Interconnection Rules

Contents

Interconnection Rules

1 Purpose and Scope of Rules

The Communications and Information Technology Commission (CITC) Statutes set out the rules, rights and obligations of service providers for interconnection to the public networks.

The CITC Statutes also establish the general provisions for interconnection and access. The Bylaw defines interconnection as:

- The physical and logical linking of telecommunications networks used by the same or a different Service Provider in order to allow the users of one Service Provider to communicate with users of the same or another Service Provider; or
- To access the facilities and/or services of another Service Provider.

These Rules govern the interconnection services for the linking of networks of all Service Providers. The Interconnection Rules also cover Collocation service (Annex B Section 2.23) as this service is essential for the linking of networks.

1.1 The Purpose of the Rules

- To ensure that all Service Providers are treated fairly and in a non-discriminatory manner with respect to the provision of interconnection services;
- To ensure good practice with respect to interconnection services between Service Providers and to promote the provision of high quality services for interconnection through technical and economic efficiency, and thereby to ensure that users can be provided with a satisfactory quality of service.

1.2 The Scope of the Rules

a) These Rules govern the interconnection services for the physical and logical linking of networks of all Service Providers.

b) Certain specific requirements under these Rules apply only to Service Providers which have been designated as dominant.

c) These Rules also provide the basis for a reasonable and mutually negotiated interconnection agreement between interconnecting Service Providers.

d) The Rules also address the development and publication of a Reference Interconnection Offer (RIO) by Dominant Service Providers. The purpose of the RIO is to provide the basis for negotiation of an interconnection agreement for the provision of

interconnection services by defining a standard set of commercial, technical and operational conditions through which interconnection services are provided.

e) These Rules address the establishment of a multilateral working group to coordinate the technical, operational and commercial standards and procedures for interconnection, especially with regard to the deployment of next generation networks.

1.3 Definitions

The Definitions in the Telecommunications Act and its Bylaws shall apply.

2 General Principles of Interconnection and Related Obligations

Interconnection services are to be provided in a technologically neutral manner. Accordingly, the provisions contained in these Rules apply to all relevant technologies.

The following principles shall apply to the provision of interconnection services.

2.1 Principles and Obligations Applicable to All Service Providers

The principles and obligations applicable to all Service Providers are:

- All Service Providers, if so requested in writing by another Service Provider or a foreign service provider, must enter into good faith negotiations to complete interconnection agreements. They must meet all reasonable requests for interconnection services and adhere to non-discrimination between services they provide to themselves and those they provide to others.
- It is obligatory on every Service Provider to offer and receive interconnection services under appropriate terms and conditions and in a timely fashion.
- Interconnection shall be permitted at any technically feasible point.
- Interconnection at International Cable Landing Point(s) shall be offered by facilities based Providers owning International Cable Landing Points upon request and on commercial terms.
- Interconnection services shall be provided without elements that have not been requested, if technically feasible.
- Interconnection shall encourage efficient and sustainable competition.
- Interconnection procedures and arrangements shall be transparent, fair and non-discriminatory.
- Service Providers must resolve interconnection disputes between them quickly and fairly. In the case where resolution cannot be reached, disputes may be referred to CITC for resolution in accordance with its Statutes.
- Interconnection interfaces and standards shall be based on recognized national and international standards.
- All information provided between Service Providers shall be subject to the terms of confidentiality defined in a RIO or interconnection agreement.
- Interconnection between Service Providers shall be based on the principles of any-to-any communication. All Service Providers have the obligation to terminate calls, data and like telecommunications services irrespective of their origination or routing in order to ensure such any-to-any communication.

- In case the Commission decides pursuant to Art. 43 of the Bylaw that an interconnection agreement is not compliant with its Statutes, the Commission will notify the concerned Service Providers. The concerned Service Providers must amend their agreement within thirty days after receiving such notification.

2.2 Principles and Obligations Applicable to Dominant Service Providers (DSPs)

In addition, the following principles and obligations apply to Dominant Service Providers:

- Interconnection charges shall be transparent, reasonable and cost-based and must comply with the following:
  - Any cost inefficiencies of Dominant Service Providers shall not be passed on through interconnection charges to other Service Providers.
  - Interconnection charges shall be free of any costs related to any universal service obligations of the Dominant Service Provider.
- Bundling of services, whereby a Dominant Service Provider requires, as a condition of supplying a service to another Service Provider, that the Service Provider acquire another service that it does not require from a Dominant Service Provider is an abuse of its dominant position.
- Standard terms and procedures for interconnection services shall be published (Reference Interconnection Offer) pursuant to section 3 of these Rules.
- A Dominant Service Provider shall provide interconnection to its networks to meet the requirements of other Service Providers.
- Dominant Service Providers shall, within 10 working days of execution of an interconnection agreement, submit a copy to the Commission.
- Any changes in the setup of existing interconnection services of Dominant Service Providers must be agreed with the requesting Service Provider or within a multilateral working group (see section 7.5 below).

