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Telecommunication Development Symposium (TDS)

**Survey Analysis on  
Next-Generation Network**

**MAKE THE RIGHT CONNECTIONS**



Telecommunication Development Symposium (TDS):

**Analysis of Global Survey on  
Next Generation Network**



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# 1 Introduction

## 1.1 Introduction

The 10th Telecommunication Development Symposium (TDS) was held at ITU TELECOM WORLD 2006 in Hong Kong 4-8 December 2006. All related information can be found on the ITU TELECOM website at <http://www.itu.int/WORLD2006/forum/tds.html>.

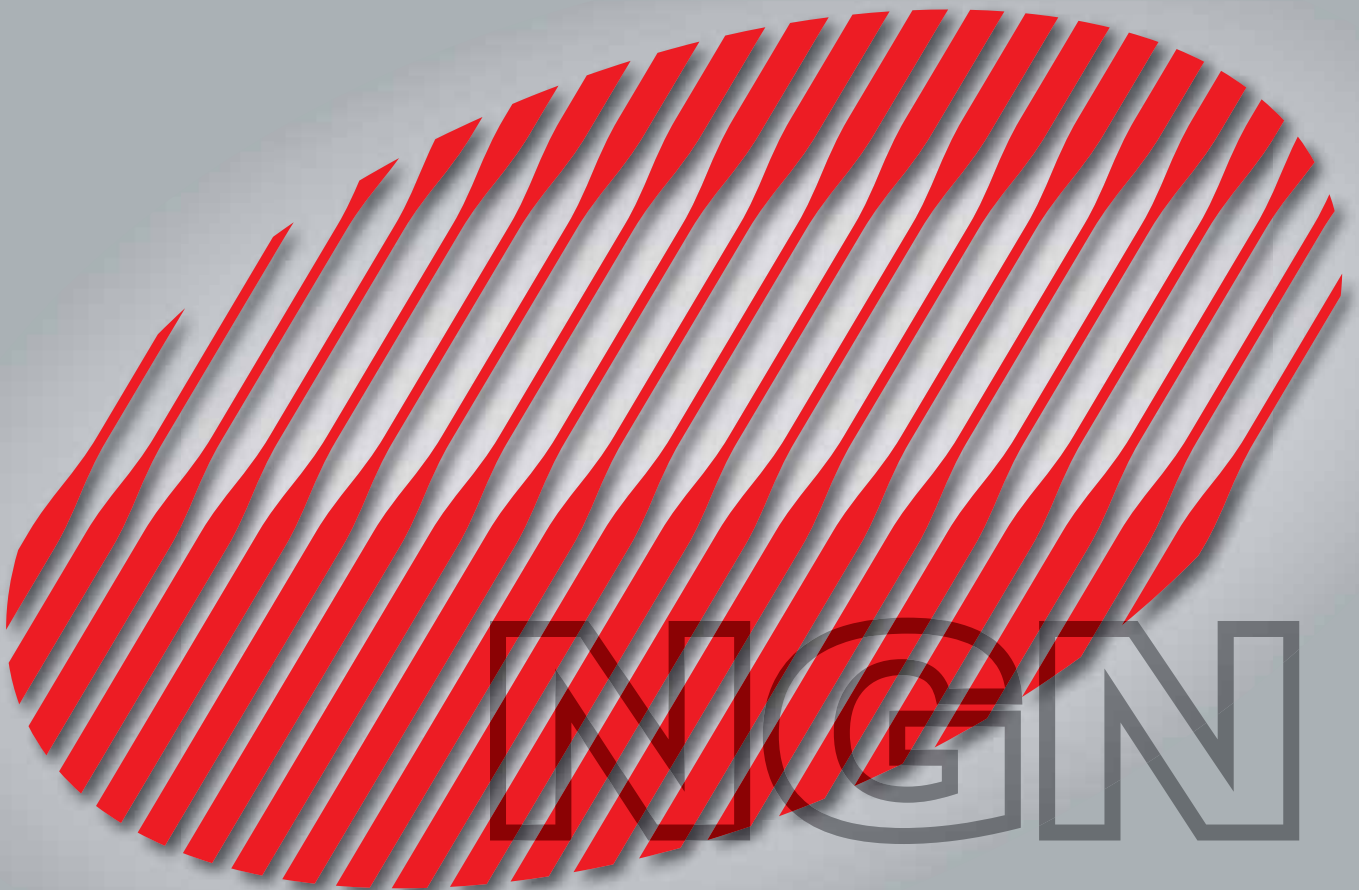
Among major TDS pre-occupations was discussion on Next Generation Networks and its impact on ICT sector development and growth. The symposium concluded that use of advanced network technologies can accelerate bridging of the digital divide, enabling developing countries to compete in global marketplace and provide better services to their people. It is evident that the next phase of networked communications will be based on NGN technologies operating on a converged platform supporting a wider range of services. NGN is therefore considered as a crucial tool for greater socio-economic development.

As a follow-up to the TDS discussions on NGN, ITU sent questionnaires to participating countries to gather detailed inputs on NGN activities in their countries. This survey is an important input for the preparation of the TDS summary report and the next TDS event. The questionnaires were sent to 63 participating countries of which 39 countries responded, representing 62% (see attachment 1) responded.

The questionnaires on the NGN survey were completed by TDS participants while the analysis was prepared by Omnitele Ltd., a Finnish telecom consulting company.

This report consists of the analysis and assessment of results from the survey.







## 2 Next Generation Networks

### 2.1 Definitions

Next Generation Networking (NGN) is a broad term used to describe some key architectural evolutions in the telecommunication core and access networks that will be deployed over the next few years. Next Generation Network solutions will offer possibilities to utilize resources more efficiently, due to the fact that new technology is more cost effective. With new technology only one is required instead of maintaining several different networks. The main principle behind NGN is that one network transports all information and services (voice, data, and multimedia) by encapsulating these into packets. NGNs are built around the Internet Protocol, and the term "all-IP" is sometimes used in connection with NGN.

The ITU-T defines a Next Generation Network (NGN) as a "packet-based network able to provide Telecommunication Services to users and able to make use of multiple broadband, QoS-enabled transport technologies and in which service-related functions are independent of the underlying transport-related technologies. It enables unfettered access for users to networks and to competing service providers and services of their choice. It supports generalized mobility which will allow consistent and ubiquitous provision of services to users."

