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TALLER INDICADORES PARA EL ACCESO COMUNITARIO DE LAS TICS

PROPOSALS ON INDICATORS FOR THE MEASUREMENT AND QUANTIFICATION OF COMMUNITY ACCESS TO ICTS

1 Background

The Plenipotentiary Conference of the International Telecommunication Union held in Marrakesh in 2002 (PP-02) recognized the need for each Member State to promote knowledge and the development of skills in order to eliminate the digital divide.

Likewise, PP-02 recognized the efforts that Member States are generally making to provide the public, on a community basis, with the means to enable them to access knowledge and information as a tool for progress and for personal and collective improvement.

That being the case, the conference resolved to promote the adoption of measures necessary to establish new indicators for the purpose of measuring the real impact of community connectivity, with a view to those indicators being taken into account in the Plan of Action of the World Summit on the Information Society (WSIS).

This contribution is submitted with the aim of achieving consensus on the procedures to be adopted in the WSIS Plan of Action in order to measure effectively the impact of community connectivity on populations, as a substantive result of the social coverage policies that developing countries are implementing in the interests of narrowing the digital divide on the basis of specific or general actions and programmes.

2 Discussion

There can be no doubting the fact that today's debate revolves around narrowing the digital divide and that in order to step up the pace of this work in the interests of better focusing the corresponding policies we need a healthy mechanism for exchanging experiences with a view to developing common parameters for identifying the progress made and the challenges that lie ahead.

It has in principle to be acknowledged that connectivity and access to ICTs are what tend to be used for providing coverage and community access in developing and least developed countries on account of their limited infrastructure, and of the fact that, for the bulk of the population, it is economically difficult to secure individual access to the new technologies.

It is for this reason that the policy of community connectivity has been put into practice worldwide - a policy under which access is provided to telecommunication services by means of digital community centres (DCC), i.e. centres where members of the community may access Internet and

digital communication services from terminal facilities that are put at their disposal and are accessible to everyone without discrimination, providing users with free or very low-cost access to telecommunication services.

This policy lays the priority on setting up DCCs and on the use of broadband at the highest possible speeds. Thus, DCCs imply not only the availability of infrastructure for access to telecommunication services, but also represent an opportunity for individuals within the community to acquire new knowledge and skills through the use and application of ICTs.

In this new context, the measurement indicators currently used, such as teledensity or the number of households connected to the telephone service, are no longer the most suitable means for monitoring the evolution and results of programmes set up in rural and underdeveloped areas in the form of points of service or community connectivity.

Consequently, the plans and actions undertaken in order to provide access to the information society must be accompanied by follow-up mechanisms designed to monitor the progress made at the national, regional and global levels.

Such indicators must be geared towards measuring the impact that the use of ICTs has on the community, i.e. the extent to which the policies adopted with a view to developing the information society are actually effective, particularly in areas less favoured by development.

In the light of the foregoing, it is important that community connectivity indicators take account of factors that are readily identifiable, that allow for the adoption of simple methodologies that do not require significant resources for their setting-up, and that derive from information that is already available or easy to obtain, the overall aim being that the same indicators should be applied by all and that their results be readily comparable so as to permit measurement of countries' performance in implementing their community connectivity programmes and determination of the overall progress made towards achieving the desired goal.

3 Proposal

We consider it essential to include different types of indicator for measuring each country's requirements in respect of community connectivity, as well as the progress made and the best way of implementing projects designed to narrow the digital divide. We shall now describe the mechanisms used for performing the necessary calculations.

3.A Indicators for target-setting

It is necessary to define the required infrastructure in terms of DCCs, taking into account the country's social, demographic and geographic characteristics. In order to perform this calculation, it is of paramount importance to know the percentage of the country's population that may be considered potential users of community centres, and to have an idea of the usage patterns they would display.

3.A.1 Potential population indicator

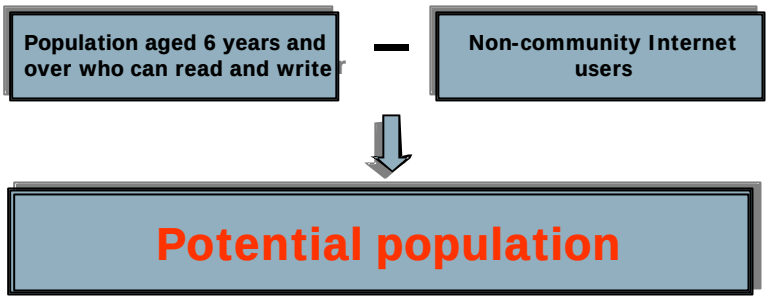
Three premises are established in order to calculate the potential population requiring the community service or needing to be served. Those premises have to do with the age profile, education and Internet access opportunities of the country's inhabitants. A potential user is considered to be anyone who:

– is unable to access the Internet from his or her home;

– is able to read and write;

– is over six years of age.