3 Reference Interconnection Offers

3.1 Regulatory Requirements

a) The Reference Interconnection Offer (RIO) shall define and provide a set of standard terms and conditions for interconnection with other Service Providers. A RIO is used by a Dominant Service Provider to complete individual interconnection agreements with other Service Providers.

b) A Dominant Service Provider shall prepare a RIO within 90 days of being so directed by the Commission and shall submit it to the Commission for approval. A Dominant Service Provider is required to publish its RIO on its website within 15 days after approval by the Commission.

c) A RIO shall include a full list of interconnection services offered, as well as the associated terms and conditions, including the prices, for each service and component of such service.

d) A RIO shall include detailed terms and conditions related to interconnection to the network, the technical standards as well as the standards for safety and security applied by the Dominant Service Provider.

e) A Dominant Service Provider shall periodically update its RIO to take account of changes to the Rules; the interconnection services offered; the associated networks, processes and systems; or any other regulatory requirements that may directly impact the terms and conditions of a RIO.

f) A Dominant Service Provider shall include in its RIO an amendment procedure that describes how changes will be made to its terms and conditions. The amendment procedure shall include the following:

- Specify how other Service Providers will be informed about proposed changes and the timeframe for such changes; and
- Provide for submission to and approval by the Commission of the details of the proposed amendments.

g) The Commission may, at any time, require changes to a RIO.

3.2 The Content of a Reference Interconnection Offer

A Reference Interconnection Offer shall contain the following:

- Framework Agreement;
- Description of the interconnection services offered;

- Technical specifications required to ensure successful interconnection;
- Specification of the transmission technologies to be used for interconnection of the networks;
- Procedures for implementation of initial interconnection as well as operational procedures which include ongoing service provisioning, planning, network traffic and fault management and maintenance processes;
- Commercial aspects including charges, payments, billing procedures and terms and conditions;
- Service Level Agreement (SLA) which includes provisioning intervals for interconnection services, quality measures and penalties in case of non-compliance.

An illustrative outline of a RIO is provided in Annex A - .

4 Interconnection Services

Interconnection services may be required by any Service Provider licensed to provide any type of telecommunications service. Interconnection services are defined in Annex B.

4.1 Prerequisites for Interconnection Services

a) Interconnection services must ensure, at any time and without limitation, any-to-any communication to the benefit of the end-user. Interconnection services as wholesale products relate to telecommunication services (voice, data, fixed, mobile, value added services, etc.) provided over communications networks, irrespective of their origin or their routing.

b) Dominant Service Providers may be required by the Commission to include certain interconnection services in their Reference Interconnection Offer. The Commission may also impose such requirements as an outcome of the process of Designation of Markets and Dominance in the Telecom Sector.

4.2 Additions or Changes to Interconnection Services

a) Dominant Service Providers are required to obtain the approval of the Commission prior to additions or changes to interconnection services being introduced.

Dominant Service Providers shall publish an updated RIO on its website within 15 days of the approval by the Commission.

b) Appropriate time must be allowed for other Service Providers to make the necessary modifications or adjustments to their systems and networks due to the additions or changes to the interconnection services. Unless otherwise agreed between the parties, this shall be at least 60 days in advance of these additions or changes being introduced.

c) In case of migration of interconnection to more efficient technologies (e.g. from TDM towards IP-technology), such major changes must be coordinated with all interconnection partners. A notice period of 2 years prior to the start of such major changes shall apply. The coordination shall take place in accordance with section 7.2 and 7.5 of these Rules and shall encompass at least the following aspects:

- Network architecture, number and location of PoIs;
- Technical Interfaces for transport and signaling with unified national implementation based on international standards;
- Billing and accounting;
- Transport, Signaling, routing and numbering aspects;

- Quality of service (end-to-end) and Service Level agreements;
- Migration strategy and timelines for changes;
- Termination or obsolescence of existing services.

d) Each Service Provider shall bear its own costs for any migration of interconnection to new technologies over those costs for existing interconnection, to encourage evolution to more efficient technologies.

5 Interconnection – Technical Aspects

This section describes the technical aspects of interconnection, covering the physical form of interconnection and network aspects including switching, routing, transport, signaling, interfaces, numbering and quality of service as well as network interoperability.

5.1 The Physical Form of Interconnection

a) The physical form of interconnection is the linking and interworking of the telecommunications networks/systems of Service Providers which permit users to communicate with one another.

b) The Point of Interconnection (POI) is the physical or virtual point at which Service Providers connect their systems through interconnection links.

c) There are three main forms of physical interconnection where the Point of Interconnection may be located:

- Site of the Service Provider offering interconnection – Collocated Interconnection;
- Site of the requesting Service Provider – Customer Sited Interconnection; and
- A point in between the sites of the Service Providers – In-span Interconnection.

d) The RIO of a Dominant Service Provider shall include:

- Offers for the three main forms of physical interconnection
- A list of locations offered for interconnection including maps to enable other Service Providers to make efficient choices on the selection of POIs for interconnection services. The details of these points offered for interconnection are to be maintained as an annex to a RIO. The list and the related information must be updated on a regular basis.
- All relevant technical specifications and standards for each POI including services and numbering provisions. The details must provide all necessary information to allow for technical network planning.
- Procedures for establishing, relocating or removing a POI in a Dominant Service Provider’s network. A Dominant Service Provider is obligated to provide other Service Providers with advance notice of any expected changes and to seek to minimize any adverse effect of any expected changes on the services provided.

5.2 Switching Network Interconnection

a) Efficient interconnection at the switching level is one of the most significant aspects of network interconnection. Switching in this context is meant to be technologically neutral and includes circuit and packet switched technologies.

b) The RIO shall:

- Address the approach for meeting the switching capacity requirements for interconnection traffic;
- Identify the rules governing the level at which switching point the interconnection will take place, e.g. at International Gateway, Service Node or Local Exchange or, in the case of IP interconnection, at which transport level interconnection will take place;
- Identify interconnection rules for switch diversity.

