

I n t e r n a t i o n a l T e l e c o m m u n i c a t i o n U n i o n

**ITU-T**

TELECOMMUNICATION  
STANDARDIZATION SECTOR  
OF ITU

**D.93**

(01/2009)

SERIES D: GENERAL TARIFF PRINCIPLES

General tariff principles – Charging and accounting in the  
mobile services

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**Charging and accounting in the international  
land mobile telephone service (provided via  
cellular radio systems)**

Recommendation ITU-T D.93



ITU-T D-SERIES RECOMMENDATIONS  
**GENERAL TARIFF PRINCIPLES**

TERMS AND DEFINITIONS	D.0
GENERAL TARIFF PRINCIPLES	
Private leased telecommunication facilities	D.1–D.9
Tariff principles applying to data communication services over dedicated public data networks	D.10–D.39
Charging and accounting in the international public telegram service	D.40–D.44
Charging and accounting in the international telex message service	D.45–D.49
Principles applicable to GII-Internet	D.50–D.59
Charging and accounting in the international telex service	D.60–D.69
Charging and accounting in the international facsimile service	D.70–D.75
Charging and accounting in the international videotex service	D.76–D.79
Charging and accounting in the international phototelegraph service	D.80–D.89
<b>Charging and accounting in the mobile services</b>	<b>D.90–D.99</b>
Charging and accounting in the international telephone service	D.100–D.159
Drawing up and exchange of international telephone and telex accounts	D.160–D.179
International sound- and television-programme transmissions	D.180–D.184
Charging and accounting for international satellite services	D.185–D.189
Transmission of monthly international accounting information	D.190–D.191
Service and privilege telecommunications	D.192–D.195
Settlement of international telecommunication balances of accounts	D.196–D.209
Charging and accounting principles for international telecommunication services provided over the ISDN	D.210–D.269
Charging and accounting principles for next generation networks (NGN)	D.270–D.279
Charging and accounting principles for universal personal telecommunication	D.280–D.284
Charging and accounting principles for intelligent network supported services	D.285–D.299
RECOMMENDATIONS FOR REGIONAL APPLICATION	
Recommendations applicable in Europe and the Mediterranean Basin	D.300–D.399
Recommendations applicable in Latin America	D.400–D.499
Recommendations applicable in Asia and Oceania	D.500–D.599
Recommendations applicable to the African Region	D.600–D.699

*For further details, please refer to the list of ITU-T Recommendations.*

## **Recommendation ITU-T D.93**

### **Charging and accounting in the international land mobile telephone service (provided via cellular radio systems)**

#### **Summary**

Recommendation ITU-T D.93 sets out the principles for charging, billing, international accounting and settlement for the international land mobile telephone service provided via cellular radio systems. It also covers the applications of charging and accounting principles for various call routing scenarios.

#### **Source**

Recommendation ITU-T D.93 was approved on 23 January 2009 by ITU-T Study Group 3 (2009-2012) under the WTSA Resolution 1 procedure.

## FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications, information and communication technologies (ICTs). The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

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## CONTENTS

	<b>Page</b>	
1	General considerations.....	1
1.6	Definitions .....	1
2	Principles for charging.....	1
2.2	HPLMN charging .....	1
2.3	VPLMN charging .....	2
2.4	Fixed station charges .....	2
2.5	Mobile station-to-mobile station charges .....	2
3	Principles for accounting .....	2
4	Principles for settlements between PLMNs.....	3
5	Mobile Station Roaming Numbers (MSRNs).....	4
Annex A	– Applications of charging and accounting principles for various call routing scenarios .....	5
A.1	Case 1 – Mobile station to a fixed station .....	5
A.2	Case 2 – Roamed mobile station to a fixed station .....	5
A.3	Case 3 – Roamed mobile station-to-fixed station.....	5
A.4	Case 4 – Fixed station-to-mobile station .....	6
A.5	Case 5 – Fixed station-to-roamed mobile station .....	7
A.6	Case 6 – Fixed station-to-roamed mobile station .....	8
A.7	Case 7 – Fixed station-to-roamed mobile station .....	10
A.8	Case 8 – Mobile station-to-mobile station.....	11
A.9	Case 9 – Mobile station-to-roamed mobile station.....	11
A.10	Case 10 – Roamed mobile station-to-mobile station.....	12
A.11	Case 11 – Roamed mobile station-to-roamed mobile station.....	12



## **Recommendation ITU-T D.93**

### **Charging and accounting in the international land mobile telephone service (provided via cellular radio systems)**

#### **1 General considerations**

**1.1** In the land mobile telephony service, the Home Public Land Mobile Network (HPLMN) will know the location of all operational mobile stations for which it is the home registered network, when the station is operating within its HPLMN or has roamed in accordance with the principles contained in ITU-T Recommendations of the Q.1000 series.

**1.2** The Visited Public Land Mobile Network (VPLMN) will be able to access and record the necessary details of any mobile station which has roamed and registered with it, such that it can forward all necessary billing information to the HPLMN.

