**Telecom Regulatory Authority of India**

**Consultation Paper**

**On**

**REVENUE SHARING ARRANGEMENT FOR INTELLIGENT NETWORK SERVICES**

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**Mahanagar Door Sanchar Bhawan**
**Jawahar Lal Nehru Marg**
**New Delhi-110002**
**Web-site: www.trai.gov.in**

# Preface

Intelligent Networks give service providers the capability of developing and controlling services more efficiently. Prior to the issue of Intelligent Network (IN) Services Regulations in November 2006, the service providers who owned IN service platforms restricted access to these services to their own subscribers. The main thrust of the regulatory intervention was to increase competition and to ensure that subscribers of all access service providers are able to access these services. Following the issue these regulations, most of the service providers executed the required agreements for free phone services.

In August 2008, TRAI recommended to the Department of Telecommunications that long distance service providers may be allowed to access customers through calling cards. This was primarily meant to allow subscribers to get choice of carrier for long distance calls while keeping their access service provider same. These recommendations were accepted in August, 2009 and the licence conditions were appropriately modified.

It has been noted that despite being allowed by the regulation to do so, some of the service providers could not arrive at mutually agreed revenue share arrangement. Additionally, TRAI has also received request from some service providers to prescribe interconnection and commercial arrangement between service providers for calling card services. This consultation paper aims to seek the views of stakeholders on these and other related issues to assist TRAI in arriving at a framework by which interconnecting service providers may be fairly compensated for IN services.

Written comments may be furnished to Pr. Advisor (I&FN), TRAI by 30th November, 2010. Counter-comments may be sent by 10th December, 2010. The comments and counter-comments may preferably be sent by email at dafn@trai.gov.in or in case of any difficulty these may be sent at trai.gov@gmail.com. The fax numbers of TRAI is 011-23220209. Comments and counter-comments will be posed on TRAI's website on receipt.

Dr. J.S. Sarma
Chairman, TRAI

# CONTENTS

# Chapter I
# Introduction to Intelligent Network Services

## A- Intelligent Network

1.1     An intelligent network (IN) is a service-independent telecommunications network. Intelligence is taken out of the switch and placed in computer nodes that may be placed anywhere in the network. This separation provides the network operator with the means to develop and control services more efficiently. New capabilities can be rapidly introduced into the network. Once introduced, services are easily customized to meet individual customer's needs.

1.2     An Intelligent Network is able to separate the specification, creation, and control of telephony services from physical switching networks. The key benefit of this capability is that exchange carriers will be able to rapidly engineer new revenue-producing services, in response to market opportunities, without having to rely on lengthy cycles for implementing them entirely on switching fabric. Service providers are able to define their own services independent of service specific developments by the equipment vendor.

1.3     Intelligent Network (IN) services add value to voice and data bearer service through number translation, time based and location based routing, alternate billing and private numbering plan features.