5.3 Network Interconnection Links and Routing

a) The Network Interconnection Links connect the networks of Service Providers and facilitate the conveyance of traffic between them. These links are between Points of Interconnection.

b) For initial interconnection, a configuration with two separate POIs in separate buildings and over physically diverse routes shall be regarded as sufficient.

c) Routing considerations for Network Interconnection Links shall include:

- Route capacity;
- Route dimensioning;
- Route diversity.

5.3.1 Route Capacity

a) A RIO shall identify the rules for minimum and maximum capacities and increments in which capacity may be provisioned.

b) For expansion of the route capacity, the number of POIs must be based on reasonable engineering principles including a justified need to provide network resilience.

c) A Dominant Service Provider may require other Service Providers to interconnect at more than one location or to a particular location taking into account the requirements of section 5.3.a of these Rules. Any such requirements must be based on reasonable engineering principles and a justified need to provide network resilience.

5.3.2 Route Dimensioning

Network Interconnection Links shall be provisioned according to international standards (e.g. maximum Erlang level). A utilization factor shall be established in order to determine when to upgrade links.

For a “fully-provisioned” link a maximum utilization factor of 80% shall be used. Should the measured utilization of such a link regularly exceed the maximum utilization factor, then either traffic should be re-routed away from that link or the capacity of the link increased.

5.3.3 Route Diversity

a) Route diversity is defined as the communications routing between two points over more than one geographic or physical path with no common points. For interconnection between networks, route diversity is required in order to enhance reliability.

b) Interconnection service resilience shall be supported.

5.4 Signaling Network Interconnection

a) Service Providers must provide signaling interconnection and ensure control information is delivered for processing of session management.

b) Service Providers shall use ITU Signaling System Number 7 (SS7) for circuit switched technologies. For IP interconnection, a signaling standard that conforms to international standards may be agreed upon between the Service Providers in accordance with sections 7.2 or 7.5 of these Rules or may be determined by the Commission.

c) Dominant Service Providers shall specify signaling interconnection options and the associated configurations.

5.5 Synchronization

Synchronization is necessary for interconnected networks. Service Providers shall agree on the technical standards and operational procedures for synchronization.

5.6 Interface Standards and Interoperability

Service Providers shall use network interfaces based on internationally accepted technical standards.

5.6.1 Network Interoperability

a) Interoperability means the technical features of a group of interconnected systems that ensure end-to-end provision of a given service in a consistent and predictable way.

b) Service Providers must agree on the interoperability testing procedures that verify network integrity and interoperability of functionalities and features of interconnection services.

5.6.2 Supplementary Services

Dominant Service Providers providing supplementary services to their end-users are required to make the necessary technical and operational arrangements with interconnecting Service Providers to support the availability of these supplementary services to the end-users of the interconnecting Service Provider. A Dominant Service Provider may require reciprocal arrangements for such services from the other Service Providers.

5.7 Numbers and Addressing Elements

Service Providers shall provide details of numbers and addressing elements on their networks. This shall include number ranges allocated by the Commission but not yet activated.

5.8 Quality of Service

A RIO must include a Service Level Agreement which describes the characteristics of the interconnection services, the service level obligations and compensation details for failure to meet these obligations.

a) The Service Level Agreement shall include

- Service configuration and technical characteristics such as points of interconnection, routing and signaling;
- Operational and maintenance conditions and associated performance measures such as order lead time, network availability and service restoration time;
- Quality of Service indicators and grade of service measures; Such indicators shall include, but are not limited to those specified in the regulations of the Commission on quality of service. and
- Charges and penalties for non-compliance with service level objectives.

b) A Dominant Service Provider shall be responsible for measuring and monitoring the quality of service for the interconnection services it provides.

6 Interconnection – Operational Processes

This section describes the operational aspects and processes of interconnection and the associated rules covering:

- Provisioning including planning, ordering and implementation processes such as installation testing and commissioning;
- Operations and maintenance processes including network operations, traffic and routing management, fault management, operational testing, safety and system protection;
- Billing processes, call detail records, payment and reconciliation.

6.1 Provisioning Processes

The RIO of a Dominant Service Provider shall fully specify the provisioning processes for the interconnection services to be provided to the other Service Providers including but not limited to:

- Network planning;
- Traffic forecasts;
- Ordering of interconnection services and lead times;
- Implementation.

6.1.1 Network Planning

a) A Dominant Service Provider shall specify the network planning process in a RIO including but not limited to:
    - Planning of new interconnection links;
    - Removal of interconnection links;
    - Interconnection capacity forecasts;
    - Transport network interconnection.

b) Service Providers are required to exchange forecast information to ensure sufficient capacity is available when needed.

c) Service Providers shall agree on the approach for the management of capacity.

6.1.2 Traffic Forecasts

a) Service Providers requesting or using interconnection services shall provide a rolling two-year forecast of traffic over each interconnection link. The forecast shall be for both voice and data and only related to the traffic the requesting Service Provider is responsible for. The rolling forecast shall be updated every six months.

b) The RIO of a Dominant Service Provider shall identify the detailed requirements for the provision of traffic forecasts.

6.1.3 Collocation

Service Providers with existing telecommunications facilities shall allow other Service Providers to collocate their telecommunications transmission systems at their telecommunications facilities, where such collocation is economically feasible and no major additional construction work is required.

The accommodation of equipment required for interconnection services at sites at which collocation for access purposes is already established shall be permitted where technically feasible.

6.1.4 Ordering Procedures

a) A RIO shall provide detailed procedures for the ordering of interconnection services.

b) A Dominant Service Provider shall respond within one calendar month to a request for interconnection services indicating acceptance or rejection.

c) Where the request is not accepted, a written response, indicating the reasons as well as an appropriate alternative proposal, shall be provided to the Service Provider making the request and a copy of the response provided to the Commission.

