



PAKISTAN TELECOMMUNICATION AUTHORITY  
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**CONSULTATION PAPER**  
**ON**  
**ESTABLISHMENT OF INTERCONNECT CLEARING HOUSE AND**  
**INTERCONNECT EXCHANGE IN PAKISTAN TELECOM SECTOR**

*This Paper is an extension to the Consultation Paper on 'Interconnect Exchange or Interconnect Bill Clearing House' issued by the Authority on 29<sup>th</sup> December 2005 and intends to seek opinion of all stakeholders including LL operators, LDI operators, cellular mobile operators, general public etc. The stakeholders are requested to respond the specific issues raised in this Paper. This Paper does not convey, in any sense, any decision of the Authority in respect of the issues discussed in this Paper.*

*Your responses may be sent in writing or through e-mail, latest by 22<sup>nd</sup> May 2006 to Mr. Zeeshan Gul, Deputy Director (Commercial Affairs), PTA, F-5/1 Islamabad Fax: 2878133, Phone: 9225346, E-mail: [zeeshan@pta.gov.pk](mailto:zeeshan@pta.gov.pk)*

**PART I**

**1. INTRODUCTION**

(1) The Pakistan Telecommunication Authority is a body corporate established pursuant to Section 3 of the Pakistan Telecommunication (Re-organization) Act 1996, to perform the following functions:

- (i) regulate the establishment, operation and maintenance of telecommunication systems and the provision of telecommunication services in Pakistan;
- (ii) promote and protect the interest of users of telecommunication services in Pakistan; and
- (iii) promote the availability of a wide range of high quality, efficient, cost effective and competitive telecommunication services throughout Pakistan.

(2) Under clause (h) of sub-section (2) of Section 5 of the Act, the Authority is empowered to provide guidelines for, and determine, the terms of interconnection arrangements between licensees where the parties to those arrangements are unable to agree upon such terms. Moreover, Section 6 (a) of the Act require the Authority to ensure that rights of licensees are duly protected.

(3) In order to discharge the above-mentioned responsibilities and fore-sighting the growing complexities arising from multi-operator environment, the Authority has taken initiative to introduce an efficient mechanism for inter-operator connectivity, billing and settlement by issuing a Consultation Paper on '*Interconnect Exchange or Interconnect Bill Clearing House*' in December 2005. The Paper broadly discussed the concepts of Interconnect Exchange, Interconnect Clearing House and the Interconnect Bill Clearing Bureau with the objective to bring the industry at equal level of understanding before detailed practical issues could be raised for consultation.

(4) This Consultation Paper is a further extension to the above-referred Paper and highlights a number of specific issues for industry consultation relating to the establishment of Interconnect Clearing House and Interconnect Exchange in Pakistan telecom sector. Part I of this Paper provides a brief background of the subject issue along with the current status of interconnectivity among telecom operators in Pakistan. The proposed scope of services and related technical, financial and administrative arrangements for the establishment of Interconnect Clearing House and Interconnect Exchange are covered under Part II and Part III respectively.

## **2. CURRENT STATUS OF INTERCONNECTION IN PAKISTAN**

(1) The Government of Pakistan issued Telecom Deregulation Policy and Mobile Cellular Policy in July 2003 and January 2004 respectively for the liberalization of Pakistan telecom sector. This step not only shifted the monopoly structure of the sector to that of competition but also changed other dynamics considerably. Consequently, there is a significant increase in the number of

telecom service providers in Pakistan for provision of Local Loop (LL), Long Distance & International (LDI) and mobile telephony services. In order to promote fair competition in the sector, the above-mentioned Policies placed certain obligations on the incumbent operator i.e. PTCL, regarding provision of interconnection to new telecom players, including:

- (i) Preparation of all transit and tandem switches for interconnection and implementation of all needed upgrades in the transit switches to the capacity orders submitted by new entrants.
  - (ii) Preparation of 50% of local Main Switching Units (MSU) for interconnection within one year. The remainder to be done in two equal stages within the subsequent two years.
  - (iii) Enabling subscriber lines on all digital local switches to perform Indirect Access (call-by-call carrier selection) for 22 digit numbers within one year.
  - (iv) Enabling all subscriber lines to perform Indirect Access.
  - (v) Enabling all subscriber lines to perform carrier pre-selection.
  - (vi) Upgradation of all local switch software to allow automatic insertion of Access Code before the numbers dialed by customers of LDI licensees (carrier pre-selection).
  - (vii) Pending the development by PTCL of unbundled cost accounts of services that are approved by PTA, incumbent's interconnection services to be based on international benchmarks.
  - (viii) Issuance of Reference Interconnection Offer (RIO) to be used as the default interconnection offer for interconnection with PTCL.
- (2) The Authority was mindful of the fact that interconnection would play a key role in the achievement of Policy objectives and has taken various steps to ensure compliance by PTCL with the stated obligations. As a result, almost all new LL and LDI licensees have successfully established interconnectivity with PTCL under the terms of PTA approved Reference Interconnection Offer. Efforts have also been made to ensure seamless interconnectivity of new operators with

the mobile SMP operator i.e. Mobilink. Nevertheless, new operators have been facing some problems in dealing with incumbent operators regarding provision of required interconnect capacity. The Authority, therefore, had to intervene for resolution of the issue.

(3) In addition, the technical and administrative arrangements regarding interconnectivity of networks have become more complex than before. On technical side, the establishment and maintenance of interconnection with a number of operators, each providing diverse range of services, would be quite difficult. A significant amount of technical, financial and human resources have to be employed by the operators and the resources required go hand in hand with the market share i.e. dominant operator is under severe pressure to meet regulatory objective of any-to-any connectivity. The increase in the number of interconnecting operators also has a multiplier effect on the required number of point of interconnections (PoIs) and related links, thus placing extra burden on the operators' resources. The issue of interoperability becomes more acute in a multi-operator and multi-service scenario with the likely inefficiency in handling and routing of traffic to other operators.

(4) As far as the administrative issues are concerned, the operators have to negotiate and sign increased number of interconnection agreements, which requires a considerable amount of the operators' resources. The arrangements regarding billing and settlement with increased number of operators is also likely to enhance the complexities and may have adverse effects on operators' cash flows.

