A MODEL SURVEY FOR THE TELECOMMUNICATION SECTOR

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STATISTICS CANADA

INTRODUCTION

1. Telecommunications play an increasingly important role in modern economies. The rapid evolution of telecommunication technologies, in particular digital technology, and its integration with computer technologies has given rise to a number of new telecommunication applications. These new applications have had an impact on the way business is done, on productivity and on the competitiveness of those who use them.

2. The urgent need for internationally comparable services statistics has been argued by many[1]; and data about telecommunications is no exception. The purpose of this model survey is to set out some basic information needs and to provide a framework to enable countries to produce a set of internationally comparable statistics on this sector.

3. The telecommunication industry, as defined in ISIC Rev. 3, includes any organization engaged in the "transmission of sound, images, data or other information via cables, broadcasting, relay or satellite" (see ISIC 6420). This particular definition covers a wide range of organizations, the most important of which are telecommunication carriers, cable TV companies, other pay television organizations and rebroadcasters. These different types of organizations, although all dependent on telecommunication technology, have very different output and input structures; this implies that the information needs and classifications relevant to each of these groups are different. This model survey has been designed for a target population of telecommunication carriers[2]. The survey therefore targets a subset of the population of ISIC 6420 - Telecommunications, that is, those organizations primarily engaged in the provision of the products described in CPC 752 - Telecommunication services.

4. The model survey consists of 12 modules, each designed to collect data on a particular subject. The main thrust of the survey is to measure production, international trade, investment, research and development, telecommunication traffic and the penetration of digital technology. It is also a vehicle to test a new product classification. The modules allow countries to select, from a range of data items, those which suit their requirements and individual circumstances.

5. On the basis of consultations with industry and other interested parties, CPC 752 - Telecommunication has been restructured (new categories have been introduced, others have been merged and split). The definitions are given in Annex 1.

6. The contents of this paper are organized in three chapters: Chapter 1 sets out the objectives and scope of the survey. Chapter 2 contains the elements required to design a survey questionnaire(s) and Chapter 3 explains the data collection system. Annex 1 contains the explanatory notes for the product classes used in module 1 and Annex 2 explains the relationship between the current CPC and the classification proposed for testing.

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[1] See for example, the Economist, 20 August 1988, page 61.

[2] Organizations primarily engaged in the provision of access to telecommunication network facilities. The transmission is sent by the client, the carrier provides the means.

7. The telecommunication model survey is similar both in content and format to the model survey of computer services adopted by the United Nations Statistical Office (ST/ESA/STAT/SER.M/81) in 1991. Most of the modules are the same as those found in the computer services survey, although they have been customized to be relevant to the telecommunication sector. In these cases, the module numbering system remains unchanged. Those modules of the computer services survey which are not relevant to the telecommunication sector have been replaced by new modules.

CHAPTER I. OBJECTIVES AND SCOPE OF THE SURVEY

8. The objectives of the survey are to measure:

(a) The value of gross and net output originating from the telecommunication service industry;

(b) The value of exports of goods and services originating from the telecommunication service industry;

(c) The value of output and exports of telecommunication services by other industries;

(d) Employment and fixed capital formation in the telecommunication service industry;

(e) The volume and patterns of telecommunication traffic;

(f) Research and development expenses by telecommunication carriers;

(g) The penetration of digital technology.

9. The table below shows the scope of data collection proposed in the model survey.

MODULE	TOPIC
Module 1	Revenues from the sale of goods and services 1.1 Revenues from the provision of telecommunication services 1.2 Revenues from the sale of telecommunication related goods and services 1.3 Revenues from other sources
Module 2	Goods and services used in the operations
Module 3	Purchase of goods and services for resale
Module 4	Inventories
Module 5	Supplementary questions concerning the basis of accounting
Module 6	Exports
Module 7	Imports
Module 8	Traffic volume statistics
Module 9	Employment
Module 10	Fixed assets, additions and disposals
Module 11	Research and development
Module 12	Network characteristic - Penetration of digital technology

10. The modules should not be seen as components of a single questionnaire. Rather, each module should be seen as a "standard framework for the collection of a particular set of data". Statistical offices should therefore develop questionnaires and a collection strategy consistent with their own survey practices and concerns.

11. Modules 1 to 7 form the core of the survey in that they include the data elements necessary to measure production (value added) and international trade.

12. Module 8 is designed for the collection of data on the volume and pattern of telecommunication traffic. Many users have expressed interest in this type of information[3].

13. Modules 9 and 10 are designed for the collection of data on employment and capital formation in the telecommunication sector.

14. Module 11 is designed to investigate issues related to research and development and module 12 to measure the penetration of digital technology. This last subject appears to be of general interest.

15. Those countries who adopt the enterprise as the unit of observation could also include a balance sheet and expand modules 1 and 2 to include financial revenues and expenses. Such an approach would provide a broader set of integrated data to analyse the performance of the telecommunication services sector.

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[3] See for example, Telecom traffic statistics - MiTT matter, Gregory C. Staple and Mark Mullins, Telecommunication Policy, June 1989, Butterworth and Co. (Publishers) Ltd.

CHAPTER II - THE MODEL SURVEY

MODULE 1. REVENUES FROM THE SALE OF GOODS AND SERVICES

This module is concerned with the revenues generated by this organization from the sale of goods and services to both the domestic and the export market. Please exclude from the amounts reported any taxes collected by this organization on behalf of the government.

1.1 Revenues from the provision of telecommunications services

A. Public telephone services

a) Public local (within exchange) telephone services .....

b) Public long distance (interexchange) telephone services .....

