to regulation and to preserving the traditionally open and liberalised nature of the telecoms market and industry. Topics of interest include unbundling, mobile, pricing of the radio spectrum, interconnection charges etc. There is also interest in technological convergence and how this will impinge on regulation. Discussions for

a super-national regulatory body have been underway for some years, but decisions on how this will be taken forward (by the so-called OFCOM or Office of Communications) have only recently been published<sup>23</sup>.

In terms of access, the Communications White Paper, *A new future for Communications* is a key document. The provision of high speed access, via broadband, is of particular interest as both the *UK Online: The Broadband Future*, and the *Rural White Paper* (not cited here) move on from discussions of whether access should be provided, as to how this may occur in those instances (eg rural areas) where there is a weak commercial case for provision. Claims that the UK will be a leading nation in Europe in terms of its high speed infrastructure are perhaps a little premature, as information available from the OECD<sup>24</sup> indicates that only 39% of the UK had *potential* DSL coverage by the end of 2000.

In **France**, the majority of documents relate to creating the policy framework conditions in which the Information Society can be developed equably. The regulatory documents cover unbundling, convergence, the guidelines for using Long Run Average Incremental Costs (LRAIC), inter-connection costs and the results of public consultation on mobile telephony, IP telephony and number portability.

In Denmark, the focus is on Access issues and new radio spectrum frequencies, Finland is looking at the mobile market and competition, whilst in Sweden the emphasis is on broadband, the Internet and competition.

## Key telecommunications and access policy documents in the United Kingdom

### **OFTEL's 2000/01 review of dial-up Internet access market, September 2000 (OFTEL)**

The document contains useful definitions and indicators for the study. They have been set up by Oftel to "assess effective competition" in the Internet market.

Oftel looks at market shares in three segments:

- Internet call originator
- Internet call terminator
- Internet Protocols

The document provides a timetable on Internet dial-up access market review

### **Local Loop Unbundling: The Terms of the Access Network Facilities Agreement, Statement and Determination, 21 February 2001, (OFTEL) UK**

This Statement and Determination concerns the terms and conditions upon which BT makes available unbundled local loops. The document sets a determination responding to a group of operators concerning some of the terms offered by BT for local loop unbundling (in its offer dated 4 September 2000), which they believe were unreasonable. The areas of dispute did not cover all of the terms of the offer made by BT or required under Condition 83 of BT's licence.

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<sup>23</sup> Department of Trade and Industry, and the Department for Culture, Media and Sport, the Office of Communications Bill, 13<sup>th</sup> July 2001. The Bill allows for an Office of Communication to be set up, and for it to begin regulation in 20003. OFCOM would take on the responsibilities of 5 existing regulators.

<sup>24</sup> OECD, (2001) Telecommunications Outlook 2001, Paris

**Access to bandwidth: shared access to the local loop. Statement on the implementation of shared access to the local loop in the UK, December 2000 (OFTEL) UK**

The document is a follow up of a previous statement dated 10/2000. In this document, OfTel confirms the pricing principles it set out in October 2000 and confirms OfTel's intention to determine the price of shared access to BT's local loops in 2001. It largely confirms the technical options proposed in October 2000 in respect of BT's network.

The paper sets out OfTel's expectations of the timescale for the availability of shared access to BT's Local Loop.

**Spectrum Pricing: third stage, update and consultation, December 2000 RA - Radiocommunications Agency, DTI, UK**

The documents outlines changes in the Radiocommunications Agency's (RA) implementation of administrative spectrum pricing proposed to become effective from July 2001 and beyond. This third stage update and consultation document aims to outline the Radiocommunications Agency's (RA) latest proposals for implementation of administrative spectrum pricing through regulation under the powers of the Wireless Telegraphy Act 1998.

**Joint ITC, OFTEL and OFT advice to government on Digital Television, Consultation April 2000 (OFTEL) UK**

The Government wants the switchover from analogue to digital television broadcasting to happen quickly and smoothly and to the benefit of consumers. In the interests of facilitating this the Government has asked the ITC, OfTel and OFT to provide advice on options for ensuring that the digital television market does not develop in such a way as to inhibit competition or set unnecessary barriers for consumers to access new services. The purpose of this joint consultation is to elicit information to help with the formulation of such advice.

**UK online: the broadband future, 13 February 2001 Cabinet Office (UK)**

This report is submitted by the e-Minister and the e-Envoy in response to the Prime Minister's request for an action plan to help drive forward broadband networks in the UK. It reflects initial consultation with suppliers of broadband services, Government departments, Devolved Administrations, Regional Development Agencies and other stakeholders in the public and private sector. To set out the current state of play with regard to broadband in the UK, and to identify a strategy to ensure fair and equitable access to it regardless of location. The recommended actions are:

- Create a strategic partnership
- Continue to drive forward competition
- Tackle barriers to growth of the broadband market
- Tackle fragmented demand
- Stimulate production of content
- Tackle skills gap
- Start research into longer term strategy development

**Consultation on future interconnection arrangements for dial-up Internet in the United Kingdom November 2000 (OFTEL) UK**

The document sets out the objectives; timetable and scope of the review; explains how OfTel intends to measure competition; and asks stakeholders for their input into the process

The objectives of the effective competition review of Internet access are:

1. To review the state of competition in Internet access in the UK and to assess if OfTel's objective of "effective competition-benefiting consumers" is being met.
2. To use these results to determine whether the current mix of formal, co and self-regulation is working effectively and to identify and lift / impose any necessary regulatory action flowing from those finding

**Access Network facilities: OfTel guidelines on Condition 83 of BT's Licence, September 2000 (OFTEL) UK**

Local Loop Unbundling will have a far-reaching impact on the choice and services available to consumers and smaller businesses, the provisions of Condition 83 are primarily of interest to Operators, as it will be they who will be purchasing the new set of wholesale services from BT. This document is mainly focussed on giving guidance to Operators and BT on the provisions of Condition 83 and the way in which the Director General of Telecommunications is likely to apply the provisions where he has discretion.

**A new future for Communications** December 2000, DTI, UK

This is the White Paper on Communications delivered by the UK Government. It sets out the Government's response to the new communications regulation in the 21st century. It aims to promote access to the Internet and higher bandwidth services. To strengthen the regional dimension to UK broadcasting and to support the independent production sector, as well as to consider new plans for community media.

**Principles of implementation and best practice regarding Local Loop Unbundling, 24 November 2000 OFTEL - Office of Telecommunications, UK**

These principles of implementation and best practice (PIBs) have been devised by the IRG to assist in the process of harmonising implementation in IRG member states. The NRAs are committed to implement these principles wherever possible. To make National Regulatory Authorities (NRAs) implement the regulatory framework laid down in EU and national law. The PIBs have been developed over a two month period to facilitate a quick implementation of LLU in line with the regulation. Not all relevant issues could be addressed within this timeframe (i.e. cost basis for shared access). IRG is committed to the development and evaluation of PIBs as LLU is implemented and practical experience is gained in a growing number of countries. Interested parties will be informed via the IRG website on future developments.

**Local Loop Unbundling Fact Sheet, June 2001 (OFTEL), UK**

The document outlines the background of the local loop unbundling and gives an update on current progress. It aims to answer the most frequently questions on LLU. The progress of the LLU is recorded on monthly basis. This is followed by a series of annexes which give detail on what LLU is and are designed to answer further rising questions.

**Local Loop Unbundling – House of Commons Select Committee on Trade and Industry – OFTEL Comments on the Committee's sixth report of 20 March 2001, May 2001 OFTEL, UK**

The document is a response to the House of Commons Selected Committee's report on LLU. It described the progress made in the UK in the implementation of the LLU and its future developments. The document also contains a comparison with LLU in mainland Europe and further miscellaneous points raised by the committee. The document aims to give a framework on the state of the art of the LLU in the UK, supported by external comments from the House of Commons.

**3G Mobile Infrastructure Sharing in the UK – Note for Information, May 2001 OFTEL, UK**

The document gives an overall view on the Infrastructure sharing. It contains a brief description of the different sorts of infrastructure sharing which might take place and then

describes the general principles of regulation which apply to infrastructure sharing. It defines the Infrastructures sharing and it gives information about the regulation background. It highlights some issues rising from then Wireless Telegraphy Act and further competition issues as well. The purpose of this document is to give an overview on issues that would arise from operators sharing infrastructures as 3G mobile networks are rolled out in the UK.