(5) The scope and complexity of above-mentioned issues are increasing day by day. In order to address these issues effectively, strategic regulatory steps are needed with due consultation from all stakeholders. One such step is the establishment of 'Interconnect Exchange' in the country, which would act as a hub for all interconnecting operators by establishing direct connectivity with all relevant operators. As far as the efficient settlement of inter-operator payments is concerned, the establishment of 'Interconnect Clearing House' in Pakistan would

be a right step in the right direction. The setting up of Interconnect Exchange and Interconnect Clearing House may be executed in parallel. However, the Authority is of the view that Interconnect Clearing House may be established initially, while the Interconnect Exchange may be set up later if need arises.

*1. In your opinion, is there an urgent need to establish Interconnect Exchange and Interconnect Clearing House in Pakistan? If no, then what time frame do you suggest for the establishment of Interconnect Exchange and Interconnect Clearing House?*

*2. Whether, in your opinion, both the Interconnect Exchange and Interconnect Clearing House should be established in parallel or should one concept be executed followed by the other?*

## PART II

### 3. INTERCONNECT CLEARING HOUSE

(1) The increase in the number of telecom operators, both fixed and mobile, in Pakistan has also led to complexity in the billing and settlement arrangements besides interconnection architecture. With the current billing arrangements, more disputes for inter-operator payments are likely to arise among operators and the situation is going to be more acute in time to come if not tackled effectively.

(2) The Authority considered a number of factors, which aggravated the need for establishing Interconnect Clearing House in Pakistan telecom sector. First, the Government of Pakistan introduced the mechanism of Access Promotion Contribution (APC) through its Deregulation Policy, which set out the revenue sharing arrangements between LL and LDI operators regarding international incoming traffic. Keeping in view the sizeable level of international incoming traffic and related charges, it can be safely said that a marginal discrepancy in billing and rating can have a material impact on the operators' revenues. Hence, as a part of revenue assurance policies, it would be prudent to establish such mechanisms which could reduce the operators' revenue leakages.

(3) Second, the accurate and timely contribution from LDI operators towards Universal Service Fund (USF) for international incoming calls terminating on mobile networks is an issue of concern not only for the Authority but also for the Federal Government. This can only be done effectively, if the billing systems of all LDI and mobile operators are fairly transparent and able to record call-minutes at sufficiently disaggregated level.

(4) Moreover, during the finalization of PTCL Reference Interconnect Offer (RIO) for Mobile Operators, PTCL was of the strong view that for calls terminating on other networks, using PTCL as transit, it cannot be held liable to the terminating networks for bad debts of originating networks. In such instances, originating and terminating operators should make direct settlement, if not direct interconnection, without involving PTCL which will only get its

share of transit charges. This proposal of PTCL was not agreed by mobile operators who were of the view that their current billing systems could not handle the complexities arising out of direct settlement with large number of operators. The Authority duly recognized the concerns of both parties and directed, vide its letter No. 15-30/05(CA)/PTA dated 10<sup>th</sup> February 2006, that PTCL, as transit operator, will collect transit and terminating charges from originating operator and pass on the terminating charge to called networks within fifteen (15) days of receipt. The said directive is valid for two years during which a long-term solution will be explored. The setting up of Interconnect Clearing House is one such solution<sup>1</sup> which needs to be considered by the industry.

(5) Last but not the least, the telecom operators are often in disputes with other interconnecting operators on account of non-payment of dues. One of the reasons for non-payment of dues is dispute regarding reconciliation of CDRs between interconnecting operators. It is expected that such problems could be effectively addressed with the establishment of Interconnect Clearing House in the country.

(6) Based on these events and using its foresightedness, the Authority considers it appropriate to consult the industry on the subject. Figure 1 below portrays the establishment of Interconnect Clearing House in the absence of Interconnect Exchange. The case takes into account mobile operators only. However, the structure will remain almost the same if other fixed-line operators also come into the picture.

(7) Figure 2 below shows the structure if Interconnect Clearing House operates as a supplement to Interconnect Exchange. In such event, it would be more appropriate if the Interconnect Exchange and Interconnect Clearing House is established and run by the same party.

