

Republic of Lebanon

Telecommunications Regulatory Authority

Decision No: 4/2009

Interconnection

Regulation

The TRA, during its meeting held on 18/03/2009

Pursuant to law No 431 dated 22/07/2002 (Telecommunications Law), in particular Article 29,

Pursuant to Decree No 14264 dated 4/03/2005 (Financial and administrative management of the Telecommunications Regulatory Authority),

Pursuant to Decree N° 1 dated 08/02/2007 (Appointment of the TRA Board),

And upon the advice of the Council of State (Opinion No. 39/2008-2009 dated 29/01/2009),

Issued the following regulation:

Chapter 1 Purpose and Scope of the Regulation

Article 1 Background

1. This Interconnection Regulation (the Regulation) is issued by the Telecommunications Regulatory Authority (Authority) under the Telecommunications Law - Law No. 431 of 2002 (Telecommunications Law).
2. This Regulation is a binding regulation that states the official policies and procedures of the Authority. It may be subject to review and amendment following consultation and promulgation processes required by the law. Such review and amendment may be undertaken periodically as deemed necessary by the Authority in light of the development of the Lebanese telecommunications markets, changes to Lebanese national laws affecting the telecommunications sector, or other factors.

Article 2 Legal Basis

1. Telecommunication Policy

Having determined to transform the telecommunications sector in Lebanon from a state-owned monopoly to a competitive market, open to private participation, the Government of Lebanon promulgated the Telecommunications Law to achieve this purpose.

2. The Authority's Mandate and the Telecommunications Law

- a. The Telecommunications Law grants the Authority the power to issue regulations pertaining to competition, interconnection, dispute resolution, pricing, quality of service, consumer affairs, spectrum and any matter which the Authority deems necessary to implement the Telecommunications Law.
- b. The Authority has issued the present Regulation in order to ensure that newly established or potential entrants to the telecommunication market are able to interconnect and enter the Lebanese telecommunications market on terms and conditions enabling them to compete with other service providers.
- c. To that end, Article 29 of the Telecommunications Law provides:
 - 1) All Service Providers with Significant Market Power shall establish Interconnection with other Service Providers for the transmission and receipt of data, provide the necessary facilities and arrangements for that purpose, and establish and apportion the charges thereof, pursuant to the conditions set by the Authority.

2) Interconnection among Service Providers shall be established by agreement within a maximum period specified by the Authority. In the event that Public Telecommunications Services Providers fail to agree on terms of Interconnection within the maximum period specified by the Authority, the Authority may, at its own initiative, impose Interconnection terms pursuant to its own rules and requirements.

The Authority shall publish, at the expense of the concerned parties, a summary of the basic terms of the Interconnection agreements in the Official Gazette and in two local newspapers.

3) The Authority may approve or impose amendment to the provisions relating to Interconnection between Public Telecommunications Services Providers authorized by foreign countries in accordance with the international accounting rate framework, including the accounting rates and settlement arrangements agreed upon by the concerned parties before the agreement becomes effective.

4) Public Telecommunications Services Providers shall comply with all international treaties and bilateral agreements relating to international accounting arrangements, as well as with any rules adopted by the Authority concerning such arrangements where international services are provided pursuant to an international accounting rate framework.

5) Disputes arising between Public Telecommunications Services Providers over Interconnection terms and practices shall be resolved by arbitration in equity unless otherwise specified by the Interconnection agreement.

The Authority shall set the rules and procedures for the arbitration of disputes resulting from Interconnection agreements.

3. The Authority has based this Regulation on the provisions of the Telecommunications Law which is a *lex specialis*, taking precedence over other generally applicable laws that may apply when determining the appropriate standards and practices promulgated in this Regulation.

Article 3 Interpretation

Individual regulations containing the word 'shall' are mandatory requirements and are binding on service providers.

Individual regulations containing the word 'should' are recommendations to service providers but are not mandatory.

Individual regulations containing the word 'may' are permissions to service providers.

Article 4 Purpose of the Regulation

1. The principal purpose of this Regulation is to clarify the arrangements for interconnection and provision of services between service providers. This Regulation is also intended to guide service providers with Significant Market Power (SMP) , including Liban Telecom - once designated as having SMP in the relevant market and, until such time as Liban Telecom is established, the Republic of Lebanon acting through the Ministry of Telecommunications (MoT) and Ogero - in the preparation of a Reference Interconnection Offer (RIO). The RIO will serve as the basis for the negotiation and execution of interconnection agreements between service providers.
2. This Regulation aims to ensure that all service providers are treated fairly and in a non-discriminatory manner.

This Regulation has been drafted with the vision of introducing full competition in the fixed and mobile telecommunications sectors in Lebanon.

This Regulation aims to encourage good practice by service providers and to promote the provision of high quality of service to users, through technical and economic efficiency.

A further aim of this Regulation is to express clearly the policy of the Authority with respect to the interconnection of public telecommunications networks in Lebanon.

This Regulation is expected to reduce the scope and occurrence of interconnection disputes.

3. The publication of a RIO will:
 - a. ensure transparency by defining the interconnection services offered by the publisher of the RIO, the applicable rates for such services and the applicable conditions of use;
 - b. limit the scope of negotiations between service providers thus ensuring that interconnection is offered on non-discriminatory terms; and
 - c. advise new entrants what services are offered by certain service providers with SMP and the costs and lead-times for the provision of such services, thus facilitating further investment in the Lebanese market for telecommunications services.

Article 5 Scope of the Regulation

1. This Regulation applies to all service providers who are entitled to or obliged to provide interconnection in Lebanon. The attached Annexes are deemed to be an integral part of this Regulation.
2. This Regulation does not apply to operators of private telecommunications networks or to users. Such operators shall be entitled to 'connection' services but not 'interconnection'. Connection services involve the physical linking of private telecommunications networks to public telecommunications networks in order to allow users of the former to communicate with users of the latter or with users of the same or another private telecommunications network or to access services provided on a public telecommunications network. Connection services are outside the scope of this Regulation.

Chapter 2 Definitions

Article 6 Definitions' Basis

In the event of conflict or ambiguity between the terms defined herein and the terms defined in a license or in the Telecommunications Law then the following order of precedence shall apply:

- a. Telecommunications Law.
- b. Interconnection Regulation.
- c. Service provider license.

Article 7 Definitions

In this Regulation, the following terms shall have the corresponding meanings:

Cost accounting - the preparation by service providers with SMP of accounting information according to the costing methodology and regulation regarding cost accounting prescribed by the Authority in order to identify the cost of providing a service.

Interconnect billing reconciliation process - the process of two interconnected service providers analyzing the differences between their respective calculations of an interconnect bill from one party to the other and attempting to reach a settlement.

Interconnection - The physical and logical link between telecommunications Networks used by one or more Service Providers in order to enable their Users or Subscribers to communicate with each other or to communicate with Users or Subscribers of another Service Provider, and to connect any one service to any other service via domestic or international Networks.

Local loop unbundling - a process that allows multiple service providers access to local loops.

Number portability – a service which allows a customer to change service providers while maintaining his access number.

Reference Interconnect Offer (or RIO) - a published reference document that sets out the full list of basic interconnect services and the terms and conditions, including charges, on which the licensee offers to interconnect with other licensees. The offer forms the basis of commercial negotiations between licensees to establish interconnection.

SMP - Significant Market Power as defined in the Telecommunications Law and which is further addressed in the SMP Regulation.

User choice call - a call originated by a user that chooses a different service provider from the one the user is directly connected to, to convey the traffic to its destination.

Chapter 3 Rights and Obligations Regarding Interconnection

Article 8 All Service Providers

1. Regardless of market power, all service providers have the right and obligation when asked by another service provider, to negotiate and sign interconnection with each other within ninety (90) days of receipt of a written request. In the event that service providers fail to agree on the terms of interconnection the Authority may impose terms of interconnection following this period in accordance with Art 29 (2) of the Telecommunications Law.
2. Service Providers negotiating their interconnection agreements should abide by Confidentiality of Information passed between themselves as part of this negotiation.

Service providers are obliged according to Art 28 of the Telecommunications Law to notify the Authority of all information relating to tariffs, including prices and terms and conditions.

Article 9 Service Providers with Significant Market Power

1. Service Providers with SMP are subject to the following obligations with respect to interconnection:
 - a. Obligation to establish interconnection following reasonable requests for access to facilities and interconnection services from service providers under conditions prescribed in this Regulation.
 - b. Obligation to provide timely interconnection services –service providers with SMP sign interconnection agreements (based on their RIO's as approved by the Authority) within sixty (60) days from the date a request for interconnection is presented by another provider.
 - c. Obligation of Transparency –service providers with SMP make public specified information such as a RIO with terms and conditions for interconnection, technical specifications, and cost based prices for interconnection services.
 - d. Obligation to publish –service providers with SMP publish their RIOs on their website within fifteen (15) days of the approval date by the Authority. The RIO comes into effect from the date of its publication in the Official Gazette or such other day as the Authority's decision may specify. Service providers with SMP may withhold publication of sections that have been designated as confidential by the Authority.
 - e. Obligation of non-discrimination –service providers with SMP should provide interconnection services to other service providers under the same terms and conditions (including without limitation prices and quality of service) as they provide to their own services, including those of subsidiaries.

- f. Obligation of accounting separation – this involves the preparation of separate accounts for different businesses and parts of businesses run by the same service provider, so that the costs and revenues associated with each business and part of a business (and transfers between them) can be separately identified and properly allocated. This obligation requires a service provider with SMP to make transparent its internal transfer prices for services it provides to itself. Such an obligation ensures compliance with obligations of non discrimination and prevents unfair cross subsidy.
- g. Obligation of price control and cost accounting – in accordance with Art 28 of the Telecommunications Law, prices for interconnection shall be compatible with the cost of providing that service. Service providers with SMP shall develop cost based interconnection rates according to the costing methodology or any regulation on cost accounting prescribed by the Authority. Any cost inefficiencies of service providers with SMP shall not be passed on through interconnection charges to other service providers. Charges related to universal service obligations shall be identified and treated separately and not bundled with interconnection charges.
- h. Obligation to provide unbundled services –service providers with SMP should offer unbundled interconnection services in such a way so as not to force another service provider to purchase a service that it does not require.

Article 10 Approval and Publication of RIOs and Interconnection Agreements

1. Service providers with SMP should prepare the initial RIO and submit it to the Authority for review and approval within ninety (90) days from the date of being designated by the Authority as having SMP.
2. RIOs shall be subject to approval by the Authority prior to publication. The Authority review shall be completed within ninety (90) days from the submission to the Authority of the draft RIO. The Authority will publish the approved RIO and amendments thereto as well as the Interconnection agreements on its website and shall publish a summary in the Official Gazette and two local newspapers at the expense of the SMP service provider. The Authority shall express in writing, within the ninety (90) day period, the reasons for not approving a submitted RIO thus giving an opportunity to the service provider to amend the proposed RIO accordingly within a reasonable period of time to be set by the Authority. In case service provider does not amend the submitted RIO within such period, the Authority may issue a decision specifying the terms and tariffs to be applied until such time the submitted RIO is approved by the Authority. Such a decision shall come into effect from the date of its publication in the Official Gazette or such other date as it may specify therein.