## B- IN Architecture

1.4     An IN infrastructure typically involves service logic on network platforms, CCS7 signalling system and IN-capable software in the network switch. With this infrastructure in place, service providers, end users and third parties can, in theory, create and modify services independently of switch vendors. These features are provided with the help of entities called Service Switching Point
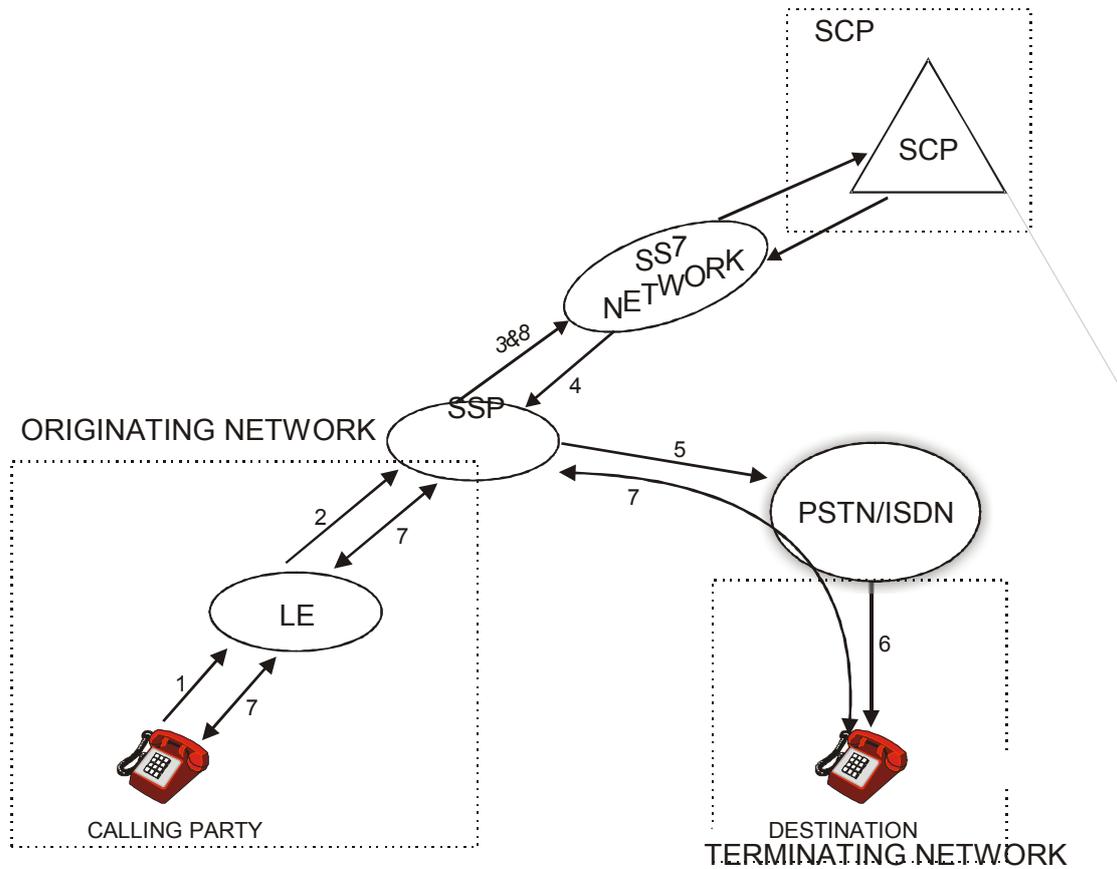
(SCP), Service Control Point (SCP), Intelligent Peripheral (IP), Service Creation Environment (SCE) and Service Management Point (SMP).

(i)     SSP (Service Switching Point) is a physical entity in the Intelligent Network that provides the switching functionality. In addition to providing users with access to the network (if the SSP functionality is built in the local exchange) and performing any necessary switching functionality, the SSP allows access to the set of IN capabilities. The SSP contains detection capability to detect requests for IN services. It also contains capabilities to communicate with SCP and to respond to instructions from the other PEs. Functionally, an SSP contains a Call Control Function, a Service Switching Function, and, if the SSP is a local exchange, a Call Control Agent Function.

(ii)    SCP(Service Control Point) contains Service Control Function (SCF) and optionally also Service Data Function (SDF). The SCF is implemented in Service Logic Programs (SLP). The SCP is connected to SSPs by a signalling network. Multiple SCPs may contain the same SLPs and data to improve service reliability and to facilitate load sharing between SCPs. In case of external Service Data Point (SDP) the SCF can access data through a signalling network. The SDP may be in the same network as the SCP, or in another network. The SCP can be connected to SSPs, and optionally to IPs, through the signalling network. These functions include message discrimination, distribution, routing, and network management and testing. SCPs endowed with query-response protocols using which the underlying bearer network entities such as Fixed network switches, Mobile Switching Centers(MSC) and Media Gateways(MG) communicate with it.

