



# What is Interconnect Billing?

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# Table of Contents

*Executive Summary* ..... 3  
*Introduction* ..... 3  
*Destinations* ..... 3  
*Charging Policies*..... 3  
*Rates* ..... 3  
*Contract Management* ..... 3  
*Reference Interconnect Offer Compliance*..... 3  
*Mediation*..... 3  
*Revenue Assurance*..... 3  
*Quality of Service*..... 3  
*Billing System Checklist*..... 3  
*Regulatory Tax Calculation*..... 3  
*Summary*..... 3  
*Contact Information* ..... 3  
*We welcome your suggestions*..... 3

## Executive Summary

White paper provides in depth information regarding Interconnect of telecom traffic to multiple operators with special emphasis on the billing of such interconnect settlements. It explains Terminating Partners, Originators and Incumbent Operators in detail. It states the concept of interconnect within the country and at international level. It gives sample Network Diagram for interconnect scenarios

For the billing of Interconnects, the white papers gives complete description regarding rate sheets, types of rates and charging policies. It also discusses issues related to payment and netting. Details regarding A-Leg billing and IN (Intelligent Network) are also mentioned in the white paper. It completely explains the concept of mediation and reconciliation.

White paper also describes the term Dispute Resolution and Revenue Assurance. It also discusses cost and revenue on per call basis. It precisely describes Contract Management, LCR (Least Cost Routing) and LI (Lawful Intercept) Compliance. This white paper also discusses issues related to Application Security.

## Introduction

Telecom operators send/receive data (calls or SMS) to/from other operators. If these calls are within the network then telecom operator can send/receive them without interconnecting. If this sending/receiving of calls is to/from other operators (outside the network) then both the operators needs to be interconnected i.e. both operators should have a network based interconnect to send/receive calls to/from the network. This setup requires some kind of billing mechanism to monitor the actual amount of data (send/received). It is known as interconnect. Following figure illustrates the typical interconnect between different Telecom operators.