6.1.5 Lead Times

A Dominant Service Provider shall identify in its RIO the expected lead times associated with the ordering of interconnection services.

6.1.6 Implementation

a) The Implementation process for interconnection defined in the RIO shall cover installation, including construction and any civil works which may be required, testing and commissioning, and shall ensure that the quality of service standards are met.

b) For the commissioning and handover of an interconnection service, there shall be a formal sign-off by both Service Providers to indicate that the service has been provided to the agreed standards.

6.2 Operations and Maintenance Processes

The RIO of a Dominant Service Provider shall specify all the operations and maintenance processes associated with interconnection including but not limited to:

- Network management;
- Traffic and routing management;
- Fault management;
- Operational testing;
- Safety and system protection.

6.2.1 Network Management

A Dominant Service Provider shall ensure that one or more Network Operation Centers (NOCs) are operational 24/7 for management of the networks used for interconnection services.

6.2.2 Traffic Management

a) All interconnected Service Providers must have Network Traffic Management (NTM) capabilities for real-time surveillance and control of traffic flow in order to maximize the use of available capacity and maintain quality of service standards.

b) The RIO of a Dominant Service Provider shall specify procedures for dealing with NTM queries and problems.

c) Service Providers shall be responsible for measuring and monitoring both the traffic and the quality of service on all interconnection links in their network. A Service Provider may implement appropriate traffic controls within its own networks to safeguard against problems detected in the interconnected network of another Service Provider. In such case, fault management procedures shall apply.

d) Service Providers shall provide traffic and quality of service measurement data when requested by the Commission.

6.2.3 Routing Management

a) Service Providers must manage and jointly plan the routing of outgoing and incoming calls and data traffic in their networks up to the Point of Interconnection.

b) The RIO of a Dominant Service Provider shall provide the detailed framework for routing management.

6.2.4 Fault Management

a) A Dominant Service Provider shall describe in its RIO the procedures for fault management and related timeframes including:

- Contact details and escalation process for fault reporting;
- Detection of faults;
- Processing of faults.

b) All Service Providers are required to provide 24/7 contact points for reporting of faults.

c) A Service Provider detecting a possible fault that may affect interconnection services shall inform the other interconnected Service Provider immediately. This shall be done irrespective of whether or not the fault is within the detecting Service Provider's network.

d) Following a reported fault, Service Providers shall determine who is responsible for the fault and proceed to clear the fault and restore service.

e) In the event of a fault, all concerned Service Providers shall share as much information as may be required to resolve the problem and restore service to normal operation.

f) Service Providers should develop and operate a fault reporting and tracking system.

6.2.5 Operational Testing

Operational and maintenance testing shall be undertaken with minimal impact on traffic flow. The scheduling shall be mutually agreed and testing shall preferably take place at the lowest traffic period of the day.

6.2.6 Safety and System Protection

a) Service Providers are responsible for the safety and operation of their own systems.

b) Service Providers have an obligation to protect the integrity and ensure the safe operation of their interconnected networks and shall adopt measures for providing safety protection to all personnel and users.

c) A RIO shall include safety standards and procedures to ensure the safety of the staff of another Service Provider that works at a Dominant Service Provider's site. The range of safety standards shall cover physical safety, electrical safety, electromagnetic

radiation and any other aspects required by national law, industry standards or CITC regulations.

6.3 Billing Processes

a) The RIO of a Dominant Service Provider shall fully describe the billing processes including but not limited to:

- Charging Data Records;
- Charging principles for interconnection services;
- Payment process;
- Billing reconciliation.

b) Service Providers offering interconnection services shall have the capability to measure, record and bill the charges for these services.

6.3.1 Charging Data Records

a) In case the billing of an interconnection service depends on the traffic exchanged, billing shall be based on charging data records (CDR) as inputs to the billing system.

b) The billing party shall store billing data for a period of at least one year. The data shall be in easily retrievable format if required for recalculation of any due amounts.

6.3.2 Payment Process

A RIO shall document a formal payment process including the billing and payment periods, invoice format, invoice queries, transmittal of invoice and other payment details such as settlements.

6.3.3 Billing Reconciliation

a) A RIO shall describe the reconciliation process for billing.

b) The reconciliation process shall be undertaken in good faith and interconnecting Service Providers shall work together to reach a satisfactory resolution of billing issues.

c) A RIO shall also define procedures for handling unresolved billing issues.

7 Management of Interconnection

7.1 Services Management

a) Dominant Service Providers offering or providing interconnection services shall designate a Services Manager to deal with other Service Providers requiring interconnection and other services. The role of the Services Manager is to facilitate communication between Service Providers on commercial and technical aspects of interconnection and the provision of other services to Service Providers.

b) Dominant Service Providers shall agree to meeting with other Service Providers within five working days of the meeting being formally requested.

7.2 Joint Technical and Operational Committee

a) Interconnected Service Providers shall establish a joint technical and operational committee. The joint technical and operational committee shall facilitate discussion to reach mutually acceptable agreements on technical, operational, planning, billing and other service aspects of interconnection.

b) The composition of the joint technical and operational committee shall be agreed upon by the Service Providers and could be reconstituted as and when required.

c) The joint technical and operational committee shall meet at regular intervals with an agenda agreed in advance and may cover one or more of the following areas:

- New Points of Interconnection;
- Analysis of traffic levels;
- Service quality;
- Capacity requirements;
- Fault analysis;
- Billing processes;
- Network and/or service changes;
- Change of technical interconnection standards;
- Any other technical and operational issues associated with interconnection.

