Improving measurement of progress toward Target 10 of the World Summit on Information Society (WSIS)*

Rohan Samarajiva & Roshanthi Lucas
LIRNE*asia*
rohan@lirneasia.net & roshanthi.lucas@gmail.com

September 2010

***** Without the Market Information and Statistics Division of ITU providing data on country ICT Surveys, the calculations that are at the heart of the new method would not have been possible. We thank Esperanza Magpantay and Dorish Olaya for their kind assistance. We also thank Athifa Ali (Head of International, Regional & Regulatory, Dhiraagu Maldives) and Salitha Priyanka Undugodage (Vice President, Technology, Fixed Telephony & Broadband Services, Dialog Axiata, Sri Lanka) for helping us understand the practical aspects of measuring Internet subscriptions. Participants of the LIRNE*asia* colloquium, especially Nirmali Sivapragasam, helped sharpen the methodology.

Contents

Executive Summary

The World Summit on the Information Society set several targets to be achieved by 2015 without specifying how they could be measured. The International Telecommunication Union has proposed four specific indicators that could measure progress made by countries toward the foundational Target 10, that of bringing ICTs within the reach of a majority of the world's inhabitants. Two indicators are for mobile subscriptions and use, and two for Internet use by individuals and by households. Of the four, Indicators 1 and 3 currently exist, albeit with significant shortcomings. This paper proposes a modest improvement to the method of measuring Indicator 3, Internet users, which combines the existing supply-side data with available but incomplete demand-side data. The proposed change implements the often-stated principle that demand-side data is first best; it also removes the most egregious use of high multipliers by imposing a mathematically derived ceiling, whereby a country's multiplier is set based on its per capita GNI rank. The ceiling preserves the current practice of national administrations setting multipliers depending on national circumstances; it simply requires them to be set at reasonable levels. If national circumstances justify higher numbers, all that the national administration has to do is to conduct a demand-side survey.

The existing momentum of the mobile voice industry is such that we can expect considerable progress to be made in connecting most, if not all, of the world's people through their own or neighbors' and friends' mobile handsets. Indicators 1 and 2 proposed by the ITU seek to document this progress at the country level. Indicator 2 in particular requires the use of demand-side survey data which is not uniformly available for all countries and for every year. The method proposed for calculating Internet users may also be used to synthesize demand- and supply-side data on mobile users and create incentives for national administrations to conduct demand-side studies.

Indicator 4 is a challenge. The only sources are demand-side household surveys. If they are conducted the ITU will be able to report results. But a backup to demand-side data does is not evident. Since it is unlikely that all countries will conduct demand-side surveys every year, it is doubtful that Indicator 4 can be reported.

The proposed solutions are interim solutions, appropriate for, and hastening, the transition from public-utility type forms of supplying ICT services to forms akin to those found in fast moving consumer goods industries that will require a complete shift from today's supply-side dominated indicators to demand-side indicators.

Introduction

The World Summit on the Information Society (WSIS) was held in two phases in Geneva (2003) and Tunis (2005) to discuss the use of Information and Communication Technologies (ICT) for development. At their conclusion, governments agreed to strive to reach ten targets related to ICTs by the year 2015. The WSIS targets are related to community access, education, health, science, culture, government, broadcasting, etc. (see Annex 1).

As 2010 is the midpoint between the last WSIS meeting in 2005 and 2015, the year by which the targets are expected to be achieved, it is opportune to review the progress made in achieving these targets. The International Telecommunication Union (ITU) has made a commendable start, analyzing the targets relevant to its remit and proposing measurable indicators, a step that had not, unfortunately, been taken when crafting the targets in the first place.

The present paper focuses on Target 10, that of bringing ICTs within the reach of a majority of the world's inhabitants. Despite the counter-intuitive numbering, this target is a foundational one, addressing the achievement of access, the precondition for the success of all other targets. It has the greatest relevance to the work of the Partnership for Measuring ICTs for Development and of the ITU.

Within the four indicators proposed by the ITU for measuring progress toward Target 10, the paper places the greatest emphasis on that of Internet Users, Indicator 3. This is partly because it is, in the considered opinion of the authors, the most flawed of all indicators developed by the Partnership for Measuring ICTs for Development and collected and disseminated by the ITU. It is obviously an important, and indeed indispensable, indicator when all eyes are on the emergence of an Internet Economy. It is a base indicator that is used in many composite indices such as the ITU's ICT Development Index (13.33 percent of the total weight), the Economist Intelligence Unit's E-readiness Index and the World Bank's Knowledge Economy Index (Win Tun, 2010). Errors in such base indicators ripple through the system, sometimes diluted and sometime accentuated. Therefore, it is imperative that best efforts be made to ensure that errors are minimized. This paper is a contribution to that effort.

In addition, it is suggested that the proposed novel solution, based on articulating supply- and demand-side indicators developed for calculating Internet users may also be extended to calculating mobile users. That particular extension is not fully worked out in this paper because comprehensive data from multiple demand-side surveys of mobile users are not available at the moment of writing.

The paper also cautions about the longevity of the present indicator definitions in the face of convergence, much talked about for years, and finally happening and emphasizes the need to create incentives for greater reliance on demand-side surveys.

Measuring Progress toward Target 10 – Proposed Indicators

WSIS Target 10 seeks to "Ensure that more than half the world's inhabitants have access to ICTs within their

reach." Target 10 may be considered as the most foundational of the WSIS targets, as access to ICTs is the base upon which an information society can be built.

The target itself is rather vaguely worded. The terms "have access", "ICTs" and "within reach" require further interpretation. "Have access" and "within reach" could denote having ICTs in the house or within a certain walking distance, as it was defined in the Maitland Commission Report (ITU, 1984). "ICT" itself is a very broad term covering many technologies. The ITU has proposed a suite of four indicators to measure progress made toward this target.

1. Mobile cellular telephone subscriptions per 100 inhabitants;
2. Proportion of individuals who used a mobile cellular telephone in the last 12 months;
3. Proportion of individuals who used the Internet (from any location) in the last 12 Months; and
4. Proportion of households with access to the Internet by type of access (narrowband, broadband) (ITU, 2010)

Indicator 1: Mobile cellular telephone subscriptions per 100 inhabitants

According to the ITU, mobile subscriptions had reached 67 per cent of the world population by the end of 2009 (i.e., an estimated 4.6 billion subscribers) (ITU 2010). This may be interpreted as indicating that universal ownership of mobile phones by 2015 is possible. However, the number of subscriptions reported by mobile operators is not the same as the number of distinct users. There are many people who use multiple SIMs. One of the primary reasons for this is to reduce costs using on-net discounts, by calling people using the same network as that of the receiver. Another rationale for multiple SIMs is uneven connectivity, where different networks differ in the scope of their coverage (CKS Consulting, 2009), See also, Donner & Toyama, 2009). Multiple SIM use by an individual overstates the number of users. At the same time, some users in poorer countries tend to share mobile phones which results in underestimation of users. There is also the issue of non-active subscriptions which may also be included when calculating the number of subscriptions by the mobile operator. New business models lead to practices unconducive to adherence to the ITU's definition on what constitutes an active prepaid mobile subscription.[1]

Indicator 2: Proportion of individuals who used a mobile cellular telephone in the last 12 months

This indicator on mobile use has been proposed by the ITU, due to the difficulty of estimating the actual number of users from the number of mobile subscriptions as stated above. It has been well documented that mobile users outnumber mobile owners in many developing countries (LIRNE*asia*, 2010, p.3; de Silva and Zainudeen, 2008). The most reliable way of measuring the number of mobile users is through demand-side or household surveys, but because they are costly and difficult to organize many countries do not conduct regular

[1] "Subscriptions that have used the system (as shown by traffic or whether they have recharged the card) during the past three months" – ITU (2010*)*

(or any) surveys.

While these indicators on mobile use are not perfect, the number of subscriptions gives an overview of mobile penetration in a country. The number of mobile users may be identified through demand-side surveys if they are conducted. Because it is unlikely that all countries will conduct regular annual demand-side surveys, it is likely that country-specific multipliers will be the practical fallback. The challenge is to develop multipliers that are not completely subjective.