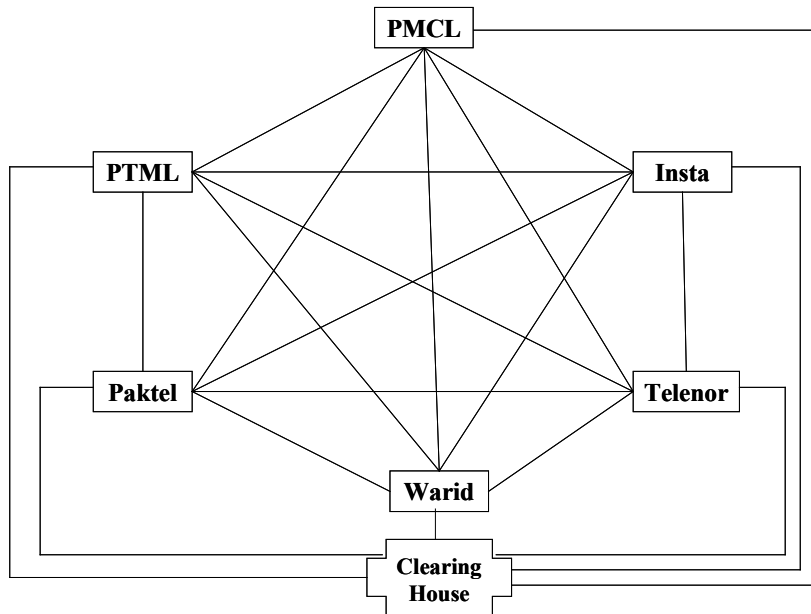


Figure 1

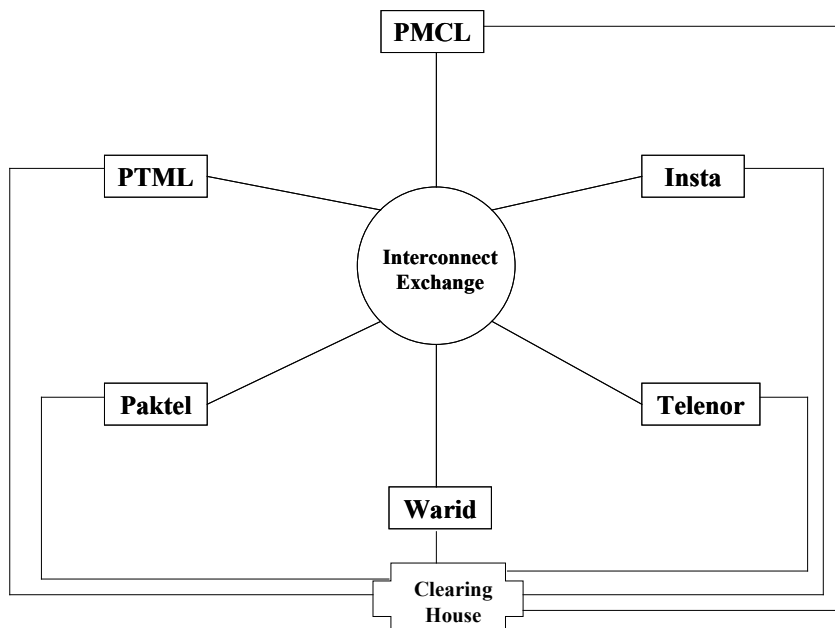


Figure 2

#### 4. SCOPE OF INTERCONNECT CLEARING HOUSE

##### (i) Geographic Scope

(1) It is suggested that the concept of Interconnect Clearing House should first be implemented in Pakistan, and later extended to AJK & NAs when other telecom players enter that market.



**(ii) Service Scope**

(2) Regarding the issue of extent of services to be covered by Interconnect Clearing House, it is proposed that Interconnect Clearing House should provide clearing services to all Local Loop operators (including WLL), LDI operators and mobile operators for both voice and data traffic.

3. *Do you agree that the geographic scope of Interconnect Clearing House should initially be limited to Pakistan, with later extension to AJK & NAs?*

4. *Whether, in your opinion, the Interconnect Clearing House should provide services to all LL, LDI and mobile networks for voice and data traffic?*

**5. SERVICES TO BE PROVIDED BY INTERCONNECT CLEARING HOUSE**

(1) Following services shall be provided by the Interconnect Clearing House to LL, LDI and mobile operators:

**(i) Billing**

(2) The Interconnect Clearing House will record the call data records which will bear the calling number, called number, call start time, call end time, call duration etc.

**(ii) Rating**

(3) The inter-operator traffic will be rated by the Interconnect Clearing House keeping in view the type of network, distance to be conveyed and timing of calls. The system of Interconnect Clearing House will have adequate capabilities to rate traffic on different scenarios including, but not limited to, per minute basis, per second basis etc.

**(iii) Reconciliation**

(4) The party running the Interconnect Clearing House will reconcile the traffic and related charges among the interconnecting operators. The Interconnect Clearing House may also provide the reconciled statement containing necessary details to the operators.

**(iv) Invoicing**

(5) After reconciliation process, the Interconnect Clearing House will raise invoices on behalf of each party. The invoices may be issued within one (1) week of the end of each billing period, which shall be two (2) weeks.

**(v) Clearing**

(6) The Interconnect Clearing House shall provide clearing services to the all LL, LDI and mobile operators who will maintain, at all times, a certain amount of cash balance ('settlement accounts') with the Interconnect Clearing House. The amount of settlement accounts may be different for each operator depending on the volume and pattern of its traffic and related charges. No interest or mark-up shall be due on settlement accounts. However, the Interconnect Clearing House may demand late payment charges from operators to ensure timely payment of dues. The Interconnect Clearing House will also keep a track record of changes in the traffic profile of each operator and will make necessary amendments in the settlement accounts by giving due notice to the operators.

(7) Based on the reconciled billing statements, the Interconnect Clearing House shall set off the amount payable by each operator with the amount receivable by it from all other operators. The 'net debtors' and 'net creditors' will be determined accordingly by the Interconnect Clearing House along with the amount which has to be received from or paid to each operator respectively.

**(vi) Settlement**

(8) The Interconnect Clearing House shall make payment to the 'net creditors' within five (5) business days of the invoice. The risk of bad debts shall be borne by the Interconnect Clearing House and will not be passed to the 'net creditors'.

**(vii) Dispute Resolution**

(9) The Interconnect Clearing House will also provide dispute resolution facilities to the disputing parties. All billing related disputes shall be handled by the Interconnect Clearing House which would have sufficient and reliable evidences to settle such cases in a transparent manner.

**(viii) Reporting**

(10) The party running the Interconnect Clearing House will provide reports to all operators in a standard format, which will be mutually agreed by the parties. The operators may also request special reports from the Interconnect Clearing House keeping in view their specific need and requirement.

(11) In addition, regular reports will also be provided to the Authority in order to discharge its functions and responsibilities effectively such as ensuring timely and accurate contribution to USF, payment of APC, identification and prevention of illegal traffic, determination of interconnection charges etc. The Authority may also, from time to time, require any other relevant information from the Interconnect Clearing House.

5. *Comments are invited from the stakeholders on the proposed list of services to be performed by the Interconnect Clearing House and their working mechanisms. You may also indicate additional services that should be carried out by the Interconnect Clearing House.*

**6. TECHNICAL ARRANGEMENTS**

**(i) System Standards**

(1) The system standards used by the Interconnect Clearing House shall be compatible to work with the billing systems of all LL, LDI and mobile operators.

**(ii) Connectivity with Operators' Billing Systems and Redundancy**

(2) The Interconnect Clearing House shall establish links with the billing system of each operator with redundancy arrangements. The operators shall provide primary access to the Interconnect Clearing House enabling it to provide billing services independently from that of the operator.

6. *Comments are invited on the above-mentioned technical arrangements of Interconnect Clearing House. You may also highlight other technical issues that should be addressed.*

## 7. ADMINISTRATIVE ARRANGEMENTS

(1) Following are the proposed arrangements regarding the licensing of Interconnect Clearing House:

### **(i) Consortium or Third Party Operator**

(2) The Interconnect Clearing House can be established by a consortium of LL, LDI and mobile operators to ensure fair participation of all stakeholders. However, keeping in view the large number of operators in LL, LDI and mobile market of Pakistan, the formulation of mechanism to ensure equal participation may become difficult.