7.3 Provision of Information between Service Providers

7.3.1 Network Information

A Dominant Service Provider offering interconnection services shall provide relevant information about its network and services to other Service Providers in order to assist these Service Providers in network planning, financial planning and operation of their networks. Such information has to be provided within 15 days after the request has been received.

7.3.2 Planned Network Changes

All Service Providers shall provide reasonable notice to all other Service Providers about any planned network change or upgrade which may be expected to affect the operation of interconnection arrangements between the Service Providers. Sufficient time shall be allowed for Service Providers to make necessary changes or adjustments to their systems and networks to ensure continuity of service. The minimum period of advance notification shall be 60 days unless agreed otherwise.

7.3.3 Interconnection Links Database

All Service Providers shall maintain a database of the interconnection links between their networks and those of other Service Providers. This database shall contain all related information such as:

- A unique identifier (common to both Service Providers) of each interconnection link;
- The details of the terminating equipment and facilities;
- Information on the transmission path including capacity;
- Traffic routing plan;
- The signaling plan.

The information contained in this database shall be provided in electronic form to the Commission upon request.

7.4 Dispute Resolution

Any disputes between two Service Providers on entering into an agreement, on the failure to reach an agreement, or on the interpretation of an agreement, related to the obligations of one of the Service Providers under these Rules, may be referred to CITC by either of the parties according to Chapter 6 of the Bylaw.

A Dominant Service Provider shall include in its RIO the procedure for resolving disputes including notification, meeting and response times, and the time limit for resolution before the dispute is escalated to the next level.

The dispute resolution procedure of a Dominant Service Provider shall include an escalation process through various levels:

Level 1: Resolution at an operational working group level;

Level 2: Referral of dispute to senior management level of the concerned Service Providers;

Level 3: Referral to the Commission in accordance with Chapter 6 of the Bylaw.

7.5 Multilateral Working Group

A multilateral working group for the purpose of facilitating interconnection may be established. If established, all concerned Service Providers shall participate in such a multilateral working group. The working group shall establish terms and procedures. The multilateral working group, if initiated, shall hold periodic meetings at least quarterly. The Commission may participate in such meetings.

The multilateral working group may establish sub-groups which may consist of regulatory, operational or technical staff as required to address specific issues as they arise. Such working groups shall aim at establishing industry solutions, standards and procedures, including on issues such as:

- Operations and maintenance processes;
- Management of interconnection;
- Technical standards and interfaces;
- Migration issues;
- Introduction of new services (e.g. data services, IP interconnection, wholesale products).

Consensus and results achieved in the working group shall be compiled in written form. Service Providers are to implement the agreed results and where appropriate to include them in their Reference Interconnection Offers and/or interconnection agreements and submit the revised documents to the Commission in accordance with the Statutes. Results, outcomes and meeting minutes are to be made available to all members, other Service Providers and the Commission.

8 Interconnection Pricing and Cost Studies

8.1 Interconnection Pricing

For Dominant Service Providers, the following conditions shall apply:

a) Charges for interconnection services provided by Dominant Service Providers shall be cost-based. In determining the interconnection charges the Commission may allow for the allocation and recovery of joint and common costs, consistent with international best practice.

b) For interconnection pricing a long run incremental cost (LRIC) approach may be required by CITC.

c) Consideration may be given by the Commission to other approaches such as benchmarking using the interconnection charges for service providers in other countries, or using a retail minus approach where wholesale prices are set on the basis of the retail prices of the corresponding final services and then applying a discount.

d) Service Providers shall provide to CITC all information necessary to determine the Interconnection charges.

Charges for interconnection services provided by non-dominant Service Providers shall be based on commercial agreements. Commercial agreements must adhere to commercially reasonable and technically feasible conditions.

8.2 Interconnection Charges

Per-unit charges for wholesale fixed and mobile call termination services shall be symmetrical.

A RIO shall identify the tariff structure and level for all interconnection services offered by a Dominant Service Provider.

The interconnection charges in a RIO must be transparent and non-discriminatory. The same rates shall apply for the same interconnection services provided under similar conditions to all Service Providers.

A Dominant Service Provider shall impute to itself the same charges for interconnection services which are used to provide its own services or the services of its other business units or affiliates.

8.3 Cost Studies

The allocation of costs for the determination of interconnection charges in a RIO shall be based on appropriate cost studies, consistent with the regulations of the Commission, and with the following high-level principles:

- **Cost causality:** Costs and assets shall be allocated on the basis of the true drivers of cost, i.e. those activities or services which cause the costs to be incurred or the assets to be purchased;
- **Transparency:** The allocation mechanisms shall be clear, understandable and consistent throughout the allocation process;
- **Materiality:** Costs and assets shall be grouped into cost categories for allocation; these cost categories should be material in terms of financial magnitude.

Annex A - Illustrative Outline for a RIO

The outline for a RIO given below is for illustrative purposes only. As long as the Interconnection Rules are followed, the structure, format and arrangement of contents may vary.

