

Annex - C

REFERENCE INTERCONNECT OFFER

GUIDELINES

Dated 12 July 2002

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1. INTRODUCTION

Interconnection agreements are required to be established between operators for interconnection of their networks. These would enable smooth operation of telecommunication services in India. Such agreements need to be entered into between all types of operators such as basic, cellular mobile, national and international long-distance operators and also the incumbent who provides a combination of these services.

To assist operators in arriving at fair agreements, it is customary for the players with significant market power to publish a Reference Interconnection Offer. After the RIO has been accepted by the Interconnection Seeker, a mutually agreed Agreement shall be entered into, within the framework of the RIO.

Operators are not required to obtain prior permission for entering into Interconnect Agreements, but these have to be registered with the Authority in accordance with the Regulations. The RIOs, however, require the prior approval of the Authority before they are published. Operators who do not have published RIOs may use the clauses of the Model RIO for their Interconnect Agreements, after appropriate legal and commercial scrutiny.

The RIO attached to these guidelines is of a universal type that could be established between any two service providers, for the interconnection of their networks. The types of networks would be defined in the Interconnect Agreement. The agreement may be modified, to suit the specific type of network and the special requirement of the two parties.

The RIO is divided into two parts, the main clauses and the Schedules and Annexes. The main clauses represent the generally stable part of the agreement. The parameters that may vary with time or type of network are placed in the schedules and Annexes. This means that the main agreement need not be changed every time a variable parameter is changed. The corresponding schedule or annexure may be changed as required. This makes the agreements more compact.

2. PREAMBLE

The Preamble introduces the parties entering into the Agreement. References are to be made to their Licenses and the Services for which the Agreement is being entered into. In case BSNL, or any party operating directly under the Telegraph Act, is involved, the separate wording shown as an alternative in the clause relating to Party A, should be used.

3. ARTICLE 1

3.1 Scope

Once interconnection is achieved, the customer's interests demand that there should be no unilateral discontinuance of service. The term "uninterrupted" is used in this sense and is dealt with in detail in the termination clauses. The Regulations and Directions refer to the relevant sections of the TRAI Act.

3.2 Definition of Services

Clause 1.2 identifies the two networks that are being interconnected and lists the schedules to the Agreement. These schedules contain important parts of the agreement relating to charging and technical aspects relating to each type of service. Additional schedules may be specified if required. Only those schedules that are relevant to the agreement should be included. These schedules may be altered by mutual agreement.

3.3 Registration and Commencement

Interconnect Agreements shall be registered in accordance with the Regulations. Clause 1.3 indicates the commencement date (effective date) and the duration. If the Agreement is of indefinite duration this may be specified in this clause

3.4 Definition of Terms

Definitions given in various Acts and Regulations have been reproduced here. A few definitions specifically relevant to the RIO have also been included. In due course the Authority will publish a consolidated list of definitions.

4. INTERCONNECTION PRINCIPLES

4.1 Levels of Interconnection

The Points of Interconnection specified in TRAI Determinations and Directions are given in the following tables. Interconnection is required to be established within 90 days under normal conditions. The actual details of interconnection should be worked out in the Coordination Committee set up under the Agreement.

4.2 Interconnection between Fixed Network (BSOs, NLD/ILD)

As per existing license conditions NLDOs are required to establish switching and transmission facilities at LDCCs and may have POP at SDCCs and have to carry inter-circle traffic offered at these centres. An NLDO may also carry intra-circle traffic by mutual consent with the BSOs. The ILDOs may have switches/ POP at Level 1 (Primary) Centres and are authorised to carry only International Traffic.

Based on the interconnection principles specified in the previous paragraph, the possible types of interconnections are shown in the following tables.

Parenting of a dependent Remote Switching Module [RSM] located in a SDCA other than where the Main Switching Module is located may also be permitted, provided that the Operator follows the National Numbering and Charging Plan in all respects.

4.3 Sharing of Interconnecting facility:

More than one service provider may share interconnection infrastructure like transmission medium such as OFC and equipment for building up leased circuits for different operators, subject to the terms and conditions of the agreement under which such infrastructure has been provided.