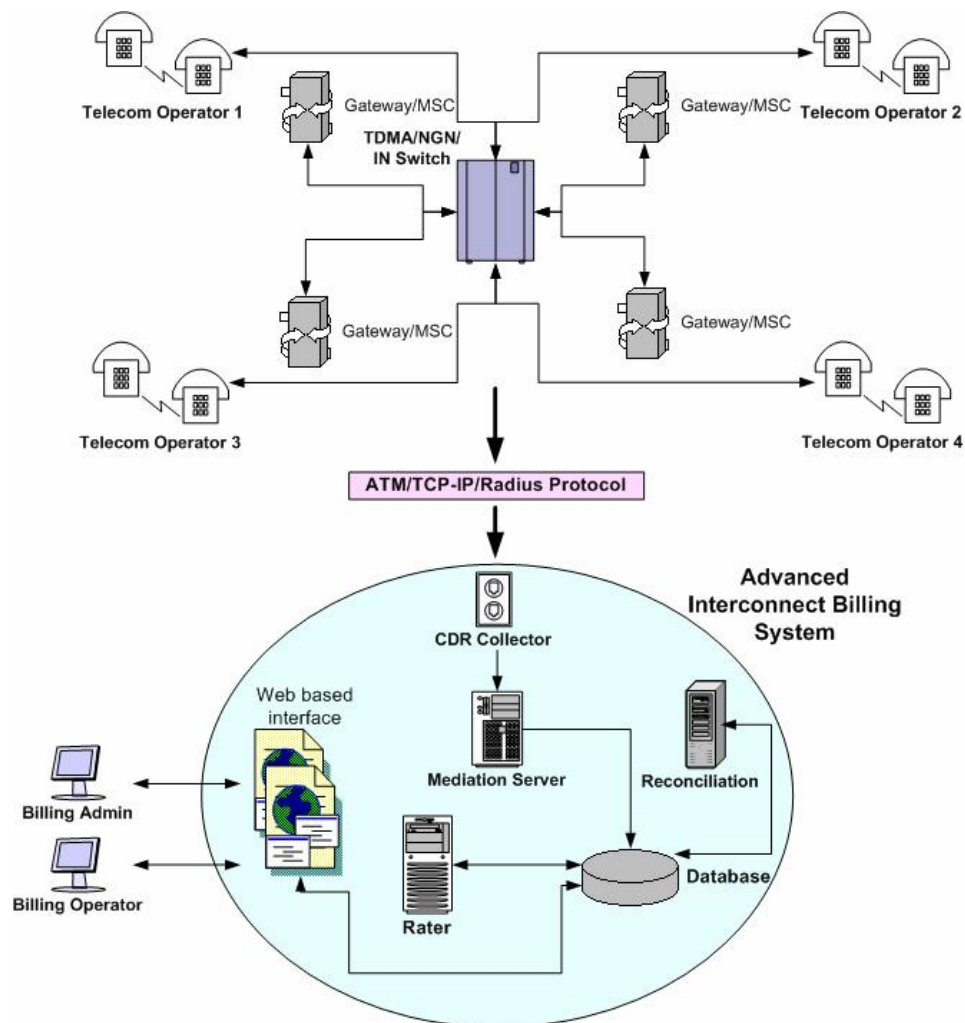


Figure 01: Interconnect between Telecom Operators

A Telecom Vendor who finally receives data (calls or SMS) from telecom operators is known as *Terminating Partner* and a Telecom Operator who sends data (calls or SMS) to any other operator is known as *Originating Partner*.

In addition to that, operator can also be in *Transit Mode* i.e. it receives data (calls or SMS) from one operator and delivers it (as it is) to any other operator. Mostly, data is send/received between two specific operators and not all the operators can transmit data to different

destinations. To transfer data (calls or SMS) to various destinations, general purpose carriers are used that sends data according to the destination prefixes. For Example: One operator takes all of the Europe's traffic but is restricted to LAN (Local Area Network) lines only and there can be another operator who has an interconnect with the mobile operators. The operator may have a separate interconnect agreement with another operator that is transmitting traffic to North America.

If the operator is not just a transit traffic operator and it has some phone numbers or retail numbers of its own like any CDMA (Code Division Multiple Access) or GSM (Global System for Mobile Communications) operators then operator can also receive calls for the specific phone numbers within its zonal network.

## Destinations

A Destination is identified by a Telephone Area Code. Different operators send/receive data to specific area codes only. Sometimes different cities are treated as a single destination and are covered by more than one operator while there are some destinations that are specific to single operator. All these destinations are identified by their area code prefixes. For Example: The area code for country Pakistan is '92' and it is assumed that the operator receiving traffic for '92' is taking traffic for all of the Pakistan's operators and LAN line numbers. Similarly the area code for all mobile operators in Pakistan starts with '3'. Therefore any operator taking traffic for '923' is receiving traffic for all of the mobile operators in Pakistan. There are some operators that take traffic specifically to single operator.

## Charging Policies

Voice or any other traffic can be charged according to different policies. One of the common charging policies is *Destination Based Billing* (based on area code prefix of the destination). In this case, separate rates are assigned to each destination and the interconnect billing calculates charges on the basis of destination.

One more type of charging policy is *Distance Based Billing* (based on distance between source and the destination) and it is usually used within the country. In this type of billing, a matrix is used for calculating distance between all the possible originating and terminating points and billing system calculates charges on the basis of these points.

In destination based billing, service is charged on the basis of termination point and irrespective of the origination point or distance covered. In distance based billing, there are different zones that are made on the basis of the distance between the originating and the terminating points. Therefore, there can be a separate zone for smaller distances (less than 25 Kms), another for medium distances (up to 80 Kms) and another for larger distances (up to 160 Kms) etc. It means that a call made from East Coast to East Coast will be less costly than the call from East Coast to West Coast while this is not the case with destination based billing. In destination based billing the only thing that is considered is the destination/termination point and not the distance.

## Rates

Rates depend on the charging policy, if it is destination based billing then rates is specified according to the area code in the supported destinations. In distance based billing, rates are specified according to different zones.

An operator can only be an originator or terminator or both to a specific zone. If an operator is responsible for both (origination and termination) then there is a separate list of rates for

incoming and outgoing calls but in case of only origination or termination there is a single rate to every prefix (area code). In most cases, prefixes are bundled together into zones and the operator provides separate price for a full zone and highlights the prefixes under that zone.

Sometimes rates can be simple like flat per minute billing but sometimes they can be more complex like peak and off-peak rates for some destinations and there can be special rates for different holidays or vacations for some specific area.