(3) Alternatively, the task may be assigned to an independent third party who has sufficient skills and experience in this area. This will ensure provision of unbiased and efficient services to the operators.

(4) The Authority is of the view that the task of establishing the Interconnect Clearing House should be assigned to an independent third party under the regulatory supervision of the Authority.

### **(ii) Licensing Mechanism**

(5) The award of license to provide the services of Interconnect Clearing House in the Pakistan telecom sector may follow different approaches three of which are discussed below:

#### ***(a) Open Licensing Regime***

(6) Open licensing regime, as being currently followed for LL and LDI licenses, for awarding licenses to operate Interconnect Clearing House may attract large number of interested parties as there would not be any barriers to entry. However, this may further complicate the process of billing and settlement among LL, LDI, mobile operators and parties running the Interconnect Clearing House. The issue of developing consensus as to which party should run Interconnect Clearing House for a particular service category or geographic area will also arise.

**(b) Auction**

(7) Instead of awarding a number of licenses to set up Interconnect Clearing House, a single party may be selected on the basis of highest quoted bid amount. This would increase the Government's revenues and ensure the selection of financially sound party. The disadvantages, however, would be that the selected party will pass on the high bid price to the interconnecting operators in the shape of higher service charges. It might be the case that the winning bidder may not be technically very sound to run such operations.

**(c) Beauty Contest**

(8) By using this approach, the interested parties will be evaluated on the basis of their technical expertise and related experience. The party obtaining the highest technical score will be awarded the license against a fixed license fee. This approach may involve some transparency issues regarding award of technical scores, but, if managed properly, would ensure the selection of 'the best' party for the task.

(9) The Authority is of the view that the license to run Interconnect Clearing House should be awarded to a single party on the basis of best technical expertise against a fixed amount of initial license fee.

**(iii) License Tenure**

(10) As the Interconnect Clearing House will provide services to LL, LDI and mobile operators, its license term should match with the same. The Authority is, therefore, of the view that the license to run Interconnect Clearing House should be valid for a period of fifteen (15) to twenty (20) years.

**(iv) Roll-out Obligations**

(11) The roll-out of Interconnect Clearing House throughout the country can be done at one go or alternatively in a phased manner. The latter approach is preferable due to the fact that it would allow taking corrective action, if any, on the basis of experience gained in initial phases. But unlike the Interconnect Exchange, the phasing of establishing Interconnect Clearing House would be

with respect to traffic type instead of geographic area. Following are the proposed network roll-out targets for establishment of Interconnect Clearing House in Pakistan:

S. No.	Traffic Type	Target Date
1	Mobile-to-Mobile	Within six (6) months of License Award
2	Fixed-to-Mobile and Mobile-to-Fixed	Within twelve (12) months of License Award
3	Fixed-to-Fixed	Within fifteen (15) months of License Award

**(v) Regulatory Fee**

(12) The Authority is of the view that following regulatory charges should be applicable to the Interconnect Clearing House license:

S. No.	Type of Regulatory Fee	Level of Charge
1	Initial License Fee	Rs. 300,000
2	Annual License Fee	0.5% of last year's gross revenue

**(vi) Bank Guarantee**

(13) Keeping in view the fact that a substantial amount of money would be handled by the Interconnect Clearing House, it is suggested that the party running the Interconnect Clearing House should be obliged to provide bank guarantee to the Authority. The bank guarantee shall be unconditional and in the form and substance acceptable to the Authority. The amount of bank guarantee shall be amended keeping in view the change in traffic volume and related charges.

*7. Do you agree with the Authority's view that Interconnect Clearing House should be operated by an independent third party? If not, then suggest alternatives with reasons.*

8. *Should the license to run the Interconnect Clearing House be awarded through beauty contest, based on technical expertise and related experience, or awarded through open auction?*
9. *Please suggest the number of years for which the Interconnect Clearing House license should be valid?*
10. *Do you agree with the proposed roll-out obligations of Interconnect Clearing House?*
11. *Comments are invited on the proposed regulatory fees applicable to the license of Interconnect Clearing House?*
12. *Whether, in your opinion, the Interconnect Clearing House should provide bank guarantee to the Authority? If yes, then what parameters should be used for determining the amount of bank guarantee?*

## **8. FINANCIAL ARRANGEMENTS**

(1) The Interconnect Clearing House may collect the following charges from the LL, LDI and mobile operators. The Authority shall ensure that such charges shall be fair and non-discriminatory.

### **(i) Clearing Charges**

(2) The Interconnect Clearing House shall charge the LL, LDI and mobile operators for the provision of billing, rating, invoicing, reconciliation, clearance and settlement services. The charges may be in the form of certain percentage of inter-operator revenues of the operators. Alternatively, the charges may be traffic based.

### **(ii) Management Reporting Charges**

(3) The Interconnect Clearing House shall provide a minimum set of billing reports to the operators, the charges of which shall be deemed to be recovered through the above-mentioned clearing charges. However, if an operator needs additional reports in the form and manner suitable to its requirements, the Interconnect Clearing House will charge additional fee to be mutually agreed

between the parties. However, no such fee shall be payable by the Authority to the Interconnect Clearing House.

*13. Please indicate the level of clearing charges (as percentage of revenues or per-minute charges) that should be paid by LL, LDI and mobile operators to the Interconnect Clearing House.*

## **9. BENEFITS OF INTERCONNECT CLEARING HOUSE**

(1) The Authority foresees the following benefits for Pakistan telecom sector, if the concept of Interconnect Clearing House is implemented:

### **(i) Focus on Core Function**

(2) The operators, through outsourcing of interconnect billing functions to the Clearing House, can concentrate on the provision of modern and quality services to their users, which is the core area of their businesses.

### **(ii) Cost Savings**

(3) The establishment of Interconnect Clearing House would save the cost of operators, which will otherwise be incurred on self-management of billing, dealing with all operators directly and settlement of multiple inter-operator claims.