3. The publication of a new or updated RIO by a service provider with SMP does not remove the need for individual interconnection agreements between interconnecting service providers. These interconnection agreements shall reflect the technical and commercial aspects of the RIO together with all necessary contractual conditions and shall be submitted to the Authority for prior approval, and considered approved if no comments are provided by the Authority within sixty (60) days of submission. Should any agreement vary in any manner from the approved RIO, the parties must submit to the Authority a separate detailed note clearly identifying and justifying each and every variation. The Authority reserves the right to request in writing from all parties associated with any submitted agreement additional information as it deems necessary and withhold its approval on any submitted agreement until such time this information is received and assessed. Executed interconnection agreements must be submitted to the Authority within seven (7) days of their execution by the respective parties.
4. Changes to be made to an approved RIO resulting from new service offerings can be submitted quarterly. The Authority will issue its decision accepting or rejecting the changes within thirty (30) days from the date of filing the change request with the Authority. The approved changes shall be published in the same form and manner of a full RIO or as annexes to the RIO and shall come into effect on the date of publication of the Authority approval decision in the Official Gazette or such other day as the Authority's decision may specify. Annual review of the RIO must include the approved changes related to new service offerings.
5. Service providers with SMP shall annually update their RIO's within sixty (60) days from the annual anniversary date of their approved RIO's to reflect changes in the telecommunications sector, including the introduction of new services, the use of new technology, and changes in market conditions. All updates prior to publication are subject to determination and approval by the Authority within sixty (60) days from the date of their submission to the Authority. The service provider with SMP shall include in its RIO an amendment procedure that describes how changes will be made to the RIO's terms and conditions. The amendment procedure shall:
 - specify how other service providers will be informed about proposed changes and the timeframe for such changes; and
 - provide for submission and approval by the Authority the details of the proposed amendments.

Chapter 4 Management of Interconnection

Article 11 Account Management

1. Service providers offering interconnection services should provide a technical account manager and a commercial account manager to deal with other service providers using or seeking to use their services, to coordinate interconnection matters.
2. Service providers with SMP shall agree to meetings with an interconnected service provider (with SMP or otherwise) within five (5) days of meetings being formally requested by that service provider.

Article 12 Joint Technical Committee

1. Each pair of interconnected service providers should establish a joint technical committee. The joint technical committee should be a forum for discussion and agreement on technical, operational, planning, billing and service aspects. The decisions taken by this committee should be binding to both parties. The composition of the joint technical committee should be agreed between the service providers and may be amended as deemed appropriate. However, it should consist of an equal number of representatives from both service providers, and should include technical and commercial staff.
2. The joint technical committee should meet on a regular basis with meetings planned in advance. There should be an agreed agenda which should include at least the following items:
 - discussion of needs for new points of interconnect;
 - analysis of traffic levels;
 - analysis of service quality;
 - discussion of capacity requirements;
 - discussion and analysis of faults during the period since the previous meeting;
 - discussion of billing processes;
 - provision of relevant information; and
 - discussion of changes either to the network or service.
3. The Authority may attend the meetings of such committees if needed (e.g., to help resolve a dispute).

Article 13 Provision of Information between Service Providers

1. General network information

- a. Service providers with SMP offering interconnection services shall provide information about their network and services to service providers entitled to use these services. Unless agreed otherwise between service providers, information provided shall be limited to that which is relevant and sufficient for the service provider using the services to conduct network planning, financial planning and subsequently operate their network. All information provided between service providers shall be subject to the confidentiality rules defined in the RIO and interconnect agreements, and shall only be used for the purposes for which it is provided.
- b. A service provider shall provide the same level of information to all other service providers entitled to similar interconnection services according to non discriminatory principle.
- c. Service providers with SMP shall publish a standard set of information within annexes to their RIOs, rather than supply this specific information on demand. Service providers with SMP shall define the rules for routing traffic in normal and abnormal situations in a non-discriminatory manner including dealing with overflow, congestion and network management.
- d. In the event of a fault or major service failure, service providers shall share as much information as is appropriate to resolve the problem and restore service. Service providers shall share as much information as is necessary to enable interconnecting service providers to provide information and services to their customers on an equal and non-discriminatory basis with respect to their own directly connected customers.

2. Planned changes to networks

- a. Interconnected service providers shall inform each other about all plans and changes which may have an effect on their arrangements. Sufficient time shall be given to allow for service providers to make necessary adjustments to their systems and networks and ensure continuous service. Unless otherwise agreed this information shall be provided at least thirty (30) days in advance of any changes. Such changes may include:
 - changes to physical network, e.g. exchange closure or re-location;
 - upgrade of electrical/signaling specification; and
 - changes to-numbering.
- b. Service providers shall notify interconnected service providers of any significant changes made in the network that may affect the conveyance of calls and /or the quality of the calls. The service provider implementing the change should pay the costs incurred by the other service provider where their alterations cause the other service provider to change its system to continue to convey calls unless where the change is agreed upon or where the alteration is part of a planned upgrade program.

3. Records of interconnect links

- a. Service providers with SMP shall maintain a database of the interconnect links between their networks and those of other service providers. This database should contain all relevant information including:
 - A-end exchange – name, location, manufacturer, software release, signaling point code;
 - B-end exchange – name, location, manufacturer, software release, signaling point code;
 - transmission path – direction designation, type;
 - capacity-(and overflow mechanism if available);
 - associated signaling link(s);
 - type of use of link (outgoing only, incoming only, both way); and
 - any priorities (e.g. for links to emergency services).
- b. Service Providers with SMP shall provide the authority with information contained therein on a periodic basis and upon the Authority's request.

Chapter 5 Interconnection Services

Article 14 Overview

- This chapter provides examples of interconnection service and gives guidelines for the provision of the services. Interconnection services are provided by service providers to other service providers.
- Interconnection services are described within this chapter.

1	Call conveyance services	Services which involve the carriage of voice band calls over an interconnect route between telecommunications systems: - call termination; - call transit; - call origination; and - intelligent network call origination (including short code dialing and calls to premium rate services).
2	Transmission link services	The provision by a service provider with SMP to other service providers of network capacity links within the telecommunications system of the service provider with SMP.
3	Interconnection link services	The provision of an interconnect link capacity between the telecommunications systems of service providers.
4	Data interconnection services	Interconnection services which involve the carriage of packet-switched data between data networks.
5	Collocation and facilities sharing	The provision by a service provider with SMP of space in its premises or the use of part of its physical infrastructure, such as masts or towers or power or air conditioning, to other service providers.
6	Operator services	The provision of operator services, for example directory enquiries and emergency services, by a service provider with SMP to other service providers.
7	Supplementary call services	Services associated with call conveyance services but with value-added, advanced features such as calling line identification (CLI), ring back when free, divert on busy and conference calls.

- Service providers with SMP shall update the RIO before the introduction of a new interconnection service. Where a new service available to users requires either changes to the RIO or the introduction of a new interconnect service, such changes to the RIO shall accompany the launch of the new user service by the service provider with SMP. Reasonable time shall be given to allow for service providers to make necessary adjustments to their systems and networks and ensure access to the new service. Unless otherwise agreed such time shall be at least thirty (30) days in advance before the launch of the new user service.
- Service providers with SMP shall obtain the approval of the Authority before withdrawing an interconnection service. Service providers with SMP shall fully define their interconnection services and charges, including technical and commercial conditions, within their RIOs (see chapters 6 and 8). Other interconnection services which may be required in the future of service providers with SMP include, but are not limited to, Internet Protocol (IP) based interconnection, number portability and local loop unbundling.

Article 15 Call Conveyance Services

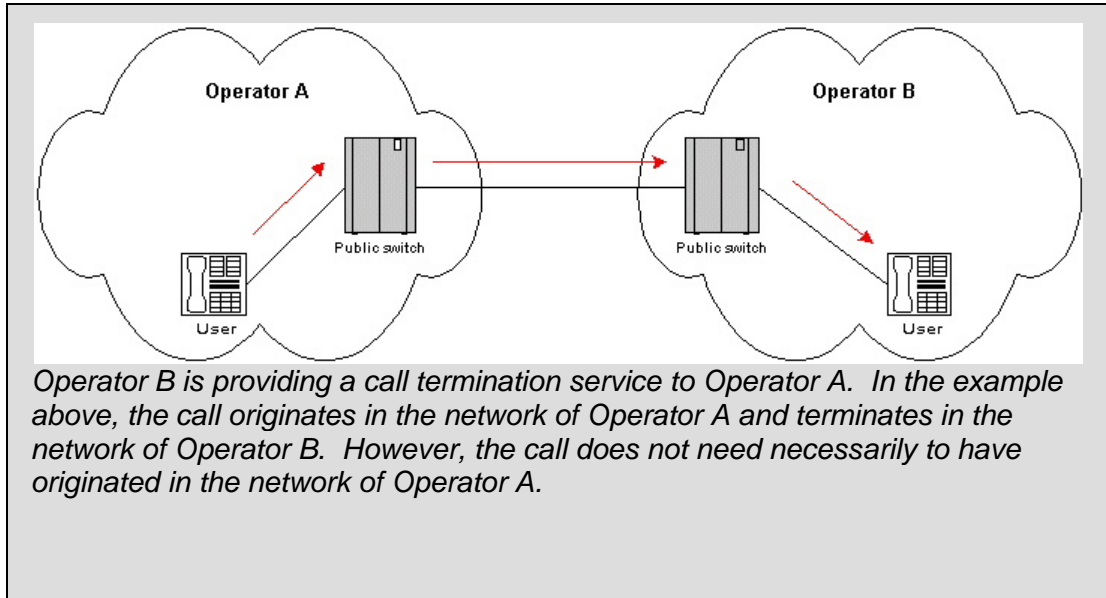
1. Overview

- a. Call conveyance services shall be defined as those services that involve a service provider conveying (carrying) basic voice band calls on its network (fixed or mobile) originating from, or terminating in, the telecommunications system of another service provider or foreign (international) service provider.
- b. Call conveyance services are used by service providers (in accordance with their licenses) with any of the following license types or services:
 - a. public switched telephone network (PSTN);
 - b. public mobile networks;
 - c. public payphone;
 - d. telephone pre-paid calling service;
 - e. paging;
 - f. data communications;
 - g. trunking; and
 - h. global mobile satellite services and VSAT.
- c. There are a number of different call conveyance services applicable to the current telecommunications sector in Lebanon:
 - i. call termination;
 - j. call transit;
 - k. call origination; and
 - l. intelligent network call origination (non-geographic calls using number translation services).

2. Call termination service

a. Service definition

A call termination service shall be defined as a service where a service provider receives voice band calls from an interconnected service provider, and then terminates (or completes) the calls within its own public telecommunications network. An example is shown below.



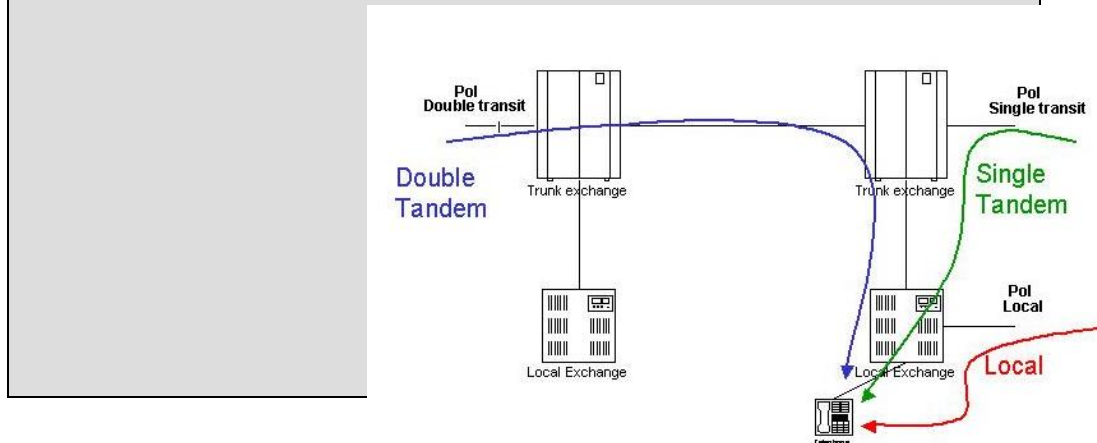
b. Requirement to provide service

Service providers with SMP shall be required to offer a call termination service to all other service providers.

c. Categories of call termination

- There are typically three categories of the call termination service provided on fixed voice networks:
 - a. **Local call termination:** where the calls are delivered on an interconnect link to the local exchange or parented remote concentrator to which the end-user is directly connected.
 - b. **Single tandem call termination:** where the calls are delivered on an interconnect link to a tandem (or transit) exchange which has a direct link to the local exchange to which the end-user is directly connected.
 - c. **Double tandem call termination:** where the calls are delivered on an interconnect link to a tandem (or transit) exchange which does not have a link to the local exchange to which the end-user is directly connected. The call must be routed over (at least) two tandem exchanges before being sent to the local exchange.