Rounding off is also an issue related to rates. Rates can be rounded off to the nearest second or sixth second or minute etc. One more thing that is considered during billing is the minimum chargeable duration that can be six seconds, thirty seconds or sixty seconds etc. To provide accurate and reliable billing, a billing system should be capable enough to manage these rounding issues effectively.

## Contract Management

When a new telecom operator is registered, a contract is signed. There are few significant items in that contract like invoicing period that is typically of one week (given for the settlements of the payments or to resolve dispute if any).

In the contract management it is also mentioned that whether the account is prepaid or postpaid. In case of prepaid account, the system automatically generates low-credit alert through e-mails to other partners. In case of postpaid account, the system takes the average expected traffic and it also takes the supported destinations by the operator.

When the operator begins to send/receive data (call or SMS) to/from different destinations, a CDR (Call Detail Record) is generated at both the ends (operator and billing system provider) for all types of services like voice call, SMS, content or any other activity etc. The purpose of interconnect billing is to rate these CDRs. First of all it identifies the vendor (originator or terminator) from the CDR and on the basis of that it applies rates (depending on the rates specified by the operator) for that particular destination. During rating process, rater considers few things like peak/off-peak rates, time of call or if there is any holiday/special day etc. Rating engine also takes care about rounding off of the calls that can be 6/6 or 30/6 or 60/60 seconds (as mentioned before). After creation, these CDRs are joined together to form a sub-invoice. When the billing period is finished then all these sub-invoices (of short time period) are combined together into a big invoice. This single invoice is sent to each originating partner and the receipt note is sent to each terminating partner.

At the end of the billing period the invoices are sent to all the partners. If they are only terminating partners then the payment is supposed to be sent to them (in the allowed time as per the contract) and if they are only originating partners then the payment has to be received from them (as per the contract). If the partner is also a terminator and an originator then both the receipt note and invoice are generated (at both ends). Both these invoices and receipt notes are checked and in case of any difference between the two they should be settled in the given time period according to the contract. Before finalizing the invoices, the CDRs generated at both the ends (operator and billing system provider) should be reconciled that is done through the process of [Reconciliation](#).

After reconciliation, there usually occur some errors and disputes in the system that needs to be fixed. Such types of errors either increases or decreases the actual amount of the invoices/receipt notes. When these errors are fixed then invoices are considered as final and then they need to be settled in the given amount of time. The system itself takes care of the payments sent/received to/from different originating and terminating partners.

## Reference Interconnect Offer Compliance

All terminators who need to be interconnected have their own Reference Interconnect Offers. Reference interconnect offers is a set of documents that highlights different charging policies, flat rates, taxes, government revenues and different other type of levies etc. that can be applied to various type of calls. Before buying any billing system, you have to make sure that the billing system you are purchasing should support all those types of RIOs that you have to handle.

The most difficult of the RIOs is usually with the national incumbent monopoly telecom operator that already exists and holds the majority of the numbers. They have a long list of entries in the RIO and interconnect billing system needs to be complaint to all of those requirements mentioned in the RIO.

## Mediation

All CDRs needs to be mediated. Mediation is the most critical task in the entire network of telecom operators and plays a vital role in revenue calculation. There are different switches deployed by the telecom operators that generates CDRs. Mediator communicates between these switches and converts these generated CDRs into application required format (standard format).

It is a three step process that includes '*collecting CDRs*', '*processing CDRs*' and '*distributing CDRs*'. Mediation server gathers CDRs from upstream systems, converts them into a required format and finally transmits them to the downstream systems (required destinations).

## Revenue Assurance

Revenue Assurance is an important process that ensures that no revenue has been leaked out during CDRs' mediation or any other step.

## Quality of Service

QoS stands for Quality of Service. Different operators provide different types of Quality of Service. It should be monitored very tightly. It should be ensured that the billing system you are using is capable enough to analyze the Quality of Service (QoS) being send/received to different operators. It must also have the required reporting functions and analysis engines to ensure Quality of Service.

## Billing System Checklist

If you need an interconnect setup with different operators and you have to purchase a billing invoices system, you must ensure that the billing system can fulfill some requirements like it should provide compliance with the charging policies of the operators you are going to interconnect with. There are some terminating partners that offer simple rates per minute while some offers really complex rates. System should be capable to handle these complex rates like peak/off-peak rates, different rates for same destinations but different timings and rates on the basis of destination zones etc. Billing system should also support different types of rounding policies for such type of rates. System should also analyze the holidays and some special days in the originating/terminating zones.