Indicator 3: Proportion of individuals who used the Internet (from any location) in the last 12 Months

The most problematic indicator is that on Internet use.

Before calculating the number of individuals who use the Internet, it is important to define what is meant by the term 'Internet'. There are a number of different definitions of the Internet. The definition by the Partnership on Measuring ICT for Development is used here for consistency with the ITU indicator measurement procedures.

> The Internet is a world-wide public computer network. It provides access to a number of communication services including the World Wide Web and carries e-mail, news, entertainment and data files, irrespective of the device used (not assumed to be only via a computer, it may also be by mobile phone, PDA, games machine, digital TV etc.). Access can be via a fixed or mobile network (Partnership on Measuring ICT for Development, 2009).

ITU's proposed methodology

The most reliable way of measuring Internet users is through demand-side or household surveys, the same as for mobile users.[2] However, demand-side surveys are costly and difficult to organize. Many countries do not conduct regular surveys, especially on ICTs. The current method of measuring Internet users when survey data are unavailable, is to derive an estimated number from the number of total Internet subscriptions, using a multiplier to account for people who use Public Internet Access Points (PIAPs) or people who use the Internet at their work places, schools or other public locations.

Total Internet users = Multiplier * Total Internet subscriptions

Total Internet subscriptions =Total fixed subscriptions + Total wireless broadband subscriptions

The World Telecommunication/ICT Indicators Definitions (ITU, 2010) defines these terms as follows.

Total fixed (wired) Internet subscriptions = total number of Internet subscriptions with fixed (wired) Internet

[2] According to the *Summary Report of the International Seminar on Information and Communication Technology Statistics*, July 19-21, 2010 held in Seoul, para 52, "The indicator on Internet users had been improved using household survey data collected by the national statistical offices." http://unstats.un.org/unsd/economic_stat/ICT-Korea/Documents/3_final_report.pdf

access, which includes dial-up and total fixed (wired) broadband subscriptions.

Total fixed (wired) broadband subscriptions = total number of subscriptions with high-speed access to the public Internet (a TCP/IP connection), at downstream speeds equal to, or greater than, 256 kbits/s.

Total wireless broadband subscriptions = sum of satellite, terrestrial fixed wireless and terrestrial mobile wireless subscriptions.

The number of Internet users = number of people who have used the Internet from any device (including mobile phones) in the last 12 months.

Currently, the ITU permits/encourages national administrations to use different multipliers at their discretion in order to estimate the number of users from the number of subscriptions.[3] Therefore, naturally, a question may be raised on the possibility of larger multipliers being used to show a higher number of Internet users in a country. For example, the ITU data shows that Afghanistan has used a multiplier of 500 (2,000 Internet subscriptions and 1,000,000 Internet users in 2009). This is in contrast to the multiplier of 13 used by Burundi, a somewhat similarly situated country (5,000 subscriptions and 65,000 users, also in 2009) (ITU, 2009b). Annex 2 shows the multipliers currently used (calculated from available data) and illustrates the arbitrary nature of the present procedures. In addition, the roundness of the numbers in many cases such as Afghanistan and Burundi suggests estimation rather than actual measurement.

The overall number depends on the accuracy of the underlying number of Internet subscriptions. The recently improved ITU definition for this indicator[4] does not, surprisingly, include prepaid mobile broadband subscriptions, increasingly becoming common in developing economies (Samarajiva, 2009). This shortcoming alone will yield significantly lower numbers of total Internet users. Preliminary investigations showed that in some countries such as the Maldives, even postpaid mobile data connections are not reported. In Sri Lanka, all SIMs provided by a major operator are data enabled. Therefore even without a specific data plan, any customer with a data-compatible mobile phone can use the Internet. These ad hoc users are not counted as Internet users by the operator and are thus not reported. Therefore, the number of mobile subscriptions is underreported in multiple ways. As a result, the overall Internet user number is also lower than it should be.

[3] ITU (2010). Annex 2 documents that data from sources other than demand-side surveys appear to be used to estimate Internet Users for all countries except Hong Kong China, contrary to the statement in Para 52 of the Summary Report of the International Seminar on Information and Communication Technology Statistics, July 19-21, 2010 held in Seoul that "The indicator on Internet users had been improved using household survey data collected by the national statistical offices." http://unstats.un.org/unsd/economic_stat/ICT-Korea/Documents/3_final_report.pdf. It appears that Para 52 indicated an intention to use demand-side data in the future, rather than an action that had already been taken.

[4] In some cases such as Iran, the ITU reports Internet user numbers, but not subscriptions. This peculiar practice needs further interrogation.

Indicator 4: Proportion of households with access to the Internet by type of access

Since access to ICT may be interpreted as the ability to use ICTs (in this case, the Internet) from the comfort of one's home, Indicator 4 on the proportion of households with access to the Internet has been proposed by the ITU. This indicator is also important as the quality of service of Internet subscriptions differs. It is useful to document the percentage of broadband Internet subscriptions versus narrowband.

At first glance Indicator 4 appears unproblematic, but it is not so. Operators do not necessarily differentiate between homes and businesses. Many homes, especially in developing countries may be accessing the Internet through mobiles or dongles issued by mobile operators. Netbooks issued for work purposes may be used at night from homes and so on. The actual performance of mobile or fixed broadband connections may or may not meet the minimum thresholds set out in the ITU broadband definition.

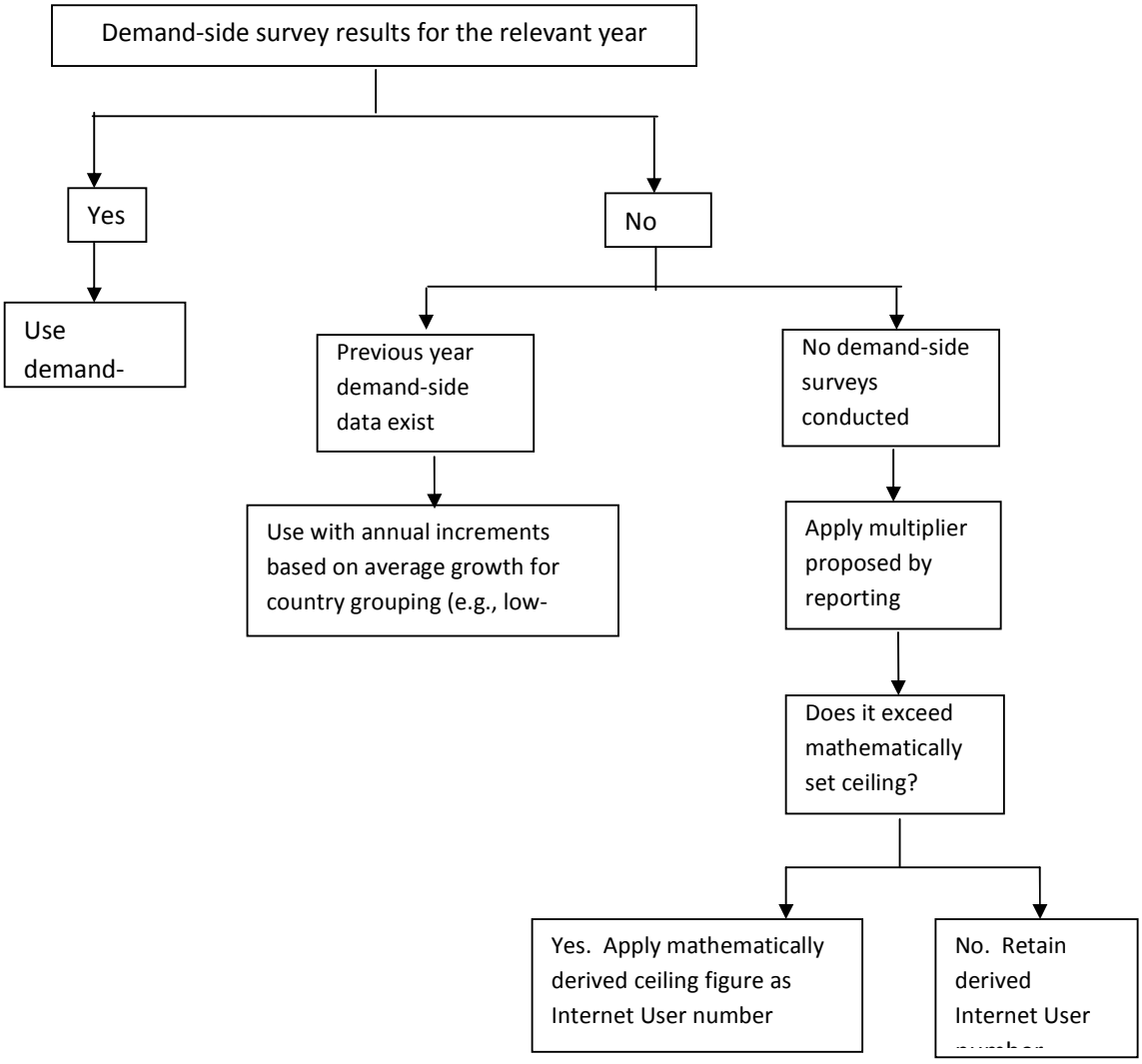
It is not at clear at this point whether the ITU will be able to generate meaningful and trustworthy numbers for Indicator 4.