Categories of call termination service

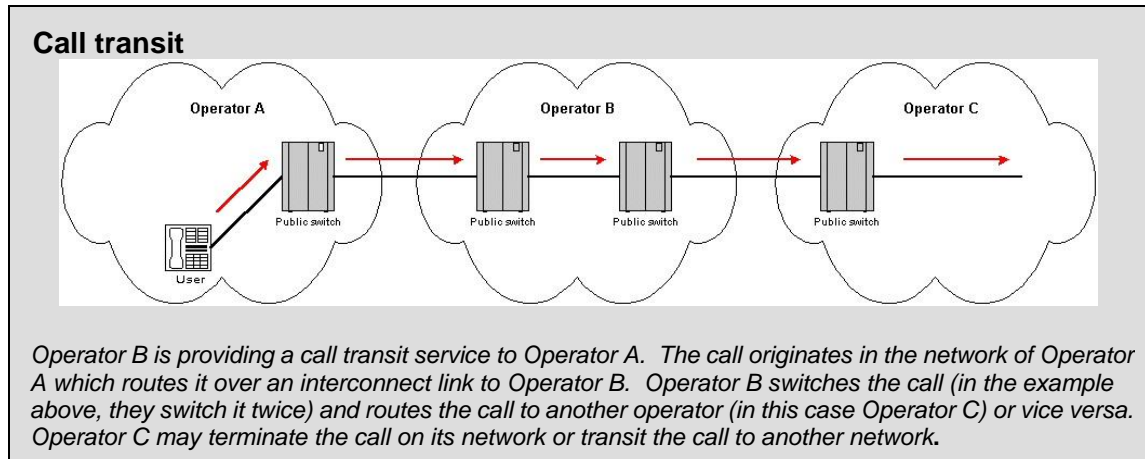


- The Authority notes that the network architectures of fixed and mobile networks are fundamentally different. When routing a call to a fixed network, it can be known where the end-user is located, i.e. on which local exchange. When routing a call to a mobile network, it is not known where the end-user is located at any point in time, i.e. on which main switching centre (MSC). There is no concept of a local exchange within mobile networks, although there may be exchanges used as tandems.
- The service provider with SMP operating the national PSTN shall initially offer a single tandem call termination service and a double tandem call termination service.

3. Call transit service

a. Service definition

- A call transit service is defined as a service where a service provider receives voice band calls from one service provider and routes them to the network of a different service provider. The service provider providing the call transit service does not originate or terminate the call within its own network.
- This service may be separated into two categories:
 - a. National call transit: a call transit service between service providers within Lebanon.
 - b. International call transit: a call transit service provided to service providers to transit their international calls to or from service providers in other countries.



b. Requirement to provide service

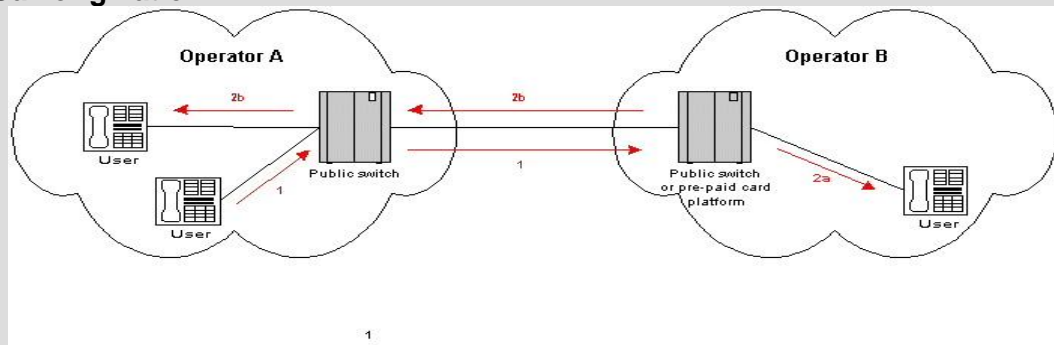
The service provider with SMP operating the national PSTN shall provide a national and international call transit service to all service providers.

4. Call origination service

a. Service definition

1. A call origination service is defined as a service provided for a user choice call. Thus one service provider provides calls to an interconnected service provider, and the originating service provider does not charge the calling user a retail tariff, but instead charges the other service provider at an interconnection rate for originating the call. The call could be for any destination and will not necessarily terminate on the network of the service provider who receives the call.
2. There are typically two categories of the call origination service:
 - c. Carrier selection: where the calling user (or the customer terminal equipment) inserts a prefix in front of the number that they are dialing.
 - d. Carrier pre-selection (CPS): the originating service provider has been instructed by the user which service provider should manage their service and calls are routed to that service provider automatically with no requirement for the dialing user to enter a prefix or non-geographic number. This is sometimes referred to as 'equal access'.

Call origination



Operator A is providing a call origination service to Operator B. The call originates in the network of Operator A which routes the call over an interconnect link to Operator B. Operator B may validate the call on a public exchange or pre-paid card platform and then route the call on for termination in their own network (2a) or to another network, e.g. Operator A (2b).

b. Requirement to provide service

3. The service provider with SMP operating the national PSTN shall be required to provide a call origination service to all other service providers.

5. Intelligent network call origination

a. Service definition

4. An intelligent network call origination service is defined as a service where the user dials a non-geographic number to a fixed terminating point on another service provider's network and is charged a fixed fee irrespective of the distance between the originating and terminating user. In some instances this charge to the originating user might be zero. These services include calls with short code dialed calls to levels 1, 8 and 9.
5. The intelligent network call origination service (sometimes called number translation services) typically covers:
 - e. Auto Freefone services where the caller pays nothing for the call but the terminating user pays;
 - f. Local Fee Call services where the originating user pays a local retail call tariff. The terminating user often pays a retail tariff for the service;
 - g. National Fee Call services where the originating user pays a national retail tariff; and
 - h. Premium Rate Services where the originating user pays a retail rate above the standard retail call tariff and receives some additional content. The terminating service provider may pay a portion of the revenue to the content provider.

b. Requirement to provide service

Service providers with SMP shall provide an intelligent network call origination service to all other service providers.

Article 16 Transmission Link Services

1. Service definition

- a. Transmission link services are defined as services where a service provider with SMP provides fixed capacity for the transmission of data between two fixed points over its network to other service providers.
- b. This shall include leased line circuits used by service providers between their own premises and international circuits but shall not include leased lines between a service provider and its users. Transmission link services may be provided using any appropriate technology including both fixed and wireless systems.

2. Requirement to provide service

- 6. Service providers with SMP offering PSTN services shall be required to provide transmission link services to all service providers.

Article 17 Interconnect Link Services

1. Service definition

- 7. Interconnect link services are defined as services where a service provider provides one or more links over which traffic between its network and the network of another service provider flows. Each end of an interconnect link is terminated on the network of a different service provider.
- 8. Interconnect link services may be provided using any appropriate technology including both fixed and wireless systems.

2. Requirement to provide service

- 9. The service provider with SMP offering PSTN services shall provide interconnect link services to all service providers.

Article 18 Data Interconnection Services

1. Service definition

- a. Data interconnection services are defined as services which involve the carriage of data between data networks. The termination of dial-up internet calls within the voice band is not a data interconnection service but a call conveyance service.
- b. These services may include:

- i. Packet Switching, Frame Relay and ATM services including those using IP Protocols; and
- j. international internet capacity.

2. Requirement to provide service

- 10. Service providers with SMP shall provide data interconnection services to other service providers if they have a suitable data network.

Article 19 Collocation and Facilities Sharing Services

1. Service definition

- 11. Collocation and facilities sharing services shall be defined as services where one service provider provides space in their premises and facilities to another service provider in order for them to install their own network equipment. The facilities provided may include, without limitation, electrical power, air-conditioning and security, cable ducts and space on antenna masts or towers.

2. Requirement to provide service

- 12. Service providers with SMP shall offer collocation and facilities sharing services. Other service providers may offer collocation and facilities sharing services.

Article 20 Operator Services

1. Operator assistance

- a. Service providers with SMP shall offer operator assistance services to other service providers.
- b. All service providers may establish their own operator assistance services but service providers with SMP shall enable other service providers to offer relevant operator assistance services via their network.

2. Emergency Services

- a. Service providers with SMP shall provide connection to emergency services to other service providers. The provision of emergency service calling to other service providers may be subject to tariffs, and such tariffs may be changed, in accordance with the license of the provider with SMP and subject to the approval of the Authority.
- b. Service providers shall cooperate to achieve a technical solution that provides prioritized capacity to connect to public emergency services.

3. Directory enquiry Services

13. Service providers with SMP shall provide directory enquiry services to other service providers.
14. Directory enquiry services to other service providers may be subject to tariffs, and such tariffs may be changed, in accordance with the license of the service provider with SMP and subject to the approval of the Authority.

Article 21 Supplementary Call Services

1. Service definition

15. Advanced call services shall be defined as value-added services associated with call conveyance services. Examples of such services are:
 - a. calling line identification presentation (CLIP);
 - b. calling line identification restriction (CLIR);
 - c. connected line identification presentation (COLP);
 - d. connected line identification restriction (COLR);
 - e. call transfer;
 - f. user-to-user signaling;
 - g. call notification (or call waiting);
 - h. ring-back on busy;
 - i. three-way call; and
 - j. conference calls.

2. Requirement to provide service

Where it is technically feasible, to introduce the mentioned services, then transparency for the benefit of users should be ensured.

Service providers shall cooperate to achieve feature transparency between interconnected networks of advanced services.

Chapter 6 Technical aspects

Article 22 Introduction

1. This chapter deals primarily with the interconnection of switched networks designed for the conveyance of voice calls and data calls within the voice bandwidth (dial-up internet access for example).
2. Other forms of interconnection including interconnection to data services and public payphone operators will require supplementary technical aspects which should be included in the RIOs of service providers with SMP.

Article 23 Interconnection of Public Exchanges

1. Provisions in this Regulation dealing with the interconnection of public exchanges are applicable only to service providers using public exchanges, including MSCs, to offer call conveyance services.
2. Service providers with SMP offering switched interconnection shall provide other service providers with details of their exchanges that are available for interconnection. Service providers with SMP shall provide this information within their RIOs. The information should include, but not be limited to:
 - a. name of exchange;
 - b. location (geographic address);
 - c. function (international/tandem/local);
 - d. manufacturer;
 - e. model (hardware/software);
 - f. traffic routing plan ;
 - g. signaling plan; and
 - h. supported signaling protocols.
3. To reduce the requirement to update the main body of the RIO in response to network developments, service providers with SMP should maintain details of these exchanges within annexes to their RIOs, which may be made available in an up-to-date electronic form.

Service providers with SMP shall produce a list of supported interfaces (e.g., E1 and STM-1 optical/electrical) that they accept for interconnection to their exchanges and define this within their RIOs.