### 2.2 NGN Services

Services offered in NGN networks can among others categorized in:

- **Broadband access** – which allows different types of E-services (E-commerce, E-healthcare, E-banking, E-government etc),
- **TV** – Digital TV-channels, VoD, IPTV and interactive TV
- **Speech** – VoIP. IP –PBX/Centrex for corporate customers as well as consumers
- **Content** – Games, music, gambling, voting, photo banks.
- **Quality and security** – Virus protection, firewall, data security, QoS

An open development environment based on Application Programming Interface (API) will enable service providers, third party application developers and potentially end users to create and introduce applications quickly and seamlessly. This will speed up introduction of new services, open opportunities to create and deliver new services to a broader audience and offer end users a wide range of choices in future to fulfill their service needs.

### 2.3 NGN TECHNOLOGY

Next Generation Networks are based on Internet technologies including Internet Protocol (IP) and Multi Protocol Label Switching (MPLS). At the application level, Session Initiation Protocol (SIP) seems to be taking over from ITU T H.323. Access defines the access layer, which connects to IP-network (Connectivity Network) either directly or through a Media Gateway.

NGN architecture simplifies the transport network. Consolidating voice and data on ATM or IP onto a single transport backbone provides not only more efficient use of network resources, but also delivers savings from a common network management system. Move to NGN means moving from a vertically layered to horizontally layered network architecture

As we move forward deploying the Next Generation Network, users may have one or several access providers to choose from, including cable, DSL, Wi-Fi, WiMAX, fibre, etc. to access into the NGN. Once connected, the options for service providers for voice, video, and data services will be virtually unlimited.

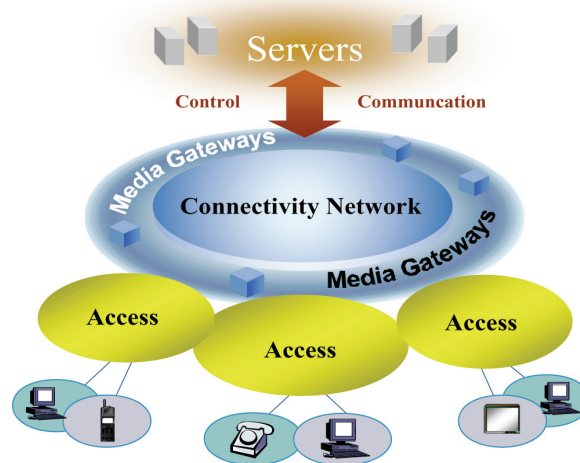


Figure 1 – NGN Architecture

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## 2.4 NGN Business Model

Moving to NGN introduces a dramatic change to the traditional business model with a clear distinction and separation of the network and content/services. This separation allows the unbundling of services and physical facilities (network elements). In this regard, NGN will foster and facilitate competition and innovation among service providers, and simplify market entry for innovative service entrepreneurs.

NGN has the potential to accelerate the deployment of telecommunication networks and services in developing countries. In fact, it offers the potential to leap frog several generations of technology. Special attention should be accorded in defining global standards as these are essential to support developing countries in building their infrastructure and encouraging economic development. By using global standards the developing countries have the opportunity to provide an unlimited range of applications and services to all their people and effectively minimizing the digital divide.

### 3 Survey

#### 3.1 General

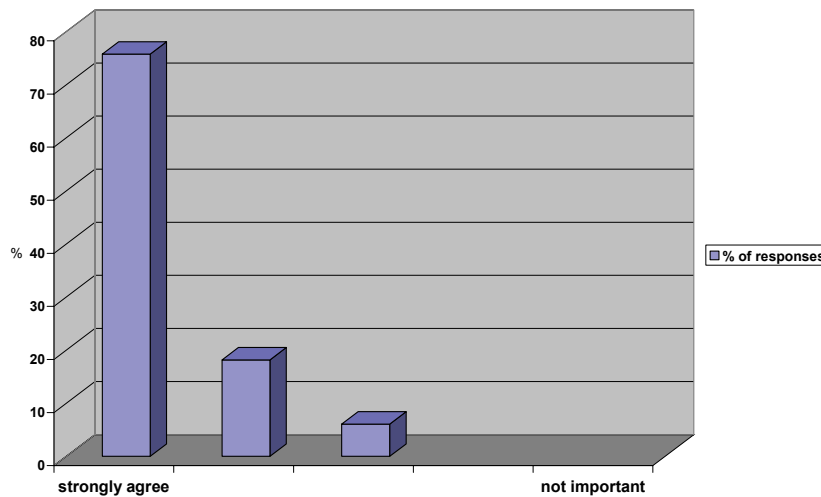
The survey was divided in two parts, the first part being an evaluation of the Symposium and the second part concerned collection of country inputs on Next Generation Networks related topics. A total 39 responses were received, analysed and an assessment on the current situation prepared. In following the analysis, it is to be noted that the results represent percentages of received responses as all 39 countries did not reply to all questions. TDS Survey Section 1 analysis and assessment

Survey Section 1 consisted of the groups of questions covering Symposium Perception, Symposium Experience and Sessions for days 1, 2 and 3. The results are shown in Section 3.2.1-3 and an assessment of the results is in Section 3.2.4.

##### 3.1.1 Symposium Perception Ratings

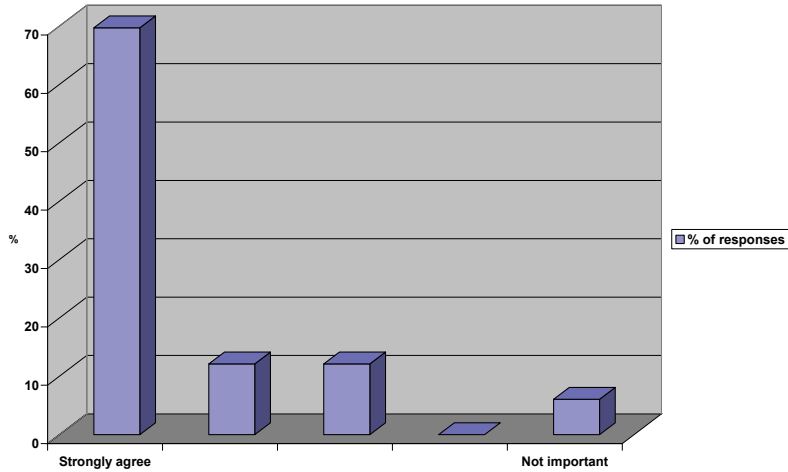
The first survey question was "Would you plan on attending another Telecommunication Development Symposium?". The result was unanimous, all countries responded "Yes, I will".