### **Review of Effective Competition in Dial-UP Internet Access, July 2001 OFTEL, UK**

This consultation document presents the findings of OfTel's review of effective competition in dial-up Internet access. It has assessed the extent to which competition is providing UK consumers with the best deal in quality, choice and value for money. The aim is a regulatory regime that is appropriate to the extent of competition in the market. This review considers effective competition in dial-up Internet access and the benefits enjoyed by residential and business consumers in the UK.

OfTel invites views on its assessment of effective competition and levels of regulation. Residential and business dial-up Internet consumers are getting a good deal. OfTel considers that the retail market is effectively competitive because:

- UK prices compare with the best in the world;
- there is a wide range of packages;
- the UK is the first market in Europe to offer consumers competitive unmetered packages;
- UK consumers are generally satisfied with the quality of service they receive; and
- low barriers to entry, the plethora of tariff structure and options and the large number of suppliers are all indicative of an absence of supernormal profits and pricing above the competitive level.

OfTel considers that BT is dominant in wholesale call origination:

- the wholesale call origination market is not effectively competitive. BT has a large market share, estimated at over 80%; and
- there is some competition in infrastructure but continued network charge controls and the availability of quality wholesale products such as FRIACO (Flat Rate Internet Access Call Origination), are essential to maintain competition.

### **International benchmarking study of dial-up PSTN Internet access, mobile and fixed line services, June 2001 OFTEL, UK**

This report is an International Benchmarking study of:

- Dial up PSTN Internet access;
- Mobile services (including both "domestic" and "roaming "services);
- Fixed line (PSTN and ISDN) services;
- in France, Germany, Italy (mobile only), Sweden, United Kingdom and the US States of Ohio and California (not for mobile).
- The results of this benchmarking study indicate that, relative to consumers in other countries:
- UK residential consumers benefit from low prices for Internet access (both peak and off-peak);
- UK mobile consumers benefit from relatively low prices for domestic services and relatively low prices are also available for UK users of mobile roaming services;
- Prices for UK residential consumers for PSTN services generally compare favourably, with only Sweden having lower prices;

- UK business consumers benefit from the availability of unmetered packages for high/unlimited Internet use. Prices for limited usage Internet baskets are about average as are prices for PSTN services; and
- UK prices for ISDN services are relatively high, particularly for business consumers.

**Effective Competitive Review – Mobile**, Feb 2001 OFTEL - Office of Telecommunications, UK

Ofel's objective in carrying out this review is to ensure that the mobile sector is providing the consumer with the best possible deal in terms of price, choice and quality. Ofel considers that the UK consumer is, in many respects, currently getting a good deal.

The purpose of this consultation is for Ofel to reach final conclusions on whether effective competition exists and, if not, what regulation of the mobile sector is necessary, in the light of the outcome of this consultation. Ofel believes that the crucial questions to be resolved are:

- do the levels of profitability and the relative pricing of some operators mean that consumers are paying too much for mobile telephony services, or can at least some of the apparent high profitability be explained by the fact that these operators are efficient ?
- even if the mobile sector is not effectively competitive now, how far away is effective competition? Is it within the 2 year timescale considered by this review?

## Key telecommunications and access policy documents in France

**France's response to the Green Paper on convergence in the telecommunications, media and information technology sectors and the implications for regulation**, 1998, French Government

The document outlines France's position on two different levels namely at the national level and community level. It covers a number of topics including network infrastructure and its increasing interchangeability, scarcity of bandwidth, division of services into public and private, regulation, linguistic and cultural diversity. The document does not provide specific information about further steps, other than in a general way. However, it does say that France would want to adopt Option 1 in the Green Paper (adapting existing frameworks by means of successive adjustments), not Option 2 – a separate regulatory framework for the new services of the digital economy.

**Telecommunications Act Of 1996**, French Ministry of Post, Telecommunications and Space

Definitions and principles are followed by the Legal Regime in chapter II, the public service obligations set out in chapter III, which include "guaranteeing every person access to the universal service, shall be safeguarded and developed; Regulation of the telecommunications sector shall be carried out independently of the operation of networks and the provision of telecommunications services. Regulation shall be administered, on behalf of the Government, by the telecommunications minister and the telecommunications regulatory authority, in accordance with the provisions of the regulatory framework for telecommunications (chapter IV)"

**Decision no. 00-1176 Adopting the guidelines for the verification of the cost orientation of tariffs for local loop access**, 31 October 2000 ART

In adopting these measures, ART pursues the same goals which led it to establish, the decision no. 00-1171 - the average long run incremental costs method (LRIC). Thus, the same principles of cost orientation, efficiency, non-discrimination and fair and long-lasting competition, as explained in the above-mentioned decision, will guide ART in the requests

and verifications it will have to make with respect to France Telecom's offer for access to the local loop

**Decision no. 00-1171 in application of article D.99-24 of the Post and Telecommunications Code, 31 October 2000 ART**

ART—in this decision—establishes the list of relevant costs and defines the method for calculating long run average incremental costs (LRAIC).

**Public Consultation on the Introduction of UMTS in France February 1999 ART**

The public consultation document is divided into two parts. The first part deals with the overall implications of UMTS, and studies in depth the issues raised within the CCR/UMTS group - such as the types of services that will make UMTS a success, and the role of the various players concerned. The second part invites players' views on issues directly associated with UMTS licensing. The French telecommunications regulatory authority seeks views and comments from all players in the IT&T industry, in order to enhance its understanding of the implications of UMTS, and enable it to prepare for the introduction of UMTS in France.

**Quality evaluation study conducted in 2000 on mobile telephony network services in France, 20 February 2001, ART**

The results of a survey of the quality of mobile telephony services in metropolitan areas in France published. The study shows that although there is no service saturation in cities of between 50,000 and 400,000 citizens, there are problems of decreased service quality levels during busiest periods in cities of more than 400,000 people. Failure rate and cut-off rate measured at "very peak" periods can be twice or even three times that of "less peak" periods. However, 93% to 97% of calls are made successfully: that is get through on the first try and are maintained for two minutes with no cut offs and have "good" sound quality.

**Policy Paper on the Adaption of the Legal Framework to the Information Society October 1999, Ministère de l'Économie, des Finances et de l'Industrie**

This paper provides an overview of facilitating access to the Internet; development of high-speed Internet access; adapting the regulatory framework for telecommunications services; guaranteeing access to decoders on fair, non-discriminatory terms; Harmonisation of the legal regimes governing cable networks and telecommunications networks; Preparing for the development of digital terrestrial television; Allowing satellite systems to develop.

**Recommendations from the Autorité de régulation des télécommunications (ART) for the definition of services for shared access to the local loop and its operational implementation / 22 December 2000, ART**

The document introduces the concept of unbundling the local loop, gives a service and technical description, outlines the operational process which will have to be undertaken (Provision of information and delivery order process, After sales service, Co-location process and Technical aspects) and gives a timetable.

**Mobile Internet's development Recommendations from the Autorité de régulation des télécommunications, November 2000, ART**

The document introduces the concept of 'upsetting' the current mobile telephony model (ie the change from voice to data), the parameters affecting the construction of new market models, and principles associated with the development of internet mobile.

**Guidelines for Flat Rate Interconnection from the l'Autorité de régulation des télécommunications**, April 2001, ART

The document sets out ART's view on the technical and market feasibility of allowing flat rate interconnection for Internet traffic. This will lead to the production of guidelines by which operators must abide – this will happen over 2001.

**Public Call for Comments: Internet Telephony, January 1999**

In order to ensure that Internet telephony can be integrated smoothly into the French regulatory framework, the telecommunications regulatory authority (ART) began gathering information to enable an in-depth study of the matter.

**Results of the public consultation on the implementation of number portability, 2001, ART**

The document collects the results of a public consultation launched by ART in October 2000. It comprises 30 responses from a variety of players both from the public and the private sectors.

**Internet Naming and Addressing. Results from of the public consultation on the principles and conditions for implementation of the ENUM protocol in France. July 2001, ART**

The document collects the results of a public consultation launched by ART in May-June 2001. It comprises 13 responses from a variety of industrial players. The following findings emerge from these contributions:

- It is essential to make management of ENUM domain names subordinate to management of numbering in order to keep the systems consistent and to ensure that services can be appropriated by a wide range of consumers.
- It is necessary to establish rules quickly to set the conditions for inserting and delegating ENUM domain names. These rules should take a position in the international agreement between ICANN and ITU, which appears to be the best guarantee of the necessary consistency between phone numbers and domain names.
- The uncertainty on the choice of a reference domain of ENUM names must not prevent the rapid definition of clear rules for management of the delegations, nor must they obscure debate on this matter, which is in reality, the primary challenge.
- There is a chance that only the ENUM database manager will be able to provide services that rely on the ENUM protocol.
- This matter deserves a special scrutiny. This is why the Regulatory Authority and the Secretary of State to Industry following the public consultation conclusions, will deepen their thoughts, together with the players, in order to define the conditions ensuring competition between ENUM service providers.