B. Public data network services .....

C. Private (leased) network services (except for program transmission)

D. Virtual private network services .....

E. Program transmission services

a) Television broadcast transmission services .....

b) Radio broadcast transmission services .....

F. Interconnection services (payments from other carriers, foreign or domestic) .....

G. Telegraph, telex and TWX services

a) Telegraph services .....

b) Telex\TWX services .....

H. Mobile telecommunication services

a) Cellular telephone services .....

b) Paging services .....

c) Other mobile telecommunication services .....

I. Other telecommunication services

a) Teleconferencing services .....

b) Call management services .....

c) Centrex services .....

c) Value added services .....

d) Other telecommunication services n.e.c. .....

Total - Telecommunication services (A to I) .....

1.2. Revenues from the sale of telecommunication related goods and services

J. Telecommunication equipment rental services .....

K. Telecommunication equipment sales .....

L. Connection services (access charges) .....

M. Telecommunication consulting services .....

N. Telecommunication and related equipment maintenance .....

O. Directory advertising services .....

P. Other telecommuncation related services .....

Total - Telecommunication related goods and services (J to P) .....

1.3. Revenues from other sources (excluding non-operating revenues)

Q. Royalties and patent fees .....

R. Services to related parties not included above (r & d charges, management fees ...) .....

S. Other goods and services .....

Total - Revenues from other sources (Q to S) .....

T. Operating subsidies .....

TOTAL - OPERATING REVENUES .....

MODULE 2. GOODS AND SERVICES USED IN THE OPERATIONS

This module is concerned with the expenses incurred by this organization for goods and services used in the regular conduct of its business. Purchases of goods and services for resale without major modifications should be reported in module 3. For the purpose of this survey, transactions with related parties (purchases at market prices or transfers at internal prices) should be included. Please exclude capital expenditures and income taxes.

A. Wages, salaries and employee benefits

a) Wages and salaries .....

b) Employee benefits .....

B. Business services

a) Computer services (CPC 84) .....

b) Professional services - legal, auditing, management consulting, etc. (CPC 86) .....

c) Advertising and sales promotion (CPC 871) .....

d) Insurance (CPC 812) .....

C. Rental and leasing of machinery and equipment (CPC 83) .....

D. Telecommunication services (CPC 752) .....

E. Materials and supplies for own use

a) Operating supplies (including maintenance supplies) .....

b) Office and other supplies .....

F. Occupancy costs

a) Rental and leasing of land and buildings (CPC 82) .....

b) Utilities (CPC 17) .....

G. Purchased repair and maintenance .....

H. Property and other non-commodity indirect taxes

a) Property and school taxes .....

b) Permits, licenses and other non-commodity indirect taxes .....

I. Royalties and patent fees .....

J. Depreciation .....

K. Other operating, administrative and general expenses .....

Total - Current operating, administrative and general expenses (A to K) .....

MODULE 3. PURCHASES OF GOODS AND SERVICES FOR RESALE

This module is concerned with purchases of goods made by this organization and which have been resold to its clients without major modifications.

A. TELECOMMUNICATION EQUIPMENT .....

B. OTHER .....

TOTAL - GOODS AND SERVICES FOR RESALE .....

MODULE 4. INVENTORIES

This module is concerned with the change in the level of the various types of inventories held by your organization during the period covered by this report

	opening	closing
a) Goods purchased for resale	.....	.....
b) Goods purchased for use in the operation	.....	.....
c) Other inventories	.....	.....

MODULE 5. SUPPLEMENTARY QUESTION CONCERNING THE BASIS OF ACCOUNTING

This module is concerned with the accounting method used in reporting revenues

A. Did you report revenues (module 1) on an accrual or cash basis ?

accrual basis ..... cash basis ..... please go to next question

B. If you were unable to report revenues (module 1) on an accrual basis, please provide an estimate of

	opening	closing
Progress payments	.....	.....
Value of accounts receivable	.....	.....

MODULE 6. EXPORTS

This module is concerned with the measurement of exports of telecommunication and related services. An export of telecommunication services is here defined as the provision by a common carrier of access to (use of) its facilities to a foreign client (transmission originating in another country that i) passes through the domestic carrier's network before reaching its final destination in a third country or ii) reaches its final destination within the reporting domestic carrier's network or another domestic carrier's network).

TELECOMMUNICATION SERVICES	
A. PAYMENTS RECEIVED FROM FOREIGN CARRIERS	.....
B. PAYMENTS RECEIVED FROM OTHER FOREIGN CLIENTS	.....
TOATL EXPORTS OF TELECOMMUNICATION SERVICES	.....
C. OTHER GOODS AND SERVICES	.....
TOTAL EXPORTS	.....

MODULE 7. IMPORTS

This module is concerned with the measurement of imports of telecommunications and related services. An import of telecommunication services is here defined as the purchase by a resident of access to (use of) a foreign carrier's facilities (transmission originating within the domestic territory that passes through and reaches its final destination through a foreign common carrier's network).

TELECOMMUNICATION SERVICES

A. PAYMENTS MADE TO FOREIGN CARRIERS .....

OTHER GOODS AND SERVICES

B. OTHER GOODS AND SERVICES .....

TOTAL IMPORTS .....

MODULE 8. TRAFFIC VOLUME STATISTICS

This module is concerned with measures of telecommunication traffic and other volume measures.

A. PUBLIC TELEPHONE NETWORK (VOICE GRADE CIRCUITS)

DESTINATION OF TRANSMISSION	# OF CALLS	MiTT
within local exchange		
interexchange - domestic		
interexchange - international		

B. PUBLIC DATA NETWORK

DESTINATION OF TRANSMISSION	# OF CALLS	MiTT
DOMESTIC		
INTERNATIONAL		

MODULE 9. EMPLOYMENT

This module is concerned with the number of persons employed, by broad categories of occupations, by sex and by category of employment (full time and part-time).