The following questions (shown in figures 2 – 15) related to Symposium perception received the following responses:



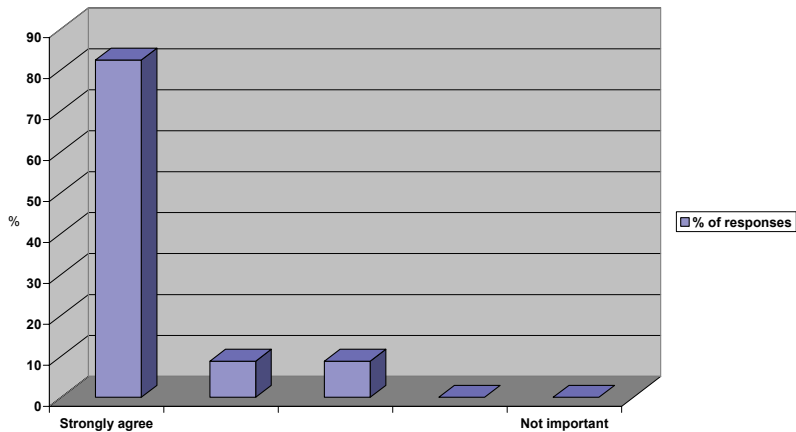
**Figure 2 – I received practical information I can take back and immediately use at my job**

The content of the Symposium was practical and useful for the participants as there were no scores lower than 3.



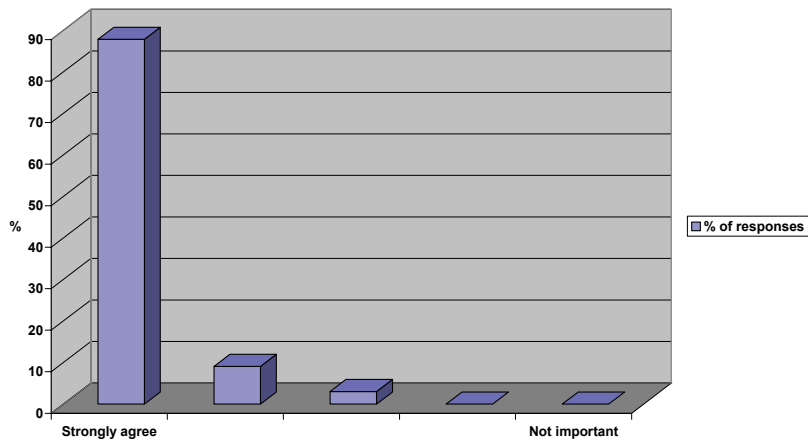
**Figure 3 – I was exposed to valuable information I would not otherwise have**

It seems that some of the participants were not satisfied with the information, which was given in the Symposium. This is probably an indication, that they already had knowledge about NGN before coming to the Symposium and that the and information given was not new to them.



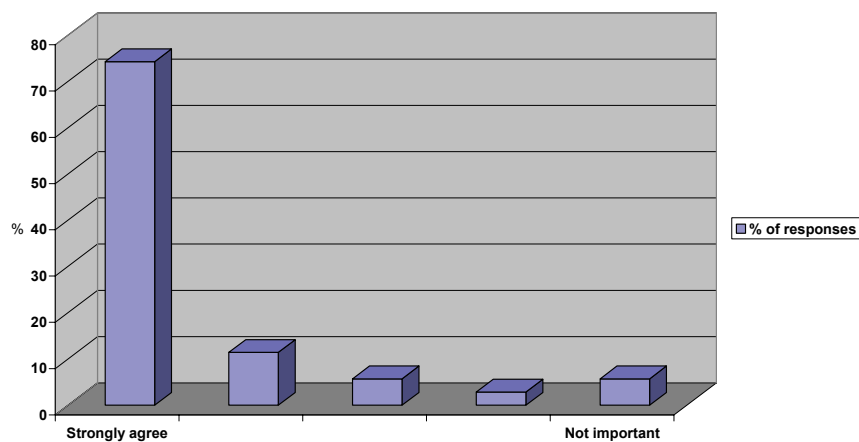
**Figure 4 – Following TDS, I better understand the role NGN will play within my country**

Message given in the Symposium was clear and understandable. Participants were able to adapt the information given to their own environment and draw conclusions.



**Figure 5 – I found the information presented believable and credible**

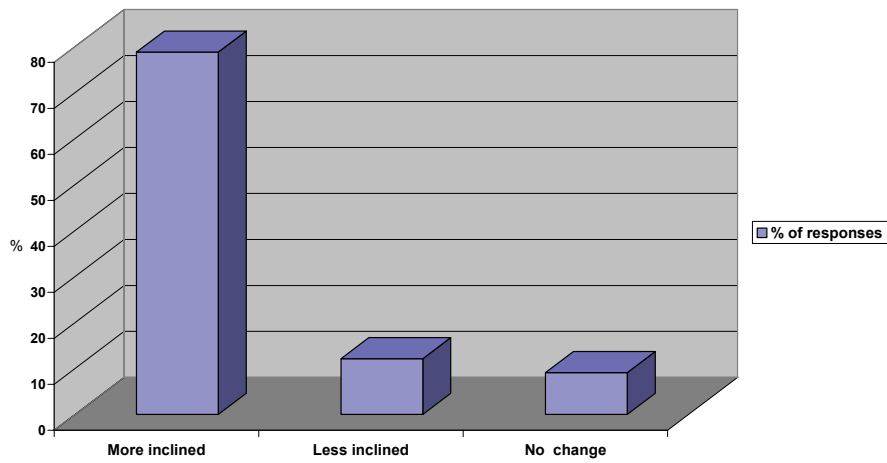
The information given in the Symposium was well received and participants are not challenging the information.



**Figure 6 – Attending TDS will impact my decision to implement a Next Generation Network**

The result is understood to reflect the fact that some countries are already implementing NGN such that their participation in TDS will not impact their decision anymore (i.e. they scored 1-3 in this question).