4.4 Sharing of resources of interconnection seeker with others:

Operators could also share with the interconnection provider, resources of interconnection seeker, up to the POI by mutual agreement.

PSTN Interconnections

Table 1.1 - PSTN to PSTN (Out-going Traffic)

Type of Call	POI	Remarks
Local	At SDCC Tandem or Local Exchange level situated in the same SDCA as per mutual agreement.	BSO- BSO
Intra-Circle Long Distance (Note 2)	(i) Terminating SDCC / LDCC (ii) Originating SDCC / LDCC, if BSO has no POI at the terminating end.	BSO- BSO (Far-end) BSO-BSO (Near-end)
Inter-Circle	BSO to hand over originating traffic at the SDCC in the same SDCA in which it has originated or by mutual agreement as per licence terms and conditions at the LDCC of originating LDCA.	BSO to NLDO (Near-end)
International	BSO to hand over originating traffic at the SDCC in the same SDCA in which it has originated or by mutual agreement as per licence terms and conditions at the LDCC of originating LDCA. NLDO to hand over international traffic at the Gateway Switch of ILDO To the gateway switch of the ILDO in case the ILD Gateway Switch and the BSO's Tandem/Transit Switch are located at the same station of level I TAX.	BSO to NLDO (Near-end) NLDO to ILDO BSO to ILDO (Near-end) for traffic of same SDCA

Table 1.2 - PSTN - PSTN (In-coming Traffic)

Type of Call	POI	Remarks
Local	Same as Table 1.1	
Intra-Circle Long distance	Same as Table 1.1	
Inter-Circle	NLDO to hand over terminating traffic by mutual agreement as per licence terms and conditions in the destination LDCA at SDCC or at LDCC POI.	NLDO to BSO
International	Level I TAX where the ILDO Gateway Switch is located. NLDO to hand over International traffic to the BSO at the terminating SDCC or by mutual agreement as per licence terms and conditions at terminating LDCC . Terminating local network at tandem/transit in case the ILD Gateway Switch and the Access Provider's Tandem/Transit Switch are located at the same station of level I TAX.	ILDO to NLDO NLDO to BSO ILDO to BSO(for traffic terminating in same SDCA)

Note 1 New National Long Distance Operator(s) can make necessary interconnection arrangements with other NLDOs, to ensure delivery of calls at places where POP is yet to be established as per their network rollout obligations.

Note 2. Intra-Circle Traffic may also be handed over to an NLDO by mutual consent

4.5 Interconnection between PLMN (Mobile) and PSTN

The following table indicates the handing over of traffic between these two types of networks.

Table 2.1 - Traffic from PLMN to PSTN

Licensed Area	POI	Remarks
A. Metros		
1. Local Call	Transit Exchange (Tandem) Local Exchange by mutual agreement	To BSO
2. Inter-circle call	Designated Level I TAX located in the Metro.	
3. International Call	Designated Level I TAX of NLDO (or) Gateway Switch of ILDO if ILDO Gateway Switch and GMSC are located at the same station of Level I TAX (Metro).	Designated by NLDO / ILDO
B. Circles		

1. Intra - Circle Call	<p>Level I TAX for both transit to other LDCAs/termination in the LDCA in which it is located.</p> <p>Level II TAX for traffic terminating in the destination LDCA, at the request of interconnection seeker. POI below TAX level may also be provided with mutual agreement for terminating traffic.</p>	To BSO
2. Inter - circle Call	<p>The traffic can be handed over at the designated Gateway Level I TAX of NLDO through any one of its Gateway MSC.</p> <p>CMTS provider cans also handover traffic to NLDOs at the POP situated in the LDCA at the location of the Gateway MSC or MSC in a Circle.</p> <p>The NLDO shall handover terminating traffic in the destination LDCA at the SDCC or by mutual agreement as per licence terms and conditions at LDCC POI.</p>	<p>To NLDO</p> <p>NLDO to BSO</p>
3. International Call	<p>The traffic can be handed over at the designated Gateway Level I TAX of NLDO through any one of its Gateway MSC.</p> <p>CMTS provider cans also handover traffic to NLDOs at the POP situated in the LDCA at the location of the Gateway MSC or MSC in a Circle.</p> <p>To the Gateway Switch of the ILDO if ILDO's Gateway Switch and the GMSC are located at the same station of level I TAX</p>	<p>To NLDO</p> <p>To ILDO</p>

Note 1 New National Long Distance Operator(s) can make necessary interconnection arrangements with other NLDOs, to ensure delivery of calls at places where POP is yet to be established as per their network rollout obligations.