**Key telecommunication and access policy documents in Denmark****The Danes' Access to the Network Society**, January 2001 Telestyrelsen (Danish telecom regulator)

In this review a comparison is made between the development of fast access to the Internet/Network Society\* in Denmark and developments in Sweden, Norway, Germany, the United Kingdom, Netherlands and the United States. The review focuses on the options available to private citizens and small and medium-sized enterprises (SMEs) of getting high-speed access, i.e. access to services capable of transferring data at a speed between 64 kbit/s and 2 Mbit/s. The following access services/technologies are included in the review:

ISDN, ADSL, cable TV modems, Fixed Wireless Access (FWA) and optical fibres. To a large extent the review is based on the information contained in a report made by the British consulting firm Ovum for the National Telecom Agency. For each of the services in question the following has been examined:

- how large a percentage of households and SMEs in a country is able to get access to the technology in question if desired
- how large a percentage of households and SMEs in a country has already established access to the technology in question
- the price for using the service desired (annually).

Also analysed is the competitive situation for individual services, taking into account the number of providers, etc. Finally, the general competition in the market for high-speed access is illustrated, including examples of how the penetration of broadband access may be influenced in a positive direction, the focus being on public initiatives.

**The National Telecoms Agency Report on New Access Routes to the Network Society, 2000, The National Telecoms Agency**

The report gives an overview on new access technologies for access to the Internet. It focuses on market and users perspectives. The annex describes the different access technologies that will play a relevant role in the market, i.e. cable TV, FWA (digital radio), cellular radio system and satellites. The technologies are described according the following scheme:

- Short description
- Technical characteristics
- Spread
- Price
- Market players
- Service offering
- Comparison with other countries

**New Frequency Policy Initiatives, 1999, Ministry of research and Information technology**

The document describes the market situation in the telecommunications sector, both fixed and mobile. It also highlights the need of a structured Frequency Policy. The report focuses on public tendering as means to achieve the goals set. Aim of the publication is to relate a regulatory framework that could create more infrastructures in bottleneck areas to guarantee more benefits to end users.

## Key telecommunication and access policy documents in Finland

**Operating Strategy and Financial Plan 2002-05, 2001 Ministry of Transport & Communications.**

This document outlines Finland's high level strategic goals in relation to the Information Society and ICT. It lists the priorities for action and expenditure. These include: balanced regional development and preparation for an ageing society, maintaining the pioneering status of Finland in terms of ICT and infrastructure (including broadband and convergence), e-commerce and logistics and transport.

**Finland's Wireless Valley. Pioneering, Regulation and Competition Policy,** February 2001 Ministry of Transport & Communications

The central argument of the study is that private-sector pioneer strategies should be stimulated, supported, and facilitated with complementary public-sector strategies. However, due to rapid and disruptive industry

evolution, regulatory reform and specialisation, as well as the globalisation of industry rivalry, this kind of reinforcement has become more difficult and complex. The present study consists of four chapters. The first one illustrates the generic strategies in the Finnish telecom/mobile cluster. It provides the context for public-sector strategies. Essentially, Finnish developments are examined against the context of global telecom reform. The second chapter focuses on the evolution and impact of the Finnish telecom/mobile regulatory policies, particularly licensing, interconnection, and pricing. The third chapter concentrates on the impact of the Finnish competition policy on the telecom/mobile industries. The fourth chapter summarizes the trends in global telecom reform, regulatory policies, and competition policy, vis-à-vis Finnish developments.

**Finland's Wireless Valley. From Industrial Policies Toward Cluster Strategies,** September 2000, Ministry of Transport & Communications

This is the first of three cases that focus on public-sector strategies in the Finnish telecom/mobile cluster. It is descriptive and historical, providing evolutionary context for the remaining cases, which will be prescriptive and proactive. The study consists of 6 chapters. The first one is an introduction and framework on the competitive developments in Finnish telecommunications. The second and third chapters explore the historical public policies in the telecom sector, from the factor-driven stage (from autonomy to independence) to the investment stage (the duopoly era). The fourth and fifth chapters explore the more recent efforts toward public-sector cluster strategies. They focus on Nordic cooperation as the innovation catalyst in mobile communications, as well as on the triumph of the GSM standard in the second-generation mobile rivalry. The sixth chapter encompasses a brief epilogue, which illustrates the "new rules of the game."

**Finland as an Information Society,** 2000, The Information Society Advisory Board

This is the first report of the Information Society Advisory Board on IS development in Finland.

The report aims at representing an overall picture of the Information Society development in Finland, though a relevant part is concentrated on Telecommunications, internet access and related technologies. Moreover the report aims at evaluating the social and economic effects of the IS.

**Key telecommunication and access policy documents in Sweden****Competition in the Internet Market,** March 2001, National Post and Telcoms Agency (PTS)

This document outlines the competition related problems and issues facing Sweden's Internet market. Its focus is on the competitive preconditions necessary to establishing a viable Internet market. Historically, telecoms monopolies were common, Sweden does not wish such barriers to be replicated in the emerging Internet market. However, the ever changing nature of the market makes it difficult to assess.

**The Internet Market in Sweden,** October 2000, National Post and Telcoms Agency (PTS)

This document characterises the Internet market in Sweden, providing a brief history, some statistics and an overview of the changing technical, regulatory and market-driven developments. The study concludes that ISPs are likely to become consolidated, different technologies are likely to still be prevalent (ie a mixture of technologies and platforms rather than a single dominant form), pricing will change, use will continue at a high rate, but the

successful business model for Internet exploitation is not yet clear. Developments will continue at a great rate.

**Risk of Monopolisation of Broadband Services to Apartment Blocks**, May 2000  
National Post and Telcoms Agency (PTS)

This document looks at the risks that the broadband market may develop in a similar way to the cable market, where apartment block owners sometimes have to sign long term deals (up to 25 years), thereby being locked into a de-facto monopoly. To determine whether monopoly or other adversely competitive market conditions may arise in the provision of broadband to blocks of flats. The study suggests a number of measures to reduce the likelihood of monopoly markets developing. These include further monitoring, dissemination of information to purchasers and amongst suppliers, any subsidies granted for broadband should be dependent on equality of access, and guaranteed speedy unbundling of the local loop.

**Telecommunications Supervision – Report on Assignment in Conjunction with Annual Report 1999**, February 2000, National Post and Telcoms Agency (PTS)

This report looks at the competition in various market segments, nature and scope of complaints to the regulator and the consequences of the telecoms sector in economic and technological terms. It also considers whether pricing legislation has been complied with. To give a picture of competition in the market in 1999.

## Key telecommunication and access policy documents in the USA

NB: It should be noted that coverage of the US is limited in comparison with the coverage given to EU Member States, as this is not the primary focus of the work.

Documents in the US consider radio spectrum frequency, 'advanced telecommunications' and their access and availability and the appropriateness of telecoms regulation.

**The Potential for Accommodating 3<sup>rd</sup> Generation Mobile Systems in the 1710-1850 MHz Band. Federal Operations, Relocation Costs and Operational Impacts**, March 2001  
National Telecommunications and Information Administration

The document sets out the Federal Government's use of the 1710-1850 MHz waveband and addresses the possible accommodation of 3G mobile comms sharing the same band

The report concludes that full sharing of the available bandwidth would not be feasible, as unacceptable operational restrictions would be placed on existing users. Federal users would be unable to vacate the bandwidth within the established timeframes and it is not clear that fully compatible alternative spectrum is available for total relocation. Co-sharing for satellite and tactical radio relay operations was also found to be unacceptable. Fixed services and general government services were also found to have co-sharing problems. Three solutions were given: in-band pairing (cost \$3.4bn), out-of-band pairing (cost \$4.6bn), and a combined in-band and Federal migration solution (cost \$2.1bn). Ways forward are being considered, but no decisions have yet been made.

**Deployment of Advanced Telecommunications Capability – Second Report**, August 2000, Federal Communications Commission

The report considers whether advanced telecommunications services are being deployed in a reasonable and timely manner to all American citizens. It is based on a 'broadband survey' of subscriptions to high speed infrastructure and services. Reporting was mandatory according to certain guidelines. The report concludes that in general rollout and availability of services is progressing in a timely and reasonable manner, but there are some disadvantaged groups. These are rural citizens, those in inner-city areas, those on low incomes, minority groups, tribal

areas and consumers in US territories. Recommendations include: examination of competition rules to streamline equipment approvals, ensure equality of access to remote terminals, consideration of measures to accelerate connections for schools etc, making more bandwidth available and considering whether unbundling access to cable platforms for multiple ISPs should be mandated.