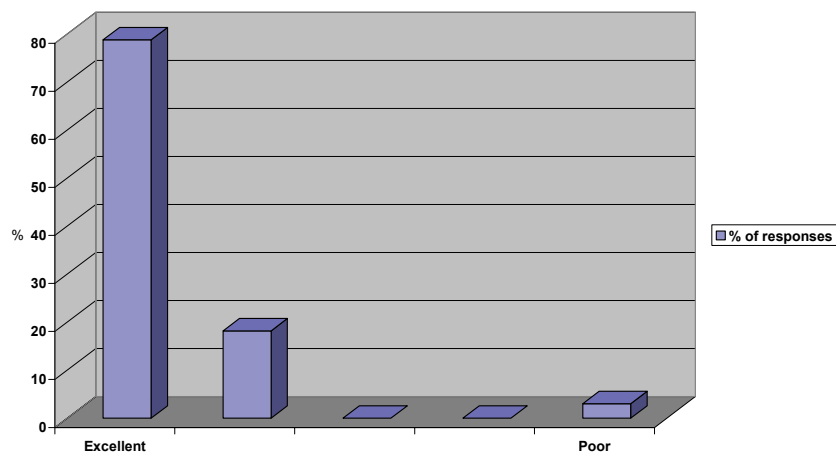
Figure 7 illustrates how TDS affected participants views on NGN. 90% were more inclined (or no change) to implementing NGN. However, 10% got less inclined. The reason for this is unclear and should be studied further.



**Figure 7 – How did attending TDS impact your decision to implement a Next Generation Network?**

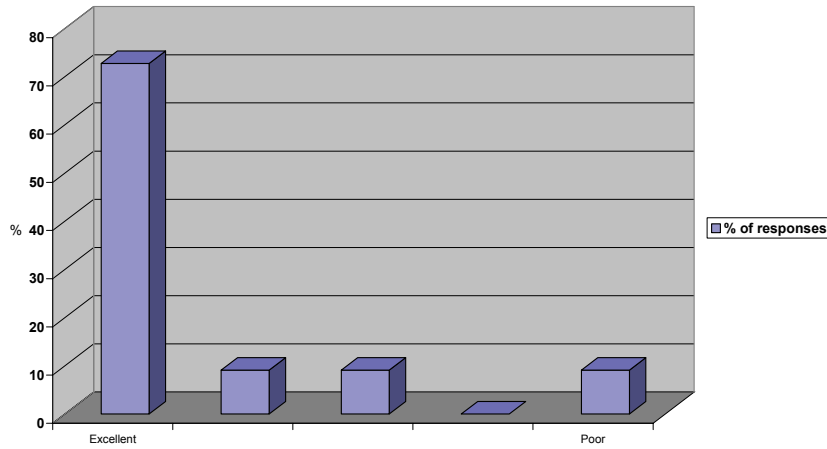
### 3.1.2 Symposium Experience Ratings

The conference was well received. However, objectives for attendance by some participants were either partially or not at all met. In this respect the message related to the next TDS should be defined carefully to avoid any misunderstandings related to the objectives of the TDS. Ratings also show that more emphasis should be put on the session speakers.



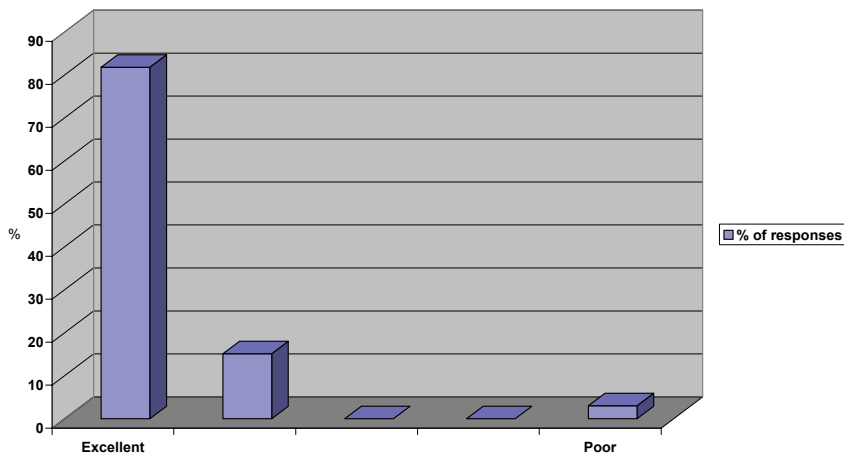
**Figure 8. Overall conference experience**

Conference experience was mainly good.



**Figure 9 – My objectives for attending meeting were met**

Again, feedback was mainly positive. However, some participants had misunderstood the TDS targets or they had wrong expectations as their objectives were not met.



**Figure 10 – Quality of session speakers**

Impression on quality of speakers was good, only one country not share that opinion.



### 3.1.3 Session ratings

Session ratings were collected from all three days. Based on the scores the 3rd day was best received.