Service providers with SMP operating public exchanges (fixed or mobile) shall offer interconnection capability at all of their exchanges.

4. The Authority believes that interconnection to public exchanges may be constrained by technical and economic feasibility and that fulfillment of the requirement to provide interconnection at all exchanges may require service providers to make modifications to their network architecture, routing and billing arrangements and that this process will take time and may involve additional costs.

5. Rules for interconnect links between public exchanges

a. General

16. Service providers providing switched interconnection services may specify technical rules to be followed by other service providers using these services.
17. Examples of technical switched interconnection rules include (but are not limited to):
 - minimum number of interconnect links;
 - maximum interconnect link capacity;
 - requirements to interconnect to specific exchanges; and
 - signaling requirements.
18. Service providers with SMP shall define any technical interconnection rules within their RIOs.
19. Technical interconnection rules shall not prevent the introduction and development of competition nor shall they represent a serious obstacle to interconnection.
20. Service providers with SMP may define a set of rules for handling calls routed incorrectly to one of their exchanges within their RIOs. Service Providers may reject calls routed erroneously to a local exchange if the called user is not hosted on that exchange.

b. Number of interconnect links

21. In order to protect the interconnection service resilience (i.e. availability of sufficient capacity to meet quality of service targets), service providers with SMP may require other service providers to interconnect to more than one of their public exchanges and to specify particular exchanges or levels of switching. Any such minimum requirements shall be justified by reasonable engineering principles to provide network resilience. Service providers shall not define a maximum limit on the number of interconnect links to any other service provider.

c. Link direction

22. Service providers with SMP providing interconnection at public exchanges shall enable service providers using their service, to designate interconnect links as being either uni-directional in either direction, or bi-directional (both-way).
23. Service providers providing interconnection of public exchanges may offer the use of uni-directional routes segregated by traffic type. Such an approach can protect certain traffic streams against congestion caused by others and it is possible to provide differing grades of service to particular traffic streams.

d. Link capacity

24. Service providers with SMP shall offer interconnection, to the voice networks of other service providers, using circuits in multiples of 2 Mbps (2048 kbps) E1 or higher (e.g., STM1) transmission links.

25. Service providers providing interconnection of public exchanges may define a minimum and maximum capacity for any interconnect link.
26. Service providers should not place excessive reliance on any particular interconnect link as this may endanger interconnection service resilience. Service providers should endeavor to spread interconnection traffic over a number of diverse interconnect links.
27. Service providers with SMP providing switched interconnection should enable service providers using their service to designate a uni-directional outgoing interconnect from the service provider's network as being either 'fully-provisioned' or 'high-usage'. This designation may be made either before an interconnect link is brought into service, or at some point during its operation. A fully-provisioned link should be dimensioned such that congestion is rare. A high-usage link may be dimensioned such that a reasonable degree of congestion (or blocking) is expected.
28. Service providers shall publish a target grade of service for each outgoing fully-provisioned interconnect link during the link busy hour. This takes the form of a blocking probability according to the Erlang B Table calculations.
29. Service providers should provision capacity on fully-provisioned interconnect links so that the congestion remains within the agreed grade of service value during normal busy hour periods.
30. In addition to the grade of service value, service providers may agree on a utilization factor for fully-provisioned interconnect links. The utilization factor is the percentage occupancy of the interconnect link that the parties aim to keep the traffic below. If the utilization of an interconnect link regularly exceeds the defined utilization factor, such utilization should trigger a re-routing of traffic (overflow) away from that link as part of a re-balancing exercise and/or an increase in the capacity on that link.
31. If a service provider using switching interconnection services has designated an interconnect link as being high-usage such designation shall be in conjunction with planned overflow via fully-provisioned interconnect links¹.

Article 24 Transmission Interconnection

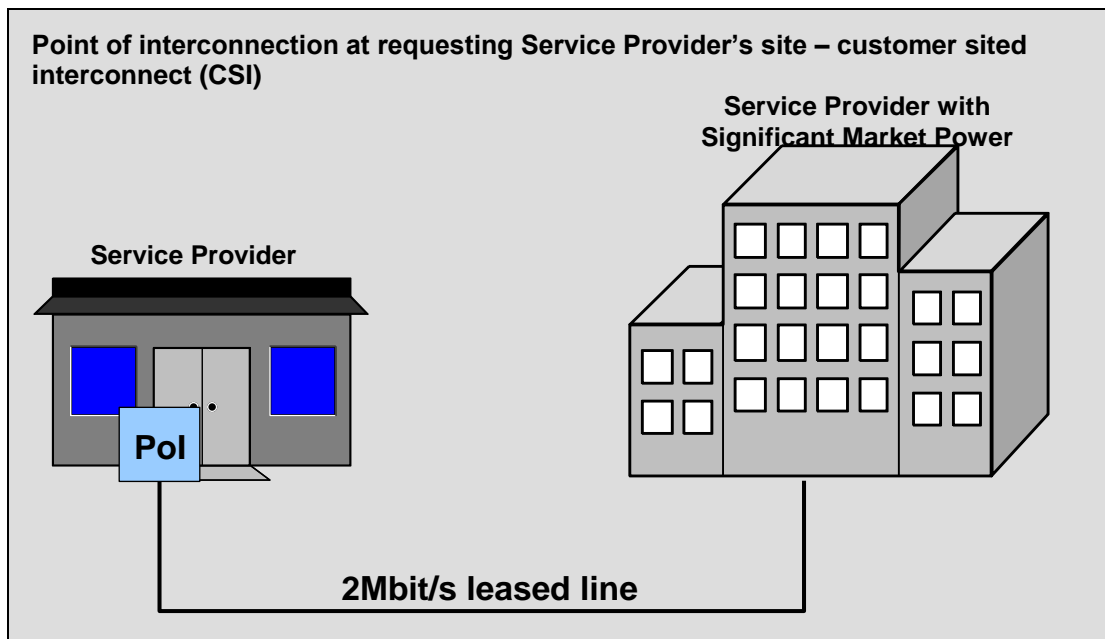
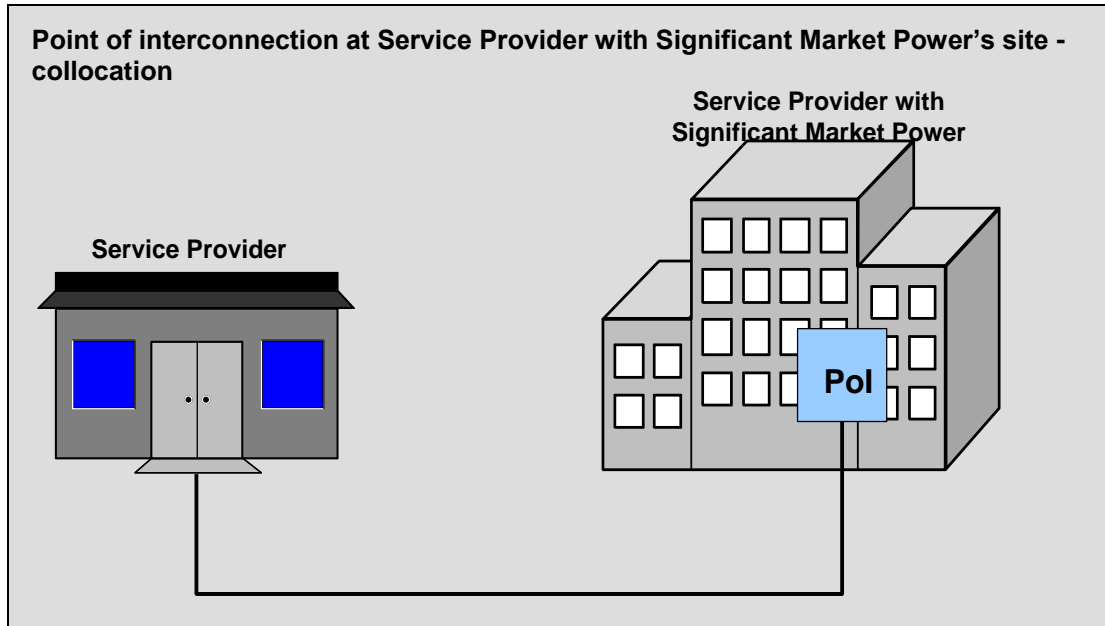
32. This chapter concerns the technical aspects of the transmission (transport) used to interconnect the networks of service providers in order to provide interconnection services.

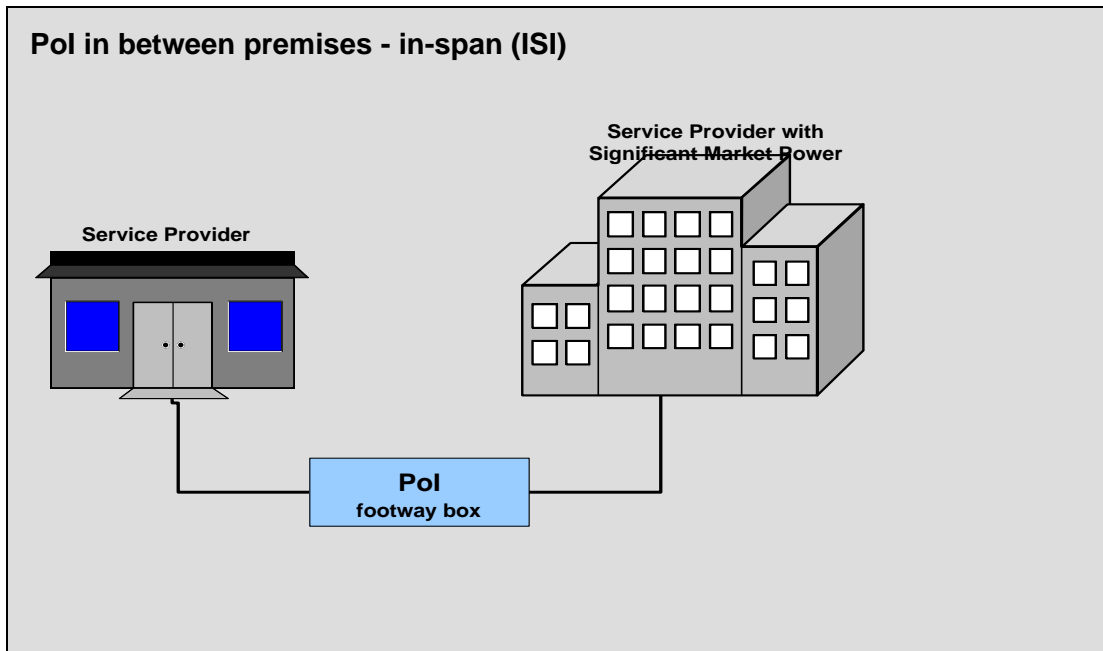
1. Point of interconnection

- a. The point of interconnection (PoI) of a transmission interconnect shall be defined as the boundary between the networks of interconnected service providers and is located at some point on the transmission interconnect link.

¹ The Authority notes that some incumbent operators around the world discourage the practice of using routes in this way from both a technical and commercial standpoint. However, high-usage routes are widely employed and may be very efficient.

- b. The PoI may be located at the premises of the service provider with SMP (collocation) within the premises of the other service provider (customer sited interconnect), or at a point in between their respective premises (in-span interconnect).
- c. In the case of the PoI at the premises of either service provider, the exact PoI shall be defined as the line side of the digital (2 Mbps) distribution frame. The service provider owning the premises shall provide the digital distribution frame as the physical interconnection point where the other service provider can terminate its transmission systems.