OCCUPATIONS IN	MALE		FEMALE	
	FULL TIME	PART-TIME	FULL TIME	PART-TIME
MANAGEMENT				
ENGINEERING				
COMPUTER SCIENCE				
REPAIR, MAINTENANCE AND INSTALLATION				
SALES AND MARKETING				
CLERICAL SUPPORT				
OTHER				

MODULE 10. FIXED ASSETS, ADDITIONS AND DISPOSALS

10.1. CAPITAL EXPENDITURES

Include all fixed assets (including work done by own labour force) shown in your books of accounts and all assets operated by your business under finance lease arrangments. Exclude expenditures on maintenance and on intangible assets such as goodwill.

TYPE OF ASSET	ADDITION DURING THE YEAR	DISPOSAL DURING THE YEAR	BOOK VALUE AT YEAR END
LAND			
BUILDINGS			
TERMINAL, TRANSMISSION & SWITCHING EQUIPMENT AND FACILITIES			
OFFICE EQUIPMENT (incl. computer and related equipment)			
MOTOR VEHICLE AND OTHER TRANSPORT EQUIPMENT			
OTHER PLANT, MACHINERY AND EQUIPMENT			
FURNITURE AND FITTINGS			
OTHER FIXED ASSETS			

10.2. OWN ACCOUNT CAPITAL FORMATION

A. BOOK VALUE OF FIXED ASSETS PUT IN PLACE BY OWN LABOUR FORCE FOR OWN USE	$
B. PURCHASE OF MATERIALS AND SUPPLIES USED BY OWN LABOUR FORCE TO CREATE FIXED ASSETS REPORTED ABOVE	$
C. SALARIES, WAGES AND SUPPLEMENTARY LABOUR INCOME PAID TO EMPLOYEES ENGAGED IN THE CREATION OF ASSETS	$

MODULE 11. RESEARCH AND DEVELOPMENT

A. Has this organization been involved (own employees, funding of a related organization or purchase from a third party) in R&D in the period covered by this report?

YES ___ go to B NO ___ end of this module

B. Please indicate the form of R&D activity in which your organization has been involved during the reporting period.

a) By the organization's employees ____ go to C

b) Funding of a related organization ____ 000 $ _____

c) Purchased from a third party ____ 000 $ _____

C. Please estimate the following categories of expenditure, for Research and Development undertaken within this organization in this country in 199...

	VALUE
Current expenditure on R&D (i.e. other than for fixed assets)	
a) Salaries and wages (incl. fringe benefits of persons engaged in R&D)	.....
b) Other current costs (incl. contracts for services required to carry out R&D but excl. contracts for R&D work. Excl. capital depreciation)	.....
TOTAL CURRENT EXPENDITURE	.....
Capital (fixed assets) expenditure related to R&D	
a) Land	.....
b) Buildings	.....
c) Equipment	.....
TOTAL CAPITAL EXPENDITURE	.....
TOTAL EXPENDITURE ON R&D	.....

D. In its financial accounts, does this organization normally capitalize or expense the Research & Development expenditures reported as current expenditure above?

	CAPITALIZED	EXPENSED
Wages, salaries and benefits	....	....
R&D contracts (subcontracting of the R&D work)	....	....
Other purchases of goods and services	....	....

MODULE 12. NETWORK CHARACTERISTIC - PENETRATION OF DIGITAL TECHNOLOGY

CENTRAL OFFICES BY TYPE OF SWITCHING EQUIPMENT	# OF OFFICES	# OF WORKING LINES
DIGITAL		
ANALOGUE		

CHAPTER III. EXPLANATION OF THE DATA COLLECTION MODULES

16. This part of the paper discusses the purpose of the modules, the universe to which they apply, possible measurement problems, as well as the implications of the choice of the statistical unit or unit of observation. The discussion is followed by a scheme that presents the conceptual framework of the modules in terms of national accounts concepts.

A. Module 1 - Revenues from the sale of goods and services

17. The purpose of **module 1** is to measure the output, in current value, of organizations primarily engaged in the provision of access to telecommunication networks[4] (part of ISIC 6420). It is organized in three sections: **section 1** covers telecommunication services (primary output); **section 2** covers telecommunication related goods and services (in terms of ISIC, all categories except connection services are primary to other industries but in some countries telecommunication carriers are the primary producers of most of these services[5]); **section 3** covers revenues from other sources. The distinction between primary and secondary products allows countries to calculate a specialization ratio and therefore to determine or confirm the existence of the industry (4-digit). In theory, if the questions related to primary output are also addressed to secondary producers, it becomes possible to estimate a coverage ratio, the second element necessary to create or confirm the existence of an industry. However, in most countries, the provision of telecommunication services is highly regulated and secondary production is not typical (except for the sale of excess capacity by organizations operating a large private network).

1.1 Revenues from the provision of telecommunication services

18. The intent of the questions in **section 1** is to measure the outputs of telecommunication services, in current value, by telecommunication carriers (part of ISIC 6420). CPC group 752 - Telecommunication services has been restructured into the following classes (4-digit):

7521 - Public telephone services
7522 - Public data network services
7523 - Private (leased) network services (excl. networks for program transmission)
7524 - Virtual private network services
7525 - Program transmission services
7526 - Interconnection services
7527 - Telegraph, telex and TWX services
7528 - Mobile communication services
7529 - Other telecommunication services

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[4] Owned or leased by the supplier.

[5] See annex 2 for a more detailed discussion of this issue.

The 4-digit classes and 5-digit subclasses of this module are defined in Annex 1. An explanation of their relationship to the CPC is provided in Annex 2.