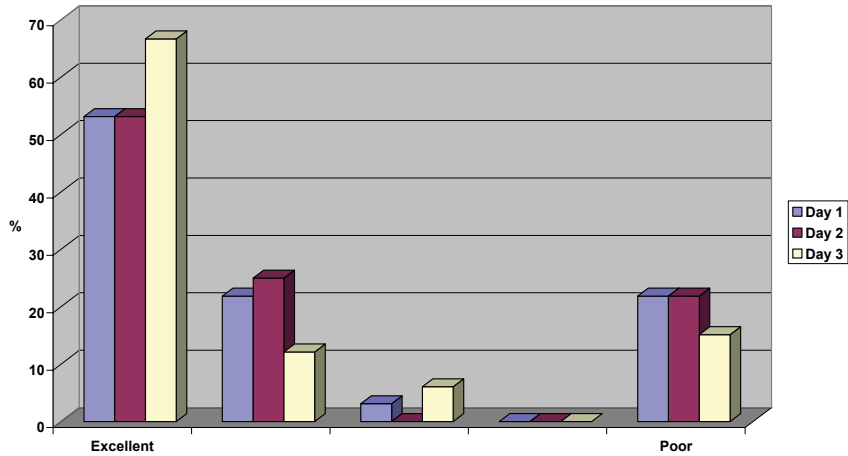


Figure 11 – Session material was well organized

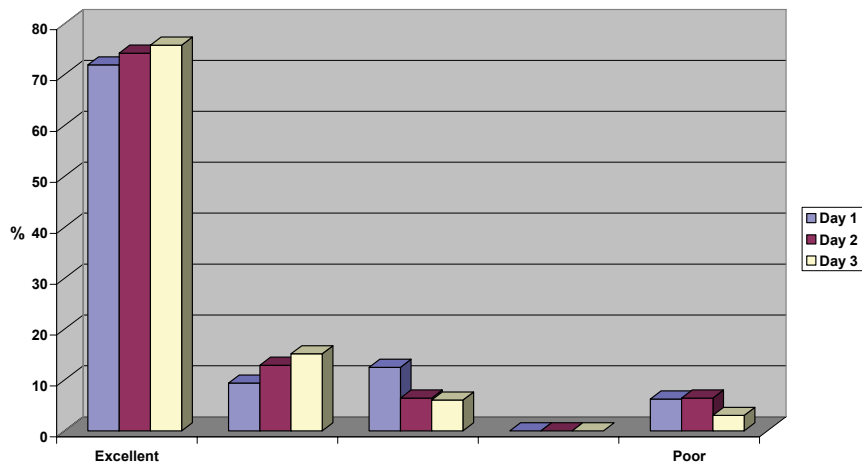
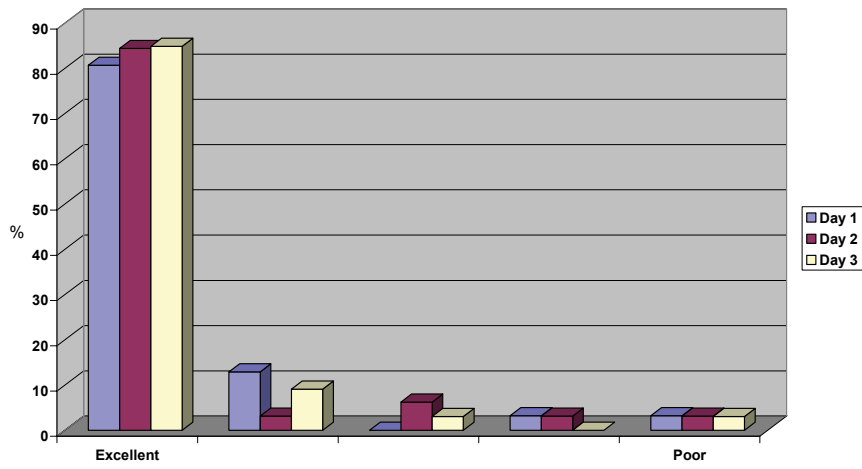
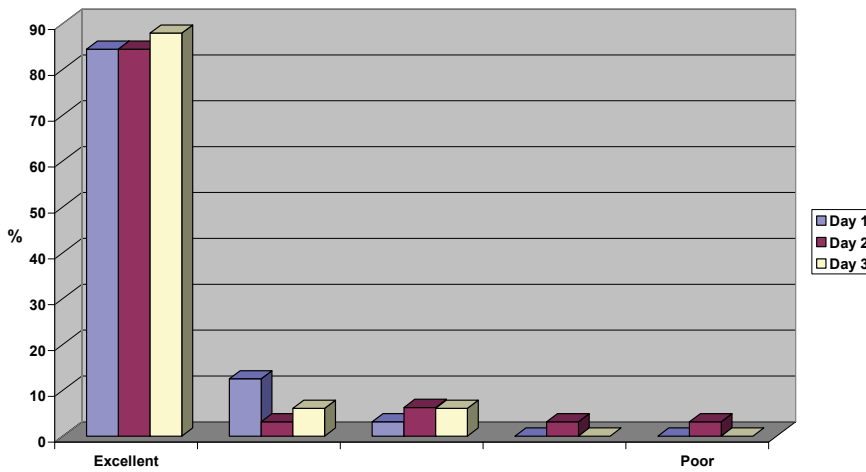


Figure 12 – Session was relevant and useful to my business



**Figure 13 – Presentations were reflective of the title and description**



**Figure 14 – Presenters were knowledgeable and appropriate for the panel**

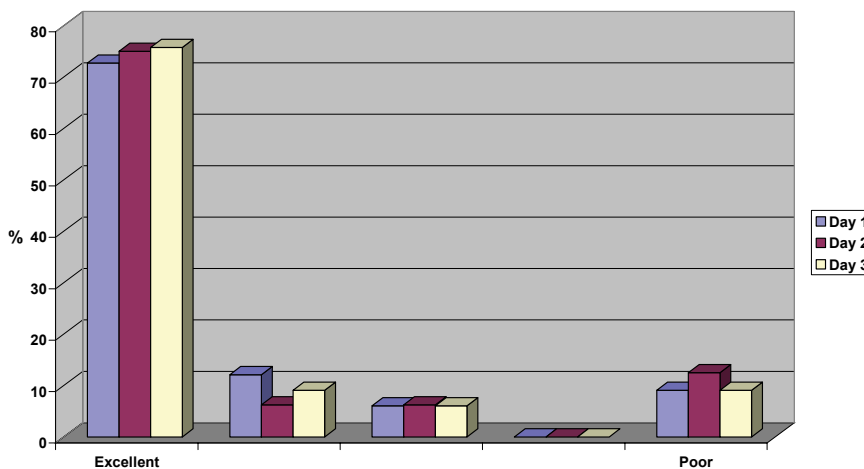


Figure 15 – Material was presented clearly

### 3.1.4 Assessment of Survey Section 1 results

Section 1 results show that the TDS was very well received with a number of responses giving a score 5 (five/excellent) to every question. In most cases there was always something to be improved, so special attention should be given on scores less than 5, because those given by participants are on purpose to encourage improvements and creativity for next events

Based on the scores, some discrepancies were also noted between the title and description and the actual contents of some presentations. Presenters should be requested to pay particular attention to cover the topics assigned to them.

Even though the responses to the question “Session was relevant and useful to my business” included some low scores, this can be explained by the fact that some of participants were not dealing with NGN business activities in their countries.

10% of participants got less inclined in implementing NGN in their countries due to the Symposium and this should be studied further, as it is wrong conclusion and the whole industry will be moving towards NGN in the next few years. One reason may be that questions analysed in figures 6 and 7 were ambiguous and could not be clearly understood hence led to false responses.

Overall, the TDS was well received by the participants. The quality of the events can further be improved to meet the countries’ expectations with the proposals outlined above.

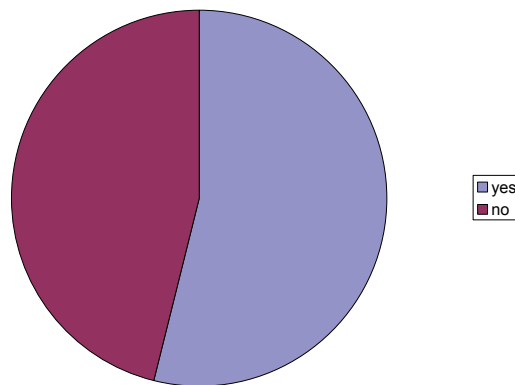
## 3.2 TDS Survey Section 2 Analysis and Assessment

### 3.2.1 Next generation networks for development: Technologies and infrastructure

Is this section questions related to NGN technologies and infrastructure were analysed.