- d. Service providers with SMP shall fully define within their RIOs the transmission options that service providers interconnecting to them may use.
- e. Service providers shall be responsible for provisioning, operating and maintaining the transmission interconnect up to the point of interconnection. They shall be considered responsible for any transmission equipment and infrastructure up to the PoI. Service providers shall be responsible for the traffic carried over their own network up to (for outgoing traffic) or from (for incoming traffic) the PoI. Service providers shall not be responsible for the traffic carried over the other's network.
- f. Service providers with SMP shall offer the option of placing the PoI at their own premises, at the premises of the service providers using their service(s) or in between as an in-span interconnect. The commercial arrangements and provisioning, operations and maintenance processes shall be dependent on the location of the PoI.

2. Interconnect extension circuits

- 33.** Service providers with SMP shall enable service providers to whom they are providing a service, to lease interconnection transmission links from the point of interconnection to other points in their network in order to enable switching interconnection to a greater number of exchanges.

3. Transmission technologies

- a. Service providers shall support the use of any appropriate transmission technologies for interconnect links. Technologies could include wireless, fiber-optic cable and SDH transmission with an appropriate range of ring capacities.

- b. Service providers should consider the resilience of transmission routes including redundancy, diverse routing, path protection, separation, diversity and ring architectures. Where appropriate, service providers should provide diverse cable entry points to buildings where a PoI is located.

Article 25 Interconnection of Signaling Networks

1. Service providers shall support the ITU Signaling System Number 7 (SS7), integrated services user part (ISUP) for interconnection signaling.
2. The service provider with SMP operating the national PSTN shall provide leased circuits routed via its international gateway exchanges to any signaling transfer point outside of Lebanon to interconnect with international service providers to facilitate roaming with their networks. It shall support the ITU SS7, ISUP, signaling connection control part (SCCP) and transaction capabilities application part (TCAP).
3. The service provider with SMP operating the national PSTN shall provide, to the public mobile service providers, leased SS7 signaling links via its international switching centers to international operators for the transit of incoming and outgoing roaming messages with foreign mobile operators. It shall Support the ITU SS7, ISUP, SCCP, TCAP, and SCCP User Adaptation (SCUP) for SS7 over IP adaptation.
4. Service providers with SMP offering transit interconnection services shall support the ITU SS7, ISUP, SCCP, TCAP, and SCUP for SS7 over IP adaptation.
5. The service provider with SMP operating the national PSTN shall provide any other service provider “open access” to any international connectivity to and from Lebanon that is to be rolled out from the date of publication of this Regulation.

The utilization of SS7 links shall be maintained within the ITU guidelines:

- critical load per SS7 link: (19.2 Kbits/s or 0.36 Erlangs); and
 - maximum load per SS7 link: (28.2 Kbits/s or 0.44 Erlangs).
6. Service providers with SMP shall specify the signaling configuration to be used on interconnect links within their RIOs. Service providers providing interconnection shall notify interconnected service providers of any modification in the adopted ITU signaling system one hundred and eighty (180) days in advance.

Article 26 Interface Standards and Technical Requirements

1. Service providers shall adhere, as far as possible, to the appropriate ITU and ETSI technical standards related to interconnection interfaces. A non-exhaustive list of ITU-T technical standards is set forth in ANNEX B: A non-exhaustive list of ETSI technical standards is set forth in ANNEX B:

2. Service providers with SMP offering interconnection services shall state, within their RIOs, the technical standards used for interconnection. Service providers offering interconnection services shall provide reasonable notice to interconnected service providers of any modifications to the technical standards related to interconnection interfaces. Service providers offering interconnection services shall collaborate with interconnected service providers to overcome any technical problems.

Article 27 Synchronization

Synchronization is necessary for interconnected networks. The RIO shall identify:

- a. The requirement for synchronization with the network of the service providers with SMP.
- b. The interconnection links to be used for synchronization (directly extracted from the cesium synchronization clock in Lebanon).
- c. Maximum slip rate and other measures based on ITU standards.

Article 28 Interface Standards and Interoperability

Service providers should use network interfaces based on internationally accepted technical standards. Service providers with SMP shall specify in their RIOs the technical standards for interconnection interfaces.

Service providers are obliged to notify any modifications in interconnection interfaces and cooperate to overcome any technical problems.

Article 29 Numbering

Designated service providers offering PSTN services shall provide details of the number ranges which are hosted on each of their local exchanges. Service providers using the interconnection services shall then route calls to those number ranges on the interconnect link leading (directly or via a tandem) to the local exchange.

Article 30 Quality of Service

- Service providers with SMP providing call conveyance services shall provide the same Quality of Service (QoS) for calls carried wholly on their own networks.
- Service providers shall work jointly to ensure the overall quality of the calls which are made via an interconnection point and their own networks. Service providers shall adopt general principles regarding standards, techniques and methods in order to guarantee the quality on telecommunication networks and in services, as stipulated in ITU and ETSI recommendations as listed in Annex B of this Regulation. Service providers shall have the capability to define a target grade of service for each interconnect link between their network and other-service providers' networks.

- Service providers with SMP shall be capable of monitoring all interconnect links at all times and shall, at all times, be able to report on the actual grade of service. Service providers with SMP shall define a number of QoS measures that they shall provide to and expect from, interconnected service providers within their RIOs. These QoS measures shall be included in the interconnect agreement as service level agreements (SLA).
- QoS measures shall include the grade of service during busy hour (blocking probability), either applied to individual interconnect links, or across all interconnect links, and may include the following:
 - answer-seize ratio;
 - transmission delay as defined in ITU-T Recommendation G.114;
 - transmission loss (loudness) as defined in ITU-T Recommendation P.76;
 - noise and distortion as defined in ITU-T Recommendations Q.551-554, G.123, G.232, G.712 and P.11;
 - echo and loss of stability as defined in ITU-T Recommendation G.122;
 - cross-talk as defined in ITU-T Recommendation P. 16; and
 - bit error rate

Chapter 7 Interconnection Processes

Article 31 Interconnect Provisioning Processes

1. Definition

- a. Interconnect provisioning processes are defined as those processes that are used to enable one service provider to establish interconnection to other service providers and to modify the physical interconnection. These processes shall be categorized as either planning, formal request for service or implementation processes.
- b. The planning processes shall include:
 - planning of new points of interconnection;
 - changes to interconnect link capacity;
 - changes to the transmission capacity;
 - changes to the signaling network;
 - changes to call routing;
 - new numbering blocks; and
 - all processes for requesting services
- c. The implementation processes shall include:
 - all civil engineering work;
 - construction;
 - installation;
 - testing; and
 - commissioning.
- d. Service providers with SMP providing interconnection services shall fully define within their RIOs the interconnect provisioning processes to be used by service providers receiving interconnection services from them.

2. Lead-times

- a. The provisioning processes of service providers with SMP shall include defined lead-time requirements and information exchange requirements for specific provisioning activities. For example, the lead-time to establish new transmissions interconnect will be longer than adding capacity to an existing interconnect link.
- b. When defining lead-times, service providers with SMP should aim to be as realistic as possible and provide sufficient time to overcome unforeseen implementation difficulties. Service providers with SMP shall provide lead-times to other service providers that are comparable with internal provisioning time-scales.
- c. Lead-times may, for example, be given for the following:

- connection of a new service provider exchange or other network equipment;
 - implementation of a new transmission interconnect;
 - implementation of a new interconnect link;
 - provision of additional capacity on an existing interconnect link;
 - removal of capacity on an existing interconnect link;
 - removal of an interconnect link; and
 - routing changes within the service provider's network to interconnects to the interconnected service provider.
- d. Any proposed changes to lead-times of service providers with SMP shall be subject to the approval of the Authority as part of a RIO update and shall be subject to the same approval process as any other RIO update.

3. Planning processes

a. Interconnection of a new public exchange

- Service providers shall define procedures to be followed by other service providers wishing to interconnect a new public exchange to their network.
- Service providers with SMP should define any such processes within their RIOs.
- The procedures are likely to be more detailed in the event that the new exchange model, hardware build or software build is not one that has previously been interconnected to the network of the service providers with SMP.
Service providers should consider developing an 'exchange questionnaire' to be completed by service providers wishing to interconnect new exchanges to their network.
- The Authority shall have the responsibility of assigning the SS7 point code(s) to new exchanges of service providers.

b. Transmission interconnection

- Service providers with SMP offering transmission interconnection services shall define a planning process for new transmission interconnects within their RIOs. This shall describe the processes to be followed by service providers when planning new transmission interconnects.
- Service providers may share, on a lease basis with terms and conditions agreed between both parties, the use of existing cable ducts owned by any other service provider.
- Service Provider providing the transmission is responsible for the planning of the transmission interconnection, including civil engineering works. Both service providers should collaborate in such planning exercises. In the case of in-span interconnection, the planning shall be considered to be a joint responsibility.

c. Planning of interconnect links

➤ Planning of new links

Service providers with SMP offering interconnection should define a formal process for the establishment of a new interconnect link within their RIOs. This process may then be supported by electronic forms attached to the RIO.

New interconnect links should normally be provided by the service provider that plans to use the interconnection services provided by the other service provider.

The information that a service provider providing interconnection requires from a service provider requesting a new link may include the following:

- service provider A exchange;
- service provider B exchange;
- transmission path(s);
- initial capacity;
- link direction (incoming/outgoing/both-way);
- link configuration (fully-provisioned/ high-usage);
- utilization factor;
- grade of service; and
- purpose of link.

➤ Removal of interconnect links

Service providers with SMP offering interconnection should define a formal process for the removal of an existing interconnect link within their RIOs. Such processes may then be supported by electronic forms attached to the RIOs.

Such a process should include agreement on how to migrate traffic off the link which is to be removed.

Service providers offering interconnection may define a minimum period for which an interconnect link will be operational, especially if they have had to incur costs in establishing an interconnection link.

d. Capacity planning on interconnect links

1. Interconnect traffic forecasts

Service providers offering interconnection may require service providers using these interconnection services to provide forecasts of traffic over each interconnect link between their networks. The service provider requesting interconnection shall comply with such requests to provide traffic forecasts.

Traffic forecasts should be given in terms of Erlangs during the peak and off-peak 'busy hours' for a period of not more than two (2) years in advance. The forecast may then, for example, be updated every quarter.

Service providers with SMP which choose to require traffic forecasts shall explicitly define the exact requirements in the RIOs. The process may be managed by electronic forms to be used by the service provider providing the traffic forecasts.

Service providers providing traffic forecasts shall make such forecasts as accurate as possible. Service providers shall not be penalized for any inaccuracy in their traffic forecasts.

Service providers providing interconnection services shall have the right to refer service providers using the service to the Authority if traffic forecasts are either not provided or are believed not to have been provided in good faith.

2. Interconnect capacity forecasts

Service providers offering interconnection may require interconnected service providers using their interconnection services to provide forecasts of capacity requirements over each interconnect link between their networks.

These forecasts should be given in terms of E1s for a period of not more than two (2) years in advance. This forecast may then, for example, be updated every quarter.

Service providers may require capacity forecasts without requiring traffic forecasts as described above. However, if both capacity forecasts and traffic forecasts are required, the capacity forecasts should be based on the traffic forecasts and the design grade of service.

On interconnect links designated as being fully-provisioned; both service providers shall provision, in advance, sufficient capacity to achieve the target grade of service.

Service providers may define a set of rules linking forecasts of required capacity to the capacity orders. For example, service providers may require interconnected service providers to order capacity within a certain percentage of their forecast capacity within one hundred and eighty (180) days.

3. Reactive capacity planning

The process should be applied even if the pro-active planning processes outlined are being used, in case the capacity requirements have been under-forecasted.

Both interconnected service providers shall measure traffic regularly on all interconnect links and they shall identify congestion and act to prevent it.