### **(iii) Reduce Revenue Leakages**

(4) The improvement in process, with the introduction of Interconnect Clearing House, would ensure accurate and prompt billing and is expected to significantly reduce the revenue leakages previously occurred.

### **(iv) Avoid Duplication of Resources**

(5) Under existing billing arrangements, both the operators i.e. service acquiring operator and service supplying operator, have to install and operate their respective billing systems for recording of inter-operator traffic. This resulted in duplication of resources which can be avoided if all such transactions are managed by the Interconnect Clearing House.



**(v) Improve Cash Flows**

(6) The reduction in time period vis-à-vis invoice issuance and bill settlement through establishment of Interconnect Clearing House, would have a positive effect on the operating cash flows of the operators.

**(vi) Less Number of Disputes**

(7) As the activity is outsourced to an independent third party, the same will be free from biases and subject to less number of disputes as against the current arrangements.

**(vii) Efficient Dispute Resolution**

(8) With the establishment of Interconnect Clearing House, every operator has to deal with only one party i.e. Interconnect Clearing House, for resolution of the billing disputes. This would simplify the process and will save a considerable amount of management and legal efforts of operators.

**(viii) Expert Services**

(9) The operators will benefit from the specialized skills and expertise of the party running the Interconnect Clearing House. This may be in the shape of provision of management reports and related advisory assistance.

**(ix) Increase Revenues of the Government**

(10) The timely recording of accurate figures of revenues in operators' accounts would also increase the government income in the form of general sales tax and corporate tax.

**(x) Improve Regulatory Reporting**

(11) The Interconnect Clearing House would be in a better position to provide different regulatory reports to the Authority, which will be helpful in determining the level of international settlement rates, access promotion contribution, interconnection charges and to address the issue of illegal traffic.

*14. Do you foresee that above-mentioned benefits can be gained by the Pakistan telecom sector through the establishment of Interconnect Clearing House?*

*15. How much cost reduction do you expect for your company if the services are outsourced to Interconnect Clearing House?*

#### **10. PROBLEMS ARISING FROM THE ESTABLISHMENT OF INTERCONNECT CLEARING HOUSE**

(1) Following problems may arise from the setting up of Interconnect Clearing House in Pakistan:

**(i) Extra Charges**

(2) The operators have to pay additional sums to the Interconnect Clearing House for providing billing, clearing, settlement and reporting services. At the same time, however, the cost incurred on performance of such services by operator himself would be avoided, which is expected to be more than the payments to Interconnect Clearing House.

**(ii) Confidentiality**

(3) The issue of confidentiality of operators' information may arise as the Interconnect Clearing House will have access to the billing system of all operators.

*16. In your opinion, what measures should be taken to address the issue of confidentiality in the presence of Interconnect Clearing House, without limiting its scope of services?*

## PART II

### 11. INTERCONNECT EXCHANGE

(1) Presently, PTCL is the main supplier of interconnection services to other fixed-line and mobile operators in Pakistan. In case of mobile-to-mobile interconnection, the Authority has issued directives for direct connectivity of mobile networks which is currently being followed by all six mobile operators. The fixed-line operators, though not obliged to establish direct connectivity, are also entering into agreements with other operators for establishment of interconnection keeping in view their particular needs and traffic pattern/profile.

(2) This arrangement not only increased the required number of PoIs and interconnection links for a given operator but also complicated the interconnect architecture and related inter-operator settlement. The network structure for mobile-to-mobile interconnection in Pakistan without Interconnect Exchange is shown in Figure 3 below. The network connectivity in this scenario requires fifteen (15) interconnect links.

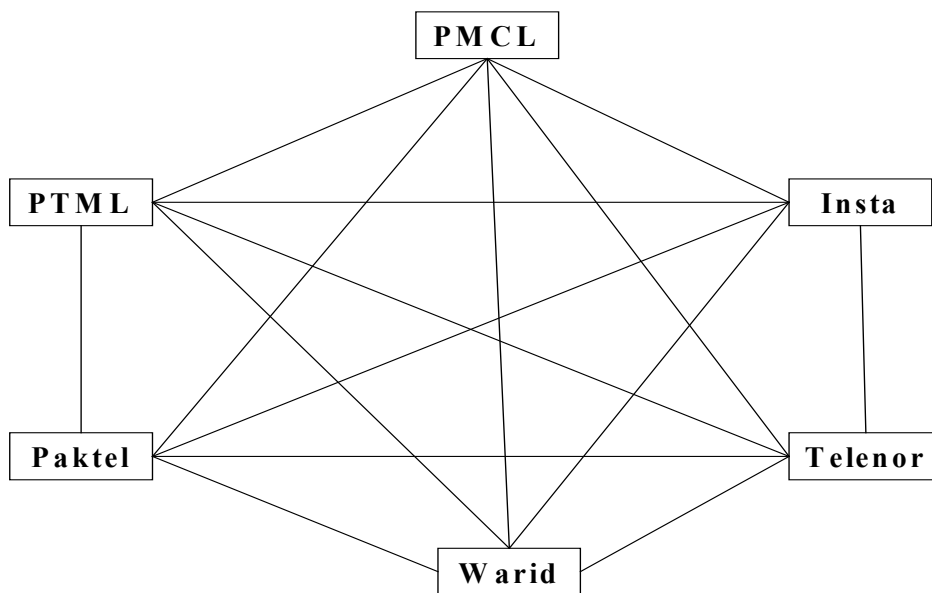
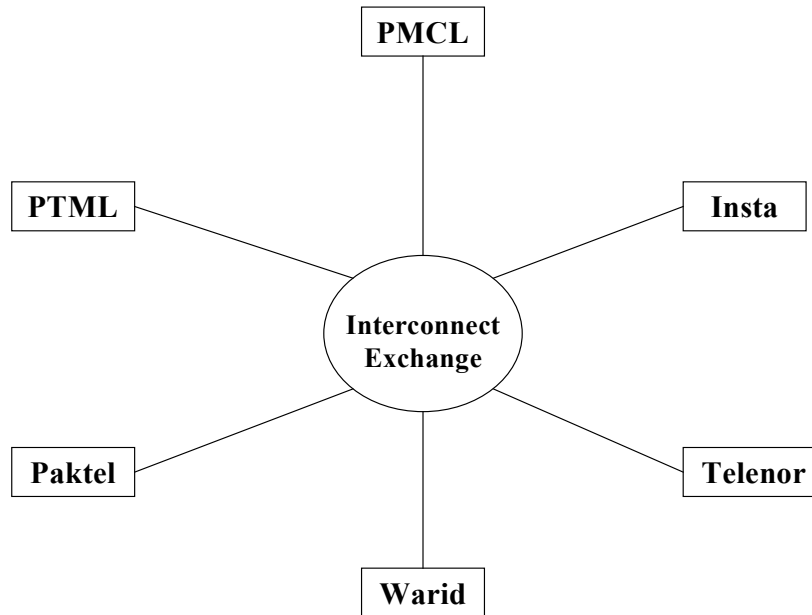