Question: Is your country planning to deploy NGN and if so, which phase is your country currently in? Do you already have a Master Plan, currently developing one or planning to? What are some of the obstacles you are facing? Do you find that the IP NGN platform enables you to deploy NGN with minimal displacement of your legacy network investment, therefore easing NGN development requirements and deployment timelines

Majority (54%) of the countries (see figure 16) responding to the survey are either deploying or planning to deploy NGN. Most of the countries deploying NGN also have a Master Plan.



**Figure 16 – Is your country planning to deploy NGN?**

When asked, which obstacles countries are facing in respect of NGN, they responded with:

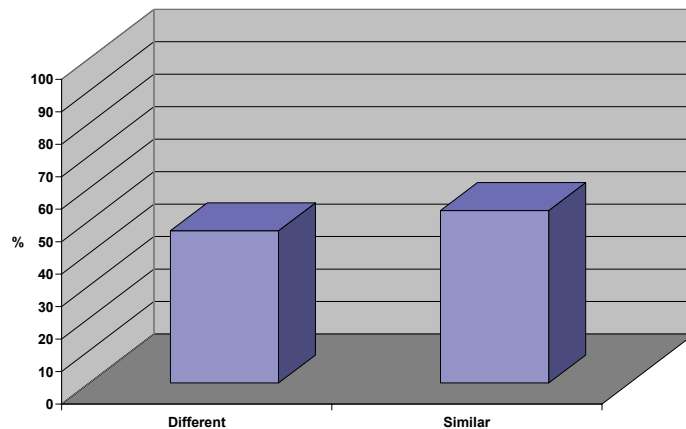
- There is no regulation/no legal framework
- What private operators are doing is not efficient and there is no agreement with private operators
- Technology decisions are not clear
- Not efficient measures to protect existing network/migration from existing technology is not clear
- (Lack of) Financing
- Lack of knowledge
- Lack of access technology/most people in rural area

It is evident, that biggest challenges when deploying NGN seem to be in the areas of financing, lack of knowledge, access technology in rural areas and legal framework.

Question about IP NGN platform enabling a country to deploy NGN with minimal displacement of legacy network investment divides countries in two groups. Those who have well developed fixed network believe that upgrading legacy network needs to happen gradually and will take some time. However, countries with almost no or none legacy network are planning to skip directly to NGN and expect to gain considerable benefits by doing it.

**Question:** Do you think that IP-based NGNs in your country will be different from those in developed economies, who are upgrading their extensive fixed-line networks? How can developing economies best leverage existing mobile networks for this network transformation?

**Answer:** Almost half of the countries (see figure 17) assume, that IP-based NGN in their countries will differ from those in developed countries. The reason is that they have very little or no legacy fixed network and they can go directly to wireless access. Also the lack of investments and human resources will have an effect on IP-based NGN in developing countries.



**Figure 17 – Do you think that IP-based NGNs in your country will be different from those in developed economies?**

Broadband wireless access is most suitable in developing countries to facilitate rapid introduction of NGN. It was also suggested, that the best way to leverage existing mobile networks for this network transformation countries should use IP-compliant wireless technologies like WiMAX as a technology mix in their mobile networks. Countries should encourage fixed and mobile operators to formulate joint ventures for easing the introduction of NGN. Emphasis should be put on licensing needs as wireless access will be the access method for the majority of population in the future.

**Question:** Which core and access technologies do you think will allow the most cost effective migration to IP-based NGN platforms given existing network infrastructures? Is your country effectively converging your wireless and wireline worlds for better ubiquitous access?

**Answer:** Multi Protocol Label Switching (MPLS) with optical transmission in core networks is the most cost effective path. For access technologies the proposed options included GPRS/EDGE, HSPA, WCDMA, CDMA 1X, CDMA 1X EVDO, WiMAX, WiFi as well as (A)DSL.

Most countries confirmed that their wireless - wireline convergence is well under way. The technology neutral licensing regime adopted in some countries is helping in this, but on the other hand the massive investments done in the fixed network make the progress slow in some cases.

**Question:** What do you think are the enabling access technologies of the future Digital Cities in your country? What kinds of NGN applications, do you think will succeed in your country? What kinds of devices will consumers use to access NGN services and applications?

**Answer:** The access technology will mainly be wireless, but in some countries fixed network will play an important role as well, because it is so widely available. The technologies to be utilized on wireless side are GSM EDGE/GPRS, WiMAX, WiFi and CDMA. On the fixed side (A)DSL, FTTH (fibre to the home) or LMDS (Local Multipoint Distribution Services, fixed broadband wireless) will be utilized. VSAT may also be used in some countries due to the size of the country.

When it comes to successful NGN applications, the overwhelming response was that they will be voice, data and multimedia. The list of services included e.g. video telephone, videoconferencing, internet, E-education, E-healthcare, E-government, E-commerce (Internet banking), VoIP, IPTV and Centrex/IP PBX.

Devices to be used are fixed line telephones, IP phones, mobile phones, computers, laptops, home TV, PDAs, specially developed devices to support triple play.

### 3.2.2 Next generation networks for development: Building the business case

**Question:** Are consumers willing to pay for Next Generation Network (NGN) services and applications? How will end users pay for services in a NGN environment? What pricing models do you think will work best for consumers who will consume everything from IPTV to VoIP to e-health services?

**Answer:** In general users are willing to pay for NGN assuming that they offer added value and QoS is good. The expectation seems to be that the cost of offering NGN services is lower than the cost of "traditional" services, so in the era of NGN users do not have to pay more even though they use more services. It is expected, that NGN services will improve user's quality of life (e.g. save time) and they are willing to pay something for that.

Prepayment is the preferred payment option. In developing economies prepayment is the easiest way for the user to control the usage of services and the service provider will not face credit losses.

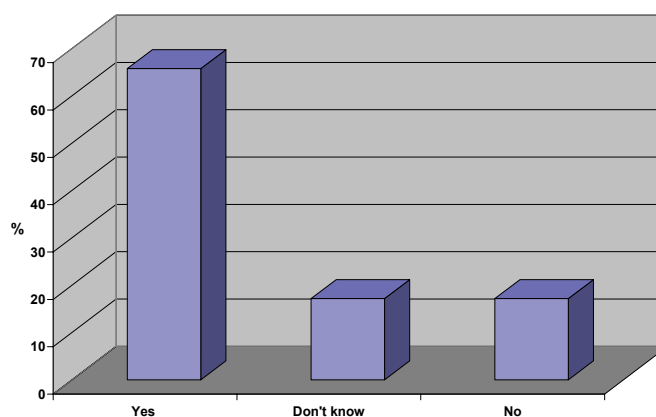
Pricing model options are flat rate, based on bandwidth, time or throughput. The preferred option among the responses was a usage based pricing model.