(iii)   IP(Intelligent Peripheral) provides resources such as customized and concatenated voice announcements, voice recognition, and Dual Tone Multi-Frequencies (DTMF) digit collection, and contains switching matrix to connect users to these resources. The IP supports flexible

information interactions between a user and the network. Functionally, the IP contains the Special Resource Function. The IP may directly connect to one or more SSPs, and/or may connect to the signalling network

(iv)    The Service Management Point (SMP) performs service management control, service provision control, and service deployment control. Examples of functions it can perform are database administration, network surveillance and testing, network traffic management, and network data collection. Functionally, the SMP contains the Service Management Function and, optionally, the Service Management Access Function and the Service Creation Environment Function. The SMP can access all other Physical Entities The Service Management Access Point(SMAP) provides some selected users, such as service managers and customers, with access to the SMP. One possible use of the SMAP is to provide one single point of access for a given user to several SMPs. The SMAP functionally contains a Service Management Access Function. The SMAP directly interacts with the SMP.

**Figure 1:  The IN Conceptual Model and Physical Architecture**

1.5     The rest of the bearer network entities are independent of the IN nodes. This independence lets the service providers to utilize the same IN infrastructure for a variety of networks viz. Fixed, WLL-F, WLL-M, Cellular Mobile, VoIP and IP. Therefore, Intelligent Networks provide twin advantages of new revenue streams and investment protection. The approach of separating feature handling from simple call handling takes care of the major shortcomings of conventional switch-based feature handling cited above.

1.6     Figure 2 depicts the role played by various IN nodes in handling a call involving an IN service (Freephone) call.

1   Service user dials the Freephone Number e.g.: 1600331234
2   Call gets routed to the SSP through the PSTN/ ISDN
3   SSP launches query to the SCP
4   SCP responds with the translated destination number e.g.: 011-701 8925
5&6   SSP routes the call through the PSTN/ISDN to the destination
7   Conversation takes place and then the call is disconnected

**8** *SSP sends call details and charging information to the SCP for logging,or*
*alternatively in some models the charging information is generated by the SCP*
*itself.*

**Figure. 2  FREEPHONE CALL FLOW**

## C-  Interfaces

1.7   The IN functional and physical architecture and the interfaces between physical nodes are specified by the ITU-T in Q.12xx series recommendations. In the Physical Plane Architecture several standardized interfaces are stated. These interfaces include: SCP-SSP,  IP-SSP, SN-SSP, SCP-IP, AD-IP, and SCP-SDP.

The proposed underlying protocols platform for the interface between an SCP and an SSP is Transaction Capabilities Application Part (TCAP) on Signalling Connection Control Part (SCCP)/Message Transfer Part (MTP) of SS7. ETSI defines the SSP-SCP interface protocol as INAP. The Interface between IP and SSP is used for communications between an IP and an SSP as well as for communication between an IP and an SCP which is being relayed through an SSP. The proposed underlying protocol platform for the interface between an IP and an SSP is ISDN Basic Rate Interface (BRI), Primary Rate Interface (PRI) (or both), or SS7. The underlying protocol platform for an interface between an SCP and an IP is TCAP on SCCP/MTP of the SS7 protocol stack. Q1201

1.8     The SCP, SCEP, SMP and IP for the Indian scenario should be kept generic, in the sense that these can be utilized for any type of underlying network, such as PSTN/ ISDN and PLMN, and the service provider could utilize the IN infrastructure for dissimilar networks. At the same time, all efforts should be attempted to ensure that all existing IN architecture network elements continue to be part of multi-operator multi-service scenario architecture subject to technical compatibility and other economic considerations.

**D-  Benefits of IN Architecture**

The major benefits of IN architecture are briefly discussed below:

**1.      Rapid Service Deployment**

1.9     Most businesses today require faster response from their suppliers, including telecommunication operators. By separating the service logic from the underlying switch call processing software, IN enables operator to provide new services much more rapidly.

**2.      Reduced Deployment Risk**

1.10    The risk associated with deployment of new services in the PSTN switches was substantial mainly because of proprietary software and non-availability of third-party applications. Major investments have to be made in developing the

software for services & then deploying them in all of the switches. With IN services can be developed independent of the switches by, loaded and tested in the SCPs and accessed by multiple SSPs located anywhere in the network. Services once developed can be rolled out to other SCP as well. The IN platforms usually allow development in modular software blocks which can be reused to cobble together new services thus reducing the time to market.