Figure 3

(3) On the other hand if the Interconnect Exchange is used to establish connectivity among six (6) of the mobile operators in Pakistan (Figure 4), the number of interconnection links would be reduced from fifteen (15) to only six (6) interconnection links. The possible reduction in the network complexity,

number of interconnection links and PoIs with the establishment of Interconnect Exchange becomes more visible by taking into account mobile-to-mobile, fixed-to-mobile and fixed-to-fixed interconnectivity.



**Figure 4**

## **12. SCOPE OF INTERCONNECT EXCHANGE**

### **(i) Geographic Scope**

(1) The Authority is of the view that Interconnect Exchange should first be established in Pakistan, excluding AJK & NAs. At least one Interconnect Exchange may be set up in each of the fourteen (14) Telecom Regions. However, it would be more prudent if the task is done in a phased manner and initially started with two to three Regions having highest volume of traffic. This approach would enable the stakeholders to learn from their experiences and will also help them to take any corrective measures before going to the next phase. The scope of Interconnect Exchange can be extended to AJK & NAs, once the deregulation process is completed in AJK & NAs and concept of Interconnect Exchange is successfully implemented in Pakistan.

### **(ii) Service Scope**

(2) Another issue that needs to be considered is the extent of services to be covered by the Interconnect Exchange i.e. which type of service providers would

be connected with the Interconnect Exchange. Keeping in view the increased number of operators and high volume of inter-operator traffic, the Authority is of the view that all Local Loop operators (including WLL), LDI operators and mobile operators shall connect their respective networks with the Interconnect Exchange.

(3) Regarding the type of traffic to be handled by Interconnect Exchange, it is desirable that both voice and data traffic is handled by the Interconnect Exchange so that inter-operability issues of traditional PSTN and emerging NGN could be addressed effectively. The type of calls i.e. local, long distance and international calls, that should be routed through the Interconnect Exchange also needs to be considered.

*17. Do you agree that the geographic scope of Interconnect Exchange should initially be limited to Pakistan, with later extension to AJK & NAs?*

*18. Should there be an obligation that all LL, LDI and mobile networks connect their networks with the Interconnect Exchange or should it be left to parties to decide?*

*19. Which type of traffic (voice, data) and calls (local, long distance, international) do you consider should be handled by the Interconnect Exchange?*

### **13. SERVICES TO BE PROVIDED BY INTERCONNECT EXCHANGE**

(1) Following are the list of services, which may be provided by the Interconnect Exchange:

#### **(i) Interconnect Hub for Fixed and Mobile Operators**

(2) The Interconnect Exchange will act as a hub for fixed-line and mobile operators. The Interconnect Exchange shall be obliged to provide connectivity to all existing and new operators within the time period as given in the Rules and Interconnection Guidelines.

**(ii) Provision of Interconnect Capacity**

(3) Interconnect Exchange will provide additional interconnect capacity (E1 or STM as the case may be) to other operators on their requests, in a stipulated time frame.

**(iii) Collocation Facilities**

(4) The party running the Interconnect Exchanges will arrange and provide adequate space and related facilities to the interconnecting operators for the purpose of establishing interconnection with the Interconnect Exchange.

**(iv) Transit Services**

(5) The Interconnect Exchange will collect traffic (voice and data) from originating networks and handover the same to the destined networks in accordance with the agreed routing arrangements.

**(v) Carrier Selection Facilities**

(6) Carrier pre-selection and call-by-call carrier selection facilities for long distance and international calls may also be provided by the Interconnect Exchange to the originating networks on their request.

*20. Comments are solicited from stakeholders on the proposed list of services which shall be performed by the Interconnect Exchange. Please indicate additional services that, in your opinion, should be carried out by the Interconnect Exchange.*

**14. TECHNICAL ARRANGEMENTS**

**(i) Number of Exchanges**

(1) At least one Interconnect Exchange will be established in each of the fourteen (14) Telecom Regions keeping in view the licensing arrangements. These Interconnect Exchanges may be linked with three (3) to five (5) Transit Interconnect Exchanges depending on the requirement.

**(ii) Compatibility**

(2) The standards followed by Interconnect Exchange will be compatible to establish interconnectivity with the PSTN, NGN and mobile networks.

**(iii) Interconnection Capacity**

(3) The Interconnect Exchange will arrange adequate capacity to accommodate the existing and future traffic of all fixed-line and mobile operators.

**(iv) Establishment of Links**

(4) Both the requesting operator and the Interconnect Exchange shall be responsible for establishment and maintenance of interconnection links and related equipment on their respective side of PoI at their own cost.

**(v) Network Deployment**

(5) The party responsible for running Interconnect Exchanges may buy or lease out respective local and tandem exchanges from PTCL. This approach would not only expedite the process but will also avoid the issue of shifting the entire fixed and mobile traffic towards a new route. However, the issue with this approach is that the incumbent may need these exchanges for its own business and may not be in a position to hand over the same to the Interconnect Exchange Operator.

(6) Alternatively, a new set of Interconnect Exchanges may be established which would require a significant amount of capital cost. Though, this strategy would result in duplication of resources yet it is only justified that like LL, LDI and mobile operators, the party running the Interconnect Exchange should be liable to establish its own network.