You also have to make sure that the billing system you are purchasing should support multiple currencies because different operators provide rates in their native currencies. Therefore, it is required for the billing system to handle multiple currencies in its rating process.

Entire data of interconnect is finally given to an accounting system (as an input). Therefore you have to make sure that your billing system must have enough interfaces so that the data generated from the billing system can be imported to your accounting system. Invoice importing and different type of financial analysis on the billing data also depends on the interfaces offered by the interconnect billing.

Different kinds of reports are also required for interconnect traffic, for that you have to make sure that the billing system should provide such types of reports generation. The system should also allow adding of report(s) on your request in a short period of time.

If the operator has its own origination network through some means like a Local Loop operator or prepaid calling cards or Payphones then the operator is required to have A-Leg billing. If they have an Intelligent Network (IN) then they need an interconnect interface with their own IN for tracking of calls.

There is also an issue of identifying the calls and attributing them to specific operators, therefore you have to ensure that the billing system should support your required way to identify calls of different operators. Sometimes operators are identified on the basis of IP Address, sometimes on the basis of trunk group (where the call is received) and sometimes on the basis of originating/terminating numbers.

You also have to ensure that the billing system offers a web based interface for the carriers to have an online view of all the activities and nature of the invoices. Interface should show information of invoices, sub-invoices and CDRs. The billing system should also allow the terminating partners to download their individual CDR (s) and compare them with the accounting data.

Billing system should be reliable and highly secure. It should not allow anyone to intrude into the system and view/modify sensitive information. System should also be flexible enough to adopt different changes. In case of some error(s), the system should be able to delete the previous rated CDRs and should re-rate them and update the system records (according to the newly rated CDRs).

## Regulatory Tax Calculation

There are different types of taxes usually levied on the calls from the regulator. The interconnect system should calculate those taxes accurately. Those taxes are different for different destinations (based on the destination or premium number, full volume). Therefore the interconnect system should be capable enough to identify these types of taxes and can also generate reports required by tax authorities.

Advanced VoIP offers a comprehensive Interconnect Billing Solution. For more details, please visit <http://www.AdvOSS.com>

## Summary

Telecom operators send/receive data (calls or SMS) to/from other operators. If these calls are within the network then telecom operator can send/receive them without interconnecting. If this sending/receiving of calls is to/from other operators (outside the network) then both the operators need to be interconnected.

A Telecom Vendor who finally receives data (calls or SMS) from telecom operators is known as *Terminating Partner* and a Telecom Operator who sends data (calls or SMS) to any other operator is known as *Originating Partner*.

Different operators send/receive data to specific area codes only. Sometimes different cities are treated as a single destination and are covered by more than one operator while there are some destinations that are specific to single operator.

Voice or any other traffic can be charged according to different policies. There are two types of policies:

- Ø Distance based billing
- Ø Destination based billing

Rates depend on the charging policy, if it is destination based billing then rates are specified according to the area code in the supported destinations. In distance based billing, rates are specified according to different zones.

When a new telecom operator is registered, a contract is signed. There are few significant items in that contract like invoicing period that is typically of one week (given for the settlements of the payments or to resolve dispute if any). In the contract management it is also mentioned that whether the account is prepaid or postpaid.

All terminators who need to be interconnected have their own Reference Interconnect Offers. Reference interconnect offers is a set of documents that highlights different charging policies, flat rates, taxes, government revenues and different other type of levies etc.

As far as Quality of Service (QoS) is concerned, different operators provide different types of Quality of Service. It should be monitored very tightly. It should be ensured that the billing system you are using is capable enough to analyze the Quality of Service (QoS) being send/received to different operators like [Advanced InterConnect Billing](#).

## Contact Information

In case of any ambiguity regarding the concept, explained in the whitepaper, please feel free to contact us at [support@AdvOSS.com](mailto:support@AdvOSS.com) or please, visit [http://www.AdvOSS.com/voip\\_contact.html](http://www.AdvOSS.com/voip_contact.html)

For further information please, visit [www.AdvOSS.com](http://www.AdvOSS.com)

## We welcome your suggestions

Thank You for reading this whitepaper. We will be pleased to receive your response and suggestions.