The figure for the "**Potential population**" is obtained by means of the following formula:



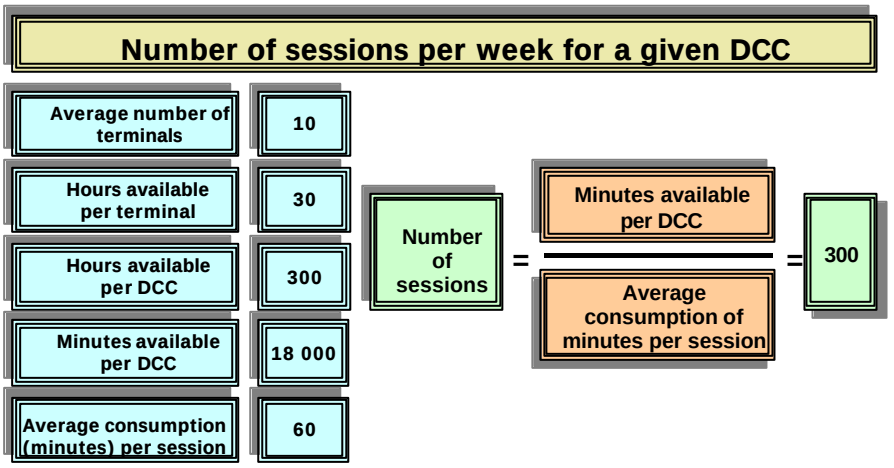
In the case of our country, the "**Population aged 6 years and over who can read and write**" is obtained from the results of the 2000 General Census of Population and Housing, carried out by the National Institute of Geography, Statistics and Informatics (INEGI), as updated for 2002 on the basis of the figures published by the National Population Council (CONAPO). Likewise, the data for the country's "**Non-community Internet users**" are obtained from surveys carried out by a specialized company (SELECT) in December 2002. This group of non-community users comprises non-community Internet users as described in this document, given that the physical installation of community connectivity under the e-Mexico project began in January 2003.

It is proposed that the "**Potential population indicator**" be calculated as follows:

$$\textbf{Potential population indicator} = \frac{\textbf{Potential population}}{\textbf{Total population}}$$

3.A.2 Usage indicators

Subsequently, on the basis of the usage parameters of a given DCC, it is possible to calculate the "**Number of sessions per DCC**". This is done by assigning an estimated value to the following variables: number of terminals, hours available per week, frequency of use, and average consumption of minutes per session. The following diagram represents an example in which we calculate, for a given usage pattern, the number of sessions that a DCC can offer within the space of one week.



Furthermore, based on the assumption that in providing the service to users from a single household one is enabling all of the individuals dwelling in that household to participate in the use of ICTs, the "**Average number of potential users served per DCC**", the impact on the population is calculated by multiplying the '**Number of sessions per DCC**" by the "**Average number of inhabitants per household**" within the country, the latter data item likewise being obtained from the 2000 Census by INEGI.

3.A.3 Target and progress indicators

The aim is to calculate the total number of DCCs necessary to serve all potential users and thereby satisfy the country's requirements. This is obtained by dividing the "**Potential population**" by the "**Average number of potential users served per DCC**", as follows:

$$\textbf{Target number of DCCs} = \frac{\textbf{Potential population}}{\textbf{Average number of potential users served per DCC}}$$

Likewise, in order to measure the progress made in setting up and operating DCCs, it is possible to calculate the "**Percentage of progress made in setting up DCCs**" by dividing the number of "**Existing DCCs**" (at the time of performing the calculation) by the "**Target number of DCCs**", as follows:

$$\textbf{Percentage of progress made in setting up DCCs} = \frac{\textbf{Existing DCCs}}{\textbf{Target number of DCCs}}$$

3.A.4 Example calculation of indicators for the setting of targets

By way of an example, we present a calculation to illustrate the way in which a target is set, having regard to the indicators described in the preceding paragraphs. This calculation can be performed using global figures at the national level; however, in the interests of obtaining a more accurate overview of the current situation within the country in terms of population and geographic distribution, groups of localities are included by size ranges, with care being taken to ensure that each group maintains the necessary representativity among its components. The calculation is then performed for each group and the results are subsequently combined to obtain the national value.