Alternative Method of Measuring Indicator 3

No change is proposed in the basic formulae:

Total Internet users = Multiplier * Total Internet subscriptions Total Internet subscriptions =Total fixed subscriptions + Total wireless broadband subscriptions

What is proposed is changing the manner of calculating the multiplier. It is proposed that it be based on demand-side data whenever available and subject to ceilings derived from objective data, albeit imperfect, when multipliers are used. The proposal allows the continued use of multipliers, but subjects them to safeguards in the form of ceilings derived from objective data. The flow chart in Figure 1 illustrates the procedure.


Demand-side survey results for the relevant year
Yes
No
Use demand-
Previous year demand-side data exist
No demand-side surveys conducted
Use with annual increments based on average growth for country grouping (e.g., low-
Apply multiplier proposed by reporting
Does it exceed mathematically set ceiling?
Yes. Apply mathematically derived ceiling figure as Internet User number
No. Retain derived Internet User

The fundamental assumption is that the multiplier is inversely correlated with income level and declines as country income level increases. More people from lower-income countries will access the Internet from Public Internet Access Points (PIAP) or at other public locations such as schools, places of work etc. In higher-income countries most people will have Internet at their homes. Indeed many users have multiple subscriptions associated with them in high-income settings. There are likely to be more Internet users per subscription in lower-income countries, with the number inversely correlated to income level. Indeed, careful examination of existing demand-side survey results show that the number of users may even be less than the number of subscriptions in high-income countries, for example where most people have Internet subscriptions at home, in the workplace and on their mobiles. However, for the moment, the proposed method yields the mathematically derived multiplier that is in all cases above 1.

Using the existing Internet user data from demand-side surveys conducted by different countries[5] and the number of Internet subscriptions obtained from service providers by the ITU it is possible to calculate the actual multiplier for the subset of countries which have conducted demand-side surveys on Internet users.

Multiplier = Actual number of Internet users / Number of Internet subscriptions

In order to test the hypothesis it is possible to plot the actual multipliers (for countries where demand side surveys on Internet use has been conducted and data is available) against the 2009 Gross National Income (GNI) per capita ranking.[6] When actual multipliers are plotted against GNI per capita ranking, it can be seen that the income level is correlated with the multiplier. According to the data the formula of the equation with best fit is as follows.

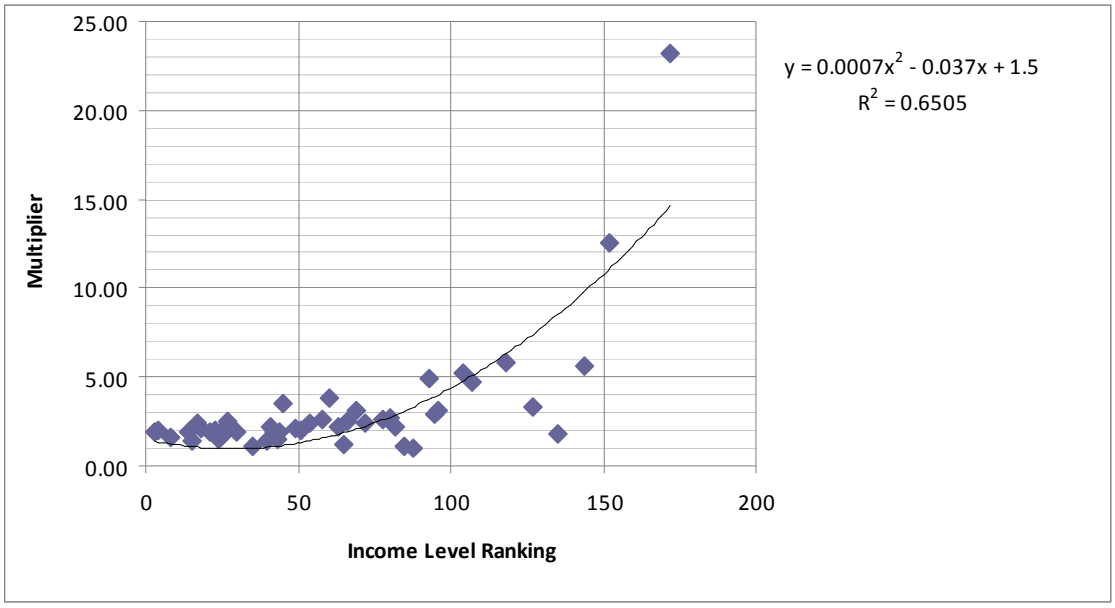
$y = 0.0007x^2 - 0.037x + 1.5$

where y is multiplier and x is 2009 GNI-per-capita ranking

[5] The methodology requires corrections for demand-side data that are from years prior to the current year. These corrections have not been included in the present calculation. However, we have used only data from 2007 onward.

[6] World Development Indicators database, World Bank, revised July 2010

Figure 2: Extant multiplier derived from demand-side survey results correlated with GNI per capita ranking of countries for which demand-side survey results are available



Source: Data from ITU (number of Internet users from demand side surveys and number of Internet subscriptions); World Bank (Income level ranking according to GNI per capita)

Therefore, it is possible to derive the corresponding multiplier taking the GNI per capita for countries that have not conducted demand-side surveys on ICT use. It is important to note that while most high-income countries (as defined by the World Bank) have conducted demand-side surveys and a moderate number of countries from both high-middle income and low-middle income countries have conducted surveys, there have been no demand side surveys on Internet users conducted in low-income countries. This formula can be improved if low-income countries conducted surveys yielding real data from low-income contexts.

For low-income countries, it is proposed that the ITU request one or more countries to volunteer to conduct surveys, possibly providing some financial and technical assistance. As designing and implementing a standalone ICT household survey is costly, a country which is already planning on conducting a census or a multipurpose household would be ideal. It is also important to select a country which has significant population (i.e., not a micro state). The ITU published *Manual for measuring ICT access and use by households and individuals* (2009 edition) can be used in designing and implementing the survey.

This multiplier can and should evolve with time, especially as people obtain more Internet connections in their homes and the formula may change as more countries conduct demand-side surveys. Therefore, re-plotting the existing multipliers with GNI per capita and recalculating the equation for the multipliers annually is recommended. This can be done soon after the World Bank sets the income classifications at the beginning of July each year.

Annex 2 shows there is significant variation not only in currently used multipliers, but also in calculated versus demand-side numbers where both exist. Singapore, for example, shows a mathematically derived number of Internet users (958,000), not only less than the number reported by the ITU (3,658,000) but also less than the reported number of subscriptions (1,103,000), indicating a real multiplier of less than 1. This is indeed a rather peculiar result, but could well be true. Singapore's IDA, the national administration, could be accurately reporting the base number of Internet subscriptions, including all office and residential connections (including the Internet of Things) and all mobile broadband connections. Because there would be multiple subscriptions associated with individuals and because Singapore families are small, it is possible that the number of subscriptions exceeds the number of users.