**1.3** Mobile stations will only be able to roam to another Public Land Mobile Network (PLMN):

- upon the conclusion of a bilateral agreement between PLMNs;
- upon the granting by the HPLMN of the option to roam to the mobile station.

**1.4** As part of the bilateral agreement, the HPLMN should undertake to pay the VPLMN the charges incurred by the HPLMN registered mobile subscribers.

**1.5** Examples of the application of the charging and accounting principles, set out below, for various call routing scenarios are given in Annex A.

#### **1.6 Definitions**

##### **1.6.1 home PLMN**

The PLMN in which a mobile station is permanently registered.

##### **1.6.2 home location register**

The location register to which a mobile station is assigned for record purposes such as subscriber information

##### **1.6.3 visited PLMN**

The PLMN, other than the home PLMN, in which a roaming subscriber is currently located.

##### **1.6.4 visitor location register**

The location register, other than the home location register used by an MSC to retrieve information for, for instance, handling of calls to or from a roaming mobile station, currently located in its area.

##### **1.6.5 mobile station roaming number**

The network internal number used for routing of calls to the mobile station. See Recommendation ITU-T E.213.

#### **2 Principles for charging**

**2.1** The charge structure and level in any country is a national matter.

##### **2.2 HPLMN charging**

**2.2.1** The HPLMN is responsible for billing the mobile subscriber for all incurred charges.

**2.2.2** Charging structures should be as simple as possible.

**2.2.3** The charge would normally consist of two components:

- a network access component;
- a network utilization component.

**2.2.3.1** The network access component is intended to cover the cost of making the service available, such costs being independent of network utilization:

- initial registration charge (non-recurring);
- subscription or rental (periodic).

The network access component shall not be included in the international accounts.

**2.2.3.2** The network utilization component is intended to cover the costs of the service which are dependent on network utilization:

- utilization charges (covering mobile, national/international elements as applicable);
- any supplementary service charges.

**2.2.4** The charges billed to the mobile subscriber should be such as to cover the payments due to the VPLMN plus any handling charges which may also be raised.

### **2.3 VPLMN charging**

The charges raised by a VPLMN against the HPLMN should normally include one or more of the following:

- roaming registration fee (non-recurring);
- roaming subscription (periodic);
- utilization charges (covering mobile, national/international elements as applicable);
- any supplementary service charges.

### **2.4 Fixed station charges**

In the case of a fixed station to mobile station international call, the charge to the calling station should be:

- a) the appropriate fixed station to fixed station charge; or
- b) where 3.3 b) below applies, a separately established charge to reflect the different cost associated with call delivery *may be applied*.

### **2.5 Mobile station-to-mobile station charges**

In the case of a mobile station-to-mobile station international call, the charge to the calling station should be:

- a) the appropriate mobile station-to-fixed station charge; or
- b) where 3.3 b) below applies, a separately established charge to reflect the different costs associated with call delivery *may be applied*.

## **3 Principles for accounting**

**3.1** International traffic originating or terminating at a mobile station will always be routed via the fixed networks of the countries concerned. The Administration of the country where the call originates should, therefore, include all such traffic in its regular international traffic accounts.

**3.2** The accounting rates for international traffic originating or terminating at a mobile station should be cost-orientated and should be applied on a non-discriminatory basis to all relations, taking into account the principles embedded in Rec. ITU-T D.140.



- 3.3** International traffic terminating at a mobile network will be accounted for either:
- a) at the normal IDD rate for the relation concerned<sup>1</sup>; or
  - b) in relationships where cost-orientated rates have been agreed, and where costs for terminating at a mobile network differ from those of terminating at a fixed network, a separate rate may be bilaterally agreed for traffic terminating at a mobile network. In each case, both the rates for fixed and mobile traffic need to be cost-orientated based on the costs of terminating that traffic. The difference between the two rates should be as small as possible.
- 3.4** In a case where 3.3 b) is applied, suitable means need to be established by bilateral agreement to enable the Administration of origin to separately identify this traffic, for both charging and accounting purposes.
- 3.5** Where 3.3 b) applies, subject to bilateral agreement, the mobile terminating traffic will have to be separately identified in the traffic accounts.
- 3.6** Where 3.3 b) would be applicable but traffic terminating at mobile network is more or less in balance in both directions of the relationship and costs are similar, the Administrations concerned may agree not to account separately for this traffic while it remains more or less in balance.
- 3.7** Where 3.3 b) applies but the difference between the two rates cannot objectively be justified on the basis of costs, the following could be considered:
- a) the difference between the rates for calls terminating on fixed networks on the one hand, and calls terminating on mobile networks on the other (arrived at by deducting the lower from the higher), should be no greater than the corresponding difference between the average of the available interoperator rates for national fixed-to-fixed calls on the one hand, and the average of available interoperator rates for all national calls terminating on a mobile network on the other.

If such a comparison is not possible, the difference should be no greater than the corresponding difference between the average of retail rates for a national fixed-to-fixed call on the one hand, and the average of retail rates for a national fixed-to-mobile call on the other hand.