The localities are divided into eight groups, four for urban localities[1] and four for rural localities[2] according to the number of inhabitants, i.e. from communities of 1 to 99 inhabitants up to localities with 500 000 and more inhabitants, the population ranges increasing exponentially from 99 to 450 000 and 500 000 and more inhabitants, as follows:

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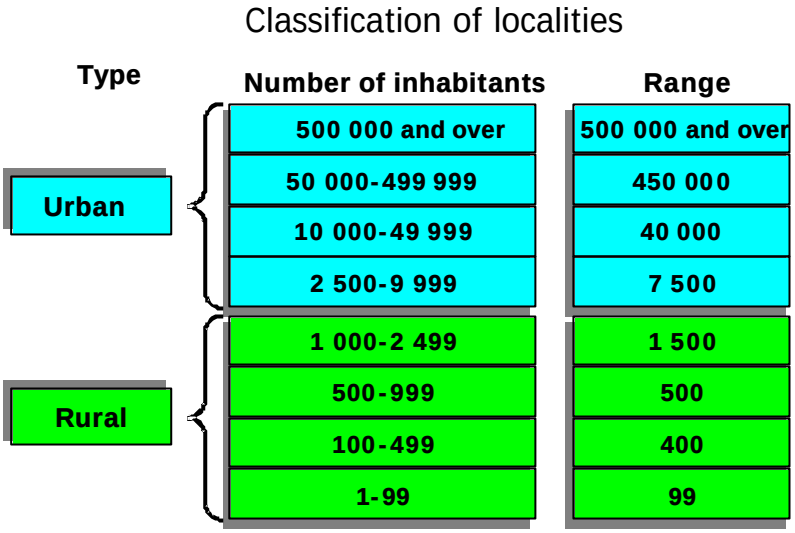
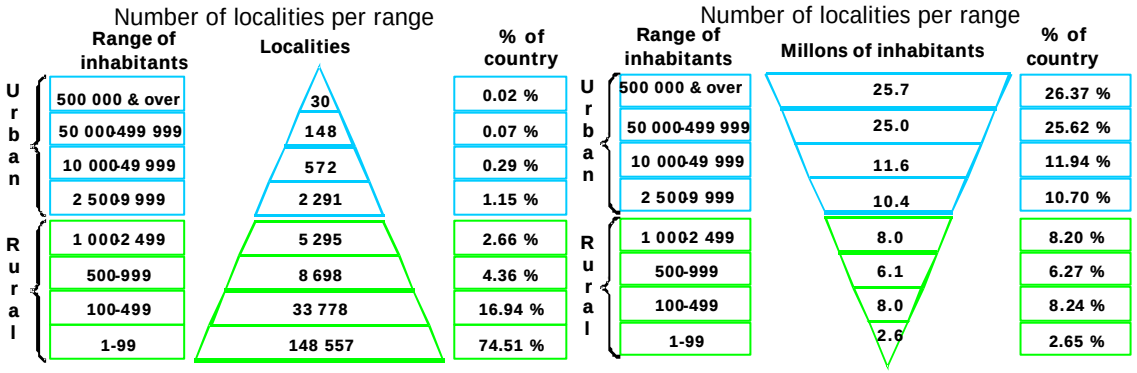
1 Urban localities are considered to be those with 2 500 inhabitants and over, based on the INEGI criterion.

2 Rural localities are considered to be those with fewer than 2 500 inhabitants, based on the INEGI criterion.



By way of an illustration, we indicate below the manner in which the number of localities and inhabitants are integrated, it being observed that, whereas in the group of localities from 1 to 99 inhabitants we find the lowest volume of population and the highest number of localities; in the group of localities numbering more than 500 000 inhabitants we find the highest volume of inhabitants and the lowest number of localities. This can be observed in the following two diagrams.



NOTE - The figures for the number of localities and inhabitants correspond to the 2000 Census conducted by INEGI.

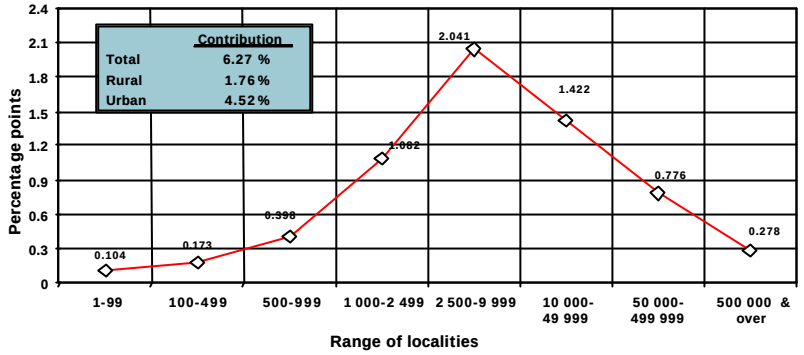
For this reason, it is appropriate to segment the localities according to size in order to obtain the correct representation for each group having a different population size.

Once the groups of localities were established, we updated the population data as at the end of 2002 and proceeded to calculate the "**Potential population**" and the "**Potential population indicator**" for each range. We then added together the results obtained for each group in order to obtain the rural, urban and national totals.

We also calculated the "**Average number of potential users served per DCC**" on the basis of the "**Number of sessions per DCC**", as explained in § A.2 above. This gave us the result of 300 sessions for the "**Average number of inhabitants per household**". Using this information and the figure in respect of "**Potential population**", we calculated, by way of an example, the "**Target number of DCCs**", in order to illustrate that it is possible to establish a preliminary target on the basis of the country's characteristics and requirements, using the criteria referred to above.