Hong Kong China, a densely populated city state that is slightly larger than Singapore but is otherwise quite similar, shows similar results: 3,042,000 subscriptions, almost the same as the 3,066,000 users revealed by the demand-side survey, but considerably less than the 4,300,000 reported by ITU and/or OFTA, the national administration. The gap here, however, is not as large as in Singapore. Mauritius, another densely populated city state sharing many attributes of Singapore and Hong Kong yields a demand-side user number (224,000) identical to the number of subscribers (224,000), but showing a 29 percent overcount of users relative to the demand-side number in what is reported by the ITU (290,000).

Except for these three cases, the user numbers usually exceed the subscription numbers even in highly-developed economies where one may expect mobile Internet use to be quite high (Wortham, 2010). In the case of the United States, this is possibly because subscription numbers (81,939,000) are underreported because of competitive market conditions. Still, the 21 percent overcount of users (239,894,000) reported by the ITU relative to the demand-side figure of 197,870,000 is troublesome.

The ITU also has blanks for the Internet subscriptions and subscriptions per 100 for many countries ranging from Finland to Iran. How user numbers are reported without either subscription data or demand-side data is another topic worth deeper investigation. Because the calculations cannot be done without subscription numbers, these countries have had to be excluded from Annex 2.

For the most part, the new method (and even without it, the use of demand-side surveys) will bring down the Internet user numbers for the high-income countries. This is not a tragedy in itself, because the rapid uptake of mobile-broadband devices may be expected to drive up their numbers quickly, even with low multipliers. It also brings down the Internet User numbers of a large number of developing countries that had used unreasonably large multipliers (e.g., 500 for Afghanistan; 475.65 for Kenya; 106.67 for Uganda). The end result is a decrease of around 17 percent in the total number of Internet users in the world, distributed across all income categories.

Testing the indicator in Sri Lanka

The proposed methodology can be demonstrated using Sri Lanka as a test case. Currently, according to ITU reported data, there are 249,800 Internet subscriptions and 1,776,200 Internet users in Sri Lanka. As Sri Lanka has not conducted demand-side surveys on Internet use, it appears that Internet users have been calculated using an arbitrary multiplier of 7.11. It is also important to note that the number of Internet users is not available on the Telecommunication Regulatory Commission Sri Lanka (TRCSL) website. The website gives

249,800 as the number of Internet and email subscribers, a rather mysterious and undefined indicator that does not seem to have international comparators. This raises the question whether the base number is correct. Also in Sri Lanka there are many prepaid mobile data users, who are not reported by the operators as these prepaid SIMs are the same for both voice and data. Users can activate data functions by simply sending an SMS to the operator. Therefore, it appears that the base number of Internet subscribers may be understated. However, for present purposes the ITU-reported base number of subscriptions is used.

Using the proposed alternative methodology and using 149 as the GNI per capita rank in 2009, the Sri Lanka multiplier is:

0.0007*149*149 - 0.037*149 + 1.5 = 11.53

Therefore the ceiling or upper limit of Internet users is:

249,800*11.53 = 2,879,620

This result of 2,879,620 is 62 percent higher than the existing number of Internet users reported by the ITU which is 1,776,200. Since the Sri Lanka national administration has used a multiplier that yields a number of Internet users below the ceiling the number does not change.

Implications for digital divide

The number of indicator driven Internet users will decrease in all countries, developed and developing. The digital divide between the developed countries and the developing countries, will reduce marginally as shown in Table 1 below:

Table 1: Digital divide in Internet use under current and new methodologies

	Internet users/100 (current method)	Internet users/100 (new method)
Developed countries	64.75	47.20
Developing countries	20.64	15.26
Digital divide (Internet users)	3.14: 1	3.09:1

Source: Author calculations

The digital divide is calculated by dividing the penetration rates in the developed world by the penetration rate in the developing world. The definition of Developed and Developing is as defined by the World Bank. [7]

[7] Low-income and middle-income economies are referred to as developing economies.
Income group: Economies are divided according to GNI per capita, calculated using the World Bank Atlas method. The groups are: low income, USD 975 or less; lower middle income, USD 976 - 3,855; upper middle income, USD 3,856 - 11,905; and high income, USD 11,906 or more.

For those who may criticize our proposal as one that seeks to define away the digital divide in Internet use, we have a simple response. Before making that criticism, it is necessary to explain why the present method is not one that shows a divide deeper than actually existing. When most demand-side surveys show that the estimated numbers based on supply-side data are overstated,[8] and countries have used arbitrarily high multipliers, the burden is on the defenders of the present methodology. Both the present and proposed methods have flaws and are depicting a divide that does not exactly represent reality. The only valid question is which method is less arbitrary and which method is more capable of reflecting reality, based on best efforts of estimating Internet user numbers, including greater reliance on demand-side surveys.

The proposed method creates strong incentives for countries to conduct demand-side surveys because that is the only way they can escape the constraint of the mathematically derived ceiling. If a national administration believes that it actually has implemented policies that have resulted in a higher number of Internet users than the ceiling permits, all it has to do is to conduct a demand-side survey to demonstrate its success. This is superior to the current option of arbitrarily increasing the multiplier.

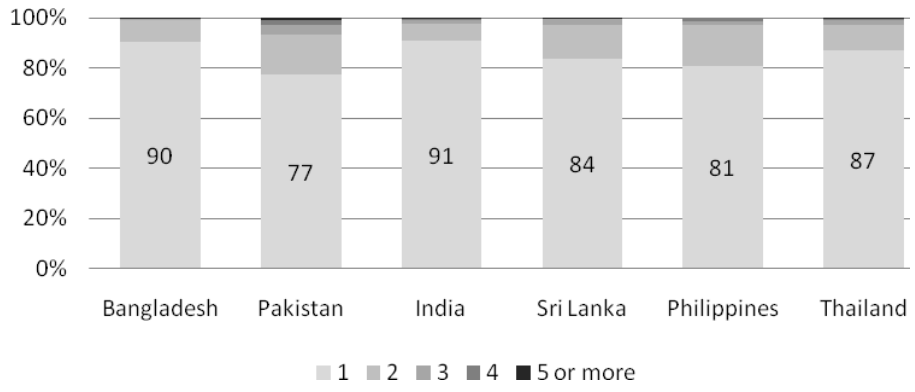
Implications for ICT indicators

The entire enterprise of collecting and disseminating ICT indicators is in crisis. The basic methods of data collection were designed for monopoly provision of a limited set of services by government-owned or regulated entities, known quaintly as "administrations." Since the reforms of the past three decades,[9] the markets for ICT services have grown in complexity with multiple suppliers striving to meet consumer needs in workably competitive settings. New business models have emerged yielding a range of price-quality bundles in a range of services unimaginable in the bad old monopoly days. In sum, ICT service markets have begin increasingly to resemble fast moving consumer goods (FMCG) markets rather than supplier dominated public-utility markets. In particular, the Budget Telecom Network Model for mobile voice services, a new business model that first emerged in South Asia and is now rapidly spreading throughout the developing world (Samarajiva, 2009), has made the conventional associations between subscribers and users obsolete. For example, this model leads to practically giving away SIMs or connections, making untenable the ITU definition of a mobile subscription. For example 23 percent of owners in Socio-Economic Classifications D and E (the bottom of the pyramid, or BOP) in Pakistan reported in 2008 having more than one active SIM card, with some even reporting having as many as five active SIMs (see Figure 3).

[8] The only exceptions are Honduras, Hong Kong China, Nicaragua and Qatar. The variance in the Qatar numbers is surprisingly large.

[9] It is customary to anchor the start of the reform wave to 1984 when three major events, the AT&T Divestiture in the US, the privatization of British Telecom, and the partial privatization of NTT in Japan, occurred.

Figure 3: Ownership of (active) multiple SIMs (% of SEC D and E mobile owners), 2008



Source: LIRNE*asia* (2010).

In the FMCG world no one expects soap producers to report how much soap they make to the soap regulatory authority which compiles the reported data once a year and submits a report using standard definitions and formats to the International Soap Union which after a few weeks or months publishes soap indicators for the whole world. What happens instead is the collection of data on soap on the market and fluctuating market shares at the retail level through the mechanism of retail audits (Treasure, 1953). This is the end game for ICT services. We are now in the interregnum. The old supply-side data dominated indicators simply do not work. The new retail-audit type data collection mechanisms have yet to emerge.