### 3.    Cost Reduction

1.11    Because IN services were designed from the beginning to be reusable, many new services can be implemented by building on or modifying an existing service. Reusability reduces the overall cost of developing services. Also, when the switching network architecture changes the same IN can be used without the necessity of redeveloping any of the services.

### 4.    Customization

1.12    In telephone switch based service deployment the time frame for development and deployment of software was long which prevented further modifications and refinements of deployed services. With IN, the process of modifying the service or customization of service for a specific customer is much less expensive and time consuming

### 5.    Service Creation and Management

1.13    The other major strengths of the IN architecture lie in the manner in which the services are created and managed. IN systems include Service Development Platform which allow development of services using Service Independent Building Blocks (SIBs). These SIBs can be combined in different ways to create new services. Administration of the IN is done from the Service Management Point (SMP) to which a number of local and remote access terminals are connected. SMP manages the subscription data, call logs and billing logs, and provides man machine interface.

**E - IN Services as defined in TEC's Generic Requirements (GRs)**

1.14    The IN services as defined in the TEC GR (No. G/INS-01/03 of June 2003) are summarized in Table 1.

**Table 1 : IN services Defined in TEC GR's**

| IN Service | Paying Party | Old Levels | Level as per National Number Plan 2003 | Network Charge | Information Charge | Rental/ Revenue Share |
|---|---|---|---|---|---|---|
| Freephone (National)[2] | Called | 1-600 | 1-800 | Yes | No | Rental |
| Universal Access (Local)[3] | Calling | 1-901 | 1-860 | Yes | No | No |
| Universal Access (Long Distance)[3] | Calling & Called | 0-901 | 0-901 | Yes | No | Rental |
| Virtual Private Networks (VPN) | Group ID | 1-901 | 1-801 | Yes | No | Rental according to VPN size. |
| Tele-voting (Chargeable to caller) | Calling | 1-902 | 1-803 | Yes | No | Yes. (subscriber) |
| Tele-voting (not chargeable to caller) | Caller | 1-603 | 1-861 | Yes | No | Yes. (subscriber) |
| Prepaid calling (VCC, ACC, CCC) | Card | 1-602 (VCC) 1-604 (ACC) | 1-802 (VCC) 1-804 (ACC) | Yes | No No | No No |
| Premium Rate[4] | Calling | 0-900 | 0-900 | Yes | Yes | Yes |
| Universal Personal Telecommunication[5] | Calling & Called | 0-902 | 0-902 | Yes | No | Yes |

Note 1:    Local Number Portability (LNP) service is another issue under consideration of TRAI and is therefore, kept out of scope for the purpose of this report.

Note 2 :    International Freephone is defined in the National Numbering Plan of year 2003 with code '000800'.

Note 3:    Diversion to non-home location is permitted only for Universal Access Number – Long Distance and the called part pays the home-to-visited location charge.

Note 4:    Premium Rate (PRM) service is permitted only from phones with NSD access.

Note 5:    For forwarded calls, the called party pays the home-to-visited location charge.

1.15    Any of the above services can be given by fixed or mobile service providers. NLD and ILD operators have recently been permitted to provide national and international long distance service respectively through prepaid calling cards. Of the services listed in the table, it is believed that prepaid calling services are the most popular, followed by free phone, premium rate and universal access number. Prepaid calling services are popular as they help control expense on such calls and allow subscribers to call long distance even from

phones not having STD/ISD facilities. Subscribers are also relieved on billing and misuse problems.

1.16    IN services should be easily accessible to all the users. Any subscriber of any access provider should be able to access the IN services provided by any service provider from anywhere in the access provider's network.

# Chapter II
# Regulatory approaches so far

2.1    Thrust of regulatory initiatives in the area of Intelligent Network services has been increasing competition and ensuring availability of services to the customers. Before the issue of IN regulations the service providers' had created islands IN facilities where only their own subscribers could access services. If such a situation is allowed to persist then toll-free numbers of institutions like hospitals would be available only to the service provider owning the platform. Hospitals and other such agencies would be forced to obtain such facilities from all service providers, a very impractical situation. In contrast, in India prior to issue of IN services Regulation the subscribers were able to access the IN platform of their own Access Service Provider only.