**Biennial Regulatory Review** - 2000 January 2001 Federal Communications Commission

This report fulfils the FCC's obligation to make determinations concerning certain regulatory decisions every two years. The report concludes that in general rollout and availability of services is progressing in a timely and reasonable manner, but there are some disadvantaged groups. These are rural citizens, those in inner-city areas, those on low incomes, minority groups, tribal areas and consumers in US territories. Recommendations include: examination of competition rules to streamline equipment approvals, ensure equality of access to remote terminals, consideration of measures to accelerate connections for schools etc, making more bandwidth available and considering whether unbundling access to cable platforms for multiple ISPs should be mandated.

**Spectrum study of the 2500-2690MHz Band: The Potential of accommodating the 3G mobile system**, March 2001, Federal Communication Commission

This report describes the current uses of 2500-2690Mhz band and analyses the potential for using that band for third generation wireless systems.

The document reviews the initial analyses in the Interim Report; identifies potential alternate bands for relocating incumbent users to alternate bands; and evaluate the cost and migration schedules for three time periods (2003, 2006, 2010) for the sharing, band segmentation and relocation options presented

### 3.3.Review of Existing Indicators

A comprehensive review of statistical indicators, and the problems associated with collecting data has already been dealt with WP1. This chapter deals solely with the choice of existing statistical indicators upon which it might be useful to focus.

#### 3.3.1 Traditional indicators Telecommunications and Access

In this section we firstly provide an overview table of the eEurope indicators to which we make reference in the template tables. This is followed by a refined list of current indicators (condensed from an exhaustive list of indicators, over 500, collected in WP1.3) which we consider to be useful and/or frequently cited to measure the Information Society. These indicators are chosen for one of two main reasons:

- Either they are general purpose indicators which are widely cited and used (although they can be based on different assumptions) OR
- They are indicators which might help meet some perceived indicator weaknesses as set out in the conclusions section

The latter group includes indicators of technological evolution (emerging technologies), indicators of behaviour (such as choice or motivation to use a particular form of ICT access or appliance), and some price indicators.

We have included a few indicators which collect data on activities in a particular Member State rather than across the Union. They are included because either the methodology, or the outputs, appear interesting, and do not appear to currently be collected at the harmonised EU level.

However, we must make it clear that this selection covers perhaps 10% of the available indicators which have been listed in WP1.3. It is too time-consuming, with little apparent value added, to list them all again here. Taking all of the possible indicators into account, we can confidently state that the majority of them relate to the existence of different technologies or access mechanisms, with less robust information the newer the technology or access appliance. There is less data available concerning the uses to which infrastructure is put, and hardly any information on impact. As in WP1 we have not included, or attempted to analyse, indicators of market size or of digital content.

Some policy issues do not lend themselves particularly to statistical analysis – such as the speed of unbundling the local loop or discussions on radio spectrum frequency or policies regarding the sale of 3G/wireless internet licences. This is because whilst it is possible to arrive at a 'number' of something, the real value lies in the contextual, explanatory information such the timescale under which telecoms de-regulation has been managed, and the national propensity to regulate telecommunications in general.

Finally, this chapter does not contain information on different methodological approaches, because this topic was also extensively covered in WP1. It is also worth highlighting that the indicators listed below, in many instances, do not support eEurope objectives. This is, because, in the main, the eEurope objectives under consideration are policy issues concerning the uptake of EU directives. In general, we conclude that this type of data is not of widespread interest to industrial or statistical agencies.

**Table of eEurope References**

eEurope relevance	<p>Shows which of the 8 eEurope actions within this topic the indicator refers to:</p> <ul style="list-style-type: none"> <li>• 1b-1 – achieve significant reductions in Internet access tariffs by reinforcing competition</li> <li>• 1b-2 – adopt directives for new framework for electronic communications and associated services<sup>25</sup></li> <li>• 1b-3 – Introducing greater competition in local access networks and unbundling of the local loop</li> <li>• 1b-4 – improve the co-ordination of the European frequency policy framework.</li> <li>• 1b-5 – Public financing instruments to support the development of information infrastructure and projects.</li> <li>• 1b-6 – Full conversion of Ipv6</li> <li>• 1b-7 – Reduced prices for leased lines by increasing competition</li> <li>• 1b-x - general indicator for topic 'Telecommunications and Access'</li> </ul>
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**Overview Table**

New No.	Name of indicator	Sub-domain	eEurope code	Main Source
TA1	Cable TV subscribers	Technology	1b-x	EITO
TA2	Digital main lines	Infrastructure	1b-x	EITO
TA3	Mobile subscriptions	Technology	1b-x	EITO
TA4	Interested in online services/ready to pay subscription	Access - Choice	1b-x	EITO
TA5	Internet applications used in past 3 months	Use	1b-x	EITO
TA6	Internet access speeds too slow	Access - Quality	1b-6 1b-x	EITO
TA7	Internet access affordability-high speed connection	Access - Cost	1b-1	EITO
TA8	Internet access outside the home	Access - Choice	1b-x	EITO
TA9	Internet hosts	Infrastructure	1b-x	EITO
TA10	Main lines per 100 inhabitants	Infrastructure	1b-x	EITO
TA11	Technologies that respondents have/use at home	Technology	1b-x	EITO
TA12	Technologies that non-users intend to purchase in next 6 mths	Technology	1b-x	EITO
TA13	Interconnection charges between fixed and mobile networks in OECD countries	Access - Cost	1b-x	OECD
TA14	Number of mobile operator equivalents in OECD countries	Market	1b-x	OECD
TA15	Personal basket of digital cellular service - costs	Use - Cost	1b-x	OECD
TA16	Price of calls between fixed and mobile networks	Use - Cost	1b-x	OECD
TA17	International Internet bandwidth by country	Infrastructure	1b-x	OECD
TA18	Costs for Internet access by DSL	Technology	1b-1 1b-x	OECD

<sup>25</sup> These directives concern the overall framework, access and interconnection, authorisation and license, universal service and data protection.

New No.	Name of indicator	Sub-domain	eEurope code	Main Source
TA19	Costs for Internet access basket for 20 hours at peak times using discounted PSTN rates	Use - Cost	1b-1	OECD
TA20	Price index for residential broadband services	Use - Cost	1b-1	OfTel
TA21	Households with home access to the Internet	Access - Choice	1b-x	ONS
TA22	Internet connection by Industry	Access - Choice	1b-x	SESSI, DIGITIP
TA23	Factors describing the reasons to adopt/benefits from mobile technologies	Access - Choice	1b-x	MICT
TA24	The number of mobile phone subscribers in business and in personal communication	Use -	1b-x	MICT
TA25	Number of Telecoms License holders	Market	1b-x	PST
TA26	Number of active pre-paid cards	Access - Cost	1b-x	PST
TA27	Telecom Italia's interconnection 2000 rate for a local port	Access - cost	1b-3	ART
TA28	Diversity of Internet access offers in UK, Denmark, Germany, The Netherlands, Italy, Spain and Belgium	Access - Choice	1b-1	ART
TA29	World Wide Web links between TLDs and gTLDs	Use	1b-x	OECD
TA30	Internet access by Cable in OECD Member countries	Technology	1b-1 1b-x	OECD
TA31	Downstream bandwidth for residential and business broadband services	Technology	1b - x	OfTel
TA32	Reasons for not using the Internet	Access -Choice	1b - x	ONS
TA33	Secure Web servers for electronic commerce per 1 million inhabitants	Infrastructure	1b-x	OECD
TA34	Revenue from leased lines	Market	1b-7	OECD
TA35	Survey of European Roaming Prices	Access - cost	1b - x	INTUG
TA36	Business Satisfaction with Mobile Telephony	Use	1b - x	OFTTEL
TA37	Business Internet Access Methods and package used	Access - Choice	1b - x	OFTTEL
TA38	Business Satisfaction with Internet service	Use	1b -x	OFTTEL

**Indicator descriptions in detail**

<b>Name of indicator</b>	<b>TA1 Cable TV subscribers</b>
Definition	Cable TV subscribers per HH (%) the indicator describes the number of households with a connection to cable Television. Data are expressed in percentage.
Notes	n.a.
Sources	EITO
Countries covered	EU 15
Time series available	Yearly
eEurope relevance	1b-x - general indicator for topic 'Telecommunications and access'
Future value	Yes, the indicator will be important in the next future due to the increasing penetration of cable TV in Europe. Most relevant for 3-5 years
Links to other indicators	-