Table 2.2 Traffic From PSTN to PLMN

Licensed Area	POI	Remarks
A. Metros		
1. Local Call	<p>Transit Exchange (Tandem)</p> <p>Local Exchange (by mutual agreement)</p>	To CMTS provider
2. Inter-circle call	<p>BSOs shall handover the call at the designated TAX of NLDO in the originating Metro.</p> <p>The traffic can be handed over at any one of the GMSC through a designated Level I TAX of NLDO</p> <p>NLDO can also handover traffic to CMTS provider at the POP situated in the LDCA at the location of GMSC or MSC in the Metro /</p>	<p>BSO to NLDO</p> <p>NLDO to CMTS provider</p>

	Circle .	
3. International Call (Out-going)	BSOs shall handover the call at the designated TAX of NLDO in the originating Metro	BSO to NLDO
	To the gateway switch of the ILDO in case the ILD Gateway Switch and the Access Provider's Tandem/Transit Switch are located at the same station of level I TAX (Metro).	BSO to ILDO(Near-end for traffic of same SDCA)
(In-coming)	The ILDO to handover at the Gateway MSC of the Cellular Operator if this Gateway MSC and the Gateway Switch of the ILDO are located at the same location of Level I TAX (Metro).	ILDO to CMTS provider
	The traffic can be handed over at any one of the GMSC through a designated Level I TAX of NLDO.	NLDO to CMTS provider
	NLDO can also handover traffic to CMTS provider at the POP situated in the LDCA at the location of GMSC or MSC in the Metro / Circle.	
B. Circle		
1. Intra -Circle Call	Level I TAX or Level II TAX of the originating LDCA. If no POI is available at Level II TAX then at GMSC of the CMTS provider subject to mutual agreement.	BSO to CMTS provider
2. Inter-circle call	BSO to hand over originating traffic at the SDCC in the same SDCA in which it has originated or by mutual agreement as per licence terms and conditions at the LDCC of originating LDCA.	BSO to NLDO
	The traffic can be handed over at any one of the GMSC through a designated Level I TAX of NLDO.	NLDO to CMTS provider
	NLDO can also handover traffic to CMTS provider at the POP situated in the LDCA at the location of GMSC or MSC in the Metro / Circle.	
3. International Call (Out-going)	BSO to hand over originating traffic at the SDCC in the same SDCA in which it has originated or by mutual agreement as per licence terms and conditions at the LDCC of originating LDCA.	BSO to NLDO
	NLDO to hand over International calls to the ILDO at the Gateway Switch	NLDO to ILDO
	To the gateway switch of the ILDO in case the ILD Gateway Switch and the Access Provider's Tandem/Transit Switch are located at the same station of level I TAX.	BSO to ILDO(Near-end for traffic of same SDCA)
(In-coming)	ILDO to hand over incoming International traffic to NLDO at the Gateway Switch of ILDO	ILDO to NLDO
	The traffic can be handed over at any one of	NLDO to CMTS

	<p>the GMSC through a designated Level I TAX of NLDO.</p> <p>NLDO can also handover traffic to CMTS provider at the POP situated in the LDCA at the location of GMSC or MSC in the Metro / Circle.</p> <p>The ILDO to handover at the Gateway MSC of the Cellular Operator if this Gateway MSC and the Gateway Switch of the ILDO are located at the same location of Level I TAX.</p>	<p>provider</p> <p>ILDO to CMTS provider</p>
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Note 1 New National Long Distance Operator(s) can make necessary interconnection arrangements with other NLDOs, to ensure delivery of calls at places where POP is yet to be established as per their network rollout obligations.