In the meantime, industry observers and policy makers have recognized the increasing importance of demand-side data, resulting in their greater production. Yet, few countries conduct demand-side studies, and even those that do, fail to conduct them annually. The proposed method of estimating Internet users is a transition method: it draws from both demand- and supply-side data to develop an imperfect but reasonably useful and reliable method capable of regularly generating an important indicator whether or not a particular country conducted a demand-side survey that year. It is superior to relying on supply-side data only; but it is not as good as the indicator that would be generated if every country every year conducted standardized and comparable demand-side surveys at the same time. Since that latter scenario is utterly unrealistic, what is proposed is the best available.

Despite the great interest in mobile user numbers, the current indicators do a very poor job of giving a reliable measure. The ITU proposal for Indicator 2 to measure progress toward Target 10 of the WSIS suffers from the usual shortcomings. If it is possible to collect and adequate number of nationally representative demand-side surveys on how many people had used mobiles in more or less the same 12 month period, it will be possible to replicate the method here proposed for Internet users, for mobile users.

Future of measuring Internet Users

The proposed method for estimating Internet users, along with many other indicators in the Partnership for

Measuring ICTs for Development and the ITU lists will be made obsolete by convergence that has been talked about for years, but is finally coming thanks to new business models for fixed and mobile broadband.

In the future, the measurement of number of Internet subscriptions will become obsolete with the advent of fourth generation (4G) telecommunication networks, and possibly even earlier with the use of applications such as Gtalk on smartphones on 3G networks. In 4G networks voice and data will be converged and it will not be possible for network operators to differentiate between the two, even if they wanted to, which is doubtful because voice will be simply one bundled data application. This future is foretold by the difficulties of calculating mobile broadband even in a 3G environment in Sri Lanka.

In the near future, the only way of measuring the number of Internet users and number of mobile users would be through demand-side surveys or the less costly retail audits. On the supply side it may be necessary to develop a new indicator on the volume of data per user instead of number of Internet and mobile subscriptions.

Conclusion

The achievement of the WSIS targets requires that a majority of the world's people are electronically connected. Making this possible is the intent of Target 10.

The ITU has proposed two indicators for mobile subscriptions and use, and two for Internet use by individuals and by households. Of the four, Indicators 1 and 3 currently exist, albeit with significant shortcomings. This paper proposes a modest improvement to the method of measuring Indicator 3, Internet users, which combines the existing supply-side data with available but incomplete demand-side data. The proposed change implements the often-stated principle that demand-side data is first best; it also removes the most egregious use of high multipliers by imposing a mathematically derived ceiling, whereby a country's multiplier is set based on its per capita GNI rank. The ceiling preserves the current practice of national administrations setting multipliers depending on national circumstances; it simply requires them to be set at reasonable levels. If the national circumstances justify higher numbers, all that the national administration has to do is to conduct a demand-side survey.

The existing momentum of the mobile voice industry is such that we can expect considerable progress to be made in connecting most, if not all, of the world's people through their own or neighbors' and friends' mobile handsets. Indicators 1 and 2 proposed by the ITU seek to document this progress at the country level. Indicator 2 in particular requires the use of demand-side survey data which is not uniformly available for all countries and every year. The method proposed for calculating Internet users may also be used to synthesize demand- and supply-side data on mobile users that would also create incentives for national administrations to conduct demand-side studies.

Indicator 4 is a challenge. The only sources are demand-side household surveys. If they are conducted the ITU will be able to report results. But we have not been able to figure out a backup to demand-side data. Since it

is unlikely that all countries will conduct demand-side surveys every year, we are at a loss on how the ITU will actually report Indicator 4.

The proposed solutions are interim solutions, appropriate for, and hastening, the transition from public-utility type forms of supplying ICT services to FMCG-type forms that will require a complete shift from today's supply-side dominated indicators to demand-side indicators.

References

Badmino, Anna (2005) *Making ICTs Work for the Poor: Pursuing the Millennium Development Goals through ICTs, retrieved from* http://www.choike.org/documentos/wsis/book12.pdf

Beilock, Richard and Dimitrova Daniela V. (2003), *An exploratory model of inter-country Internet diffusion*, retrieved from http://danielad.jlmc.iastate.edu/docs/intercountry.pdf

CKS Consulting Pvt. Ltd (2009),*Teleuse@BOP3 a Qualitative Study*, Colombo: LIRNE*asia*

de Silva, H., and Zainudeen, A. (2008). Teleuse at the Bottom of the Pyramid: Beyond Universal Access. *Telektronikk* (2), 25-38. Available at: http://www.telenor.com/telektronikk/volumes/spdf/2.2008/Tel_2-08_Page_025-038.pdf

Donner, Jonathan & Toyama, Kentaro (2009), *Persistent themes in ICT4D Research: priorities for inter-methodological exchange, retrieved from* http://www.jonathandonner.com/DonnerToyama_ISI2009prepub.pdf

Feldmann, Valerie (2003) *Mobile overtakes Fixed: Implications for policy and regulation retrieved from* http://www.itu.int/osg/spu/ni/mobileovertakes/Resources/Mobileovertakes_Paper.pdf

Gilhooly, Dennis (2005) *Innovation and Investment: Information and Communication Technologies and the Millennium Development Goals retrieved from* http://www.unicttaskforce.org/perl/documents.pl?id=1519

ITU (1984), *The Missing Link: Report of the Commission for World-Wide Telecommunications Development*, Geneva: ITU

ITU (2009) *Manual for Measuring ICT Access and Use by Households and Individuals retrieved from* http://www.itu.int/ITU-D/ict/publications/hhmanual/2009/material/HHManual2009.pdf

ITU (2009a) *Measuring the Information society – The ICT Development Index*, Geneva: ITU

ITU (2009b), *ITU ICT EYE*, retrieved from http://www.itu.int/ITU-D/icteye/Reporting/ShowReportFrame.aspx?ReportName=/WTI/InformationTechnologyPublic&ReportFormat=HTML4.0&RP_intYear=2009&RP_intLanguageID=1&RP_bitLiveData=False

ITU (2010a) *Definitions of World Telecommunication/ICT Indicators*, Geneva: ITU

ITU (2010b) *Measuring the WSIS Targets, mid-term review*, Geneva: ITU

ITU (2010c), *Measuring the Information Society*, Geneva: ITU

ITU and UNCTAD (2007), *World Information Society Report 2007, Beyond WSIS*, Geneva: ITU

Kalba, Kas (2007), *The Adoption of Mobile Phones in Emerging Markets: Global Diffusion and the Rural Challenge, retrieved from* http://www.marshall.usc.edu/assets/006/5577.pdf

LIRNE*asia* (2010). Teleuse at the bottom of the pyramid data booklet: Findings from a six country study. p.3. Available at: http://lirneasia.net/wp-content/uploads/2008/04/Teleuse-at-BOP-Data-Booklet-LIRNEasia.pdf

Park, Kyung (2001*), Development of ICT Indicators in Korea*, retrieved from http://www.stat.go.jp/english/info/meetings/iaos/pdf/park.pdf

Partnership on Measuring ICT for Development (2005), *Measuring ICT: The Global Status of ICT Indicators*, Geneva: ITU

Partnership on Measuring ICT for Development (2009), *Revisions and additions to Core ICT Indicators 2010*, Geneva: ITU

Partnership on Measuring ICT for Development (2010), *Core ICT Indicators 2010*, Geneva: ITU

Samarajiva, Rohan (2009). How the developing world may participate in the global Internet economy: Innovation driven by competition, in *ICTs for development: Improving policy coherence*, pp. 75-118. Paris: OECD. http://www.oecd.org/dataoecd/39/15/44003919.pdf

Telecommunication Regulatory Commission of Sri Lanka (Dec 2009), *Statistics*, retrieved from http://www.trc.gov.lk/information/statistics.html

The core list of ICT indicators, retrieved from http://unstats.un.org/unsd/statcom/doc09/BG-ICTIndicators.pdf

Treasure, J.A.P. (1953). Retail audit research. *The Incorporated Statistician*. 4(3): 148-59 http://www.jstor.org/pss/2988333.