<b>Name of indicator</b>	<b>TA2 Digital main lines</b>
Definition	Digital main lines (expressed as a % of main lines)
Notes	The indicator describes the penetration of digital lines per main lines. Data are expressed in percentage.
Sources	EITO
Countries covered	EU 15
Time series available	Yearly
eEurope relevance	1b-x - general indicator for topic 'Telecommunications and access'
Future value	The indicators will be valuable in relations to future technology developments. Most relevant for next 3-5 years.
Links to other indicators	

<b>Name of indicator</b>	<b>TA3 Mobile subscriptions</b>
Definition	Number of mobile subscriptions to mobile operators.
Notes	The indicator refers to the number of subscribers to mobile operators per year.
Sources	EITO
Countries covered	EU 15
Time series available	Yearly
eEurope relevance	1b-x - general indicator for topic 'Telecommunications and access'
Future value	Yes, because mobile phones are increasing in Europe and in certain countries their penetration is higher than fixed. Most relevant for next 3-5 years.
Links to other indicators	Correlation with indicators on other wireless technologies

Name of indicator	TA4 Interested in online services/ready to pay subscription
Definition	Percentage of internet users interested in paying a subscription for online services.
Notes	The percentage is expressed on the number of internet users interviewed for the survey.
Sources	EITO
Countries covered	EU 15
Time series available	Yearly
eEurope relevance	1b-x - general indicator for topic 'Telecommunications and access'
Future value	Useful for e-commerce future developments.
Links to other indicators	n.a.

Name of indicator	TA5 Internet applications used in past 3 months
Definition	Internet applications used in past 3 months (%)
Notes	The indicator shows the most used applications by consumers, from emails to online job hunting. The percentage of respondents is related to the sample used in the survey.
Sources	EITO
Countries covered	EU15
Time series available	Yearly
eEurope relevance	1b-x - general indicator for topic 'Telecommunications and access'
Future value	Useful for future developments in internet IPs development and speed of access. Most relevant for next 10 years.
Links to other indicators	Measurement on speed of access correlated to internet usage.

Name of indicator	TA6 Internet access speeds too slow
Definition	Internet access speeds too slow
Notes	The indicator expresses the number of respondents from the survey, who believe that the internet access speed is too slow.
Sources	EITO
Countries covered	EU-15
Time series available	Yearly
eEurope relevance	1b-6 – Full conversion of Ipv6 1b-x - general indicator for topic 'Telecommunications and Access'
Future value	Internet speed is a big issue for the future due to the increase demand of image and data online transfers. Most relevant for next 10 years.
Links to other indicators	<ul style="list-style-type: none"> <li>• Internet browsers penetration</li> <li>• Internet penetration</li> <li>• Internet access costs</li> </ul>

<b>Name of indicator</b>	<b>TA7 Internet access affordability – high speed connection</b>
Definition	The indicators describes the number of internet users interviewed for the survey who have access to the internet through high speed connection.
Notes	n.a.
Sources	EITO
Countries covered	EU 15
Time series available	Yearly
eEurope relevance	1b-1 – achieve significant reductions in Internet access tariffs by reinforcing competition
Future value	We do not know to what extent it will be useful as we are going towards flat rates, however it will remain important for the next 3 years at least.
Links to other indicators	Personal income Internet access costs and Internet host density, 1999

<b>Name of indicator</b>	<b>TA8 Internet access outside the home</b>
Definition	Internet access outside the home
Notes	The indicators express the number of respondents who use the internet outside the home. The sample includes 16,078 interviewees.
Sources	EITO, OECD
Countries covered	EU 15
Time series available	Yearly
eEurope relevance	1b-x - general indicator for topic 'Telecommunications and Access'
Future value	The increase penetration of the Internet and mobile wireless connection makes this indicator less important for future use, but it will remain interesting for at least the next 3 years, and probably the next 3–5 years.
Links to other indicators	<ul style="list-style-type: none"> <li>• Internet access costs</li> <li>• Adults who have accessed the Internet at some time (by age)</li> <li>• Locations adults have used to access the Internet (for personal use)</li> </ul>

<b>Name of indicator</b>	<b>TA9 Internet hosts</b>
Definition	Internet hosts
Notes	The indicators express the number of internet hosts in Europe.
Sources	EITO,OECD (TA14)
Countries covered	EU 15
Time series available	Yearly
eEurope relevance	1b-x - general indicator for topic 'Telecommunications and Access'
Future value	It will be interesting to study the increase of hosts as Internet penetration approaches universal service levels. The indicator will remain interesting for the next 3 –5 years
Links to other indicators	<ul style="list-style-type: none"> <li>• Ipv6 penetration</li> <li>• Internet hosts per 1 000 inhabitants (OECD)</li> <li>• Web server sites per 1 000 inhabitants</li> <li>• Internet access costs and Internet host density, 1999</li> </ul>

<b>Name of indicator</b>	<b>TA10 Main lines per 100 inhabitants</b>
Definition	Main lines per 100 inhabitants
Notes	The indicator expresses the number of telephone main lines per hundred inhabitants.
Sources	EITO
Countries covered	EU 15
Time series available	Yearly
eEurope relevance	1b-x - general indicator for topic 'Telecommunications and Access'
Future value	Less of an interesting indicators for the future as universal service approaches in all MS, but with correlations with high-speed connections it will remain interesting. Probable timeframe is next 3 years.
Links to other indicators	<ul style="list-style-type: none"> <li>• Penetration of IDSL and other high-speed connections</li> <li>• Households with home access to the Internet</li> </ul>

Name of indicator	TA11 Technologies that respondents have/use at home
Definition	<p>The indicator is based on survey results and indicates the type of technologies that respondents have/use at home (expressed in % of respondents) across a range of technologies:</p> <ul style="list-style-type: none"> <li>• mobile</li> <li>• digital TV</li> <li>• Desktop</li> <li>• Internet</li> <li>• ISDN</li> <li>• DVD</li> <li>• fax</li> <li>• cable TV</li> <li>• games console</li> <li>• laptop</li> <li>• palmtop</li> <li>• satellite</li> <li>• CDRom</li> </ul>
Notes	The indicator attempts to illustrate the penetration and usage of the technologies surveyed in households
Sources	EITO
Countries covered	unknown
Time series available	unknown
eEurope relevance	1b-x - general indicator for topic 'Telecommunications and Access'
Future value	Digital TV and other technologies are penetrating homes in Europe, therefore it will be useful to study them for the future. Most relevant timeframe 3-5 years.
Links to other indicators	Correlations with other technologies used at home.

Name of indicator	TA12 Technologies that non-users intend to purchase in next 6 mths
Definition	<p>Number of respondents who do not use the internet and intend to purchase different types of technologies in the next 6 mths (on the date of the survey):</p> <ul style="list-style-type: none"> <li>• mobile</li> <li>• digital TV</li> <li>• Desktop</li> <li>• Internet</li> <li>• ISDN</li> <li>• DVD</li> <li>• fax</li> <li>• cable TV</li> <li>• games console</li> <li>• laptop</li> <li>• palmtop</li> <li>• satellite</li> <li>• CDROM</li> </ul>
Notes	The indicators try to set some basis for future penetration of technologies.
Sources	EITO
Countries covered	unknown
Time series available	unknown
eEurope relevance	1b-x - general indicator for topic 'Telecommunications and Access'
Future value	Interesting to understand future penetration of technologies in Europe. Most relevant timeframe 3-5 years.
Links to other indicators	<ul style="list-style-type: none"> <li>• Technologies penetration trends in the past 5 years</li> <li>• Factors describing the reasons to adopt mobile technologies</li> </ul>

<b>Name of indicator</b>	<b>TA13 Interconnection charges between fixed and mobile networks in OECD countries</b>
Definition	Average interconnect rate for fixed – to mobile (US cents per minute) and the average interconnect rate for mobile to fixed (US cents per minute).
Notes	The indicator results from a Ovum survey 1999
Sources	OECD
Countries covered	OECD countries
Time series available	1999
eEurope relevance	1b-x - general indicator for topic 'Telecommunications and Access'
Future value	The fast developments of the mobile markets make this indicator useful to understand trends and future changes in price issues. Most relevant timeframe 3-5 years.
Links to other indicators	Internet access costs