19. The basic change to the current CPC is a shift in emphasis from the "type of transmission" criterion to "type of network" criterion, that is, public versus private networks. The new approach is based on the following rationale:

a) In essence, the service provided by telecommunication carriers to their clients consists of **providing access to a network(s)[6] that meet their communication needs**. Although some networks are better adapted to particular communication applications, different networks can serve the same application (they can in fact serve many applications). Furthermore, the client chooses the application(s), the carrier then provides access to the network that is best adapted to meet those needs at the best possible price.

b) One advantage of creating categories that emphasize the public/private network distinction from a statistical point of view is that they regroup products which are generally priced on a similar basis, that is, priced on the basis of usage as opposed to leased. These categories should therefore be better adapted to the construction of price indices.

20. The provision of some of the telecommunication services listed in section 1 can involve more than one telecommunication carrier[7] (e.g. public long distance telephone service) or a telecommunication carrier and a business operating in another sector (e.g. customer sponsored services such as 976). In those cases, the consistent application of a standard definition for the "transaction" is necessary to ensure comparability of data. The following paragraphs provide guidelines to define and value such transactions.

21. In cases where the provision of a telecommunication service involves many carriers, **the total amount billed by the carrier handling the transmission constitutes one transaction**. This transaction should be classified to the appropriate service category (e.g. public long distance telephone services, mobile telephone services or public data network services). **The amount paid (settlement) by that carrier to other carriers for use of their networks is a separate transaction.** The recipient of this payment should classify the transaction to the interconnection service category; the carrier making the payment should treat the transaction as a purchase of telecommunication services classified to item D in module 2.

22. In cases where a "non-telecommunication" service is provided through the telecommunication network, **only the telecommunication charges should be treated as a telecommunication service**. This is the case for so-called "gateway to data bases" services or "customer sponsored services". In the first case, the telecommunication carrier offers a single access to a large number of data bases operated by other businesses (usually refered to as data base vendors and classified to the computer services industry). The subscribers to such services are typically billed for both

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[6] Public or private, analogue or digital, narrow band or wide band.

[7] Two or more domestic carriers in countries where many carriers operate, a domestic and a foreign carrier, or both.

telecommunication services and data base services by the telecommunication carrier; the carrier remits part of the amount to the data base vendor and retains the balance for the rendering of telecommunication and billing services. Customer sponsored services are similar. In this case clients of the phone companies pay a certain amount to listen to messages provided by specialized organizations; the phone company remits part of the amount collected to the sponsor and retains the balance for the provision of telecommunication and billing services.

1.2 Revenues from the sale of telecommunication related goods and services
1.3 Revenues from other sources

23. The intent of **section 2** is to measure the most important "non-telecommunication" outputs of telecommunication carriers. As mentioned earlier, telecommunication carriers may be the primary producers of these services in some countries and secondary producers in other countries. The service categories used in section 2 are defined in Annex 1.

24. **Section 3** is included in module 1 to preserve the conceptual framework set out in the computer services model survey. However, given the nature and organization of the telecommunication sector in most countries, it is unlikely that receipts of royalties and patent fees and of operating subsidies constitute important sources of revenues. A similar comment can be made about the "Services to related parties" category. The main purpose[8] of this category is to capture revenues earned by domestic organizations from charges to foreign affiliates for research and development services, management services, etc. Foreign ownership by telecommunication carriers is not typical.

25. Module 1 contains most of the information needed to measure the gross output of the telecommunication sector. The missing information will be reviewed below in the discussions concerning modules 4, 5 and 10 (section 2).

26. Users often show more interest in the measure of the total output of a particular product than they show for a measure of the total output of a particular industry. In theory, some of the questions in module 1 could be addressed to organizations classified in other industries in order to measure the secondary and total output of telecommunication services. In practice, however, secondary production of telecommunication services is likely to be minimal and costly to measure although this may well vary from one country to another. The judgement as to whether it is worthwhile collecting information on secondary production is a matter best handled by national statisticians who have the necessary knowledge of the country's economy and industrial organization.

[8] It should also be used to record charges to domestic affiliates.

B. Module 2 - Goods and services used in the operations and Module 3 - Purchases of goods and services for resale

27. **Modules 2 and 3** are concerned with the costs (current) incurred by the surveyed organizations to produce services. This information along with that of modules 1 (revenues), 4 (inventories), 5 (accounting adjustments) and 10.2 (own account capital formation) allows the calculation of value added at factor cost originating from the telecommunication sector and also provides for an estimate of its major components, namely,

- wages, salaries and supplementary labour income;
- gross and net operating surplus.

28. The categories of module 2 are the same as those recommended in the model survey of computer services; they are sufficiently generic to be relevant for most sectors of the economy with the possible exception of the royalties and patent fees and services to related parties categories. Statistical offices should exercise judgement as to whether or not it is important to ask these questions of their carriers.

29. Countries may wish to combine some categories and elaborate others. For example, some may wish to combine salaries and wages with employee benefits or to isolate, from the residual category, fuel oil, gasoline and automobile repair costs, other purchased services such as printing and publishing and any other categories that they consider important.

30. The categories for **Property and school taxes** and **Permits and licenses** are included as examples of non-commodity indirect taxes[9]. The data are necessary to calculate value added at factor cost by the residual method. Each country adopting this survey should take into account the taxation practices in place to determine the relevant questions. They may also choose to use an alternate source of information for this data.

31. **Module 3** is concerned with the purchase of goods for resale. The information along with the information on their sale (module 1) allows the calculation of trade margins.