United Nations (2003), *Indicators for Monitoring the Millennium Development Goals*, New York: United Nations

United Nations (2008) *Official list of MDG indicators*, retrieved from http://unstats.un.org/unsd/mdg/Resources/Attach/Indicators/OfficialList2008.pdf

United Nations (2010) *Millennium Development Goals report*, New York: United Nations Department of Economic and Social Affairs

Win Tun, Haymar (2010) *Building Knowledge Economies, Application of Knowledge Assessment Methodology (KAM).* Policy analysis exercise. Lee Kuan Yew School of Public Policy, National University of Singapore.

World Bank (2010a*), Extending Reach and Increasing Impact*, Washington, DC: World Bank

World Bank (2010b), *Gross national income per capita 2009, Atlas method and PPP*, http://siteresources.worldbank.org/DATASTATISTICS/Resources/GNIPC.pdf

World Bank (2010c), *How we classify countries*, retrieved from http://data.worldbank.org/about/country-classifications

Wortham, Jenna (2010, May 13). Cellphones now used more for data than for calls. *New York Times*. http://www.nytimes.com/2010/05/14/technology/personaltech/14talk.html

Annex 1: WSIS Targets

Target	Description
1	Connect villages and establish community access points
2	Connect universities, colleges, secondary schools and primary schools
3	Connect scientific and research institutions
4	Connect all public libraries, archives, museums, cultural centres and post offices
5	Connect health centres and hospitals
6	Connect all local and central government departments and establish websites and e-mail addresses for them
7	Adapt all primary and secondary school curricula to meet the challenges of the information society, taking into account national circumstances
8	Ensure that the entire world population has access to television and radio services
9	Encourage the development of content and put in place technical conditions in order to facilitate the presence and use of all world languages on the Internet
10	Ensure that more than half the world's inhabitants have personal use of ICT

Annex 2: Internet users and users/100 estimated using current and ceiling methods

Country	GNI per capita (Atlas Method) Ranking [10]	Population (000s) (from ITU data)	Internet Subscriptions (000s) 2009[11]	Internet Subs per 100 inhabitants 2009	Internet Users (000s) 2009 (current method)	Internet users per 100 inhabitants 2009 (current method)	Current multiplier	Multiplier using new methodology	Actual Survey Results where available [12]	Internet users (ceiling method) (000s)	Internet users per 100 using ceiling method
Afghanistan	202	28,169	2	0.01	1,000	3.55	500.00	22.59		45.2	0.16
Albania	116	3,153	105	3.33	1,300	41.23	12.38	6.63		695.9	22.07
Algeria	112	32,759	190	0.58	4,700	14.35	24.74	6.14		1,166.0	3.56
Andorra	29	85	32	37.44	67	78.62	2.10	1.02		32.5	38.03
Angola	125	18,136	107	0.59	607	3.35	5.68	7.81		607.4	3.35
Antigua & Barbuda	70	88	16	17.81	65	74.21	4.17	2.34		36.5	41.68
Argentina	86	39,887	3,737	9.37	12,244	30.70	3.28	3.50		12,244.0	30.70
Australia	25	21,291	6,300	29.59	15,757	74.01	2.50	1.01	12,576.0	12,576.0	59.07
Austria	18	8,364	2,142	25.61	6,144	73.45	2.87	1.06	4,614.3	4,614.3	55.17
Azerbaijan	107	8,839	522	5.90	3,689	41.74	7.07	5.56	2,465.3	2,465.3	27.89
Bahamas	50	342	39	11.29	116	33.87	3.00	1.40		54.0	15.81
Bahrain	45	776	115	14.76	649	83.70	5.67	1.25	402.9	402.9	51.94
Bangladesh	188	150,000	150	0.10	617	0.41	4.12	19.28		617.3	0.41
Belarus	100	9,637	1,631	16.92	4,437	46.04	2.72	4.80		4,436.8	46.04
Belgium	21	10,648	3,205	30.10	8,113	76.19	2.53	1.03	6,014.1	6,014.1	56.48
Belize	120	306	8	2.65	36	11.78	4.44	7.14		36.0	11.78
Benin	181	8,818	19	0.22	200	2.27	10.31	17.74		200.0	2.27

[10] World Development Indicators database, World Bank, revised July 2010

[11] ITU ICT EYE, ICT Statistics database, Internet: users, total subscriptions, broadband subscriptions

[12] Survey data obtained from the Market Information and Statistics Division of ITU

Country	GNI per capita (Atlas Method) Ranking [10]	Population (000s) (from ITU data)	Internet Subscriptions (000s) 2009 [11]	Internet Subs per 100 inhabitants 2009	Internet Users (000s) 2009 (current method)	Internet users per 100 inhabitants 2009 (current method)	Current multiplier	Multiplier using new methodology	Actual Survey Results where available [12]	Internet users (ceiling method) (000s)	Internet users per 100 using ceiling method
Bermuda	7	64	38	58.84	54	83.84	1.42	1.28		48.3	75.04
Bhutan	148	705	7	0.95	50	7.09	7.46	11.36		50.0	7.09
Bolivia	154	9,862	351	3.56	1,103	11.18	3.14	12.40		1,102.5	11.18
Bosnia and Herzegovina	108	3,767	399	10.60	1,422	37.74	3.56	5.67		1,421.5	37.74
Botswana	93	1,923	10	0.52	120	6.24	12.00	4.11		41.1	2.14
Brazil	84	193,724	16,157	8.34	75,944	39.20	4.70	3.33	62,978.6	62,978.6	32.51
Bulgaria	96	7,589	853	11.24	3,395	44.74	3.98	4.40	2,668.7	2,668.7	35.17
Burkina Faso	190	15,455	17	0.11	178	1.15	10.48	19.74		178.2	1.15
Burundi	213	8,333	5	0.06	65	0.78	13.00	25.38		65.0	0.78
Cambodia	185	15,000	18	0.12	78	0.52	4.33	18.61		78.0	0.52
Cameroon	162	19,231	25	0.13	750	3.90	30.00	13.88		346.9	1.80
Canada	28	33,262	10,714	32.21	26,225	78.84	2.45	1.01	19,231.2	19,231.2	57.82
Cape Verde	133	497	9	1.85	150	30.16	16.30	8.96		82.4	16.58
Central African Rep.	195	4,167	3	0.06	23	0.54	9.04	20.90		22.6	0.54
Chile	75	16,962	1,671	9.85	5,767	34.00	3.45	2.66	5,572.2	5,572.2	32.85
China	124	1,328,594	150,264	11.31	384,000	28.90	2.56	7.68		384,000.0	28.90
Colombia	104	45,690	2,266	4.96	20,789	45.50	9.17	5.22	11,905.4	11,905.4	26.06
Comoros	178	667	1	0.18	24	3.65	20.25	17.09		20.5	3.08