Note 2: Different level 1 TAXs can be designated for terminating calls from different circles, in case a circle has more than one level 1 TAX.

Arrangements at the POI

4.6

The complete definition of all classes of POI requires to be entered into Schedule 1. This should cover location, physical and electrical properties, transmission definitions, signalling, type and direction of traffic, information passing across the POI, quality of service and other significant parameters.

4.7 Network Elements

A party may supply network elements, such as accommodation in buildings and on towers, leased circuits, leased switch capacity etc. All agreed rental charges for these elements should be included in Schedule 3.

5. Interconnection Implementation

Article 3 prescribes procedures for the requisitioning of capacity for interconnection and subsequent augmentation of interconnects capacities to meet the QOS standards. The time schedules and penalties have been laid down. Interconnection will mutually benefit all parties and it is therefore hoped that commercial interests, rather than application of penalties will ensure prompt interconnection.

The article prescribes maximum periods, but the principle expected to be applied is that, as long as capacity is available, reasonable requests would be met in accordance with the requested schedule. The Coordination Committee established under the Agreement is expected to settle all matters amicably.

While the requirement of Interconnect Seeker paying for interconnection is re-emphasised, once interconnection has been established, each party should be responsible for seeing that QOS is maintained for his outgoing traffic. He shall therefore pay for additional capacity required for his outgoing traffic. The parties may, however, negotiate to equally share the costs of augmentation.

Utilisation will be determined by reference to the Erlang B traffic tables and the traffic should be measured over a reasonable period (say 3 months) before reference to the Coordination Committee for surrender or withdrawal.

6. Network Engineering

Article 4 prescribes rules for traffic and network engineering. Since interconnection establishes a route between two networks, the peak traffic on the route should be used for engineering.

Operators are encouraged to use alternative routing arrangements to increase network efficiency. Such arrangements may, however, cause overload on backbone routes at times of congestion. It is therefore desirable to engineer backbone routes with a sufficient safety margin.

7. Technical Specifications and Standards

National Standards are currently set by the Telecom Engineering Centre. These shall be followed. A typical list of standards is given below. The list of applicable standards shall be included in Schedule 4 of the Interconnect Agreement.

Where national standards do not exist, the standards prescribed by the International Telecommunication Union shall be used. In case such standards are also not available, international industry standards may be used.

Interoperability standards for VOIP are currently incomplete. Available ITU standards may be used.

SCHEDULE OF STANDARDS AND SPECIFICATIONS

Sl. No.	Item	Specification	Remarks
1	Switching Interface	G/PNI-02/01 & ITU-T E770 G/PNI-03/01	(PSTN and Mobile) (PSTN & Private basic operators)
2	Transmission Interfaces	I/DMX-01/01 Dec, 98 & ITU-T G.703/G.707 (3/96)/ G.782/G.783 G/VAN-02/01 Sept, 96	2/8/34/140/ 155 Mbps For V 5.2 interface
3	Signaling CCS 7	R/NSP/-01/01 Sept, 92 S/CCS -02/03 Jan, 2000 G/CCS-03/01 Jun, 94 G/CCS-04/01 Sept, 94	National CCS 7 Plan MTP & ISUP SCCP STP
4	Other cases	G/LLT-01/04	
5	Synchronization	G/SYN-01/01 Jun, 90 G/PNI-02/01	As per National Synchronization Plan
6	Junction Traffic	G/LLT01/04	Maximum loading =0.7E
7	Junction Testing	G/LLT01/04	
8	Higher Level Protocols	G/LLT01/04	
9	Interface with IP Networks	I/RAS-01/01 Apr. 99 I/TCP-01/01 Apr. 99	Remote Access Server TCP/IP Internet user devices
10	Electrical Safety requirements	S/SFT-01/01 May, 94	
11	Quality of telecom services	TRAI Regulations	ITU-T E 800
12	Terms and Definitions	TRAI Regulations	ITU-T B.13

8. Network Integrity

Integrity of a network refers to the ability of its systems to preserve and retain their original operational states and remain unaffected by interconnection with other networks. Integrity issues are crucial when multiple operators, service providers, and other players inter-work. They provide confidence that this inter-working will not jeopardize the correct and proper functioning of the individual networks and systems. Integrity is a broad term encompassing a variety of issues concerning system structure, functionality and behaviour. This concept has been introduced along with the basic rules.