A period of the specified utilization factor or grade of service being breached on a particular interconnect link shall not automatically trigger an increase of capacity on that interconnect link but should trigger a review of the network routing and interconnection capacity by both service providers.

Service providers shall take all reasonable steps to prevent congestion through the 're-balancing' of interconnection traffic. This means that either or both service providers shall adapt the exchange routing in order to re-direct traffic away from a congested interconnect link onto an interconnect link(s) with adequate spare capacity. Such a re-balancing process should be coordinated in advance between both service providers.

If one or both service providers considers that it is necessary to increase the capacity on one or more interconnect links in order to avoid or remove congestion, they shall have the right to call a meeting between them.

A meeting shall be held within three (3) days of it being called by either service provider. The service provider calling the meeting shall inform the Authority and may invite a representative of the Authority to attend the meeting.

At such meetings, both interconnected service providers shall present their traffic measurements to each other.

The traffic measurements provided shall be as comprehensive as possible and should cover at least a seven (7) day period with the traffic profile over each day, in fifteen (15) minute intervals.

Both service providers should be able to reach agreement on the requirement for an increase in interconnection capacity and on the details of the number of E1 links and the type of interconnect links.

If agreement cannot be reached during this meeting, either service provider shall have the right to ask the Authority to intervene and make a determination on the requirement for additional capacity.

4. Transmission link services planning

Service providers with SMP offering transmission link services shall define a formal process for the planning of such services, within their RIOs. This process may be supported by electronic forms attached to the RIO.

The definition shall include the charges, provisioning, operations and maintenance processes and an SLA for the quality of the service. The SLA shall include delivery and repair performance criteria and penalty payments for failure to meet the service levels.

Service providers with SMP offering transmission link services shall use identical processes to provide such services to all service providers.

4. Collocation and facilities sharing processes

- a. Service providers with SMP shall cooperate in all aspects of providing collocation and facilities sharing services. Adoption of such practices brings about economic, environmental and social benefits.
- b. Service providers with SMP shall maintain a list of their sites where collocation space is available and should include an indication of how much space is available on a long-term basis. This list shall be made available to other service providers and the Authority.
- c. Service providers with SMP shall publish their space allocation policies within their RIOs. The priority will be given to the first request but should take into account the following factors:
 - amount of space required;
 - urgency of requirement; and
 - alternative options available to the requesting service provider and the cost of these options.

Service providers should maintain a list of facilities that they are prepared to share and the prices that they will charge others for doing so.

- d. In circumstances where a service provider with SMP rejects a service provider's request for collocation space on the grounds of insufficient space, the service provider with SMP should propose an alternative solution. In case of dispute, the Authority shall make a determination.

5. Request for service processes

- a. RIO shall contain a template of the 'request for service process' that should be submitted by SMP when requesting an interconnection service. The defined request for service process shall include lead-times. When requesting an interconnection service, the service provider shall have a clear understanding of the maximum time that they could reasonably expect to wait before the service is delivered.
- b. Service providers with SMP offering an interconnection service may stipulate that all, or some, types of request for service are binding on the service provider placing the request for service. Any such stipulations shall be fully defined within their RIOs. Any such stipulations shall be reasonable and should reflect the costs that the service provider has incurred in responding to a request for service. Reasonable flexibility should be permitted, especially in the early stages of a request for service.
- c. Service providers with SMP offering an interconnection service shall define within their RIO and within individual interconnect agreements as appropriate, the formats upon which requests for service will be accepted.
- d. The request for service should contain the date when the capacity is required. In some cases, this may simply be stated as 'as soon as possible'. Service providers with SMP shall respond to any request for service within five (5) days. Service providers with SMP rejecting a request for service, in whole or in part shall respond, in writing to the service provider, giving them the reasons for this rejection. This letter shall also be copied to the Authority. In the event of a service provider with SMP rejecting a request for service, in whole or in part, the requesting service provider shall have the right to refer the matter to the Authority. The Authority shall then investigate with the cooperation of both service providers and may make a determination on the matter.

Service providers with SMP accepting a request for service shall provide, within fifteen (15) days of the request for service being received, a date by which the request for service will be implemented, within their published lead-times.

Service providers should consider the urgency of the requirement in deciding the capacity provision date. If the request for service is for interconnection capacity and is required to overcome congestion, service providers should make every effort to expedite the provision of this capacity.

- e. Service providers with SMP providing interconnection services shall implement a documented process for tracking the progress of capacity orders. The requesting service provider and the Authority shall have the right to request a progress report within three (3) days following the notification of the delivery date.

6. Implementation

- a. Service providers offering interconnection services should have detailed internal implementation procedures to ensure that the services are provided in a timely manner and that the resulting services fulfill quality requirements.

- b. In the case where both service providers are involved in the implementation process, they should work constructively and in a cooperative manner. In such situations, there should be a pre-agreed schedule of testing which is defined in the RIO of the service provider with SMP offering the service.
- c. The service providers should develop and agree to the testing plans and schedule, the testing procedure, and the acceptance and handover of service. Where appropriate, the service providers should use the following testing procedures for interconnection:
 - conformance test;
 - compatibility test;
 - interoperability test of the interconnected systems;
 - test of whether the networks deliver the same charging / billing data; and
 - any other tests as may be required.
- d. There shall be a formal sign-off procedure for both the offering service provider and the requesting service provider to agree that the service has been provided.

Article 32 Interconnection Operations Processes

1. General principles

- a. Interconnection operations processes are defined as those processes that are used to enable interconnected service providers to operate interconnection services.
- b. The operations processes shall include, but are not limited to:
 - network traffic management;
 - quality measurement;
 - traffic controls;
 - routing management; and
 - fault reporting and resolution.
- c. Service providers with SMP offering interconnection services shall define the procedures used between themselves and service providers using their services, to operate the interconnection services. Service providers with SMP shall define the interconnection operations processes within their RIOs.

2. Network traffic management

a. General

- Network traffic management (NTM) is defined as the real-time surveillance and control of traffic flow on a telecommunications network. Its aims are to maximize the effective use of available capacity for call completion and to maintain an acceptable grade and quality of service for users of all service providers.

- Service providers with SMP should establish network management centers (NMCs) to monitor and control the flow and routing of traffic to maximize the effective use of available capacity. Service providers with SMP should provide 24-hour contacts for dealing with NTM queries and problems and should recognize the necessity for co-operation to achieve efficient NTM relating to the traffic routes linking their respective networks.
- Service providers shall notify other service providers in a timely manner when major problems occur which are likely to affect interconnected traffic. Service providers should communicate as necessary to achieve a coordinated NTM effort.
- The Authority recognizes that congestion created in one network can have an impact on a competitor's network due to network interconnection. If steps are taken in the affected network to reduce the impact of excessive traffic, typically by call-gapping, it is conceivable that another network operator may have cause to complain that its ability to carry revenue-earning traffic is restricted. If no action is taken the affected network could fail. Effective network traffic management actually maximizes the effective (i.e. revenue-generating) call capacity of the network. The Authority therefore expects that:
 - Service providers with SMP shall document what congestion protection measures will be used (e.g., call gapping, alternative call routing and priority techniques) and in what circumstances. Any such documentation should be made available to other service providers with a legitimate interest;
 - Service providers with SMP shall also document what measures will be used to ensure the priority of emergency services traffic, particularly during congestion periods; and
 - signaling links shall be dimensioned to avoid congestion and will in general have much lower occupancy than traffic links. The lower occupancy is important to minimize the risk of losing signaling messages and the need to reduce signaling latency. The number of signaling links should be established for normal and failure conditions.

b. Traffic and Quality of Service measurement

- Interconnected service providers shall both be responsible for measuring and monitoring the traffic and QoS on the interconnect links between their networks, and shall be able to do so at all times in 'real-time' or as close to it as possible. Service providers with SMP shall be responsible for measuring and monitoring the traffic and QoS within their networks and shall be able to do so at all times in 'real-time' or as close to it as possible. Service providers with SMP shall ensure that they have adequate traffic and QoS measurement systems, trained staff, procedures and any required resources in order to fulfill these two requirements. Service providers with SMP shall provide traffic and QoS measurements to the Authority upon request.
- Service providers should provide NTM information relevant to an existing or perceived problem to other service providers on request. Under no circumstances shall service providers be required to provide commercially sensitive information, nor shall the information supplied be used for any other purpose than NTM.

c. Traffic controls

- There are two main types of traffic control; 'expansive', typically re-routes, and 'protective', typically call-gapping:
 - A re-route control may mean that the traffic affected will be carried over a service provider's network for a greater distance than normally expected before being offered to the interconnected service provider's network. Providing contractual agreement has been reached, re-routes may be 'set-up' in data at all interconnect units. The NMC will activate and remove the re-route option for each incident.
 - Overflow from the primary route(s) should only be to pre-designated interconnect alternative routes. These calls would normally be given a lower priority than primary routed calls but the same priority as calls alternatively routed within the original network.
- Protective controls prevent switching units being put in jeopardy due to excessive call attempts, problems and overloads in the other service provider's network. The protective call-gapping control should mean that traffic destined for the interconnected service provider's network may be restricted by the application of the control which would normally be applied on the receipt of a formal request.
- Service providers may request controls from service providers with SMP in instances where it is necessary to reduce the traffic offered to the service provider's network. Service providers with SMP shall define the availability of such controls and degrees of selectivity and possible speed of implementation within their RIOs.

Service providers may implement controls within their own networks in response to perceived problems detected in another service provider's networks. When such action is taken they should advise the other service providers of the scope, cause, impact and likely duration of the problem. Advice of removal of the controls should also be given.

If a service provider considers that the use of NTM controls by another service provider is acting to the detriment of its own network's performance, both service providers should consult on the matter.

d. Routing management

- Service providers shall manage the routing of outgoing calls up to the Point of Interconnection and incoming calls from the Point of Interconnection to their destination. Service providers shall make every effort to ensure that calls are routed to the other service providers' networks, using overflows to alternative routing paths if necessary.
- Service providers shall be able to require interconnected service providers to deliver incoming traffic to their networks on specific interconnect links and to request the use of proportional routing and other routing techniques. When an interconnect link has been defined as being 'high usage', the interconnect link(s) where calls will overflow should be defined. Service providers should consider the formal agreement of routing plans between themselves and other interconnected service providers. This could also include an agreed change process.

- Service providers shall pass onto other service providers, the full CLI and CLIR for all calls, to the extent that the CLI and CLIR are available. Service providers should agree advanced contingency routing plans to be used to alleviate different levels of NTM problems.

e. Mass call events

- A 'mass call event' is defined as a planned period of high call volumes to a specific set of destinations, e.g. a 'phone-in' to a 'telethon' type of event.
- Service providers should establish procedures to coordinate mass call events with their large Users who may host them. Service providers with a user planning a mass call event shall provide interconnected service providers with reasonable advance notice. Such procedures shall be described in the RIO or Interconnect Agreement and may be accompanied by a form containing the relevant details. Service providers should cooperate to ensure that, either additional capacity is provided on a temporary basis or that routing controls are applied in order to maintain the service.

3. Fault management

a. Contact points

Service providers with SMP shall be required to provide 24-hour contact points for fault reporting (24-hours a day, seven (7) days a week and all days a year). All initial contacts on faults affecting the other service provider shall be between each service provider's nominated contact points.