<b>Name of indicator</b>	<b>TA14 Number of mobile operator equivalents in OECD countries</b>
Definition	Trend in the number of mobile operators in OECD countries.
Notes	The indicator used by the OECD indicates when network commenced or were expected to commence.
Sources	OECD
Countries covered	OECD Countries
Time series available	1990-2000
eEurope relevance	1b-x - general indicator for topic 'Telecommunications and Access'
Future value	Due to the development of the market is useful to understand the trends and developments in the supply side. Most relevant timeframe 3 – 5 years.
Links to other indicators	Mobile penetration

<b>Name of indicator</b>	<b>TA15 Personal basket of digital cellular service - costs</b>
Definition	Average prices in USD and USD PPP including fixed costs and usage costs.
Notes	The prices include VAT and volume discounts. Excluding international calls. The basket includes 568 calls.
Sources	Eurodata for OECD
Countries covered	OECD Countries
Time series available	Yearly
eEurope relevance	1b-x - general indicator for topic 'Telecommunications and Access'
Future value	Digital services and price comparison will be still an important issue in the next few years due the development and implementation of 3G. Most relevant timeframe 3-5 years.
Links to other indicators	Mobile penetration

Name of indicator	TA16 Price of calls between fixed and mobile networks
Definition	Average prices for calls from a fixed network to mobile network and from a mobile network to a fixed network in USD PPP.
Notes	Call charges include any set up charge for fixed mobile networks spread over five minutes excluding VAT. The prices are for weekdays and weekend rates are not included.
Sources	OECD Eurodata
Countries covered	OECD Countries
Time series available	Yearly
eEurope relevance	1b-x - general indicator for topic 'Telecommunications and Access'
Future value	Call prices from fixed lines to mobiles are a big issue in several countries. Most relevant timeframe 3-5 years.
Links to other indicators	<ul style="list-style-type: none"> <li>Ratio of mobile price to fixed price</li> <li>Ratio of the price of calls from fixed to mobile against the price of the longest distance on fixed networks</li> </ul>

Name of indicator	TA17 International Internet bandwidth by country
Definition	Internet bandwidth speed (Mbytes) by country
Notes	These indicators uses data drawn from the Top 50 Internet hub cities 1999. Some OECD countries did not have an international route large enough to make <i>Telegeography's</i> cut-off point.
Sources	OECD
Countries covered	OECD Countries
Time series available	Yearly
eEurope relevance	1b-x - general indicator for topic 'Telecommunications and Access'
Future value	The implementation of LLU will create and increase in the bandwidth spectrum, this will imply new policies and prices structure for the market. Most relevant timeframe next 5 years.
Links to other indicators	Price index for residential broadband services (OfTel).

Name of indicator	TA18 Costs for Internet access by DSL
Definition	Average connection charge and the monthly rental in USD PPP, March 2000
Notes	n.a.
Sources	OECD
Countries covered	OECD Countries
Time series available	Yearly
eEurope relevance	1b-1 – achieve significant reductions in Internet access tariffs by reinforcing competition 1b-x - general indicator for topic ‘Telecommunications and Access’
Future value	Speed and price indicators will play an important role in the next years to understand the developments of markets. Most relevant timeframe 5 years.
Links to other indicators	<ul style="list-style-type: none"> <li>• Mbytes included Additional cost per mbyte (USD PPP)</li> <li>• Monthly ISP access cost if additional Additional ISP set up fee Equipment included in connection / rental?</li> <li>• Additional cost for equipment (US\$ PPP)</li> <li>• Speed of connection downstream (kbit/ s)</li> <li>• Speed of connection 7upstream (kbit/ s)</li> <li>• Internet access costs</li> </ul>

Name of indicator	<b>TA19 Costs for Internet access basket for 20 hours at peak times using discounted PSTN rates</b>
Definition	Average ISP charges as a % of total PSTN fixed charges and PSTN usage charges, including VAT
Notes	Includes 20 one-hour calls. In France and Luxembourg, ISP and PSTN usage charges are bundled and included under the ISP. PSTN fixed charges include monthly rental fee and additional monthly charges related to discount plans, if applicable.
Sources	OECD
Countries covered	OECD Countries
Time series available	Yearly
eEurope relevance	1b-1 – achieve significant reductions in Internet access tariffs by reinforcing competition
Future value	Price indexes to access the internet will be of economic value to understand developments in the supply and demand side of the market. Most relevant timeframe 3-5 years.
Links to other indicators	<ul style="list-style-type: none"> <li>• OECD Internet access basket for 20 hours at off-peak times using discounted PSTN rates, including VAT, 2000</li> <li>• OECD Internet access basket for 30 hours at peak times using discounted PSTN rates, including VAT, 2000</li> <li>• OECD Internet access basket for 30 hours at off peak times using discounted PSTN rates, including VAT, 2000</li> <li>• OECD Internet access basket for 40 hours at peak times using discounted PSTN rates, including VAT, 2000</li> <li>• OECD Internet access basket for 40 hours at off peak times using discounted PSTN rates, including VAT, 2000</li> <li>• OECD Internet access basket for “any time” using discounted PSTN rates, including VAT, 2000</li> <li>• Internet communication rates in Italy.</li> </ul>

Name of indicator	<b>TA20 Price index for residential broadband services</b>
Definition	Total costs for users to access the internet through broadband lines.
Notes	Price excludes VAT
Sources	Of tel
Countries covered	UK
Time series available	Yearly
eEurope relevance	1b-1 – achieve significant reductions in Internet access tariffs by reinforcing competition
Future value	Price indexes to access the internet will be a useful tool to analyse markets developments. Most relevant timeframe 3-5 years.
Links to other indicators	<ul style="list-style-type: none"> <li>• Downstream bandwidth for residential broadband services</li> <li>• Price Index for Mobile Telephony</li> </ul>

<b>Name of indicator</b>	<b>TA21 Households with home access to the Internet</b>
Definition	The indicator describes the number of households which have access to the internet.
Notes	The data are based on surveys results.
Sources	Office for National Statistics, UK
Countries covered	UK
Time series available	Yearly
eEurope relevance	1b-x - general indicator for topic 'Telecommunications and Access'
Future value	The developments of wireless technologies make this indicator less important unless used as second reference for comparisons. Most relevant timeframe 3-5 years.
Links to other indicators	<ul style="list-style-type: none"> <li>• Adults who have accessed the Internet at some time (by age)</li> <li>• Locations adults have used to access the Internet (for personal use)</li> <li>• Access the internet (by purpose)</li> <li>• Frequency of access to the Internet for personal use</li> <li>• Reasons for not using the Internet</li> <li>• Number of Internet connected computers (hosts) in some countries 1994-1998</li> </ul>

<b>Name of indicator</b>	<b>TA22 Internet connection by Industry</b>
Definition	The indicator describes the number of internet access by industry.
Notes	The data result from a survey conducted in France.
Sources	SESSI
Countries covered	France
Time series available	Yearly
eEurope relevance	1b-x - general indicator for topic 'Telecommunications and Access'
Future value	This is an interesting indicator that describe the Internet access by "sector", it will be useful to understand the development and implementation of access through different industries. Most relevant timeframe 3-5 years.
Links to other indicators	n.a.

<b>Name of indicator</b>	<b>TA23 Factors describing the reasons to adopt/benefits from mobile technologies</b>
Definition	The indicator shows the motivations that respondents (SMEs and large firms) identified for their choices to adopt mobile technologies and also the benefits which have accrued
Notes	The data are the result of a survey carried out by the MICT.
Sources	MICT
Countries covered	Finland
Time series available	Yearly
eEurope relevance	1b-x - general indicator for topic 'Telecommunications and Access'
Future value	This is an interesting indicator, which helps analyse consumer behaviour in terms of acquisition of mobile technologies. Most relevant timeframe 3 –5 years, at least for 3G technologies.
Links to other indicators	Factors describing the benefits from mobile technologies in SMEs and large firms

<b>Name of indicator</b>	<b>TA24 The number of mobile phone subscribers in business and in personal communication</b>
Definition	The indicator describes the number of mobile phone subscribers both for residential and business users.
Notes	The data result from a survey conducted by the MICT on residential and business
Sources	MICT
Countries covered	Finland
Time series available	Yearly
eEurope relevance	1b-x - general indicator for topic 'Telecommunications and Access'
Future value	This would be useful in understanding different rates of penetration of mobile technologies in business and personal communications. Above all under the light of the technological developments like G3. Most relevant timeframe 3-5 years.
Links to other indicators	N.a.

<b>Name of indicator</b>	<b>TA25 Number of Telecoms License holders</b>
Definition	Number of telecoms licence holders per country.
Notes	-
Sources	OECD
Countries covered	OECD Countries
Time series available	Yearly
eEurope relevance	1b-x - general indicator for topic 'Telecommunications and Access'
Future value	The indicator gives a first view of the market share, therefore it will be useful to track the developments of the presence of incumbents and new players in each European country. Most relevant timeframe 10 years.
Links to other indicators	n.a.