2.2    To further the objectives explained in preceding paragraph, TRAI issued Intelligent Network Services in Multi Operator Multi Service Scenario Regulations, 2006.   These regulations paved the way for improving the availability of modern telecommunication services across the country.

2.3    The   IN   regulations   require   every   service   provider   to   enter   into arrangements/agreements with other service provider within 90 days from the date of issue of these regulations for enabling the service provider to allow its subscribers to access IN services and these arrangements or agreements would have to come into force within 30 days from the date of signing. The regulations envisaged quick implementation of at least free phone service and virtual calling card services.

2.4    Some of the service providers requested TRAI to extend the time for entering into agreements. Keeping in view the complexity of implementation of Intelligent Network services, extension was granted by TRAI.   Persistent follow-up by TRAI ensured that most of service providers concluded agreements for free phone services and some even did it for universal access (local) and universal access (long distance services).

2.5    The service providers who failed to successfully negotiate terms and conditions of the agreements requested TRAI to invoke the provisions of sub-regulation (8) of regulation 10 which vest power with the TRAI to specify interconnection arrangement in case of service providers fail to enter into arrangement or agreement within the stipulated time.

2.6    The Authority examined all the IN agreements filed by service providers and noted that the service providers had agreed to extend the access of their IN based free phone services on already existing Point of Interconnection(POI) established according to the existing licence and regulatory requirements and, therefore, there was no disagreement on this count.

2.7    It was noted that the main issue was with regard to access charges paid to the originating access provider by the telecom service provider who owned the IN subscribers. IN service like free-phone service, is different from normal telephone services as the revenue accrues to the IN service provider and not to the access service provider of the subscriber who is making the free-phone call. For success of any such agreement it is necessary to ensure fair distribution of the revenue collected among the networks involved. TRAI decided to specify the access charges to be paid to the originating access provider by the telecom service provider who is providing free phone services so that the remaining agreements could be concluded.

2.8    Taking into account various aspects of matter and the charges that had been most commonly agreed  by the service providers, the TRAI vide its decision dated 05.12.2007 prescribed 52 paise as a access charge to be paid to the originating service provider by the telecom service provider who is providing IN based services and also directed all service providers to enter into agreement in accordance with the framework suggested in the decision.

2.9    After repeated follow up and direction to MTNL, MTNL could not enter into agreement with some of the access providers.  A show cause notice was also issued to MTNL for non-compliance of IN regulations.  MTNL preferred to file

an appeal before Hon'ble TDSAT against the show cause notice which was later withdrawn by MTNL paving way for further discussions.

2.10 During the discussions MTNL argued that for standalone operators, like MTNL, who operate in Delhi and Mumbai paying 52 paise per minute as an originating access charge to originating service providers and additional carriage charge to the NLDO would make the services unviable and result in losses to the MTNL. They further stated that for all India integrated operators it may be easy to take call anywhere and bring to the location of their IN platform. MTNL suggested that access provider should handover the call to MTNL in Delhi or Mumbai. MTNL pointed out that in view of downward revision of the domestic termination charge it may not be out of place to review of 52 paise per minute originating access charge.

2.11 TRAI had also been exploring ways to implement carrier selection for long distance calls. After consultations in May 2008, TRAI sent recommendations on "Provision of Calling Cards by Long Distance Operators" to the DOT on 20.8.2008. TRAI had recommended that License conditions of the NLD and ILD license may be amended to allow NLDOs and ILDOs to have direct access to consumers, through calling cards for provision of national and international voice telephony services, respectively. These recommendations were accepted by the DOT in August 2009 and licence conditions were appropriately modified.

2.12 Subsequent to acceptance of TRAI's recommendation by DOT and simultaneous resultant amendment in the related clauses of the NLD and ILD Licences agreement, NLDOs and ILDO have now become eligible to issue calling cards for national and international calls respectively.