Country	GNI per capita (Atlas Method) Ranking [10]	Population (000s) (from ITU data)	Internet Subscriptions (000s) 2009 [11]	Internet Subs per 100 inhabitants 2009	Internet Users (000s) 2009 (current method)	Internet users per 100 inhabitants 2009 (current method)	Current multiplier	Multiplier using new methodology	Actual Survey Results where available [12]	Internet users (ceiling method) (000s)	Internet users per 100 using ceiling method
Congo (Dem. Rep.)	151	67,000	67	0.10	365	0.54	5.45	11.87		365.0	0.54
Costa Rica	93	4,576	275	6.01	1,579	34.51	5.74	4.11	1,353.6	1,353.6	29.58
Côte d'Ivoire	167	20,000	18	0.09	968	4.84	53.78	14.84		267.2	1.34
Croatia	65	4,416	1,498	33.93	2,234	50.58	1.49	2.05	1,733.1	1,733.1	39.25
Cyprus	43	871	191	21.92	434	49.81	2.27	1.20	290.2	290.2	33.32
Czech Republic	58	10,370	2,020	19.48	6,681	64.43	3.31	1.71	5,281.3	5,281.3	50.93
Denmark	8	5,471	2,162	39.52	4,751	86.84	2.20	1.25	3,511.4	3,511.4	64.19
Djibouti	159	867	9	1.05	26	2.99	2.85	13.31		25.9	2.99
Dominican Rep.	110	10,094	429	4.25	2,701	26.76	6.30	5.90		2,531.1	25.08
Ecuador	118	13,610	562	4.13	2,052	15.08	3.65	6.88	3,263.3	3,263.3	23.98
Egypt	147	83,101	2,809	3.38	16,636	20.02	5.92	11.19		16,635.8	20.02
El Salvador	127	6,168	151	2.44	889	14.41	5.91	8.09	493.8	493.8	8.01
Equatorial Guinea	67	600	1	0.20	14	2.40	12.00	2.16		2.6	0.43
Eritrea	207	5,000	7	0.14	250	5.00	35.71	23.84		166.8	3.34
Estonia	63	1,341	343	25.58	970	72.34	2.83	1.95	742.6	742.6	55.40
Ethiopia	206	79,000	71	0.09	445	0.56	6.26	23.58		445.4	0.56
Fiji	116	836	14	1.65	114	13.65	8.28	6.63		91.5	10.93
France	24	62,348	20,338	32.62	44,625	71.57	2.19	1.02	31,314.7	31,314.7	50.23
Gabon	87	1,421	11	0.76	99	6.95	9.15	3.58		38.7	2.72

Country	GNI per capita (Atlas Method) Ranking [10]	Population (000s) (from ITU data)	Internet Subscriptions (000s) 2009 [11]	Internet Subs per 100 inhabitants 2009	Internet Users (000s) 2009 (current method)	Internet users per 100 inhabitants 2009 (current method)	Current multiplier	Multiplier using new methodology	Actual Survey Results where available [12]	Internet users (ceiling method) (000s)	Internet users per 100 using ceiling method
Gambia	196	1,591	4	0.22	130	8.18	37.17	21.14		74.0	4.65
Georgia	139	4,306	903	20.98	1,300	30.19	1.44	9.88		1,300.0	30.19
Germany	27	82,406	20,000	24.27	65,124	79.03	3.26	1.01	50,029.1	50,029.1	60.71
Ghana	182	23,769	93	0.39	1,297	5.46	13.99	17.95		1,297.0	5.46
Greece	42	11,161	1,980	17.74	4,971	44.54	2.51	1.18	3,684.2	3,684.2	33.01
Greenland	38	57	12	21.28	36	62.79	2.95	1.10		13.5	23.51
Grenada	99	104	11	10.50	25	24.08	2.29	4.70		25.0	24.08
Guinea-Bissau	190	1,750	1	0.04	37	2.12	53.00	19.74		13.8	0.79
Guyana	157	764	48	6.28	220	28.78	4.58	12.95		220.0	28.78
Honduras	152	7,272	59	0.81	732	10.06	12.42	12.05	739.3	739.3	10.17
Hong Kong, China	40	7,022	3,042	43.32	4,300	61.24	1.41	1.14	4,300.0	4,300.0	61.24
Hungary	66	9,992	1,903	19.04	6,176	61.81	3.25	2.11	4,705.1	4,705.1	47.09
Iceland	26	323	113	34.95	302	93.45	2.67	1.01	209.2	209.2	64.81
India	162	1,200,000	15,240	1.27	61,300	5.11	4.02	13.88		61,300.0	5.11
Indonesia	144	227,627	1,707	0.75	20,000	8.79	11.72	10.69	9,543.5	9,543.5	4.19
Iraq	146	31,000	3	0.01	325	1.05	104.84	11.02		34.2	0.11
Ireland	23	4,516	1,104	24.45	3,043	67.38	2.76	1.02	2,197.6	2,197.6	48.66
Israel	46	7,051	1,714	24.31	3,700	52.48	2.16	1.28	2,716.7	2,716.7	38.53
Italy	35	59,610	20,500	34.39	29,236	49.05	1.43	1.06	21,981.2	21,981.2	36.87

Country	GNI per capita (Atlas Method) Ranking [10]	Population (000s) (from ITU data)	Internet Subscriptions (000s) 2009 [11]	Internet Subs per 100 inhabitants 2009	Internet Users (000s) 2009 (current method)	Internet users per 100 inhabitants 2009 (current method)	Current multiplier	Multiplier using new methodology	Actual Survey Results where available [12]	Internet users (ceiling method) (000s)	Internet users per 100 using ceiling method
Jamaica	103	2,722	112	4.13	1,581	58.10	14.07	5.12		575.0	21.13
Jordan	122	6,318	245	3.87	1,742	27.57	7.12	7.40		1,741.9	27.57
Kazakhstan	90	15,635	1,801	11.52	5,300	33.90	2.94	3.84		5,300.0	33.90
Kenya	180	42,000	8	0.02	3,996	9.51	475.65	17.52		147.2	0.35
Korea (Rep.)	54	48,340	16,349	33.82	39,440	81.59	2.41	1.54	38,655.1	38,655.1	79.96
Kuwait	10	2,700	283	10.49	1,100	40.75	3.88	1.20		339.8	12.59
Kyrgyzstan	178	5,488	47	0.86	2,194	39.98	46.49	17.09		806.8	14.70
Lao P.D.R.	177	6,545	7	0.11	300	4.58	41.67	16.88		121.5	1.86
Latvia	68	2,269	146	6.43	1,503	66.26	10.30	2.22	1,176.5	1,176.5	51.85
Lebanon	85	4,194	315	7.51	1,000	23.84	3.17	3.41	350.4	350.4	8.36
Lesotho	170	839	3	0.31	77	9.16	29.54	15.44		40.1	4.79
Liberia	211	3,659	15	0.41	20	0.55	1.33	24.86		20.0	0.55
Libya	71	6,066	83	1.36	354	5.83	4.29	2.40		198.1	3.27
Liechtenstein	2	35	17	47.25	23	65.07	1.38	1.43		23.0	65.07
Lithuania	72	3,287	636	19.35	1,964	59.75	3.09	2.46	1,534.4	1,534.4	46.68
Luxembourg	4	481	156	32.48	425	88.33	2.72	1.36	320.0	320.0	66.58
Madagascar	200	20,750	8	0.04	320	1.54	38.55	22.10		183.4	0.88
Malawi	209	14,789	105	0.71	716	4.84	6.82	24.34		716.4	4.84
Malaysia	89	27,465	5,592	20.36	15,824	57.61	2.83	3.75		15,823.7	57.61

Country	GNI per capita (Atlas Method) Ranking [10]	Population (000s) (from ITU data)	Internet Subscriptions (000s) 2009 [11]	Internet Subs per 100 inhabitants 2009	Internet Users (000s) 2009 (current method)	Internet users per 100 inhabitants 2009 (current method)	Current multiplier	Multiplier using new methodology	Actual Survey Results where available [12]	Internet users (ceiling method) (000s)	Internet users per 100 using ceiling method
Maldives	119	310	20	6.49	88	28.38	4.37	7.01		87.9	28.38
Mali	184	12,625	10	0.08	250	1.98	24.75	18.39		185.8	1.47
Malta	55	409	111	27.26	241	58.88	2.16	1.58		176.3	43.14
Mauritania	175	3,233	10	0.30	75	2.32	7.73	16.46		75.0	2.32
Mauritius	88	1,288	224	17.38	290	22.51	1.30	3.66	224.4	224.4	17.42
Mexico	78	109,614	10,315	9.41	28,439	25.94	2.76	2.87	27,206.2	27,206.2	24.82
Micronesia	145	111	1	1.17	17	15.30	13.08	10.85		14.1	12.70
Moldova	156	3,602	204	5.65	1,295	35.95	6.36	12.76		1,295.0	35.95
Monaco	1	33	13	38.32	23	70.51	1.84	1.46		18.3	56.09
Mongolia	154	2,668	49	1.84	350	13.12	7.13	12.40		350.0	13.12
Montenegro	92	622	89	14.27	280	45.05	3.16	4.02		280.0	45.05
Morocco	136	31,987	480	1.50	10,300	32.20	21.47	9.42		4,517.4	14.12
Mozambique	196	22,500	14	0.06	613	2.72	45.37	21.14		285.4	1.27
Namibia	114	2,088	90	4.31	128	6.11	1.42	6.38		127.5	6.11
Nepal	196	29,571	104	0.35	626	2.12	6.05	21.14		625.8	2.12
Netherlands	14	16,461	5,618	34.13	14,872	90.35	2.65	1.12	10,887.2	10,887.2	66.14
New Zealand	44	4,266	1,415	33.17	3,600	84.39	2.54	1.23	2,677.0	2,677.0	62.75
Nicaragua	172	5,488	24	0.43	200	3.64	8.47	15.84	546.2	546.2	9.95
Niger	204	12,000	4	0.03	116	0.97	32.19	23.08		83.1	0.69