Finally, on the basis of the data obtained following the bringing into use, in June this year, of the 3 200 DCCs of the First Satellite Network for Connectivity of the e-Mexico National System, we were also able to calculate the "**Percentage of progress made in the setting up of DCCs**", obtaining the value of 6.27% at the national level, corresponding to a contribution of 1.76% at the rural level and 4.52% at the urban level within the country as a whole. The following table illustrates the part played by each group of localities in the progress made at national level.

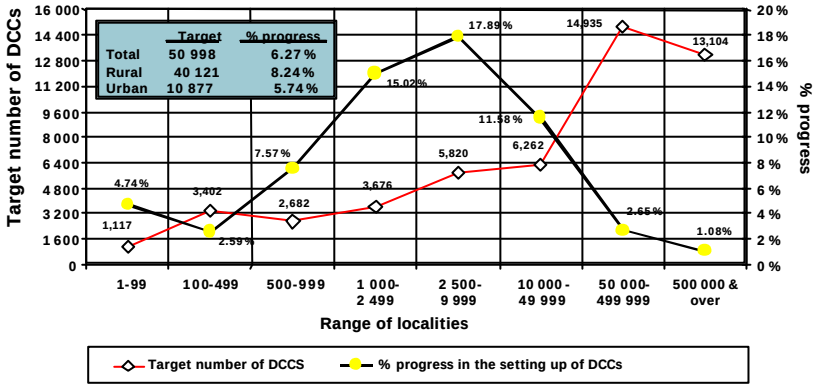
Contribution by each group to the progress made in setting up DCCs



SOURCE: Directorate-General for Tariffs and Statistical Integration, **COFETEL**

Our calculation of the target example, with the stated assumptions, gives a result of 50 998 DCCs to be set up. The actual number of DCCs already set up is 3 200, corresponding to a progress percentage of 8.24% and 5.74% in rural areas and urban areas, respectively. The following table describes the target for each group with the corresponding progress percentage.

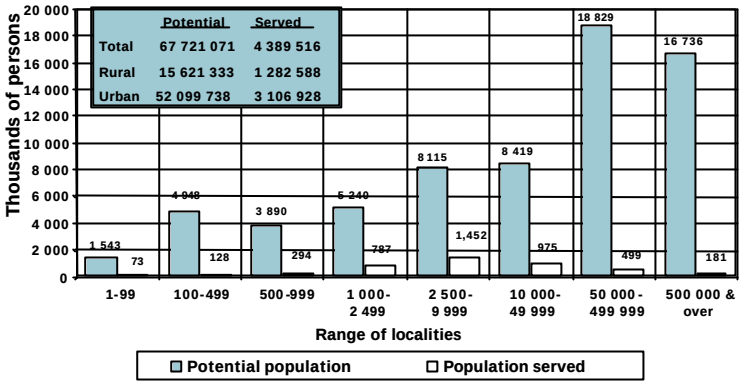
Progress made in the setting up of DCCS



SOURCE: Directorate-General for Tariffs and Statistical Integration, **COFETEL**

In the same way, it is possible to analyse, for each group, the potential population and the population served, as well the totals for rural and urban areas.

Potential population and population served by DCCs



SOURCE: Directorate-General for Tariffs and Statistical Integration, **COFETEL**

The figures in respect of population and number of non-community Internet users should be updated as frequently as possible, typically on an annual basis, in order to allow for recalculation of the number of DCCs required to serve the population, to follow up any changes called for by the public, and to be in a position to update the established targets.

The following page contains a table entitled **Community connectivity indicators**, in which the aforementioned calculation can be seen, together with all the results obtained for each group and the national total.