**21. *How many Interconnect Exchanges, in your view, should be established in the country and in each Region? Please categorize the same in Local and Transit Interconnect Exchanges.***

22. *Do you agree with the proposed mechanism for sharing of cost for establishing interconnection links and related equipment? If not, then what alternative would you suggest?*

23. *Whether, in your opinion, the party responsible for running the Interconnect Exchange should build a new set of exchanges or lease out the same from the incumbent operator? Provide supporting details.*

24. *What other technical issues do you foresee arising from the establishment of Interconnect Exchange? Please specify each along with the proposed strategy for their resolution.*

## 15. ADMINISTRATIVE ARRANGEMENTS

(1) Following are some proposed arrangements regarding the issuance of license(s) to operate the Interconnect Exchange:

### (i) Consortium or Third Party Operator

(2) The establishment and running of Interconnect Exchange can be carried out by a consortium of LL, LDI and mobile operators. This approach would ensure fair participation of all stakeholders for whose benefit the Interconnect Exchange will be established. Such parties are also in a better position to resolve and address the issues in a more transparent and practical manner. Keeping in view the large number of operators in LL, LDI and mobile market of Pakistan, however, the formulation of mechanism to ensure equal participation of all stakeholders may be problematic in itself. Moreover, it would also be difficult to chalk out the functions and responsibilities of each consortium member and to manage the conflict of interest among different categories of members.

(3) Preferably, the task may be assigned to an independent third party that has sufficient skills and expertise in this area. This will ensure provision of unbiased and efficient services to the operators. However, the confidentiality issue of the information of interconnecting operators may arise.



(4) The Authority is of the view that the task of establishing the Interconnect Exchange should be assigned to an independent third party under the regulatory supervision of the Authority.

**(ii) Licensing Mechanism**

(5) The award of license to provide the services of Interconnect Exchange in the Pakistan telecom sector may follow different approaches, three of which are discussed below:

**(a) Open Licensing Regime**

(6) Open licensing regime, as applicable to LL and LDI licenses, for awarding licenses to operate Interconnect Exchange may attract a large number of interested parties as there would no entry barriers. However, this may further complicate the process of establishing interconnectivity, contract management, traffic routing, billing and settlement among LL, LDI, mobile operators and parties running the Interconnect Exchanges.

**(b) Auction**

(7) Alternatively, a single party may be selected on the basis of highest quoted bid. This would, on the one hand, increase the Government's revenues and, on the other, ensure the selection of a financially sound party. The associated disadvantage is that the selected party may pass on the high bid price to the interconnecting operators in the form of higher interconnection charges, which may result in increased retail tariffs. Furthermore, the winning bidder may not be technically competent enough to manage such operations. In either case, the very purpose of establishing Interconnect Exchange may not be served.

**(c) Beauty Contest**

(8) By using this approach, the interested parties will be evaluated on the basis of their technical expertise and related experience. The party obtaining the highest technical score will be awarded the license against a fixed license amount. This approach may involve transparency issues regarding award of technical scores. However, proper management of the task would ensure selection of 'the best' party for the task.

(9) The Authority is of the view that the license to run Interconnect Exchange should be awarded to a single party against a fixed amount of license fee on the basis of best technical expertise.

**(iii) License Tenure**

(10) Another issue that needs to be consulted is the tenure of license for running the Interconnect Exchange. As the Interconnect Exchange will provide services to LL, LDI and mobile operators, its license term may be matched accordingly. The Authority is, therefore, of the view that the license to run Interconnect Exchange should be valid for a period of fifteen (15) to twenty (20) years.

**(iv) Roll-out Obligations and Performance Bond**

(11) The roll-out of Interconnect Exchanges throughout the country can either be executed in one go, or in a phased manner starting with the Regions having highest traffic-volume. The latter approach is preferable due to the fact that it would allow taking corrective action, if any, on the basis of experience gained in initial phases and would also result in relatively quick execution of the project in subsequent phases. Following is the proposed network roll-out targets for establishment of Interconnect Exchanges:

S. No.	Telecom Regions to be covered	Minimum No. of Interconnect Exchanges	Target Date
1.	KTR, LTR, ITR, RTR, GTR	One (1) Exchange for each Region	Within one (1) year of License Award
2.	STR- 1, STR-5, FTR, CTR	One (1) Exchange for each Region	Within two (2) years of License Award
3.	WTR, NTR-1, NTR-2, HTR, MTR	One (1) Exchange for each Region	Within three (3) years of License Award

(12) The Authority is also of the view that the licensee of Interconnect Exchange should provide a performance bond in respect of above-mentioned network roll-out targets in the form and substance acceptable to the Authority. The performance bond shall be released by 50% in first year, 30% in second year and 20% in third year subject to successful achievement of the targets.

**(v) Regulatory Fee**

(13) In order to ensure level playing field in the sector, the Authority suggests that following regulatory charges should be applicable to the Interconnect Exchange license:

S. No.	Type of Regulatory Fee	Level of Charge
1	Initial License Fee	USD 100,000
2	Annual License Fee	0.5% of last year's gross revenue minus inter-operator and related PTA/FAB mandated payments
3	Research and Development (R&D) Fund Contribution	1% of last year's gross revenue minus inter-operator and related PTA/FAB mandated payments
4	Universal Service Fund (USF) Contribution	1.5% of last year's gross revenue minus inter-operator and related PTA/FAB mandated payments

**(vi) Provision of Reference Interconnect Offer**

(14) In order to provide connectivity to fixed-line and mobile operators in a fair, transparent and non-discriminatory manner, it is important that Interconnect Exchange Operator should draft its Reference Interconnect Offer (RIO) and obtain approval of the same from the Authority. The RIO would detail the terms and conditions on which the Interconnect Exchange Operator shall provide interconnection to LL, LDI and mobile operators.