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[9] **Indirect taxes** are defined as compulsory payments made by producers to government in respect of the production, sales, purchase or use of goods and services, which they charge as expenses of production. **Non-commodity indirect taxes** are defined as indirect taxes which cannot be identified with any particular commodity produced or sold.

C. Module 3 - Inventories

32. The information of **module 4** serves two purposes. First, the data on inventories allows the calculation of gross output and intermediate inputs for services producing industries in a manner consistent with that used for goods producing industries (**if and when the information relating to costs (modules 2 & 3) has been collected as materials and services purchased rather than goods and services used**). Secondly, it allows the measurement of investment in inventories, a component of capital formation. The next two paragraphs discuss the use of the information in relation to the first objective.

33. The first question in **module 4** (inventories of goods purchased for resale) is addressed to carriers engaged in the trading of telecommunication equipment[10]. This information allows the adjustment of "purchases of goods for resale" (module 3) for changes in the level of inventories.

34. The second question relates to inventories of goods purchased for use in the business. This information allows the adjustment of "purchases of materials and supplies for own use" (module 2, question E) for changes in the level of inventories.

D. Module 5 - Supplementary questions concerning the basis of accounting

35. The purpose of **module 5** is to collect the information necessary to correctly value the production of service outputs in a given period when transactions/revenues are reported on a **cash basis**[11]. This is especially important for services that can be produced over an extended period of time. In those cases, the period in which transactions (payments) are recorded may not reflect the period in which the services were produced. The only such service in this case is telecommunication consulting services (module 1, section 1.2, category M).

36. **Module 5** is organized in a manner similar to that of a typical module on inventories. It asks for particular values at the opening and closing of the accounting period. The questions address the issues of:

(a) **Progress payments** - Some service contracts include provisions for payments after completion of particular phases of the project. These payments can be used as a proxy for the value of production, in a given period, of a project which is not yet completed. The only service listed in module 1 that can be subject to this type of arrangement is telecommunication consulting services.

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[10] The choice of statistical unit may very well affect the relevancy of this question. See discussion in section K of this document.

[11] See footnote 10 above.

(b) **Accounts receivable** - This item allows the measurement of the value of services which have been delivered during the accounting period, but for which no payment has been received.

37. The above questions are not relevant if respondents report revenues on an **accrual basis of accounting**.

E. Module 6 - Exports and Module 7 - Imports

38. The purpose of modules 6 and 7 is to measure international trade in telecommunication services. This does not include flows resulting from direct investment abroad by telecommunication carriers.

39. The categories proposed to measure international trade are broad aggregates (telecommunication services and other). This choice was influenced by:

a) The choice of the method to measure export and import which, in our opinion, does not lend itself to a detailed break down by type of service (see discussion below);

b) The assumption that long distance telephone calls still constitute the bulk of international telecommunication traffic.

40. The methodology to measure international trade in telecommunication services must take into account the mode of delivery and the mode of payments by residents to non-residents for services rendered.

a) Mode of delivery

Most international traffic passes through common carrier networks and involves more than one carrier. For example, a person making a phone call in another country needs access to the telecommunication network of that country and obtains it through his/her domestic carrier. In fact, for that person, the import of telecommunication services is invisible; the billing from the domestic carrier includes charges to cover the use of the domestic telecommunication network(s) as well as the use of a foreign telecommunication network(s).

b) Mode of payment

Payments by residents to non-residents is generally achieved through international settlements where carriers are compensated for the use of their networks by non-residents[12]. This implies that carriers can provide most of the information necessary to measure international trade ($) in telecommunication services.

[12] The same type of settlement procedures exists for the domestic market in countries where many carriers operate.

41. The expressions "payments received from foreign carriers" (exports) and "payments made to foreign carriers" (imports) are used here to convey the notion that there are settlement procedures for international traffic. They do not imply that every domestic carrier involved in international communications makes direct payments to, or receives direct payment from, foreign carriers. The implementation of this module will therefore have to take account of national circumstances. For example, in Canada, one carrier is responsible for providing, through its own network and through coordination with domestic and foreign carriers, all telecommunications services between Canada and other continents. This responsibility includes coordination of payments to foreign carriers (for outward traffic) and domestic carriers (for inward traffic) for their involment in the routing of traffic. This carrier can therefore provide information on export to and import from other continents. Other arrangements are in place for North and South America.

42. Not all international trade in telecommunication services involves settlements between carriers (by-pass). In some instances, non-residents may deal directly with a domestic carrier (e.g. a European based enterprise may set up its own network between Europe and North America and deal directly with a North American carrier to set up that part of its network). Category B of module 6 (payments received from other foreign clients) is proposed as a means of capturing this type of export[13].

F. Module 8 - Traffic volume statistics

43. The purpose of **module 8** is to collect information on the volume of telecommunication traffic. These data can be used to elaborate constant dollar series for the telecommunication sector and also as an indicator of general economic activity. The usefulness of telecommunication traffic statistics as an indicator of general economic activity is discussed in detail by Gregory C. Staple[14] and Mark Mullins in a June 1989 article published in "Telecommunication Policy". The authors also present a methodology to measure telecommunication traffic; this module of the survey is based on that recommendation.

44. In summary, the authors are proposing the elaboration of a consistent measure of domestic and international flows of telecommunication traffic. They argue this can be achieved by adopting a standard unit of account, minutes of telecommunication traffic (MiTT) and by measuring these flows over circuits of similar bandwidth (narrow band or telephony bandwidth and wide band) with particular emphasis on public telephone voice grade circuits.

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[13] We are not proposing an equivalent category for the import module (7) because it would imply a user survey. In theory, however, such a survey would be necessary to ensure total coverage of imports.

[14] Director of the International Institute of Communications.