2.13 It was noted that sub regulations (2), (4) and (6) of Regulations 10 of the IN Regulations give the provisions relating to time period of entering into agreement and submission of the same to the Authority. However there was no specific time frame in the IN regulations for the service providers who become eligible to provide IN services subsequent to the date of issue of IN regulations.

2.14 Amendment to the IN regulations was therefore considered necessary so that Access providers can enter into agreement with all telecom service providers who has started IN based services or would start IN based services at a later date in a time bound manner in the consumer interest. TRAI has already issued draft amendment for consultation with service providers.

# Chapter III
## Proposals for various arrangements

3.1 In case of the normal calls the retail tariff is decided by the access provider who collects revenue for all services offered to its subscribers. The access provider then compensates the other service providers like long distance service provider for carriage of call or the access provider in whose network the call is terminated for use of their network. However, in case of Intelligent Network based services, retail tariff to the consumers are offered by the telecom service provider who is providing IN based services and the revenue is collected by this provider.

3.2 The IN service provider, who has invested in the IN platform and has taken initiative to offer new services, would like not only recover his cost but would also expect adequate profit margin for the initiative he has taken. The access provider owns the customer and allows the customer to use his network for IN services provided by another party. Both the service providers would try to maximise their revenue share on such calls. This becomes even more apparent in case of services of long distance calls where the access provider earlier had control over which NLD/ILD would carry the call and could negotiate charges beneficial to them. With the long distance operators being permitted to access subscribers directly through virtual calling cards the access providers would have to forego any revenue they would have been making on this count. Regulator may intervene by specifying some revenue sharing arrangement to ensure fair distribution of revenue.

3.3 In the IN Regulation dated 27.11.2006 the TRAI has left open the exact implementation of architecture and revenue share arrangement to mutual negotiations. The access and IN service providers have been allowed to mutually agree terms and conditions of their agreements. However, to create certainty in the market TRAI mandated that every arrangement or agreement should be entered within 90 days from the date of commencement of the IN Regulation for providing Intelligent Network services to the subscribers of other telecom service providers.

3.4 In case of free phone services provided by MTNL, mutual agreement on charges could not be arrived at with other access providers who are operating in service areas other than Delhi and Mumbai. Similarly, no agreement has been filed for the calling card services by any of the service provider even after a lapse of around one year permission being granted to NLD and ILD operators to access subscribers through calling cards. In fact one of the service provider has requested TRAI to prescribe interconnection and commercial arrangement between service providers for calling card services.

3.5 IN platforms are used for multiple purposes and dimensioning of the IN platforms are done by the service providers according to their present requirements and projections. Therefore, it may be difficult to estimate the cost incurred by IN service provider on the IN platform for specific services. Charging, billing and sharing of revenue in case of IN services depends on the service feature and, therefore, sharing of revenue for resources used for IN services could be a complex issue. Another facet is the perceived value of many of the IN services to the customer. Where services are more valuable to the customers access providers may demand higher share than what would be justified according to the work done principle.

3.6 In case of the virtual calling card, the termination charge already prescribed by TRAI for voice calls would be applicable and if IN service provider is required to carry call by itself then the only charge that needs to be determined is the charge paid to originating access provider. In case the IN service provider, the originating access provider and the carriage service provider are different entities then both origination and carriage charges would need to be determined in such a way that the residual is the fair share for the IN service provider. These charges could be fixed as a percentage of the revenue for each IN call or could be fixed on some basis.

3.7 In case of other services like premium rate service, tele-voting etc. tariffs are decided by the IN service providers and revenue is collected by the access provider from the consumer on behalf of IN service provider with deducting fair

revenue share as mutually agreed between the IN service provider and the originating access provider. For these services the perceived value of the service to the consumer could be high and may vary from service to service. Since these services could not be the service of first necessity to the consumers, therefore, one may argue that revenue sharing arrangement for them may be left to mutual negotiations. .

3.8     On the other hand, voice services through virtual calling card are essential for giving choice of long distance service provider to the consumers creating competition in this segment. TRAI may, therefore, have a role here in case mutual negotiations fail.