In several responses it was also stated that NGN services should be bundled, i.e. the more services the customer subscribes, the cheaper the cost for the service.

But as stated in one response, the market forces eventually should determine the pricing model.

**Question:** Will the separation of services from the network in NGNs lead to a proliferation of service providers as conceived? Which applications would be the most sustainable for a new entrant in this scenario?

**Answer:** The majority believes yes, but there are also contrary opinions (see figure 18). In countries where NGN is already in use (e.g. Kenya, Uganda, Sierra Leone, Egypt, Vietnam, Mongolia, Moldova), the number of service providers has increased. This is mainly because the initial investment is much less than it was when service was part of network.



**Figure 18 – Will the separation of services from the network in NGNs lead to a proliferation of service providers as conceived?**

A variety of applications were noted most sustainable for a new entrant. Among these applications were: VoIP, IPTV, IP telephony, all services in Internet today, content providing, content hosting, media applications, games, movies on demand, electronic wallet, online merchandise, MP3 download, and call centre.

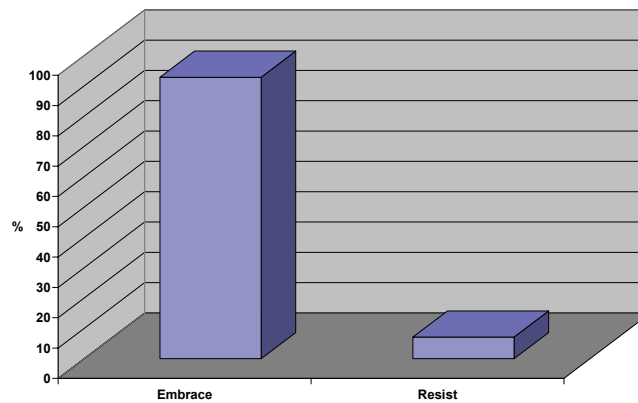
How will today's Telco's, whose business models depend on voice revenues, evolve their businesses to survive in a world of converged triple play services, including VoIP and IPTV?

**Question:** How will today's Telco's, whose business models depend on voice revenues, evolve their businesses to survive in a world of converged triple play services, including VoIP and IPTV? Will operators in your country embrace or resist mobile VoIP?

**Answer:** TelCo's need to adapt in this new situation and convergence triple play will be in their business models. TelCo's need to migrate to NGN and plan for advanced services requested by customers. They also should look at mergers with other entities to maintain their competitiveness.

Operators will embrace mobile VoIP, see figure 19.





**Figure 19 – Will operators in your country embrace or resist mobile VoIP?**

**Question:** How should tariff and interconnection regulation evolve to allow businesses to thrive? How long will it be before operators are no longer defined by the type of access technology they use?

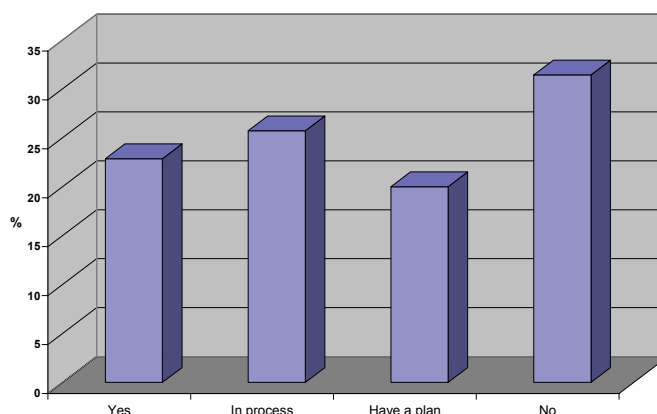
**Answer:** Tariff and Interconnection regulation should follow a cost based model. The evolution should be towards market forces to determine tariffs. Interconnection fees should be fair and reasonable to allow new entrants to enter the market. In NGN, where service and network providers are (in most cases) different, interconnection regulation plays an important role.

Most countries have or are planning to move towards technology neutral licensing regimes and even though it may take some years, operators eventually are not defined by the type of access technology they use in the future.

### 3.2.3 Next generation networks for development: The enabling environment

**Question:** Have you or are you planning to revamp licensing and the legal framework designed for the telecommunication world for the converged NGN environment in which single service networks are replaced by multi-service networks? If so, how are you doing or planning to do it? If so, how are you doing or planning to do it?

**Answer:** As can be seen in figure 20, the countries are in different phases related to the licensing and legal framework. However, it should be noted that one third haven't done anything yet. This may delay the implementation of NGN, or lead to uncontrolled situations.



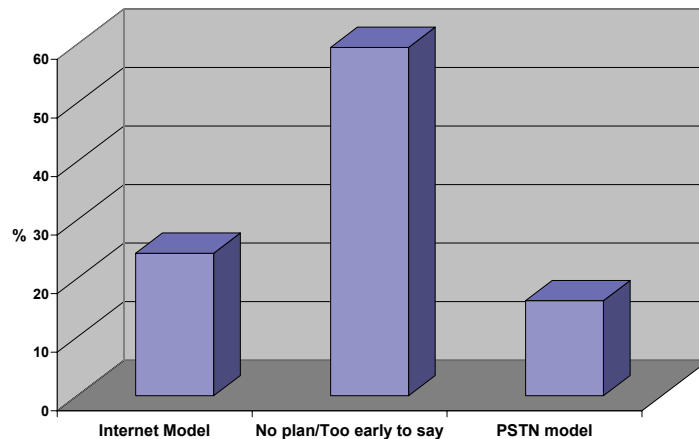
**Figure 20 – Have you or are you planning to revamp licensing and the lawful framework designed for the telecommunication world for the converged NGN environment?**

A technology neutral licensing approach seems to be the choice for many countries, the new/modified framework needs to make this possible. Furthermore, separation of network operators and services providers should be considered in the legal framework. While licensing work is ongoing, granting provisional licensing was suggested.

**Question:** *What kind of policies are you developing to foster the deployment of IP-based NGN platforms? Will regulation in this NGN world follow Internet interconnection models like peering and transit or will PSTN-like Interconnection regulatory and tariff regimes be used?*

**Answer:** *Most countries are not in the process of developing policies to foster the deployment of NGN platforms or they are only in early phases to give an answer to this question. However, in some responses it was stated that future policy should be technology neutral, encourage competition and offer transparency of services. The current broadband network development be used to support future IP-based NGN platforms.*

On whether regulation in the NGN world should follow Internet interconnection models or PSTN-like interconnection models, it was noted that such opinion is yet to be formulated in most countries. Figure 21 demonstrates the results for this question.