45. The proposed approach results in consistent information if the volume of traffic carried over a circuit of a given bandwidth for a given period of time is and remains constant, which is not necessarily the case. New coding and signal compression techniques, made possible by digital technology, allow carriers to "move" more traffic with existing circuits. The solution is to refine the classification of circuits at the national level so as to adapt to national circumstances.

46. Telecommunication carriers are in a position to provide information on traffic over public networks but are not in a position to provide information on traffic over private networks[15]. In theory that information can be obtained through a user survey, assuming users of private networks monitor traffic volumes. The launching of a user survey is not suggested here but may be of interest to some users.

G. Module 9 - Employment

47. This module is designed for the collection of information about working proprietors and partners and paid employees within businesses. No definition of part-time is provided as this differs between countries. Each country should define this according to its own conventions.

48. In terms of the Revised International Standard Classification of Occupations of the International Labour Office (ISCO-88), the model survey categories are defined as follows:

MODEL SURVEY CATEGORIES - OCCUPATIONS	ISCO-88 CATEGORIES
MANAGEMENT	**SUB MAJOR GROUP 12** - CORPORATE MANAGERS **SUB MAJOR GROUP 13** - GENERAL MANAGERS
ENGINEERING	**UNIT GROUP 2144** - ELECTRONICS AND TELECOMMUNICATION ENGINEERS **UNIT GROUP 3114** - ELECTRONICS AND TELECOMMUNICATION TECHNICIANS
COMPUTER SCIENCE	**MINOR GROUP 213** - COMPUTING PROFESSIONALS **MINOR GROUP 312** - COMPUTER ASSOCIATE PROFESSIONALS
REPAIR, MAINTENANCE & INSTALLATION	**UNIT GROUP 7244** - TELEGRAPH AND TELEPHONE INSTALLERS AND SERVICERS **UNIT GROUP 7245** - ELECTRICAL LINE INSTALLERS, REPAIRERS AND CABLE JOINTERS
CLERICAL SUPPORT	**MAJOR GROUP 4** - CLERKS
OTHER	

[15] Owned by the user or leased from a carrier by the user for his exclusive use.

H. Module 10 - Fixed assets, additions and disposals

49. This module is designed for the collection of information relating to capital formation. The objective is to collect information about investment in all types of construction and machinery and equipment by organizations primarily engaged in the supply of telecommunication services.

50. **Section 1** of the module is concerned with total capital expenditure and **section 2** with own account capital formation (should be included in section 1). The section on own account capital formation is introduced for the following reasons:

a) The United Nations Statistical Office[16] recommends that the output (value) of such activities be part of the producing industry's gross output;

b) The telecommunication sector is one of the sectors most likely to be involved in such activities.

The third category in section 1 (Terminal, tansmission and switching equipment and facilities) is meant to include assets such as pole lines, cable, microwave towers, sattelites, central office equipment, station equipment, etc. Some countries may wish to isolate the major components of this aggregate.

I. Module 11 - Research and Development

51. The purpose of **module 11** is to gather information on amounts spent by telecommunication carriers on R&D and on their accounting practices related to these expenses. The information requested in this module ought also to have been provided in modules 2 and 10. Those countries who currently conduct an R&D survey based on the OECD (Frascati) standards can meet the basic objectives of this module[17].

52. **Research and Development** (R&D) is defined as the systematic investigation carried out by means of experiment or analysis to achieve a scientific or commercial advance. **Research** is original investigation undertaken on a systematic basis to gain new knowledge. **Development** is the application of research findings or other scientific knowledge for the creation of a new or significantly improved product. If successful, development will usually result in a product which represents an improvement in the "state of the art" and is likely to be patentable.

53. It is recommended that for section C all outlays on this activity by the surveyed organization should be included, whether these outlays are expensed or capitalized. A further question in D then asks the respondent whether the expenses are capitalized or not.

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[16] United Nations, International Recommendations for Industrial Statistics, Statistical Papers, Series M no. 48 Rev. 1, New York, 1983, para 148.

[17] The measurement of scientific and technical activities, "Frascati manual" 1980, OECD, 1981.

J. Module 12 - Penetration of digital technology

54. The evolution of telecommunications in the direction of Integrated Services Digital Network (ISDN) is an issue of interest for many. There are, however, few data that allow the measurement of the extent of ISDN implementation in various countries.

55. The implementation of the ISDN concept is dependent on the introduction of wide band transmission and digital switching technologies which both require sizeable investments. For that reason, these technologies are gradually introduced within existing networks. It is therefore proposed to assess the extent of ISDN implementation by measuring the degree of digitization of public networks. One method of measuring the degree of digitization is to compare the number of digital central offices with the number of traditional central switching offices and the number of working lines connected to each.

K. Unit of observation

56. The choice of unit of observation for this survey is best left to the participating countries, since they are in a position to take account of factors such as the industry profile, the structure and content of their business register, the agency's usual collection strategy, etc.

57. The establishment unit, the kind-of-activity unit or the enterprise unit are possible choices. However, the establishment concept which is based on the notions of industrial homogeneity, geographical origin of production and availability of accounting records, is not easily applicable to the telecommunication sector, which is characterized by physically dispersed and highly integrated operations; the kind-of-activity unit is therefore a more likely choice. The following interpretation\guideline for the delineation of the statistical unit is proposed;

a) All operations of a telecommunication enterprise necessary to provide and maintain telecommunications services (switching, transmission, network maintenance, billing, administration, etc.) are an integral part of a single statistical unit **unless** there are recognizable administrative units (not including exchange areas) within the enterprise which are responsible for the management and operation of the telecommunication network in a given territory. In such cases, each administrative unit constitutes a statistical unit[18].

b) The operating entities of telecommunication enterprises engaged in activities not directly associated with the provision of telecommunication services such as directory advertising, telecommunication equipment retailing and telecommunication related consulting are likely separate statistical units.