<b>Name of indicator</b>	<b>TA26 Number of active pre-paid cards</b>
Definition	The indicator shows the number of pre-paid card per each country.
Notes	n.a.
Sources	ART
Countries covered	Italy, France, Belgium, The Netherlands, Germany, Denmark, Spain, UK
Time series available	1997 - 1999
eEurope relevance	1b-x - general indicator for topic 'Telecommunications and Access'
Future value	Pre-paid phone card are faster and gaining bigger portions of the market. It is interesting to understand where we will saturate the market and how technologies (i.e. smart cards) will influence the implementation of these. Most relevant timeframe 5 years.
Links to other indicators	n.a.

<b>Name of indicator</b>	<b>TA27 Telecom Italia's interconnection 2000 rate for a local port</b>
Definition	Average interconnections rate considering both peak and off-peak times.
Notes	The data are determined in EURO/100/Min
Sources	ART
Countries covered	Italy
Time series available	Yearly
eEurope relevance	1b-3 – introducing greater competition in local access networks and unbundling of the local loop
Future value	Interconnection rates for local ports will change due to development and implementation of broadband access.
Links to other indicators	Comparison with other countries data

<b>Name of indicator</b>	<b>TA28 Diversity of Internet access offers in UK, Denmark, Germany, The Netherlands, Italy, Spain and Belgium</b>
Definition	The indicator describes interconnections rate for Internet access considering both peak and off-peak times.
Notes	The data are determined in EURO/100/Min
Sources	ART
Countries covered	UK, Denmark, Germany, The Netherlands, Italy, Spain and Belgium.
Time series available	1999
eEurope relevance	1b-1 - general indicator for topic 'Telecommunications and Access'
Future value	Knowing what different price makes will be still an issue when future developments in speed connections will provide operators with a wider spectrum of choices and service differentiation. Most relevant timeframe 3-5 years.
Links to other indicators	Comparison with other countries data

<b>Name of indicator</b>	<b>TA29 World Wide Web links between TLDs and gTLDs</b>
Definition	Percentage of the number of hyper-text links embedded in Websites between TLDs and gTLDs.
Notes	n.a.
Sources	OECD
Countries covered	OECD Countries
Time series available	Yearly
eEurope relevance	1b-x - general indicator for topic 'Telecommunications and Access'
Future value	The increased popularity of the WWW creates a growth in the number of browsers. It will be useful to study, under a policy point of view, the importance of the topography of world linkages between domains. Most relevant timeframe 5 years.
Links to other indicators	n.a.

<b>Name of indicator</b>	<b>TA30 Internet access by Cable in OECD Member countries</b>
Definition	The indicator presents the price of access to the Internet by cable, by OECD countries.
Notes	Data are expressed in USD PPP.
Sources	OECD
Countries covered	OECD Countries
Time series available	Yearly
eEurope relevance	1b-1 – achieve significant reductions in Internet access tariffs by reinforcing competition
Future value	It will be interesting to understand in the future what will be the penetration of Internet through cable lines and the rate of diffusion of this Internet access. Most relevant timeframe 3-5 years.
Links to other indicators	Internet access Internet access by wireless technologies

Name of indicator	TA31 Downstream bandwidth for residential and business broadband services
Definition	Downstream bandwidth penetration both for residential and business broadband technology.
Notes	n.a.
Sources	OECD
Countries covered	OECD Countries
Time series available	Yearly
eEurope relevance	1b-x - general indicator for topic 'Telecommunications and Access'
Future value	Due to the development and implementation of ipv6 and LLU, it will be interesting to understand the trends of downstream broadband. Most relevant timeframe 3-5 years.
Links to other indicators	n.a.

Name of indicator	TA32 Reasons for not using the Internet
Definition	Number of respondents who do not have access to the Internet, in the UK, and the reasons of not doing so.
Notes	The data result from a survey carried on by the Office of National Statistics in 2000.
Sources	ONS
Countries covered	UK
Time series available	Yearly
eEurope relevance	1b-x - general indicator for topic 'Telecommunications and Access'
Future value	It is interesting to understand why people do not have access to the Internet in countries where Internet penetration per households is increasing. Most relevant timeframe 3 years.
Links to other indicators	<ul style="list-style-type: none"> <li>• Internet penetration</li> <li>• Reason for using the internet</li> </ul>

Name of indicator	TA33 Secure Web servers for electronic commerce per 1 million inhabitants
Definition	Number of secure servers per 1 million inhabitants. Global TLDs have been weighted using a methodology developed by Netsizer (or one could weight them by the number of gTLD registrations emanating from a country).
Notes	Data is based on information from Netsizer which has been further worked on by OECD
Sources	OECD
Countries covered	OECD
Time series available	1997-2000
eEurope relevance	1b-x - general indicator for topic 'Telecommunications and Access'
Future value	It is interesting to understand how the infrastructure underpins the take up of ecommerce. It can provide an indicator of growth and the digital divide. Most relevant timeframe 5 years.
Links to other indicators	-

<b>Name of indicator</b>	<b>TA34 Revenue from leased lines</b>
Definition	Total revenue accruing to a number of operators from leased lines
Notes	-
Sources	OECD
Countries covered	OECD
Time series available	1999
eEurope relevance	1b-7 – reduced prices for leased lines by increasing competition
Future value	This indicator will show differences in revenue streams, but unless other factors are taken into account (like other revenue streams) the indicator is not as useful as it could be. In addition, it says little about competition. Most relevant timeframe 3-5 years.
Links to other indicators	-

<b>Name of indicator</b>	<b>TA35 Survey of European Roaming Prices</b>
Definition	The indicator compares the prices of the leading 2 operators in each EU MS. The calculation was made of the cost of an international roaming call back to the home country, with a duration of 2 minutes, in EURO excluding VAT. It is for peak hours on a business subscription.
Notes	Based on a survey from INTUG – Intl Telecoms User Group
Sources	INTUG
Countries covered	European
Time series available	1999 and 2000
eEurope relevance	1b-x-general indicator
Future value	Most relevant timeframe 3-5 years.
Links to other indicators	UK regulator comparison of roaming costs, UK, France, Germany, Sweden and Italy

<b>Name of indicator</b>	<b>TA36 Business Satisfaction with Mobile Telephony</b>
Definition	Expressed satisfaction with a number of service elements on a Yes/No/Don't Know basis with the answer given as %. The sample is 556 UK SMEs
Notes	Variables are: <ul style="list-style-type: none"> <li>• network coverage,</li> <li>• value for money,</li> <li>• customer service,</li> <li>• dropped calls,</li> <li>• network congestion,</li> <li>• call costs (from mobiles),</li> <li>• cost to others,</li> <li>• off-net call costs.</li> </ul>
Sources	OFTEL
Countries covered	UK
Time series available	May 2001
eEurope relevance	1b-x-general indicator
Future value	Most relevant timeframe 3 years.
Links to other indicators	TA38 and: Consumer satisfaction with mobile telephony (variables are different – value for money, cost of calls to fixed phones, mobiles on same network and off-network, abroad, line/sound quality, cut off, customer service

<b>Name of indicator</b>	<b>TA37 Business Internet Access Methods and package used</b>
Definition	Share of SMEs that use certain Internet connection methods; and the share that use certain Internet packages. Based on a sample of UK SMEs (594)
Notes	The Internet connection method variables are PSTN/dialup, ISDN, leased line, DSL or cable modem)and the Internet package used variables are unmetered, no subscription calls only, and subscription and calls,
Sources	OFTEL
Countries covered	UK
Time series available	May 2001
eEurope relevance	1b-x-general indicator
Future value	Most relevant timeframe 3 years.
Links to other indicators	Consumer use of the Internet

Name of indicator	TA38 Business Satisfaction with Internet service
Definition	Expressed business Satisfaction with Internet service based on a sample of 594 SMEs, answer categories: Satisfied, Dissatisfied and Don't Know
Notes	The variables are: <ul style="list-style-type: none"> <li>• overall quality of service,</li> <li>• subscription charges or call charges,</li> <li>• speed of access,</li> <li>• ISP customer care</li> </ul>
Sources	OFTEL
Countries covered	UK
Time series available	May 2001
eEurope relevance	1b-x-general indicator
Future value	Most relevant timeframe 3 years.
Links to other indicators	TA 36 and TA37

### 3.3.2. Innovative indicators under development

This section describes innovative indicators which are being developed according to current thinking. In fact, there are relatively few of these, and their focus is often very much the 'digital divide'. Although this topic could be more properly dealt with under the 'social exclusion' line of the eEurope initiative, it is clear that these composite indicators are made up of basic T&A measures, such as existence of lines, Internet access and costs for example.