**Figure 21 – Will regulation in the NGN world follow Internet interconnection models like peering and transit or will PSTN-like Interconnection regulatory and tariff regimes be used?**

**Question:** *Mobile and fixed wireless technologies use radio spectrum to offer new narrowband and broadband access technologies. What changes to spectrum management will be needed to enable the growth of wireless-based NGNs and services? Will the move to IPTV free spectrum now used for analogue TV broadcasting?*

**Answer:** *The key is to have a clear spectrum policy. The spectrum management needs to be capable of accommodating new and emerging technologies in a timely manner, more spectrum should be freed for wireless services. The cost for licence (spectrum) should be reasonable (to encourage competition). It was further stated that technologies using higher frequencies should be deployed.*

It was also stated that care should be taken to avoid polluting the environment with E-field radiation.

Move to IPTV is expected to free spectrum, although in some responses a concern was raised that the move will not happen as fast as expected due to the cost of IPTV.

It should be noted that 30% of the countries did not answer to this question at all, which indicated that the issue is not yet considered in those countries.

**Question:** *What key policy changes or decisions can policy-makers and regulators in your country make now to be ready for NGN?*

**Answer:** *One of the responses was: "To make sure that necessary changes to the current policy and regulatory framework will be developed to address issues arising as a result of NGN developments and implementation issues." This summarizes well all the responses to this question.*

Some of the specific key changes or decisions highlighted in the country responses are:

- Stop licensing technologies (be technology neutral)
- Provide uniform legal frameworks that covers the convergence of telecommunications, media and information technologies
- Allow free competition/encourage competition/liberalize the telecom market
- Ensure that interconnection regulations are fair and reasonable
- Ensure regulatory independence/have independent and flexible policy-makers
- Have a good training policy for regulatory personnel to handle NGN issues.
- Develop national legal frameworks to facilitate investment
- Increase competition by offering service diversity and good quality at reasonable cost
- Developed countries should assist developing countries to implement NGNs
- Allocate adequate bandwidth for NGN services

## **Assessment of Survey Section 2 results**

Majority (54%) of the countries responding to the questionnaire are deploying the initial step for NGN . The remaining 46% raise a valid concern as they do not yet have a plan. There is an urgent need to help them to start planning for NGN. The biggest challenges to them seem to be in the areas of financing, lack of knowledge, access technology in rural areas and legal frameworks.

IP-based NGN networks are expected to be different in developing countries as they have very little or no legacy fixed network and they can go directly to wireless access. Based on the country responses, lack of investments and human resources is expected to affect deployment of NGN deployment in developing countries .

Countries should adopt a technology neutral licensing regime as the choice for core and access technologies. This would depend on the situation in each country and the best option would be to leave the decision to network and service providers to select the most cost effective solution for their purposes.

The access technology will be mainly wireless, although in some countries fixed networks will play an important role as well because it is so widely available.

As for successful NGN applications, the list of services included e.g. video telephone, videoconferencing, internet, E-education, E-healthcare, E-government, E-commerce (Internet banking), VoIP, IPTV, and Centrex/IP PBX. With expectations that many services currently requiring physical movement of persons to accomplish the task, will in future be done in E-format - with NGN based services.

Devices to be used are fixed line telephones, IP phones, mobile phones, computers/laptops, home TV, PDAs and specially developed devices to support triple play services. In developing countries the cost device will play an important role in the deployment of NGNs and care must be taken to ensure availability of affordable devices to support future services.

People are willing to pay for NGN services if they find them useful/attractive. However, it is expected that the cost of services in the NGN era will be significantly lower than today and the total amount paid for services will not be higher than today. Prepayment will remain the preferred payment option as it is the easiest way for the user to control usage costs of services and for the service provider to avoid credit losses. A usage based pricing model similar to the one used for NGN services is expected to be adopted.

NGN will encourage new entrants to provide services as it will be easier and it will require less investment to offer services and applications than today.

TelCo's need to adapt the new business model as their current voice based revenues are expected to shrink further. They need to migrate to NGN and plan for advanced services demanded by the customers.

Licensing and legal framework should be modified for the converged NGN environment. Interconnection regulation will play an important role. Interconnection fees should be fair and reasonable to allow new entrants to enter the market. A third of the countries have not yet done anything for their licensing and legal frameworks, and that may cause delays/bottleneck in implementing NGN.

As wireless access will be widely utilized in NGNs, spectrum management needs to be capable of accommodating new and emerging technologies in a timely manner. More spectrum should be freed for wireless services. The cost for licence (spectrum) should be reasonable (to encourage competition).

### 3.3 Conclusions

The survey questions were very general and tried to cover all aspects of NGN. Some countries had difficulties in responding to the questions. In order to have a clear overview of the situation, simpler and more straightforward questions would have been more beneficial.

Based on the survey results, countries seem to be in different phases on NGN issues. Some countries are well on their way in implementing NGNs, while a large number of countries have not yet done anything. A lot of effort should be put in helping the countries to start NGN planning. It will require resources and investments, but if not done, widening of the digital divide will be the consequence.

Lack of knowledge is an issue of great concern. Based on the responses from countries, it was evident that many issues related to NGN are unclear and countries need training to be familiar with NGN. It is only when they are familiar with the issues that they will have the capability to do the required modifications to their legal, licensing and policy frameworks. Only then the controlled NGN deployment is possible.

NGN services are expected to help developing countries to improve the economic environment, offer access to a larger number of the population and improve their quality of life. The survey results indicate that this could be achieved, but a lot of support in terms of resources, both financial and expertise is needed to make it happen.

## Attachment 1

Responses to the survey from following countries were received and included in the analysis:

Afghanistan	Georgia	Mongolia
Republic of Armenia	Ghana	Nicaragua
Azerbaijan Republic	Guinea	Philippines
Kingdom of Bhutan	Guyana	Samoa
Cambodia	Republic of Haiti	Sao Tome e Principe
Cameroon	India	Sierra Leone
Central African Republic	Indonesia	Swaziland
China	Kenya	Togo
Comoros	Lao P.D.R	Uganda
Cote D'Ivoire	Lesotho	Ukraine
Cuba	Liberia	Vanuatu
Democratic Republic Of Congo	Malawi	Vietnam
Egypt	Moldova	Zimbabwe









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