58. In theory, the choice of statistical unit can have a considerable impact on the results of an industry based survey both in terms of coverage (mix) of activities and industrial distribution of data. The magnitude of the impact is a function of the degree of

[18] It is assumed here that, in either case, the data necessary to delineate the statistical unit is available.

specialization of the units and of the extent of secondary production. In practice, however, telecommunication enterprises tend to be specialized and very few enterprises operating in other sectors provide telecommunication services.

59. Those countries who choose the enterprise as the unit of observation might want to add a module to collect information on assets, liabilities and source and application of funds. They might also wish to expand modules 1 and 2 to cover financial revenues and expenses. This information is typically available for enterprises, but not necessarily for more narrowly defined statistical units. Such an approach would provide a broader set of integrated data to analyse the performance of the computer services sector.

NATIONAL ACCOUNTS CONCEPTS AND THE MODULES

60. The schema shown on the next page does not provide a guide to the precise reconciliation of the content of the modules to the National Accounts. There are items such as interest and dividends paid and received which are not included in the modules. In addition, some of the items collected with the proposed model survey will need to be revalued to conform to SNA concepts. In particular insurance and depreciation expenses are treated differently in business and economic accounts.

61. The survey's conceptual framework in terms of macro-economic concepts is as follows

Gross output at producers' prices

Module 1, except S (operating subsidies)
\+ Module 4c (closing)
\- Module 4c (opening)
\+ Module 5B (closing)
\- Module 5B (opening)
\+ Module 10.2 A

less **Intermediate inputs at purchaser's prices**

Module 2, except A, G, I
\+ Module 3
\+ Module 4, questions a & b (closing)
\- Module 4, questions a & b (opening)
\+ Module 10.2 B

= **GDP at factor cost**

\- Module 2, question A

= **Gross operating surplus**

\- Module 2, question J

= **Net operating surplus**

less **Non commodity indirect taxes**

Module 2, question G

plus **Operating subsidies**

Module 1, question P

ANNEX 1 - EXPLANATORY NOTES FOR THE PRODUCT CATEGORIES USED IN MODULE 1

752 Telecommunication services

7521 Public telephone services

75211 Public local telephone services - The provision of the switching and transmission services necessary to establish and maintain communications within a local calling area. This service is primarily designed (used) to establish voice communications but also serves other applications such as text communication (facsimile or teletex) and is generally provided for a flat monthly fee independently of the number of calls made by the subscriber. This category includes local payphone services but does not include the provision of local private line services or the rental of terminal equipment (class 7523 and 7541).

75212 Public long distance telephone services - The provision of the switching and transmission services necessary to establish and maintain communications between local calling areas. This service is primarily designed (used) to establish voice communications but also serves other applications such as text communications (facsimile or teletex) and may be provided on a toll or flat rate basis. This service provides the customer with access to the supplier's and connecting carrier's entire telephone network or, in some instances, to a limited number of exchange areas (e.g. WATS service). This category includes long distance payphone services and the telecommunication component of specialty customer sponsored services such as party lines and electronic polling.

7522 Public data network services

75221 Public data network services - The provision of switched data transmission services. This service is provided on a pay as you use basis where charges can be based on any or a combination of the following factors: time, distance, speed (bps) and/or volume (kilopackets) of information transmitted. Public data network services typically serve applications involving low to medium volumes of data. The leasing of dedicated data networks is classified in class 7523.

7523 Private network services (except for program transmission)

75231 Private network services - The leasing of dedicated network facilities to establish voice, data and\or image communications between selected (point-to-point or multi-point) locations or terminals. The leasing of network facilities for the transmission of television and\or radio programs is classified in class 7525.

7524 Virtual private network services

75241 Virtual private network services - The provision of the switching and transmission services necessary to establish voice, data and\or image communications between selected (point-to-point or multi-point) locations or terminals. This type of service has characteristics similar to those of a private network (custom dialing plans, high bandwith, network management) but is provided via the public network on a pay as you use basis.

7525 Program transmission services

75251 Television broadcast transmission services - The provision of the network services necessary for the transmission of television signals, independently of the type of technology (network) employed. This class does not include satellite-to-cable services where the provider sells T.V. signals via satellite to cable companies (as opposed to selling use of satellite facilities) nor does it include DTH (direct-to-home) satellite services where the provider sells television program packages directly to households located in remote areas.

75252 Radio broadcast transmission services - The provision of the network service necessary for the transmission of audio signals such as radio broadcasting, wired music and loudspeaker service.

7526 Interconnection services

75261 Interconnection services - The provision of network services by one carrier to another when a communication originating in a carrier's network reaches its destination through another carrier's network.

7527 Telegraph, telex and TWX services

75271 Telegraph services - The transmission of written messages by telegraphy.

75272 Telex/TWX services - The provision of the network and related services necessary to send and receive written messages between telex/TWX terminals.

7528 Mobile telecommunication services

75281 Cellular telephone services - A radiotelephone service which, by means of transportable equipment, gives both-way access to the public telephone network or other mobile telephones. Some versions of this service, with proper terminal equipment, may be used to transmit facsimiles as well as voice communications.

75282 Paging services - The summoning of a person to the telephone through the use of an electronic pager. This class includes tone, voice and digital display paging services.

75289 Other mobile telecommunication services - The provision of mobile telecommunication services not elsewhere classified such as air-to-ground and maritime communications.

7529 Other telecommunication services

75291 Teleconferencing services - The provision of the network and related services necessary to hold voice conferences or a one-way or two-way fully interactive video conference.