Arrangements should be made for direct person-to-person connection between fault resolution functions of all interconnected service providers.

b. Fault detection

- Service providers detecting a possible fault which may affect interconnection services shall inform interconnected service providers immediately (within 15 minutes). This shall be done whether or not it is believed that the fault is within the detecting service provider's network. The service provider that detects a possible fault shall process the fault report internally before requesting the assistance of interconnected service providers in providing diagnostic support. Service providers shall make every effort to determine whether the fault is genuine and to identify the location of the fault.
- Service providers should request an interconnected service provider to process a fault, only when they are sure that the fault does not lie within their own network and is not their responsibility. Following a fault report, interconnected service providers shall agree ownership of the fault. The fault owner shall then assume responsibility for restoration including possible roll back to initial configuration when fault comes from a change and the eventual report back of service restoration.

c. Fault processing

- A service provider shall provide sufficient information to the other service providers to enable both to carry out diagnostics and then progress the fault to restoration. It is recommended that service providers implement a fault management system as part of their operational support systems. Service providers should number fault reports in order to facilitate the management of individual faults, especially across two (or more) service providers. When either service provider believes that a fault has been cleared, it shall give positive confirmation to the other service provider immediately. Service providers should prioritize the clearance of faults affecting service over the clearance of faults not affecting service.
- A fault shall be considered to be cleared when the service provider that reported the fault, has accepted the fault clearance information or confirms a successful test (e.g., traffic has been restored).
- Service providers with SMP shall include indicative response times, restoration times and procedures for different fault conditions within their RIOs. These shall be subject to the approval of the Authority. The RIO shall also define the escalation procedures for fault management.

Article 33 Interconnection Maintenance Processes

1. General principles

- a. Interconnection maintenance processes are defined as those processes that are used to enable interconnected service providers to maintain the interconnection and interconnection services.
- b. The maintenance processes shall include:
 - operational testing;
 - planned engineering works; and
 - system protection and safety.
- All service providers offering interconnection services shall define the procedures used between themselves and the service provider who uses their services, to maintain the interconnection services. Service providers with SMP shall define these processes within their RIOs.

2. Operational testing

Any testing which might affect traffic flows should be scheduled after midnight or during the low traffic period during the weekends and holidays with the prior approval of the joint technical committee of both service providers.

3. Planned engineering works

- a. 'Planned engineering work' is defined as any foreseen work, necessary to be carried out within either service provider's network, which may affect the interconnect arrangements or standards of performance between the networks, as perceived by the service providers or their users.
- b. Service providers should provide interconnected service providers with sufficient advance notice of any planned engineering works. This notice should be at least thirty (30) days in advance.

- c. It is further recommended that the notification should contain the following information:
- the service provider's name, address, telephone and fax numbers, and email address;
 - planned work reference number;
 - date, time and duration of the planned work;
 - type of planned work;
 - type of disturbance the planned work will cause;
 - date and time when the planned work will be completed; and
 - any other information which will add value to the advice of interruption.
- d. Service providers should endeavor to minimize disruption when making tests, expansion or maintenance works. Any activity which might affect the service should be performed after midnight or during weekends and holidays supported with prior approval from the other service providers.

4. Site access procedures

- a. Site access procedures are defined as the procedures used to arrange and control access by one service provider to their network equipment collocated in the premises of a different service provider.
- b. Service providers with SMP providing collocation space and shared facilities shall define the site access procedures within their RIOs.
- c. Service providers with SMP providing collocation space should be able to provide access, by prior notice, on a 24 hour, seven (7) days a week, all days a year basis for planned work, and with no prior notice in the case of unplanned work for service restoration, resulting from network failure.

The procedures for planned access may be different according to the purpose of the planned access including:

- delivery and installation of equipment;
- software or hardware upgrades; and
- planned maintenance.

Site access procedures may include escort arrangements whereby staff of the service provider owning a site escorts the staff of the service provider collocating their equipment at the site. Such procedures should be reasonable and not excessively onerous. The service provider owning the site shall bear all costs of escort. Where separate entrance and secure areas are provided, site escort may not be required.

- d. Service providers using collocation space shall ensure that their technicians (or sub-contractors) have adequate training for working on equipment collocated at a site belonging to another service provider, and that these staff comply with all reasonable safety and security requirements of the service provider owning the site.

It is the responsibility of each service providers' member of staff to ensure that they work in a safe environment. The service provider owning the site shall be prepared to accept any questions or comments regarding safety from service providers using the site, and to take the appropriate action.

Service providers providing collocation space should offer the representative of the service provider using the site, access to on site facilities such as facilities, power, lighting, water and toilets.

5. System protection and safety

- a. Service providers should define their respective obligations to protect each others' networks and define measures to protect the safety of all personnel and users.
- b. Network integrity is a question of network management and the ability of the network to maintain certain characteristics with regard to performance and reliability. In order to maintain network integrity:
 - The interfaces between the networks shall conform to recommendations from international standards bodies and/or international standards. Those standards should be open and monitored by the Authority.
 - Compatibility measures should ensure that networks or systems with different levels of performance work together correctly.
 - Testing procedures should be carried out before interconnection and possibly after interconnection but before bringing equipment into service. Documentation of validity/conformity and interoperability should be submitted before the system is brought into operation;
 - Special national and/or international technical solutions might be introduced for the interconnection of networks. For instance, the signaling networks could be separated by a signaling inter-network between the respective gateways. These solutions may be made available to all potential interconnecting service providers in a non-discriminatory manner;
 - All testing should be carried out within a reasonable period of time and subject to mutually-agreed principles, so as not to delay interconnection.

Service providers shall be responsible for the safety and operation of their own systems.

Chapter 8 Commercial Aspects

Article 34 Charges and Payments

1. Principles of charging

- a. Interconnection charges levied by a service provider with SMP should be determined with reference to the costs of providing that service. This chapter of the regulation contains the policies of the Authority in respect to the derivation of cost based charges for interconnection services. Interconnection services include all services as defined in chapter 5 of this Regulation.
- b. The Authority directs service providers with SMP to present to the Authority for review interconnection charges which reflect the costs incurred in providing the interconnection services. This could initially be based on a Fully Allocated Costing (FAC) methodology which recovers direct costs for the services provided with applicable overheads and a reasonable return on capital employed. In the longer term the Authority would expect that interconnection charges be based on a Long Run Incremental Cost (LRIC) methodology with a reasonable rate of return on capital employed. The assessment and calculation of cost based interconnection charges shall be based on "Cost Causation" principles. Cost causation principle means costs are recognized as being caused by a service if the costs are brought into existence as a direct result of providing the service; or the costs are avoided if the service is not provided. The implementation of costing methodologies to establish cost based pricing shall be subject to a detailed consultation. Cost based charging shall apply equally to all interconnection services.
- c. Service providers with SMP shall undertake to fully analyze their costs of providing interconnection services with the initial results presented to the Authority within one hundred and eighty (180) days of the publication of the relevant costing regulation. The Authority reserves the right to undertake its own exercise so as to determine reasonable cost of interconnection services provided by service providers with SMP who shall cooperate with the Authority in any service costing exercise that the Authority may decide to undertake.
- d. In advance of the submission determination and approval of any cost based interconnection rates in accordance with this Regulation, the Authority reserves the right to set interconnection charges based on benchmarking of interconnection services. The Authority also reserves the right to employ a 'retail minus' pricing methodology for interconnection services should the circumstances warrant it. The Authority recognizes that the preparation of separated accounts and a regulatory accounting framework can provide a valuable source of information in any determination and assessment of cost-oriented charges and non-discriminatory behavior. The Authority will publish separately a regulation concerning accounting separation.
- e. Service providers with SMP may publish charges on their website but shall also publish the charges as a separate Schedule in any published hardcopies of their RIOs. Service providers with SMP shall define any penalties for cancellations of requests for service within their RIOs.

2. Call conveyance

- a. Charges shall only be made for successful calls – calls receiving an answer signal in the backward direction. The (wholesale) charging unit for all successful calls shall be one second of conversation time.
- b. Service providers with SMP shall charge all interconnected service providers the same per-second rates for the same call conveyance services. There shall be no minimum charge for successful calls.
- c. Call conveyance charges shall reflect the amount of network infrastructure used in the conveyance of each call. Designated service providers offering PSTN services are therefore expected to offer different interconnection charges for local, single tandem, double tandem and transit (including international) calls.
- d. Public mobile telecommunication service providers shall offer a single charge for call termination based on the average utilization of network infrastructure by incoming calls in mobile networks. Service providers with SMP may offer peak and off peak interconnection rates, providing the overall cost recovery does not exceed the total average cost of providing the service.

3. Transmission link costs and charges

- a. The costs of transmission links shall be met by the service provider requesting the service.
- b. Charges shall be the same for all requesting service providers.
- c. Minimum contract periods shall not exceed one (1) year but discounts should be offered if longer commitments are made provided that these are cost justified and are offered on a transparent, fair and non discriminatory basis.

4. Interconnection link costs and charges

- a. The costs of the interconnection links shall be shared between the service providers on the basis of the proportion of traffic which each originates on each link. This shall be shared on the basis of traffic volumes measured in call minutes over the preceding ninety (90) days. Bills should be retrospectively adjusted.
- b. The costs for the interconnection links shall include the ports on the trunk side of exchanges on which they are terminated. This may include the cost of establishing and testing the link and associated equipment.
- c. Minimum contract periods shall not exceed one (1) year but discounts should be offered if longer commitments are made provided that these are cost justified and are offered on a transparent, fair and non discriminatory basis.
- d. Costs shall be separated into circuit set-up costs and ongoing leasing costs. These charges shall be cost based but geographically averaged.

5. Data interconnection services

Data interconnection services, when provided, shall be charged—through a combination of call conveyance and transmission link charges.

6. Collocation and facilities sharing services

The prices charged by service providers with SMP for the running costs of collocation and facilities sharing services shall be, as far as is practicable, cost based. Leases for the space within buildings should reflect local market values.

7. Operator services

Service providers with SMP shall offer operator assistance services at cost based charges.

Article 35 Billing

1. Call conveyance billing

a. General

- Service providers with SMP shall fully define their billing processes within their RIOs. These shall include timescales for:
 - billing period (start and end dates);
 - delivery of invoice from billing party;
 - queries related to invoices from billed party; and
 - time to reach a reconciliation agreement.
- Interconnect billing shall be based on call recording in the interconnected exchanges using call detail records (CDR) and processed through the CDR mediation system as inputs to the billing system.
- Service providers on each side of an interconnect link shall have the capability to measure the call seconds. If only one of the service providers has the capability to measure such calls, then their measurements shall be considered to be definitive. If both service providers have the ability to measure such calls, then the reconciliation process should be contained in the interconnect agreement and defined in the RIO of service providers with SMP.
- For charging and accounting purposes, calls shall be considered in principle to fall entirely within the charge period in which they start, regardless of the fact that they may end in another charge period. The traffic unit used by service providers with SMP for charging and settlement of call conveyance bills shall be one second of conversation time. Conversation time shall be measured according to the relevant ITU standards for R2 and SS7 signaling.
- Service providers with SMP shall define the format of the invoice and the method of transmitting the invoice within their RIOs.

- Except for disputed amounts being processed in accordance with the billing disputes process, if a party fails to pay five (5) days after the due date (specified in the RIO) any amount due under the interconnect agreement, the party shall pay interest at the default interest rate (specified in the RIO) on the amount-due as from the due date.
- The billing party shall store billing data (raw CDRs) in such format as shall be sufficient to recalculate the amounts due from one party to the other. The billing party shall archive such data for at least ten (10) years.

b. Interconnect billing reconciliation

- Service providers with SMP shall define their interconnect billing reconciliation process within their RIOs.
- Some discrepancy in billing values should be expected. Service providers with SMP providing the interconnection service should define a specific percentage difference in both parties calculation of a bill, below which there shall be no interconnect billing reconciliation process.
- During an interconnect billing reconciliation process, service providers should work together in good faith, taking more frequent measurements and exchanging detailed information if necessary. In the case of unresolved disputes, service providers should work together in order to improve the accuracy of the bills and a comparison of records shall be made more frequently until the fault is identified and resolved.