Country	GNI per capita (Atlas Method) Ranking [10]	Population (000s) (from ITU data)	Internet Subscriptions (000s) 2009 [11]	Internet Subs per 100 inhabitants 2009	Internet Users (000s) 2009 (current method)	Internet users per 100 inhabitants 2009 (current method)	Current multiplier	Multiplier using new methodology	Actual Survey Results where available [12]	Internet users (ceiling method) (000s)	Internet users per 100 using ceiling method
Nigeria	164	153,424	905	0.59	43,982	28.67	48.59	14.26		12,907.4	8.41
Norway	3	4,767	1,710	35.87	4,431	92.95	2.59	1.40	3,195.1	3,195.1	67.02
Oman	56	2,840	78	2.75	1,237	43.55	15.83	1.62	387.9	387.9	13.66
Pakistan	170	177,033	3,700	2.09	20,350	11.50	5.50	15.44		20,350.0	11.50
Panama	90	3,451	213	6.18	960	27.81	4.50	3.84		819.1	23.73
Paraguay	143	6,352	157	2.47	1,000	15.74	6.37	10.52	689.3	689.3	10.85
Peru	115	28,186	1,029	3.65	8,085	28.68	7.86	6.50	7,902.5	7,902.5	28.04
Philippines	153	90,361	3,000	3.32	5,955	6.59	1.99	12.23		5,955.1	6.59
Poland	69	38,061	5,576	14.65	22,451	58.99	4.03	2.28	17,133.4	17,133.4	45.02
Portugal	51	10,705	1,898	17.73	5,169	48.28	2.72	1.43	3,876.7	3,876.7	36.21
Qatar	6	1,409	139	9.87	399	28.31	2.87	1.30	1,096.3	1,096.3	77.79
Romania	82	21,282	2,805	13.18	7,787	36.59	2.78	3.17	6,184.8	6,184.8	29.06
Russia	77	140,864	88,068	62.52	59,700	42.38	0.68	2.80		59,700.0	42.38
Rwanda	193	9,986	148	1.48	450	4.51	3.04	20.43		450.0	4.51
S. Tomé & Principe	164	156	3	1.60	27	17.09	10.68	14.26		26.7	17.09
San Marino	12	31	7	20.84	17	54.50	2.62	1.16		7.5	24.11
Saudi Arabia	57	25,708	1,882	7.32	9,800	38.12	5.21	1.67		3,133.8	12.19
Senegal	169	12,438	60	0.48	923	7.42	15.46	15.24		909.8	7.32
Serbia	95	9,846	843	8.56	4,107	41.71	4.87	4.30	2,412.8	2,412.8	24.51
Seychelles	81	84	6	7.11	34	40.29	5.67	3.10		18.6	22.01

Country	GNI per capita (Atlas Method) Ranking [10]	Population (000s) (from ITU data)	Internet Subscriptions (000s) 2009 [11]	Internet Subs per 100 inhabitants 2009	Internet Users (000s) 2009 (current method)	Internet users per 100 inhabitants 2009 (current method)	Current multiplier	Multiplier using new methodology	Actual Survey Results where available [12]	Internet users (ceiling method) (000s)	Internet users per 100 using ceiling method
Singapore	33	4,615	1,103	23.91	3,658	79.28	3.32	1.04		1,149.0	24.90
Slovak Republic	60	5,406	833	15.41	4,064	75.17	4.88	1.80	3,165.0	3,165.0	58.55
Slovenia	49	2,020	479	23.71	1,299	64.27	2.71	1.37	1,014.8	1,014.8	50.23
Solomon Islands	176	475	2	0.40	10	2.11	5.26	16.67		10.0	2.11
Spain	41	44,900	9,860	21.96	28,118	62.62	2.85	1.16	21,708.5	21,708.5	48.35
Sri Lanka	149	20,309	250	1.23	1,776	8.75	7.11	11.53		1,776.2	8.75
St. Lucia	101	171	16	9.08	143	83.71	9.22	4.90		76.0	44.53
St. Vincent and the Grenadines	102	109	12	10.82	76	69.69	6.44	5.01		59.1	54.20
Sudan	160	40,091	44	0.11	4,200	10.48	95.24	13.50		595.4	1.49
Suriname	106	519	13	2.43	163	31.44	12.94	5.44		68.6	13.23
Swaziland	142	1,183	22	1.86	90	7.61	4.09	10.36		90.0	7.61
Sweden	15	9,205	4,271	46.40	8,398	91.23	1.97	1.10	6,195.6	6,195.6	67.31
Switzerland	9	7,568	2,772	36.63	5,480	72.41	1.98	1.22	4,557.0	4,557.0	60.22
Syria	141	21,900	786	3.59	3,935	17.97	5.01	10.20		3,935.0	17.97
Timor-Leste	140	1,000	1	0.07	2	0.21	3.00	10.04		2.1	0.21
Togo	196	6,622	60	0.90	356	5.38	5.98	21.14		356.3	5.38
Tonga	128	105	5	4.30	8	8.03	1.87	8.23		8.4	8.03
Trinidad & Tobago	59	1,335	114	8.55	485	36.34	4.25	1.75		200.1	14.99
Tunisia	123	10,273	414	4.03	3,500	34.07	8.45	7.54		3,121.3	30.38

Country	GNI per capita (Atlas Method) Ranking [10]	Population (000s) (from ITU data)	Internet Subscriptions (000s) 2009 [11]	Internet Subs per 100 inhabitants 2009	Internet Users (000s) 2009 (current method)	Internet users per 100 inhabitants 2009 (current method)	Current multiplier	Multiplier using new methodology	Actual Survey Results where available [12]	Internet users (ceiling method) (000s)	Internet users per 100 using ceiling method
Turkey	80	74,844	6,392	8.54	26,410	35.29	4.13	3.02	17,577.4	17,577.4	23.49
Uganda	193	33,333	30	0.09	3,200	9.60	106.67	20.43		613.0	1.84
Ukraine	135	45,681	2,650	5.80	15,300	33.49	5.77	9.26	4,714.9	4,714.9	10.32
United Arab Emirates	13	4,598	1,408	30.63	3,778	82.16	2.68	1.14	3,430.8	3,430.8	74.61
United Kingdom	30	61,232	19,380	31.65	51,442	84.01	2.65	1.02	37,571.0	37,571.0	61.36
United States	17	314,666	81,939	26.04	239,894	76.24	2.93	1.07	197,870.0	197,870.0	62.88
Uruguay	76	909	288	31.65	1,855	204.07	6.45	2.73		785.8	86.44
Uzbekistan	166	27,483	2,737	9.96	4,689	17.06	1.71	14.65		4,689.0	17.06
Vanuatu	138	241	3	1.08	17	7.06	6.54	9.72		17.0	7.06
Venezuela	73	28,566	2,034	7.12	8,847	30.97	4.35	2.53		5,144.3	18.01
Viet Nam	172	86,053	5,241	6.09	24,000	27.89	4.58	15.84		24,000.0	27.89
Yemen	167	22,884	295	1.29	420	1.84	1.42	14.84		420.0	1.84
Zambia	174	12,929	18	0.14	817	6.32	45.12	16.26		294.2	2.28
World			**600,951**		**1,650,934**				**700,780**	**1,379,103**	