9. Operations and Services

Apart from physical elements, operators may provide services to each other, for example billing, revenue collection, directory enquiry etc. Schedule 2 should list and describe all these services along with the agreed rates.

10. Interconnection Gateways

In a multi-operator environment the number of interconnections at a centre may be large. It is possible for operators to provide, wherever possible, interconnection through their switches for transit traffic between other operators. Charges for such services would be fixed and entered into Schedules 5. A draft Technical Facility Schedule for such Gateways is available with the TEC.

11. Billing and Inter-carrier Charging

Each operator is normally responsible for billing his own subscribers, however, the NLDOs and ILDOs have to make their own arrangements to bill customers for their services. They may either bill directly or negotiate with the Access Providers to bill and collect revenue. The agreed arrangements should be described in this paragraph and agreed procedures placed in an appropriate annexure.

Wherever call carriage involves the networks of two or more operators, the collection from the subscriber has to be then distributed on an agreed basis. The agreed basis should be entered in Schedule 6. Article 11 lays down the rules for such transactions.

Billing settlement may be on the "cascade basis". In this method each operator settles with the next operator in the chain on a bulk-billing basis. In the other method the operator collecting the revenue from the customer has to settle with each of the operators in the chain, based on the Call Data Record (CDR) containing identities of the originating, transit & terminating operators as well as charging areas. This enables computation of network usage charge based on the resources used in each network segment. This latter method is more accurate, but requires more detailed information to be collected from the system by employing CCS7 (ISUP) and sophisticated digital switching systems at gateway points. It is recommended that Operators consider adapting this method for proper interconnect billing and settlement.

12. Commercial Terms and Conditions

Article 12 lays down the commercial conditions. The cost of upgradation / modifying interconnecting networks to meet the service requirements of the service shall be met by the Party seeking interconnection. However mutually negotiated sharing arrangements for cost of upgrading / modifying interconnecting networks between the service providers shall be permitted.

Two years after the initial interconnection is established, the issue as to who bears the cost of additional resources required shall be negotiated between the service providers. The general principle followed in these negotiations is that each party should bear the incremental costs incurred for the additional ports required for meeting the QOS standards relating to its outgoing traffic to the other Party.

13. Charges for Originating, Terminating and Transit Traffic

For arriving at the usage charges (IUC) payable by one service provider to the other, based on the cost of network resources used, the following principles may be followed:

- Unbundled element costs as a basis for the usage charge applicable to Origination, Transit and Termination. This needs to be worked out on Fully Allocated current Costs (FACC) basis. Once calculated these would be advised by the TRAI as benchmarks.
- Additional items may be specified by the Authority, such as an access deficit charge to compensate the access provider, for costs the recovery of which is otherwise not provided for.

14. Fundamental Technical Plans

This is a descriptive paragraph relating to Numbering, Routing, Charging etc.

15. Coordination and Dispute Settlement

Operational problems continually arise between interconnected networks, these may be technical or relate to money matters. Before they develop into disputes it is desirable that they should be formally discussed in a coordination meeting between the two parties. A formal Coordination Committee should be established under the Agreement. This Committee will be responsible for laying down detailed procedures in the light of experience and also try to settle matters of difference. The Committee may also seek the intervention of the TRAI in matters of interpretation of Rules and Regulations. If no settlement can be reached, the parties shall be free to pursue other avenues for settlement. Article 16 relates to the Coordination Committee and Article 18 to dispute settlement.

16. Termination and Review

The Interconnection Agreement is expected to last indefinitely, but may have to be suspended or terminated under exceptional circumstances. Article 17 lays down the conditions relating to these matters. Discontinuation of services to customers, however, requires the permission of the TRAI and Licensor.