Community connectivity indicators

Hours of service: 30 hours per week	RURAL				URBAN				TOTALS		
Frequency of use: once per week	1-99	100-499	500-9 999	1 000-2 499	2 500-9 999	10 000-49 999	50 000-499 999	500 000 & over	**RURAL**	**URBAN**	**TOTAL**
TOTAL POPULATION 2002 (INHABS.) 1/	2 478 837	7 696 776	5 852 496	7 657 632	11 287 222	12 591 472	27 732 016	27 081 194	**23 685 741**	**78 691 904**	**102 377 645**
PEOPLE AGED 6 YEARS AND OVER WHO CAN READ AND WRITE, 2002 1/	1 543 124	4 948 067	3 889 816	5 240 326	8 115 345	9 619 940	22 337 238	22 059 889	**15 621 333**	**62 132 412**	**77 753 745**
NON-COMMUNITY INTERNET USERS 3/						1 200 456	3 508 073	5 324 145		**10 032 674**	**10 032 674**
POTENTIAL POPULATION 2002 (INHABS.)	1 543 124	4 948 067	3 889 816	5 240 326	8 115 345	8 419 484	18 829 165	16 735 744	**15 621 333**	**52 099 738**	**67 721 071**
POTENTIAL POPULATION INDICATOR (PERCENTAGE OF TOTAL POP.)	62.25%	64.29%	66.46%	68.43%	71.90%	66.87%	67.90%	61.80%	**65.95%**	**66.21%**	**66.15%**
CALCULATION OF TARGET											
AVERAGE CONSUMPTION PER USER (MINUTES)	60	60	60	60	60	60	60	60	**60**	**60**	**60**
NUMBER OF SESSIONS PER DCC	300	300	300	300	300	300	300	300	**300**	**300**	**300**
AV. NUMBER OF INHABS. PER HOUSEHOLD 1/	4.604	4.848	4.834	4.752	4.648	4.482	4.202	4.257	**4.787**	**4.324**	**4.433**
AVERAGE NUMBER OF USERS SERVED PER DCC	1 381	1 454	1 450	1 426	1 394	1 345	1 261	1 277	**1 436**	**1 297**	**1 330**
DCC TARGET (NUMBER OF DCCS NECESSARY TO SERVE ALL USERS)	1 117	3 402	2 682	3 676	5 820	6 262	14 935	13 104	**10 877**	**40 121**	**50 998**
CALCULATION OF PROGRESS MADE											
EXISTING DCCS	53	88	203	552	1 041	725	396	142	**896**	**2 304**	**3 200**
POPULATION SERVED BY DCCS	73 209	127 985	294 383	787 011	1 451 538	974 793	499 238	181 360	**1 282 588**	**3 106 928**	**4 389 516**
PERCENTAGE OF PROGRESS IN SETTING UP OF DCCS	4.74%	2.59%	7.57%	15.02%	17.89%	11.58%	2.65%	1.08%	**8.24%**	**5.74%**	**6.27%**
DCC WEIGHTING	2.19%	6.67%	5.26%	7.21%	11.4%	12.3%	29.3%	25.7%	**21.33%**	**78.67%**	**100.00%**
CONTRIBUTION OF EACH GROUP TO THE PROGRESS MADE IN SETTING UP DCCS	0.104%	0.173%	0.398%	1.082%	2.041%	1.422%	0.776%	0.278%	**1.76%**	**4.52%**	**6.27%**

1/ Figures estimated on the basis of information from the Census of Population and Housing (2000, INEGI) and from CONAPO.

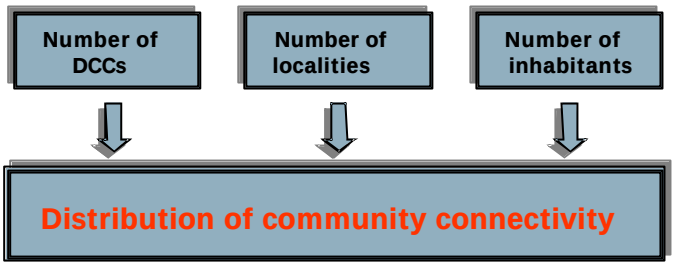
2/ Figures from SELECT; at the time of writing, all estimated Internet users are considered to be using the non-community service and to live in urban localities.

SOURCE: Directorate-General for Tariffs and Statistical Integration, **COFETEL**

3.B Community connectivity

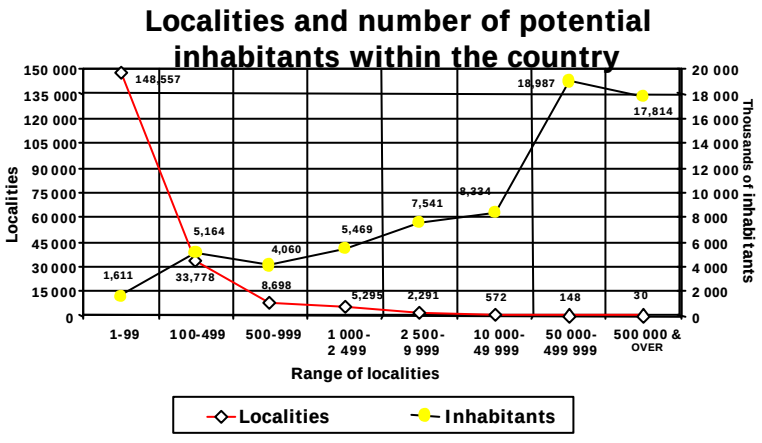
3.B.1 Community connectivity distribution indicator

The connectivity distribution indicator is proposed for the purpose of measuring the level of community connectivity within the country, in the light of the progress made in the setting up of DCCs. It consists in measuring the presence and territorial distribution of DCCs by groups of localities, classified on the basis of different population ranges. It is calculated on the basis of the number of DCCs in operation, as well as of the number of localities and inhabitants within the country.