A.1. Framework Agreement

- Preamble, definitions and interpretation
- Commencement and duration
- Confidentiality and non-disclosure
- Intellectual property rights
- Legal rights, protections and extent of liabilities
- Review, renewal rights and obligations
- Terms associated with breach, suspension and termination of the agreement
- Provisions for staff safety and systems protection
- Disputes and arbitration
- Force majeure, waiver and assignment
- Authorized representatives and notices
- Governing law and jurisdiction

A.2. Service Definition

- Service definition and description
- Service configuration
- Service provisioning
- Technical characteristics
- Operational conditions

A.3. Technical Aspects

- Network interconnection
- Network interconnection links and routing
- Signaling network interconnection

- Synchronization
- Interface standards
- Numbering and addressing

A.4. Service Level Agreement

- Quality and grade of service
- Penalties for non-compliance with service level objectives

A.5. Operational Processes

- Provisioning processes
  - Network planning
  - Traffic forecasts
  - Collocation
  - Ordering procedures
  - Lead times
  - Implementation
- Operations and maintenance processes
  - Network operation
  - Traffic management
  - Routing management
  - Fault management
  - Operational testing
  - Safety and system protection
- Billing processes
  - CDR generation and mediation
  - Payment process
  - Reconciliation

A.6. Management of Interconnection

- Services management
- Joint technical and operational committee

- Provision of information between Service Providers
- Network information
- Planned network changes
- Interconnection links database
- Dispute resolution

A.7. Interconnection Pricing

- Rates
- Billing procedures
- Terms & conditions

Annex B - Interconnection Services

Interconnection services must be provided by all Service Providers when requested and are subject to mutually agreed commercial conditions. In case a Service Provider is designated as dominant in a defined market for certain interconnection services, the Dominant Service Provider must offer such services to other Service Providers and must conform with the conditions set out in the CITC Statutes including the terms and rates approved by CITC.

B.1 Overview of Interconnection Services

This Annex contains descriptions of the following interconnection services:

- Wholesale fixed call termination service
- Wholesale mobile call termination service
- Wholesale fixed voice call origination service
- Wholesale fixed intelligent call origination
- Wholesale mobile intelligent call origination service
- Wholesale transit interconnection service
- Wholesale international voice call services
- Wholesale leased line services and managed network transmission services
- Interconnection link service
- IP transit service
- Private Peering Service
- Wholesale bitstream access service
- Line sharing access service
- Virtual unbundling service
- Pure resale of telecommunications services
- Wholesale line rental
- MVNO hosting service
- Wholesale national roaming service
- Wholesale signaling for international roaming
- SMS termination service
- MMS termination service

- Video call termination service
- Collocation
- Ancillary services
    - Emergency services
    - Directory services
    - Supplementary services
    - Operational support systems.

B.2 Interconnection Services Descriptions

The above list in section 1 is not intended to be exhaustive. Further interconnection services may be defined by the Commission at any time as deemed necessary.

In the following descriptions, Service Provider A is requesting an interconnection service (requesting Service Provider A) and Service Provider B is offering the interconnection service. Any other Service Provider is referred to as Service Provider C.

B.2.1 Wholesale Fixed Call Termination Service

Wholesale fixed call termination service to geographic numbers is a call conveyance service provided by fixed Service Provider B through its network where a voice call handed over by requesting Service Provider A is carried from the Point of Interconnection to a called party's network termination point, the called party being a subscriber of Service Provider B.

Wholesale call termination service includes the following cases:

1. Requesting Service Provider A hands over a call originating on its own network for termination in the fixed network of Service Provider B.
2. Requesting Service Provider A provides a transit service and hands over to Service Provider B a call originating on Service Provider C's network, where Service Provider C is either a national or a foreign Service Provider.

Service Provider B is obliged to terminate such calls irrespective of the point of origination.

Fixed call termination services can be of three types depending on the location of the called party relative to the calling party:

- **Local call termination:** Where the calls are delivered through an interconnection link to the local node serving the end-user;
- **Single tandem call termination:** Where the calls are delivered through an interconnection link to a tandem (or transit) node that has a direct link to the local node serving the end-user;

- **Double tandem call termination:** Where the calls are delivered through an interconnect link to a tandem (or transit) node which does not have a direct link to the local node serving the end-user. In this case the call must be routed over one or more additional tandem nodes before being sent to the local node serving the end-user.

In case the network architecture changes, the above classification of service types may be revised according to the new architecture.

B.2.2 Wholesale Mobile Call Termination Service

Wholesale mobile call termination service is a call conveyance service provided by mobile Service Provider B through its network where the voice call handed over by requesting Service Provider A is carried from the Point of Interconnection to a called party's network termination point, the called party being a subscriber of Service Provider B.

Wholesale call termination service includes the following cases:

1. Requesting Service Provider A hands over a call originating on its own network for termination in the mobile network of Service Provider B.
2. Requesting Service Provider A provides a transit service and hands over to Service Provider B a call originating on Service Provider C's network, where Service Provider C is either a national or a foreign Service Provider.

Mobile Service Provider B is obliged to terminate such calls irrespective of the point of origination.

B.2.3 Wholesale Fixed Voice Call Origination Service

Wholesale fixed voice call origination service comprises the conveyance of a call from a calling party's network termination point through the infrastructure of fixed Service Provider B to a Point of Interconnection where the call is handed over to requesting Service Provider A for transit and/or termination. The wholesale fixed voice call origination service is required to enable provision of Carrier Selection Service.

"Carrier Selection" (CS) means a mechanism which allows Subscribers directly connected to one facilities based Service Provider network to proactively select an alternative facilities based Service Provider for voice telephony services. There are two main schemes for CS implementation:

a) Call by Call Carrier Selection (CBC CS) means a mechanism that allows Subscribers to select a facilities based Service Provider to carry their call each time a call is made. This is done by dialing a Carrier Identification Code (CIC).

b) Carrier Pre-Selection (CPS) means a mechanism that allows Subscribers to select, in advance, alternative facilities based Service Provider to carry their calls without having to dial a prefix or install any special equipment at their premises.