The other, overriding trend which becomes apparent is that these new indicators are composites, or indices. Below we present a short overview table, followed by a table which describes each indicator in detail.

#### Overview table

No.	Name of indicator	Sub-domain	eEurope code	Main Source
NewTA1	Divide Index	Access	1b-x	OECD
NewTA 2	Digital Divide	Access	1b-x	World Bank
New TA3	Index of Competitive Development	Market	1b-x	Teligen
New TA4	DSL/Cable modem Price/Speed Index	Cost/Technology	1b-x	OFTEL
New TA5	e-Readiness Index	Access	1b-x	Bridges.org

Name of indicator	NEWTA1 Divide Index
Definition	<p>The index measures the percentage concentration ratio of several indicators such as:</p> <ul style="list-style-type: none"> <li>• Fixed teledensity;</li> <li>• Mobile teledensity;</li> <li>• Personal computer density;</li> <li>• Internet host density;</li> <li>• Secure servers density.</li> </ul>
Notes	<p>This percentage ratio measures the variability inside the series. It is preferred by the authors, instead other variability indexes –such as the standard deviation–, when it is necessary to study the joint variability among the different values of the series. It ranges from 0 (the condition of perfect equal distribution – that is “<i>absence of divide</i>”) to 100 (the condition of maximum inequality – that is “<i>maximum divide</i>”).</p>
Sources	OECD
Countries covered	OECD Countries
Time series available	2000
eEurope relevance	1b-x - general indicator for topic ‘Telecommunications and Access’
Future value	<p>The index will be useful because it collects a set of crucial ICT variables, comparable among OECD countries, that can be further combined in an overall ICT divide index; It will be useful over the next 3-5 years in particular.</p>
Links to other indicators	n.a.

Name of indicator	NEWT A2 Digital Divide
Definition	There are 2 indices used, the first measures Internet, telephones and mobile telephones density per capita, to give an ICT index. The second index measures the elements of ICT development connected with cost and quality
Notes	<p>The paper develops two indicators of the present level and quality of ICT access in a country, as well as four indicators (beyond income) of the determinants of access and quality.</p> <p>the paper suggests combining Internet, telephones and mobile telephones per capita into a single ICT provision index. The next stage of the methodology is to compare a countries actual ranking with what would be expected given their income (GDP) levels. The country with the highest percentage score of actual compared to predicted ICT provision (more ICT rollout than would be expected given its income) scores one. Those with lower percentage score of actual compared to predicted ICT provision score higher. A second index is then constructed to measure the elements of ICT development connected with cost and quality. This consists of:</p> <p>the country's cost of local calls expressed as a percentage of the global average cost of a local call plus</p> <p>the country's cost of international calls expressed as a percentage of the average global cost of an international call plus</p> <p>the country's waiting time for the installation of a fixed telephone line as a percentage of the global average waiting time for telephone installation</p> <p>The country with the lowest rank score (best quality and cost) scores one, those with the higher rank scores have worse quality and cost.</p> <p>The four indicators measuring the determinants of provision (beyond income) are defined as follows: competition, rural needs, small economies and institutional investor. Regression analysis is used to determine if they are indeed linked to the level, cost and quality of ICT access in developing countries.</p>
Sources	World Bank
Countries covered	'Developing Economies'
Time series available	2000
eEurope relevance	1b-x - general indicator for topic 'Telecommunications and Access'
Future value	The index will be useful because it collects a set of crucial ICT variables, comparable amongst developing countries, that can be further combined in an overall ICT divide index. It is likely to be useful for the next 5-10 years as it relates specifically to developing countries, where the length and pace of change will be different to the EU.
Links to other indicators	n.a.

Name of indicator	NEWTA3 Index of Competitive Development
Definition	<p>There are 6 elements to the index, and many more sub-elements. The key elements are:</p> <ul style="list-style-type: none"> <li>• The industry - profits, investment, productivity improving, number portability, carrier selection/pre-selection, local loop unbundling, share of incumbent held by private sector</li> <li>• PSTN – number of operators, market share of incumbent (local and intl), price changes/ranking (residential/business) and interconnect margin</li> <li>• ISDN - number of operators, price changes/ranking (basic and primary rate)</li> <li>• Mobile – market structure (including Hefindahl-Hirshmann Index), residential/business price changes (connection &amp; rental), price ranking, price changes</li> <li>• Data services – number of operators (leased lines/ATM/FR) price ranking/changes (local &amp; 200 km)</li> <li>• ISPs – number, price ranking/changes</li> </ul>
Notes	<p>The index is part of a study to identify the institutional and regulatory barriers to competition in the telecoms market. It uses data on the structure, conduct and performance of market players to quantify competition in key product areas with a number of geographical areas including the EU.</p> <p>The HHI measures the concentration of competition within a market by calculating the squares of the percentage market share of each player, the resulting index has a max of 10,000 (100%) for a monopoly, with (theoretically) no minimum. The lower the number, the less is the degree of market concentration.</p> <p>The index tends to measure outputs rather than inputs, and it concentrate on the behaviour of market participants rather than framework enablers.</p> <p>Each element of the index is normalised so that the score is based on 0-100, and is also weighted. A default index weighting is provided.</p>
Sources	Teligen
Countries covered	EU, US, Norway, Czech Republic, New Zealand
Time series available	2000
eEurope relevance	1b-x - general indicator for topic 'Telecommunications and Access'
Future value	The index will be useful because it collects information across 6 different parameters and combines them into one to give a 'big picture' of competitiveness; It will be useful over the next 3-5 years in particular.
Links to other indicators	n.a.

Name of indicator	NEWTA4 DSL/Cable modem Price/Speed Index
Definition	The index compares speed of service (downstream bandwidth) and monthly cost in residential and business markets.
Notes	The index is part of a larger benchmarking study to compare price and speed.
Sources	OFTEL
Countries covered	France, Germany, UK, US
Time series available	1999 and 2000
eEurope relevance	1b-x - general indicator for topic 'Telecommunications and Access'
Future value	The index will be useful because it collects information across emerging technologies to give a picture of competitiveness and consumer choice; It will be useful over the next 3-5 years in particular.
Links to other indicators	n.a.

Name of indicator	NEWTA5 e-Readiness Index
Definition	<p>There are actually 2 indices which are useful:</p> <p><i>Readiness for the Networked World (from Harvard University)</i></p> <p>This is a self-assessment tool which measures e-readiness in 5 different areas (network access, networked learning, networked society, networked economy, network policy) by asking which stage the respondent (representing a community) is at (from 1 to 4, crudely characterised as least developed to fully developed).</p> <p><i>Global Diffusion of the Internet (from the Mosaic Group)</i></p> <p>This is another self-assessment tool which measures the growth of the Internet using 6 dimensions (pervasiveness – per capita use – geographic dispersion, sectoral absorption, connectivity, organisational infrastructure, &amp; sophistication of use). Again a multiple choice approach is used, this time with 5 levels of response. There is a 2<sup>nd</sup> part to the questionnaire which covers ‘Determinants of Internet Diffusion’ which requires the respondent to highlight ‘stimulating factors’ and ‘constraining factors’ for each of the 6 areas, this is followed by a 3<sup>rd</sup> part which covers predictions and forecasts.</p>
Notes	<p>Actually there are 5 different e-readiness assessment tools listed in the report, but 2 the most relevant for our purposes are given above. Although the report covers metrics for developing countries, with some amendment to become relevant to European environment, the principles and the application are still very useful.</p>
Sources	<p>Bridges.org (private sector), and in particular the IT Group at HU: <a href="http://www.readinessguide.org">www.readinessguide.org</a></p>
Countries covered	Not applicable
Time series available	Not applicable
eEurope relevance	1b-x - general indicator for topic ‘Telecommunications and Access’
Future value	<p>As they stand the indices measure network readiness. As the parameters stand they are somewhat irrelevant for the EU because they focus too much on under-development and ICT in general. However, the principle is interesting, and could be used ‘as is’ to illustrate scenarios within developing technologies (eg Bluetooth readiness or 3G readiness). OR, with some adaption (ie fine graining the issues and responses) they could be used to drill down into a topic such as ‘mobile e-readiness’ by combining more detailed and probing questions. It would be useful over the next 5 years in particular.</p>
Links to other indicators	n.a.

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