3.9     Similarly, free phone service has become one of the important utility services for the consumers and, therefore it is the responsibility of the regulator to ensure that consumers of all access providers are able to access these services.  In this case when IN service provider is present only in one or two service area and also does not have its NLD network then he would expect that the access provider would handover the call at the destination service area.  If the IN service provider is an  integrated operator and has a vast NLD network then he may like to pick the call from the originating access service area and would like to carry it on his own NLD network.  Therefore, there may be  need to specify charges for fair revenue share for both the cases so that  IN service provider are given flexibility to either pick up the call from the originating service area or at the destination service area.

3.10   Through this consultation paper the TRAI aims to involve all the stakeholders to deliberate on the complex issue of sharing of revenue from IN based services among the interconnecting service providers and assist TRAI in arriving at an arrangement by which work done of interconnecting service providers may be compensated.

# Chapter IV
## Issues for the consultation

1. **Assuming that the first preference in deciding revenue share among service providers involved in IN calls would be to mutual negotiations, what would be the most suitable method in case mutual negotiations fail to conclude within the stipulated time frame:**

   (a) **A predetermined percentage of revenue share out of the total accruals to the service providers involved in completion of IN calls.**

   (b) **Fixed origination, termination, carriage and other charges like usage of IN platform.**

2. **Should TRAI only prescribe charges for virtual calling card and free phone services or for other IN based services as well?**

3. **If the revenue share option is considered better then what should be the share of each interconnecting operator?  Please support your answer with detailed explanation and calculations.**

4. **If fixed interconnection usage charges are considered better for IN services then what methodology should be followed to estimate these charges?**

5. **In case of the free phone services should the originating access provider handover the call at the destination service area or the IN service provider should be required to pick up this call from the originating service area.**

# List of Acronyms

| Acronym | Expansion |
|---------|-----------|
| ACC | Account Card Calling |
| BRI | Basic Rate Interface |
| CCAF | Call Control Agent Function |
| CCF | Call Control Function |
| CCS7 | Common Channel Signalling Seven |
| DoT | Department of Telecommunication |
| DTMF | Dual Tone Multi-Frequencies |
| GRs | Generic Requirements |
| ILD | International Long Distance |
| ILDO | International Long Distance Operator |
| IN | Intelligent Network |
| IP | Internet Protocol |
| IP/SN | Intelligent peripheral/ Service Node |
| ISD | International Subscriber Dialling |
| ISDN | Intelligent Services Digital Network |
| ITU | Internet Telecommunication Union |
| LE | Local Exchange |
| LNP | Local Number Portability |
| MTNL | Mahanagar Telephone Nigam Limited |
| MSC | Mobile Switching Centres |
| MTP | Message Transfer Part |
| NLD | National Long Distance |
| NLDO | National Long Distance Operator |
| PLMN | Public Land Mobile Network |
| POI | Point of Interconnection |
| PRI | Primary Rate Interface |
| PSTN | Public Switch Telephone Network |
| SCCP | Signalling Connection Control Part |
| SCE | Service Creation Environment |
| SCF | Service Control Function |
| SCP | Service Control Point |
| SDF | Service Data Function |
| SDP | Service Data Point |
| SIB | Service Independent Building Blocks |
| SMAF | Service Creation Environment Function |
| SMAP | Service Management Access Point |

| SMF | Service Management Function |
|---|---|
| SMP | Service Management Point |
| SMS | Service Management System |
| SRF | Special Resource Function |
| SS7 | Signalling System Seven |
| SSF | Service Switching Function |
| SSP | Service Switching Point |
| STD | Subscriber Trunk Dialling |
| TCAP | Transaction Capabilities Application Part |
| TDSAT | Telecom Disputes Settlement & Appellate Tribunal |
| TEC | Telecommunication Engineering Centre |
| TRAI | Telecom Regulatory Authority of India |
| VCC | Virtual Calling Card |
| VOIP | Voice Over Internet Protocol |
| VPN | Virtual Private Network |
| WLL-F | Wireless in Local Loop-Fixed |
| WLL-M | Wireless in Local Loop-Mobile |