75292 Call management services - The provision of network "management intelligence" services such as call displaying, call tracing, call waiting and call screening to the subscribers of the basic telephone service.

75293 Centrex services - The provision of PBX functionality (inward dialing from extensions, transfer of incoming from one extension to another, identification of extension telephones for billing of long distances calls, etc.) from a carrier's central office.

75294 Value added services - The provision of the network and support services (hardware or software) necessary to establish "intelligent" computer based communication. This type of service typically offers one or a combination of the following communication applications: E-mail, EDI, gateway to data bases, electronic bulletin boards, dataconferencing, electronic calendar, voice mail box and videotex.

75299 Other telecommunication services n.e.c. - The provision of telecommunication services not elsewhere classified.

Telecommunication equipment rental services - The provision of telecommunication terminal equipment through a rental or lease agreement (generally for a flat monthly fee).

Telecommunication equipment sales services - The retail or wholesale sales of telecommunication terminal equipment.

Connection services - The provision of access to telecommunication network services by connecting the customer's premises to the carrier's facilities.

Telecommunication consulting services - The provision of advice and assistance to businesses and/or institutions on matters related to telecommunications and telematics.

Telecommunication and related equipment maintenance services - The provision of maintenance services for communications and communications related products on a fee or contract basis. Equipment maintained includes modems, multiplexers, earth stations, telex terminals, telephones etc.

Directory advertsing services - The provision of space in telephone advertising directories.

Other telecommunication related services n.e.c. - The provision of telecommunication related services not elsewhere classified such as operator services furnished to other carriers, billing and collection services for customer sponsored services etc.

ANNEX 2 - RELATIONSHIP BETWEEN THE CPC AND THE CLASSIFICATION PROPOSED FOR TESTING

The most important changes to CPC 752 - Telecommunication services are: the grouping of some CPC's into a "private network service" category; the splitting of CPC 75232 - Electronic message and information services into 3 categories; the creation of a new aggregate for mobile telecommunication services; and, the creation of categories for call management services and centrex services. The following tables provide a detail reconciliation.

CURRENT CPC 752 - TELECOMMUNICATION SERVICES	PROPOSED CLASSIFICATION FOR TESTING
75211 - Public local telephone services	75211 - Public local telephone services 75293 - Centrex services
75212 - Public long distance telephone services	75212 - Public long distance telephone services
75213 - Mobile telephone services	75281 - Cellular telephone services
75221 - Shared business network services	**part of** 75241 - Virtual private network services
75222 - Dedicated business network services	**part of** 75231 - Private network services
75231 - Data network services	75221 - Public data network services **part of** 75231 - Private network services
75232 - Electronic message and information services	75271 - Telegraph services 75272 - Telex/TWX services 75294 - Value added services
75241 - Television broadcast transmission services	75251 - Television broadcast transmission services
75242 - Radio broadcast transmission services	75252 - Radio broadcast transmission services
7525 - Interconnection services	7526 - Interconnection services
7526 - Integrated telecommunication services	**part of** 75231 - Private network services
75291 - Paging services	75282 - Paging services
75292 - Teleconferencing services	75291 - Teleconferencing services
75299 - Other telecommunication services	75289 - Other mobile telecommunication services 75292 - Call management services 75299 - Other telecommunication services n.e.c

PROPOSED CLASSIFICATION FOR TESTING	CURRENT CPC 752 - TELECOMMUNICATION SERVICES
75211 - Public local telephone services	75211 - Public local telephone services **except Centrex services**
75212 - Public long distance telephone services	75212 - Public long distance telephone services
75221 - Public data network services	**part of** 75231 - Data network services
75231 - Private network services	75222 - Dedicated business network services **part of** 75231 - Data network services 7526 - Integrated telecommunication services
75241 - Virtual private network services	75221 - Shared business network services
75251 - Television broadcast transmission services	75241 - Television broadcast transmission services
75252 - Radio broadcast transmission services	75242 - Radio broadcast transmission services
75261 - Interconnection services	7525 - Interconnection services
75271 - Telegraph services	**part of** 75232 - Electronic message and information services
75272 - Telex/TWX services	**part of** 75232 - Electronic message and information services
75281 - Cellular telephone services	75213 - Mobile telephone services
75282 - Paging services	75291 - Paging services
75289 - Other mobile telecommunication services	**part of** 75299 - Other telecommunication services
75291 - Teleconferencing services	75292 - Teleconferencing services
75292 - Call management services	**part of** 75299 - Other telecommunication services
75293 - Centrex services	**part of** 75211 - Public local telephone services
75294 - Value added services	**part of** 75232 - Electronic message and information services
75299 - Other telecommunication services n.e.c.	**part of** 75299 - Other telecommunication services
7549 Other telecommunication related services n.e.c.	**part of** 7549 Other telecommunication related services n.e.c.

CPC 754 - TELECOMMUNICATION RELATED SERVICES

Given that ISIC and the CPC emphasize the nature of the activity, it can be argued that all sub categories (except perhaps connection services) of CPC 754 are not primary products of the telecommunication industry since they are not, strictly speaking, telecommunication services; it can therefore also be argued that there is overlap in the CPC. However, it is not always clear to which ISIC or CPC category(ies) these products and services belong. The following table provides an interpretation of ISIC and the CPC.

Service category	ISIC	CPC
Telecommunication equipment rental services	7129	83109
Telecommunication equipment sales	5139 5233	62244 63234
Telecommuncation consulting services	7414	86509
Telecommunication and related equipment maintenance	5260	63309
Directory advertising services	7430 or 2211	8711 or 3221

Whatever the proper classification of these products, they remain important outputs of the telecommunication industry, particularly if the enterprise is chosen as the unit of observation.