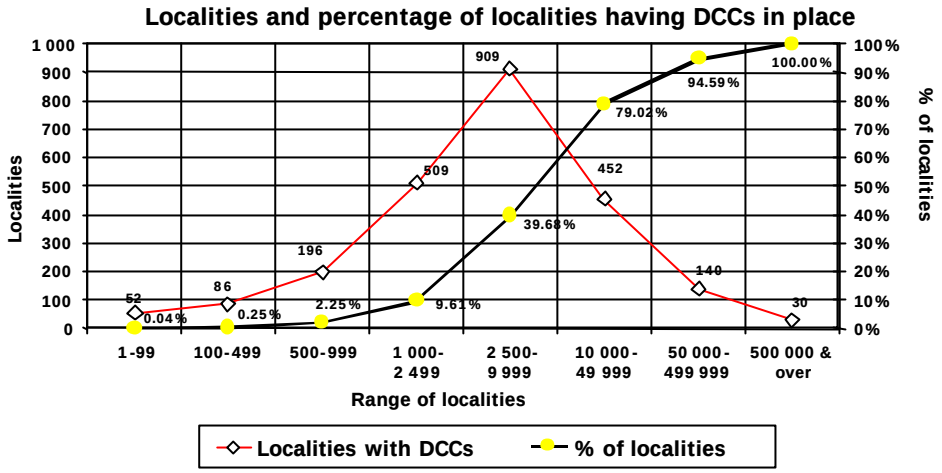
As in the case of the indicators described in the previous section, the localities are broken down into eight groups, four for urban localities and four for rural localities, on the basis of the number of inhabitants. For the purposes of this measurement, the figures in respect of population and non-community Internet users correspond to the year 2000 and will be used to calculate the weightings and percentages represented by each group. It is recommended that these data be updated each time there is a new population count or census (in Mexico this occurs every five years).

The following is a graph showing the differences in behaviour in the year 2000, the number of localities and the potential population of each group within the country.



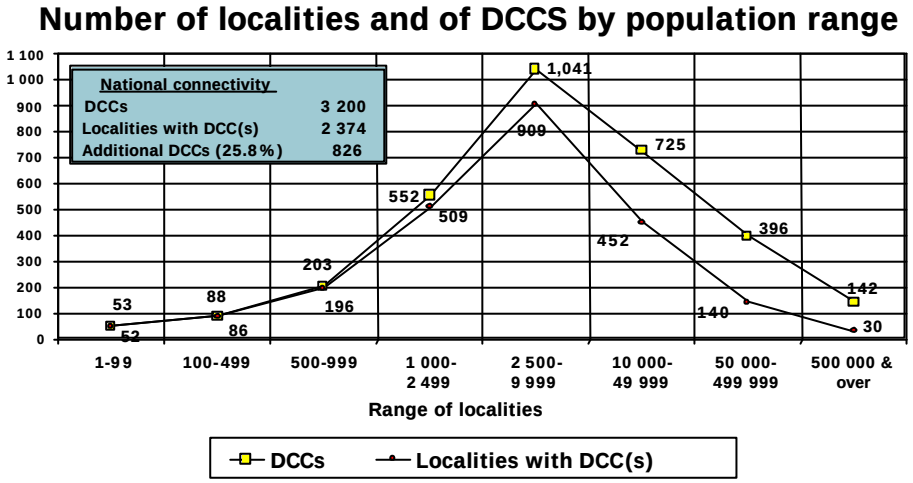
SOURCE: Directorate-General of Tariffs and Statistical Integration, **COFETEL**

The degree of penetration achieved by community connectivity is measured on the basis of the percentage of localities in which DCCs have been set up within each group. The following graph illustrates this calculation, in accordance with the distribution of DCCs in the first e-Mexico satellite network and the percentage of the total number of localities in each group representing those which have DCCs in place.



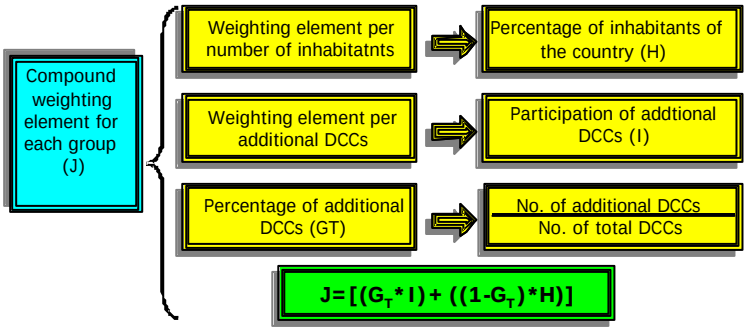
SOURCE: Directorate-General of Tariffs and Statistical Integration, **COFETEL**

The indicator also includes the effect on the connectivity measurement of setting up additional DCCs in localities already having one or more DCCs in place, given that the bigger the locality, the greater the number of additional DCCs it will require. We shall now illustrate the distribution of DCCs by group of localities already having DCCs and the number of additional centres.