B.2.4 Wholesale Fixed Intelligent Call Origination

Fixed intelligent call origination comprises the conveyance of a call to an intelligent network service from a calling party's fixed network termination point through the infrastructure of offering Service Provider B to a Point of Interconnection where the call is handed over to requesting Service Provider A for connection to the intelligent network service and termination. These are, for example, calls to freephone or premium rate services.

B.2.5 Wholesale Mobile Intelligent Call Origination Service

Mobile intelligent call origination comprises the conveyance of a call to an intelligent network service from a calling party's mobile network termination point through the infrastructure of offering Service Provider B to a Point of Interconnection where the call is handed over to requesting Service Provider A for connection to the intelligent network service and termination. These are, for example, calls to freephone or premium rate services.

B.2.6 Wholesale Transit Interconnection Service

Wholesale transit interconnection service comprises the conveyance of a call originating with requesting Service Provider A through the Point of Interconnection to the network of Service Provider B and then through another Point of Interconnection to the network of Service Provider C. Service Provider B is providing call transit service. For example, Service Provider B may route traffic from one local Service Provider A to another local Service Provider C, or from a local requesting Service Provider A to a long distance or a mobile Service Provider C.

Service Provider B providing the wholesale transit interconnection service is responsible neither for origination nor termination of the call.

B.2.7 Wholesale International Voice Call Services

Wholesale international voice call services (international transit service) is the conveyance of outgoing and incoming international calls from/to the network of Service Provider A through the Point of Interconnection with the network of Service Provider B. Any Service Provider licensed to provide international access services can provide such services to any Service Provider's end-users in combination with voice call transit service and/or a fixed/mobile voice call termination service.

B.2.8 Wholesale Leased Line Services and Managed Network Transmission Services

Wholesale leased line services and managed network transmission services (transmission link services) provide fixed transmission capacity between two points over the access and/or core transport network (thus covering access segments and/or trunk segments) of any Service Provider B to any other requesting Service Provider A.

This service encompasses national and/or international leased line services and managed network transmission services.

B.2.9 Interconnection Link Service

Interconnection link service is a transmission link connecting one licensed requesting Service Provider A's interconnection node and another licensed Service Provider B's interconnection node passing through a Point of Interconnection. The interconnection link service serves to support the provision of the different interconnection services. Service Provider A may use transmission links provided by itself, and/or Service Provider B and/or Service Provider C to interconnect with Service Provider B.

Dominant Service Providers must offer interconnection link services.

B.2.10 IP Transit Service

IP transit is a metered data service where Service Provider B provides national and/or international bandwidth for IP traffic to all destinations in its routing table or identifies a default route with the intention to provide global internet connectivity (e.g. Internet traffic) to requesting Service Provider A.

B.2.11 Private Peering Service

Private peering is a service where two separate autonomous systems interconnect for the purpose of exchanging traffic between the users of each network. Private peering is implemented by a physical interconnection of the networks, using an interconnection link service including an exchange of routing information through the Border Gateway Protocol (BGP).

B.2.12 Wholesale Bitstream Access Service

Wholesale bitstream access is a service where requesting fixed Service Provider A leases a high-speed data link to the subscriber's premises from another fixed Service Provider B. Voice services may be provided by Service Provider B over the same local loop infrastructure at the same time. Requesting Service Provider A may offer broadband data services to users on the leased bitstream access facilities. Service Provider A may interconnect with Service Provider B either in a central location or at the distributed local exchange locations. The interconnection link aggregates the traffic from several bitstream access links.

A bitstream access offer shall include all elements necessary to provide high-speed data service to the users. No additional user charges by Service Provider B for the high-speed data service shall be applicable. The bitstream access service shall include various options of uplink and downlink speeds. Service Provider B shall offer at least the same speeds as it offers to its own subscribers.

B.2.13 Line Sharing Access Service

Line sharing access is a service where a requesting fixed Service Provider A uses only the non-voice frequency spectrum of the copper pairs provided by fixed Service Provider B to provide Digital Subscriber Line (DSL) services. Service Provider B offering the wholesale service continues to provide circuit switched voice telephony service, while requesting Service Provider A delivers services over the same local loop, using the higher part of the frequency spectrum. No aggregation of data streams is provided by Service Provider B.

B.2.14 Virtual Unbundling Service

Virtual unbundling is a service by which requesting fixed Service Provider A uses a virtual connection provided by Service Provider B, to provide services to subscribers connected to fixed Service Provider B's next generation access network. Thus virtual unbundling should allow a similar level of flexibility in retail product design as physical unbundling. Service Provider A can interconnect with Service Provider B directly at local exchange level. Virtual unbundling allows requesting fixed Service Provider A to deliver services over fixed Service Provider B's (next generation access) fiber network with a degree of control that is similar to physical unbundling of the local loop. Virtual unbundling allows fixed Service Provider A to decide for themselves on retail bandwidth usage, retail pricing and retail services bundling. Thus, the service may be of the same quality as if it were a physically unbundled line..

B.2.15 Pure Resale of Telecommunications Services

Pure resale is a service where Service Provider A purchases a product from facilities based Service Provider B, and, without adding its own network elements, sells it to the end user under its own brand and with its own price plan. Service Provider A also bills the end user. Service Provider A has very limited ability to influence product quality compared to Service Provider B. The basic value added of Service Provider A lies at the retail level such as pricing, customer service and billing.

Examples of 'pure' resale may include fixed voice communications services, fixed data communication services, mobile voice communications services, mobile data communication services, short messaging services and multimedia messaging services.