If the specific reason(s) for billing discrepancies cannot be found, the service providers should agree on an estimate for the correct value based on either historical data or an average of calculated bills of both parties.

- Interconnected service providers should arrange audits of billing records and processes on a quarterly or biannual basis.

c. Payment

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

Chapter 9 Dispute Resolution Procedure

Article 36 Procedures

RIOs of service providers with SMP must include dispute resolution procedures. Dispute resolution procedures must be in line with international best practice and shall provide for timely resolution of disputes between service providers.

Article 37 Role of Parties

Before requesting the Authority to intervene to resolve a dispute, parties to the dispute must show that they have made a good faith effort to resolve the dispute.

Article 38 Role of the TRA

In the event of any dispute or difference arising between or among the service providers relating to or arising out of an issue concerning interconnection, the matter shall be dealt with by the Authority using the procedures set forth in the relevant regulation relating to dispute resolution.

Chapter 10 General Contract Provisions

Article 39 General

There are a number of legal contractual issues that should be considered by each service provider and shall be included within the RIOs of service providers with SMP. These should be adapted from international best practice in line with Lebanese law.

Article 40 Specific Clauses

1. Provision of information

Service providers with SMP should include a clause in their RIOs stating that certain network information will be supplied to interconnected service providers in order to enable them to plan their networks and interconnection. However, the clause may also state that this information is not to be divulged to third parties.

2. Services management

Service Providers with SMP 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. Service Providers with SMP should agree to meetings with other service providers within five (5) days of the meetings being formally requested.

3. Joint technical and operational committee

Interconnected service providers should establish a joint technical and operational committee. The joint technical and operational committee should facilitate discussion to reach mutually acceptable agreements on technical, operational, planning, billing and other service aspects of interconnection. The composition of the joint technical and operational committee should be agreed upon by the service providers and could be reconstituted as and when required. The joint technical and operational committee should meet at regular intervals with an agenda agreed in advance and which may cover one or more of the following areas:

- new Pols;
- analysis of traffic levels;
- service quality;
- capacity requirements;
- fault analysis;

- billing processes;
- network and/or service changes; and
- any other technical and operational issues associated with interconnection.

Service Providers should establish working groups of project managers, operational staff and technical personnel where required to address specific issues as they arise.

4. Service level agreement

- a. Service providers with SMP shall include within their RIOs a statement of the service level agreement (SLA) which they offer describing the characteristics of the interconnection services, the service level obligations and compensation details for failure to meet these obligations. The SLA shall include, at least, timings for the provision of new services, availability and repair. The RIO shall contain the details of financial penalties that will be paid to other service providers if the service provider with SMP fails to meet the commitments defined within the SLA.
- b. The SLA should include:
 - service definition and description;
 - service configuration and technical characteristics such as points of interconnection, routing and signaling; and
 - operational and maintenance conditions and associated performance measures such as order lead time, network availability and service restoration time.

5. Duration

The interconnect agreement shall not have a defined fixed duration. The agreement should be ongoing with periodic reviews and opportunities for renegotiation.

6. Review

There shall be a process for re-negotiation of defined issues such as in the case of changes in law or regulation. This process shall have defined timescales, such as minimum times for negotiation and review notices. There shall also be an option to use arbitration to resolve disputes.

7. Confidentiality

Service providers should require other service providers to sign a confidentiality agreement to protect their information from being divulged to any other party, subsidiary, partner or other parts of their business, including but not limited to their retail section, save on a need to know basis so that they may be able to provide the interconnection services agreed upon. In particular there will be a need for data protection in respect of user details. However, such measures shall not hinder the provision of information to the Authority if required.

8. Intellectual Property Rights

Service providers should ensure that they safeguard their intellectual property rights (IPR). This will include controlled use of trademarks.

9. Liability

Service providers should define events of liability and limits of liability (direct loss), together with any threshold below which claims will not be made.

10. Additional Provisions

There are a number of other contractual issues that should be considered:

- Force Majeure;
- assignment;
- contract variation;
- breach of contract;
- termination; and
- governing law.

Article 41

This Regulation will be published and entered into force upon its publication in the Official Gazette.

Beirut on the 18th of March 2009

Dr. Kamal Shehadi

Chairman of the Telecommunications Regulatory Authority

Annex A: Contents of a RIO

Definitions

Management of interconnection

- Account management
- Joint technical committee
- Provision of information between service providers
- General network information
- Planned changes to networks
- Records of interconnect links

Interconnection services

- Call conveyance services
 - Call termination service
 - Call transit service
 - Call origination service
 - Intelligent Network call origination
- Transmission link services
- Interconnect link services
- Data interconnection services
- Collocation and facilities sharing services
- Operator services
- Operator assistance
- Emergency Services
- Directory enquiries
- Advanced call services

Technical aspects

- Interconnection of public exchanges
- Rules for interconnect links between public exchanges
 - Number of interconnect links
 - Link direction
 - Link capacity
- Transmission interconnection
- Point of Interconnect
- Interconnect extension circuits
- Transmission technologies
- Interconnection of signaling networks
- Interface standards and technical requirements
- Numbering
- Quality of Service

Interconnection processes

- Interconnect provisioning processes
- Lead-times
- Planning processes
 - Interconnection of a new public exchange
 - Transmission interconnection
 - Planning of interconnect links
 - Planning of new links
 - Removal of interconnect links
 - Capacity planning on interconnects links
 - Interconnect traffic forecasts
 - Interconnect capacity forecasts
 - Reactive capacity planning
 - Transmission link services planning
- Collocation and facilities sharing processes

- Request for service processes
- Implementation
- Interconnection operations processes
 - General principles
 - Network traffic management
 - Traffic and Quality of Service measurement
 - Traffic controls
 - Routing management
 - Mass call events
 - Fault management
 - Contact points
 - Fault detection
 - Fault processing
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 - Charges and payments
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 - Operator services
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- general contract provisions
 - Provision of information
 - Legal rights and obligation
 - Duration
 - Review
 - Confidentiality
 - Intellectual Property Rights
 - Liability
 - Additional Provisions
- Annex A: Charges
- Annex B: Facilities available for collocation and sharing
- Annex C: Network documentation
- Annex D: Service Level Agreement

ANNEX B: Interface Standards and Technical Requirements

1. Appropriate ITU-T technical standards may include but are not limited to:
 - a. G.111 Loudness Ratings in an International Connection;
 - b. G.113 Transmission Impairments;
 - c. G.121 Loudness Ratings of National Systems;
 - d. G.122 Influence of National Systems of Stability, Talker Echo and Listener Echo In International Connections;
 - e. G.123 Circuit Noise in National Circuits;
 - f. G.131 Stability and Echo;
 - g. G.151 General Performance Objectives Applicable to all Modern International and National Extension Circuits;
 - h. G.165 Echo Cancellers;
 - i. G.473 Interconnect of a Maritime Mobile Satellite System with the International Automatic Switched Telephone Service Transmission Aspects;
 - j. G.703 Physical/ Electrical Characteristics of Hierarchical Digital Exchanges;
 - k. G.704 Synchronous Frame Structures used at Primary and Secondary Hierarchical Levels;
 - l. G.706 Frame Alignment and Cyclic Redundancy Check (CRC) Procedures Relating to Basic Frame Structures Defined in Rec. G704;
 - m. G.711 Pulse Code Modulation (PCM) of Voice Frequencies;
 - n. G.712 Performance Characteristics of PCM Channels between 4-wire Interfaces at Voice Frequencies;
 - o. G.726 Adaptive Differential Pulse Code Modulation
 - p. G.811 International Connections Terminating on Synchronous Network Nodes;
 - q. G.812 Section 2.2.3 (Holdover Operation);
 - r. G821 Error Performance of an International Digital Connection forming part of an Integrated Services Digital Network;
 - s. G.823 The Control of Jitter and Wander within Digital Networks which are based on the 2048 kbit/s Hierarchy;
 - t. G.826 Error Performance Parameters and Objectives for International Constant Bit Rate Digital Paths At or Above the Primary Rate;
 - u. G.921 Digital Sections Based on the 2048kbit/s Hierarchy;
 - v. O.151 Error Performance Measuring Equipment for Digital Systems at the Primary Bit Rate and above;
 - w. O.152 Timing Jitter Measuring Equipment for Digital Systems;
 - x. P.11 Effect of Transmission Impairments

- y. P.16 Subjective effects of Direct Crosstalk; Thresholds of Audibility and Intelligibility;
 - z. P.76 Determination of Loudness rating; Fundamental principles;
 - aa. Q.522 Section 2.12 Bit Patterns Generated by the Exchange in Idle Channel Time Slots;
 - bb. Q.551 Transmission Characteristics of Digital Exchanges;
 - cc. Q.554 Transmission Characteristics at Digital Interfaces of a Digital Exchange;
 - dd. Q.700 Introduction to ITU-T Signalling System No.7;
 - ee. Q.701 Functional Description of the Message Transfer Part (MTP) of Signalling System No.7;
 - ff. Q.702 Signalling Data Link
 - gg. Q.703 Signalling System No.7 - Signalling Link;
 - hh. Q.704 Signalling System No.7 - Signalling Network Functions and Messages;
 - ii. Q.705 Signalling System No.7 - Signalling Network Structure;
 - jj. Q.706 Signalling System No.7 - Message Transfer Part Signalling Performance;
 - kk. Q.707 Testing and Maintenance;
 - ll. Q.767 Application of the ISDN User Part of ITU-T Signalling System No.7 for International ISDN Interconnections;
 - mm. Q.780 Signalling System No.7 Test Specification General Description;
 - nn. Q.781 Signalling System No.7 - MTP Level 2 Test Specification;
 - oo. Q.782 Signalling System No.7 - MTP Level 3 Test Specification;
 - pp. Q.784 ISUP Basic Call Test Specification; and
 - qq. Q.785 ISUP Protocol Test Specification for Supplementary Services.
2. Appropriate ETSI technical standards may include but are not limited to:
- a. ETS 300 008 Integrated Services Digital Network (ISDN); ITU-T Signalling System No.7; Message Transfer Part (MTP) to Support International Interconnection;
 - b. ETS 300 121 Integrated Services Digital Network (ISDN); Application of the ISDN User Part (ISUP) of ITU-T Signalling System No.7 for International Interconnection (ISUP Version 1);
 - c. ETS 300 132 Power Supply Interface at the Input to Telecommunications Equipment;
 - d. ETS 300 019 1-3 Environmental Conditions & Environmental Tests for Telecommunications Equipment, Part 1-3: Classification of Environmental Conditions - Stationary Use at Weather-Protected Locations;
 - e. ETS 300 246 ONP Technical Requirements: 2048kbit/s Digital Unstructured Leased Line (D2048U) Interface Presentation;

- f. ETS 300 247 ONP Technical Requirements: 2048kbit/s Digital Unstructured Leased Line (D2048U) Connection Characteristics;
- g. ETS 300 248 ONP Technical Requirements: 2048kbit/s Digital Unstructured Leased Line (D2048U) Terminal Equipment Interface;
- h. ETS 300 303 Integrated Services Digital Network (ISDN), Global Systems for Mobile Communications (GSM), Public Land Mobile Network (PLMN) Interface;
- i. ETS 300 386-1 Public Telecommunications Network Equipment EMC Requirements Part 1: Product Family Overview, Compliance Criteria and Test Levels; and
- j. ETS 300 009 Integrated Services Digital Network (ISDN); Signalling System NO 7 (SS7); Signalling Connection Control Part (SCCP) (Connectionless, and Connection-Oriented class2) to support international interconnection.

- End of Interconnection Regulation -

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