SOURCE: Directorate-General of Tariffs and Statistical Integration, **COFETEL**

To obtain the total result, we use a compound weighting element comprising a combination of the percentage of inhabitants of the country and the participation of additional DCCs represented by each group within the national total. This can be illustrated as follows:



The national total (K) is obtained by multiplying the percentage of localities in which DCCs are installed (E) by the compound weighting element (J) and by adding together the results for each group, as indicated in the following equation:

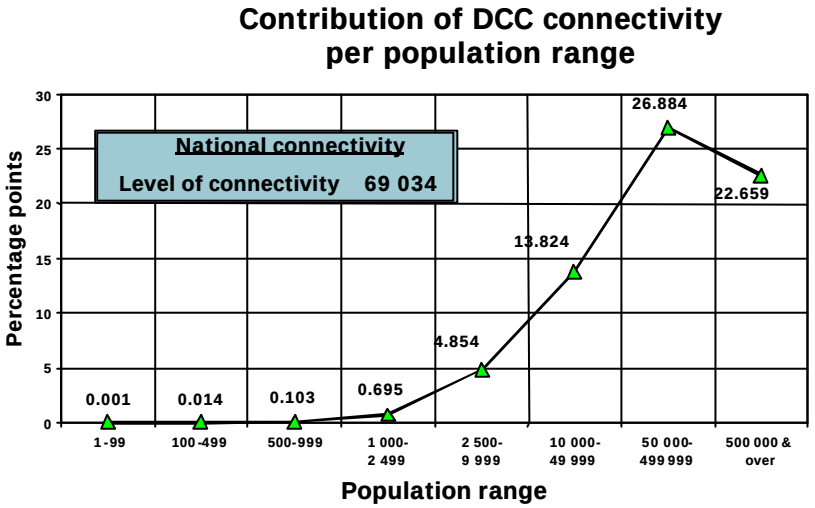
$$K=\sum_{i=1}^{n}(E_i * J_i)$$

In this way, we reflect in the calculation the population distribution of each country and territorial coverage thereof, as well as including a factor for the presence of more than one DCC in different localities.

3.B.2 Calculation of the community connectivity distribution indicator

The following two tables illustrate the calculation of the distribution indicator for the current scenario and for a future scenario, the latter being based on the information in respect of the target that was calculated to serve as an example of this exercise. The results shown are for the urban and rural parts of the country as well as the national total.

There then follows a table showing the contribution made by each group of localities to the figure in respect of national connectivity. The result given by the indicator under the current scenario of 3 200 installed DCCs is 69 034.



SOURCE: Directorate-General of Tariffs and Statistical Integration, COFETEL

3.B.3 Final results

The following table shows the main results obtained. As can be seen, for an established target of 50 998 DCCs, the value of the distribution indicator would be 95.71, despite the fact that the percentage for progress made is 100%. This is due to the fact that this indicator is based on the presence of DCCs in the different localities and will therefore never reach 100, since it would be unrepresentative to install a DCC in small localities with very few inhabitants. In order to serve the latter, efforts would be made to install DCCs in strategic locations accessible to the inhabitants of several small localities, such that, unlike urban areas, in which a given DCC affords access to the inhabitants of a single locality, a given DCC would be providing service to a group of localities.

Results of indicators

Item	Rural		Urban		Total	
	Current	Target	Current	Target	Current	Target
Number of DCCs-s	896	10 877	2 304	40 121	3 200	50 998
Potential population (thousands of inhabitants)	15 621	15 621	52 100	52 100	67 721	67 721
Population served	1 283	15 621	3 107	52 100	4 390	67 721
Number of localities	196 328	196 328	3 041	3 041	199 369	199 369
Localities with DCC(s)	843	10 824	1 531	3 041	2 374	13 865
Percentage of total	0.4	5.5	50.4	100.0	1.2	7.0
Additional DCCs	53	53	773	37,080	826	37,133
Percentage of total	5.9	0.5	33.6	92.4	25.8	72.8
Community connectivity distribution indicator	0.813	2.243	68.222	93.470	69.034	95.713

It is interesting to observe the differences, for rural and urban areas, in the indicators for localities having DCCs and the percentage of the total they represent. The same can be seen with the number of DCCs, the number of additional DCCs and the percentage they represent.

It is important to point out that when calculating the target it is possible to appreciate the DCC requirements for each group of localities, as well as the progress made to date in the setting up of DCCs. This allows for a more detailed evaluation of the decisions taken during the different phases of the project. In addition to this, the distribution indicator helps to ensure that the distribution of the DCCs installed meets the requirements of each group in a way that is equitable vis-à-vis the country's population; or, failing this, that it meets the criteria for serving the population that are drawn up in the interests of making more efficient use of the infrastructure, particularly where 100% coverage is not achieved.