B.2.16 Wholesale Line Rental

Wholesale line rental is a form of resale of voice telephony services where Service Provider A requests the access line and all services linked with it from fixed facilities based Service Provider B. Such services may be the voice telephony service, supplementary services, access to emergency services and premium rate services, etc. Call services are provided by Service Provider A via Carrier Pre-Selection.

For the retail subscriber of the voice telephony service, Service Provider A is the single point of contact for customer service issues including for retail billing.

B.2.17 MVNO Hosting Service

A mobile virtual network operator (MVNO) hosting service is a service that allows a requesting licensed Service Provider, without spectrum assignment or a radio access network, to lease mobile network capacity from a facilities based Service Provider and use this capacity to offer its own mobile services to end-users.

B.2.18 Wholesale National Roaming Service

Wholesale national roaming service is a service where a requesting mobile Service Provider's subscribers may be hosted using the facilities and/or services of a second mobile Service Provider's mobile telecommunications network where these subscribers are out of range of their own mobile telecommunications network coverage.

B.2.19 Wholesale Signaling for International Roaming

Wholesale Signaling for International Roaming is a service where a Service Provider B provides the use of SS7 signaling through its International Gateways when requested by a mobile Service Provider A, to facilitate international roaming.

When requested by a Service Provider A, Service Provider B provides a direct connection to any Signaling Transfer Point of other international operators outside of the Kingdom.

B.2.20 Short Message Service (SMS) Termination Service

Short message service (SMS) termination service is the conveyance of short messages provided by mobile Service Provider B through its network where an SMS handed over by requesting Service Provider A is carried from the Point of Interconnection to the receiving party's network termination point, the SMS receiving party being a subscriber of Service Provider B.

SMS messages may also originate via web based browser applications.

B.2.21 Multimedia Messaging Service (MMS) Termination Service

Multimedia messaging service (MMS) termination service is the conveyance of multimedia messages provided by mobile Service Provider B through its network where an MMS handed over by requesting Service Provider A is carried from the Point of Interconnection to the sent party's network termination point, the MMS receiving party being a subscriber of Service Provider B.

MMS may also originate via web based browser applications.

B.2.22 Video Call Termination Service

Video call termination service is the conveyance of a video call provided by mobile Service Provider B through its network where a video call handed over by requesting Service

Provider A is carried from the Point of Interconnection to the called party's network termination point, the called party being a subscriber of Service Provider A.

B.2.23 Collocation

Collocation is a service where a Service Provider B makes available space, infrastructure or telecommunications facilities to another requesting Service Provider A. Service Provider A typically has 24-hour by 7-day access to the collocation space or room to install, operate and maintain its own transmission systems. Such services may be necessary for the provision of access and interconnection services and must be offered by Dominant Service Providers. The service description shall indicate the terms and conditions including site access procedures and access to on-site facilities such as air conditioning, lighting, and power.

Collocation services can take the following forms:

a) Dedicated collocation: where Service Provider B provides a custom-built, dedicated, segregated and secured space for the installation of Service Provider A's telecommunications equipment.

b) Adjacent collocation: where Service Provider B provides space in an enclosed but separate structure within or near the site boundary of its existing structure.

c) Co-mingling: where Service Provider B provides floor space or space within a rack. Equipment belonging to the different Service Providers will be inter-mixed directly with each other on the floor and/or rack. Space may be filled sequentially by the different Service Providers.

d) Distant collocation: where Service Provider B provides space in an enclosed structure at some distance, but not adjacent, to its existing structure. The two locations are interconnected by external transmission facilities.

e) Virtual collocation: where Service Provider B gives Service Provider A the ability to interconnect to Service Provider B's services or facilities without physical access by its personnel to a collocation space. Service Provider A provides its own transmission equipment or leases it from Service Provider B. Service Provider B then handles the installation, maintenance, operation and repair of the equipment at Service Provider A's direction on a non-discriminatory basis. Service Provider A does not have access to the virtual collocation space or the equipment but can electronically monitor and control its communications channels terminating in such equipment.

Dominant Service Providers must offer dedicated collocation services as first priority. In case dedicated collocation is not possible due to proven space restrictions, adjacent collocation services shall be offered by Dominant Service Providers as default. Where such collocation services are not economically feasible a Dominant Service Provider must, as an alternative, offer co-mingling or distant or virtual collocation.

B.2.24 Ancillary Services

B.2.24.1 Emergency Services

All Service Providers must provide emergency services to their end-users free of charge. In order to ensure the full availability of emergency call services to all users, the Incumbent must offer an interconnection service to all other requesting facilities based Service Providers for emergency call services. The Incumbent may establish a charge for providing this interconnection service.

B.2.24.2 Directory Services

A Service Provider may choose to establish its own directory services. Each Service Provider is required to provide other service providers upon request with all necessary data for the supply of such a service against financial compensation. The data shall be provided online by access to an online database or offline by file transfer.

B.2.24.3 Supplementary Services

Supplementary Services are network based services that may be offered by Service Providers and shall be supported by interconnecting Service Providers. Examples of such features for which interoperability between Service Providers may be required are:

- Calling line identification presentation (CLIP) by presentation of a number in ITU-T E.164 format;
- Calling line identification restriction (CLIR);
- Call transfer;
- Call waiting;
- Conference call;
- Ring-back when free
- E.164 number portability
- Malicious call tracing
- Dual-tone multi-frequency signaling (DTMF)
- In-band audio tones and announcements to the user.

B.2.24.4 Operational Support Systems

Interconnection with support systems shall be offered by Service Providers upon request in order to enable more efficient processes between Service Providers (e.g. interfaces between business management systems like fault management and ordering).