25. *Do you agree with the Authority's view that Interconnect Exchange should be operated by an independent third party? If not, then suggest alternatives with reasons.*

26. *Should the license to run the Interconnect Exchange be awarded through beauty contest based on technical expertise and related experience or awarded through open auction?*

27. *Please suggest the number of years for which the Interconnect Exchange license should be valid?*

28. *Do you agree with the proposed network roll-out and performance bond obligations on the Interconnect Exchange Operator?*

29. *Comments are invited on the type and level of regulatory fee to be applied on the Interconnect Exchange Operator?*

30. *Do you agree that interconnectivity with Interconnect Exchange be covered through a standard Reference Interconnect Offer or should individualized agreements be allowed?*

## **16. FINANCIAL ARRANGEMENTS**

(1) The Interconnect Exchange Operator shall have the right to collect following charges for the provision of services to LL, LDI and mobile operators. The Authority shall ensure that such charges shall be fair, cost-based and non-discriminatory. In the absence of cost data, the Authority may use international benchmarking for the determination of such charges.

### **(i) Capacity Charges**

(2) The Interconnect Exchange Operator will charge the LL, LDI and mobile operators for the provision of interconnect capacities. Such charges may be in the form of one-off charges as well as recurring charges.

### **(ii) Transit Charges**

(3) The interconnecting operators will pay transit charges to the Interconnect Exchange Operator depending on the routing arrangements.

**(iii) Carrier Selection Charges**

(4) If the Interconnect Exchange is offering the carrier selection facilities, it will collect carrier selection charges from the originating network.

**(iv) Collocation Charges**

(5) The LL, LDI and mobile operators will also pay to the Interconnect Exchange Operator for use of its space, power and related facilities.

*31. Comments are invited on the proposed list of charges, which shall be paid by interconnecting operators to the Interconnect Exchange Operator. You may also suggest the approximate level of each charge with supporting reasons.*

**17. BENEFITS OF INTERCONNECT EXCHANGE FOR PAKISTAN**

(1) Followings benefits are likely to accrue to Pakistan telecom sector with the introduction of Interconnect Exchange:

**(i) Simplified Interconnection Architecture**

(2) The interconnection architecture would be much simplified than the existing one.

**(ii) Avoid Duplication of Resources**

(3) With the establishment of Interconnect Exchange in the country, duplication and underutilization of infrastructure and related resources would be avoided.

**(iii) Remove Barriers to Entry**

(4) The establishment of interconnectivity with Interconnect Exchange from a new operator's viewpoint would be much easier as there is no need to seek interconnection with multiple operators.

**(iv) Prompt Capacity Provision**

(5) The Interconnect Exchange will ensure prompt and simplified mechanism for obtaining and provision of additional interconnection capacity after the initial stage of connectivity.

**(v) Reduced Number of Disputes**

(6) Once the Interconnect Exchange is established, the disputes among operators for the provision of interconnection and related capacity, would be reduced to a great extent.

**(vi) Significant Reduction in PoIs**

(7) The establishment of Interconnect Exchange would bring about significant reduction in the interconnection links and related PoIs for a given operator.

**(vii) Optimum Utilization of Network and Capacity**

(8) As a given operator needs to connect its network with only one network, the optimum utilization of network and interconnection capacity can be better managed.

**(viii) Extra Space with Incumbent**

(9) The collocation space with incumbent operators could be freed for its own usage, as all operators will be connecting with the Interconnect Exchange at its collocation sites instead of incumbent's exchanges.

**(ix) Reduce Capex and Opex**

(10) The establishment of Interconnect Exchange will considerably reduce the level of capex and opex for a given operator. The result of a case study conducted by ITU shows that interconnection capacities can be reduced by approximately 50% through establishment of Interconnect Exchange under given circumstances. The required amount of capex and opex relating to these capacities would accordingly be reduced.

**(x) Efficient Handling of Traffic**

(11) The handling and routing of traffic among telecom networks would be more efficiently managed by the Interconnect Exchange.

*32. Do you foresee that above-mentioned benefits can be gained by the Pakistan telecom sector through the establishment of Interconnect Exchange?*

*33. How much reduction in PoIs, capex and opex do you expect for your company, if the present interconnection arrangements are shifted to the proposed Interconnect Exchange?*

## **18. PROBLEMS ARISING FROM THE ESTABLISHMENT OF INTERCONNECT EXCHANGE**

(1) Keeping in view the peculiar circumstances of Pakistan telecom sector, the establishment of Interconnect Exchange would not be easy to implement. The following problems may arise:

### **(i) Need Substantial Time and Resources**

(2) Keeping in view the direct connectivity of telecom operators, especially in mobile segment, the shifting of existing PoIs towards the Interconnect Exchange is likely to consume a substantial amount of time and resources.

### **(ii) Extra Switching Level**

(3) The establishment of Interconnect Exchange would increase another level of switching, as all inter-operator traffic (or only long distance and international traffic, depending on the scope of Interconnect Exchange) will have to pass through the Interconnection Exchange before it is handed over to the destined network.

### **(iii) Higher Interconnect Charges**

(4) The setting up of Interconnection Exchange is likely to increase the level of interconnection payments which might result in increased retail tariffs.

### **(iv) Effect on Quality of Service**

(5) The addition of switching level may also have adverse effects on the quality of service (QoS) of inter-operator traffic.

### **(v) Complicate Billing and Settlement Arrangements**

(6) This may also complicate the billing and settlement arrangements among telecom operators and Interconnect Exchange, unless supplemented with the Clearing House function.

**(vi) Confidentiality**

(7) The confidential traffic information of the interconnecting operators may be more exposed to leakage if the party operating the Interconnect Exchange is not neutral.

**(vii) Risk of Non-compliance of Incumbents**

(8) The whole scheme may go in vain if the incumbent operators would not be willing to connect their networks with the Interconnect Exchange.

**(viii) Network Security Issues**

(9) Severe network security issues may arise as the total inter-operators' traffic would be depending on one Interconnect Exchange, without having redundancies.

*34. Do you believe that the aforesaid problems may arise from the establishment of Interconnect Exchange in Pakistan? If yes, what measures do you suggest to mitigate the effects of each problem?*

*35. The stakeholders are requested to provide their comments or suggestions on any issue discussed in this Paper along with supporting reasons or references to international best practices.*

*36. The stakeholders are also requested to raise any other issue or provide views, comments or suggestions on any other aspect of establishing Interconnect Clearing House and Interconnect Exchange, that are not covered in this Paper.*