Community connectivity distribution indicator

	RURAL				URBAN				TOTALS		
	1-99	100-499	500-9999	1 000-2 499	2 500-9 999	10 000-49 999	50 000-499 999	500 000 & over	**RURAL**	**URBAN**	**TOTAL**
LOCALITIES, 2000 1/	148 557	33 778	8 698	5 295	2 291	572	148	30	**196 328**	**3 041**	**199 369**
PEOPLE AGED 6 YEARS AND OVER WHO CAN READ AND WRITE, 2000 1/	1 610 589	5 164 396	4 059 878	5 469 432	7 540 640	8 938 684	20 755 381	20 497 673	**16 304 295**	**57 732 378**	**74 036 673**
NON-COMMUNITY INTERNET USERS 2000 2/						605 158	1 768 441	2 683 934		**5 057 533**	**5 057 533**
POTENTIAL POPULATION, 2000 (INHABITANTS)	1 610 589	5 164 396	4 059 878	5 469 432	7 540 640	8 333 526	18 986 940	17 813 739	**16 304 295**	**52 674 845**	**68 979 140**
FUTURE SCENARIO (TARGET)											
HOURS OF SERVICE: 30 HOURS/WEEK	RURAL				URBAN				TOTALS		
FREQUENCY OF USE: ONCE PER WEEK	1-99	100-499	500-9999	1 000-2 499	2 500-9 999	10 000-49 999	50 000-499 999	500 000 & over	**RURAL**	**URBAN**	**TOTAL**
NUMBER OF LOCALITIES WITH INSTALLED DCCs	1 116	3 400	2 675	3 633	2 291	572	148	30	**10 824**	**3 041**	**13 865**
NUMBER OF DCCs	1 117	3 402	2 682	3 676	5 820	6 262	14 935	13 104	**10 877**	**40 121**	**50 998**
PERCENTAGE OF LOCALITIES WITH INSTALLED DCCs	0.8%	10.1%	30.8%	68.6%	100.0%	100.0%	100.0%	100.0%	**5.5%**	**100.0%**	**7.0%**
NUMBER OF ADDITIONAL DCCs	1	2	7	43	3 529	5 690	14 787	13 074	**53**	**37 080**	**37 133**
PERCENTAGE OF ADDITIONAL DCCs	0.1%	0.1%	0.3%	1.2%	60.6%	90.9%	99.0%	99.8%	**0.5%**	**92.4%**	**72.8%**
WEIGHTING ELEMENT PER POTENTIAL POPULATION, 2000	0.023	0.075	0.059	0.079	0.109	0.121	0.275	0.258	**0.236**	**0.764**	**1.000**
WEIGHTING ELEMENT PER ADD-ITIONAL DCCs	0.000	0.000	0.000	0.001	0.095	0.153	0.398	0.352	**0.001**	**0.999**	**1.000**
COMPOUND WEIGHTING ELEMENT	0.006	0.020	0.016	0.022	0.099	0.144	0.365	0.327	**0.065**	**0.935**	**1.000**
COMMUNITY CONNECTIVITY DISTRIBUTION INDICATOR	0.005	0.205	0.496	1.537	9.892	14.442	36.479	32.656	**2.243**	**93.470**	**95.713**

1/ Figures from the INEGI Census of Population and Housing (2000)

2/ Figures from SELECT. All estimated Internet users are currently considered to be using the non-community service and to live in urban localities.

SOURCE: Directorate-General of Tariffs and Statistical Integration, COFETEL

4 Conclusion and recommendation

It is clear that one of the main objectives behind the adoption of community connectivity indicators is to record and evaluate the scope and results of actions derived from State policies designed to combat the digital divide, particularly in countries where the progress made has more to do with the participation of groups of communities than with a residential or individual approach.

The incorporation of indicators and their calculation must adhere to common parameters bringing together lowest possible costs with simple and understandable procedures which allow for measurement of the benefits to the public of DCCs in the geographic areas and communities of interest, and which, through the use of particular types of information of a common nature, facilitate the exchange of data and comparison of results, whether at the national, regional or international level.

It is for all these reasons that indicators which provide information on potential access for the population to DCCs, and hence on the coverage provided by services in spatial and demographic terms, are considered to be of great significance. Likewise, considerable store is set by the adoption of indicators which provide evidence of benefits to the community through information on the effective use of DCCs as reflected in the numbers of inhabitants who genuinely benefit from the availability of community connectivity.

It is clear from all that has been said that any indicator must be both simple to elaborate and effective if it is to be used to measure the results achieved through the development of community connectivity. At the same time, those results must be fully homogeneous in order to permit the

generalized application of the indicator, such that its use at the global level serves as a reference for the achievements made and targets set where shared efforts and policies in the field of community connectivity are concerned. It is such indicators that may then be taken into account within the Plan of Action of the World Summit on the Information Society.

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