## **4 Principles for settlements between PLMNs**

**4.1** The VPLMN should prepare a statement of the charges payable by the HPLMN for its registered mobile subscribers. The format and frequency of dispatch should be agreed between the two parties. This statement should show the total charge expressed in SDRs or another agreed accounting currency, together with the conversion rate.

**4.2** To ensure that the HPLMN has sufficient information for billing purposes, individual statements should be prepared for each registered subscriber. These statements should include the following information:

- a) The period covered by the statement.
- b) The subscriber identity in the HPLMN.
- c) For each call:
  - i) the date and start time;
  - ii) number called and area code;
  - iii) destination country;

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<sup>1</sup> In this case, the rate should be cost-orientated based on blended cost between the cost terminating at the fixed station and the mobile station.

- iv) duration in minutes and seconds;
- v) any supplementary services used.

**4.3** In the absence of alternative settlement procedures agreed between the PLMNs concerned, settlement of balances shall be effected in accordance with the provisions of the Administrative Regulations [1].

## **5 Mobile Station Roaming Numbers (MSRNs)**

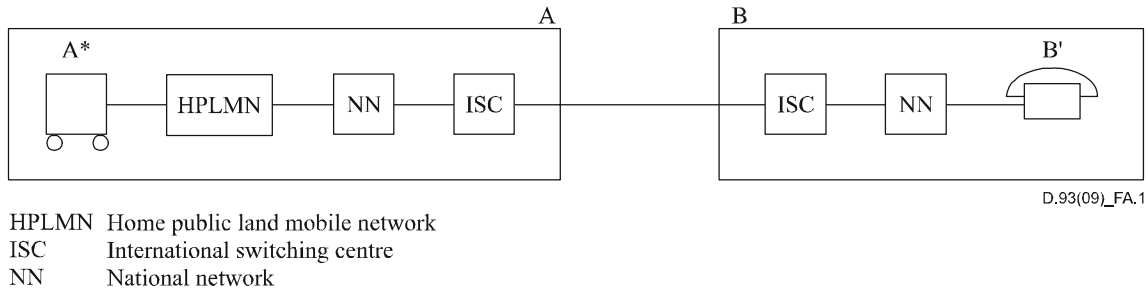
VPLMN should assign MSRN(s) from the E.164 resource of the actual physical location of the roamed mobile station. In the case of a shared MCC for networks assigned by the ITU TSB, VPLMN should assign MSRN(s) from the associated E164 resources assigned by the ITU TSB to the assignee for the specific MNC of the shared MCC for networks.

## Annex A

### Applications of charging and accounting principles for various call routing scenarios

#### A.1 Case 1 – Mobile station to a fixed station

In this case, mobile station A\* in its home PLMN (country A), makes an international (non-roaming) call to a fixed station B' in country B (see Figure A.1).

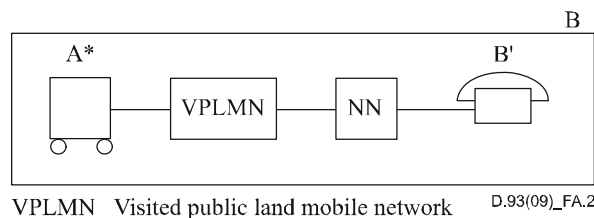


**Figure A.1 – Case 1 configuration**

Charging: A\* will be billed by its HPLMN for call to country B.  
Inter PLMN settlement: Not applicable.  
Traffic accounting: The call from A to B is included in A's outgoing traffic account.

#### A.2 Case 2 – Roamed mobile station to a fixed station

Mobile station A\* has roamed to PLMN in country B and makes a national call to a fixed station (see Figure A.2).



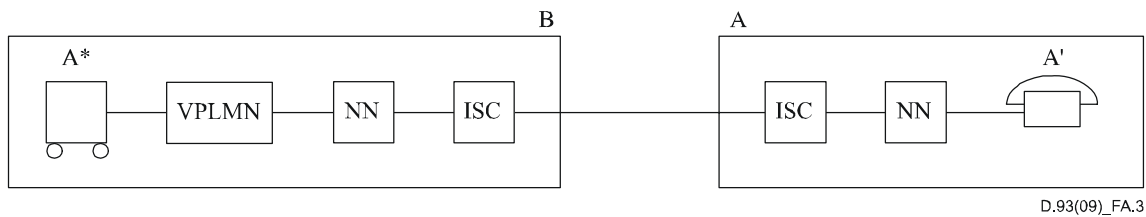
**Figure A.2 – Case 2 configuration**

Charging: A\* will be billed by its HPLMN based on data provided by the VPLMN.  
Inter PLMN settlement: The HPLMN "A" will reimburse the VPLMN "B" for the charges incurred by the roamer.  
Traffic accounting: Not applicable.

#### A.3 Case 3 – Roamed mobile station-to-fixed station

Mobile station A\* has roamed to a PLMN in country B and makes an international call.

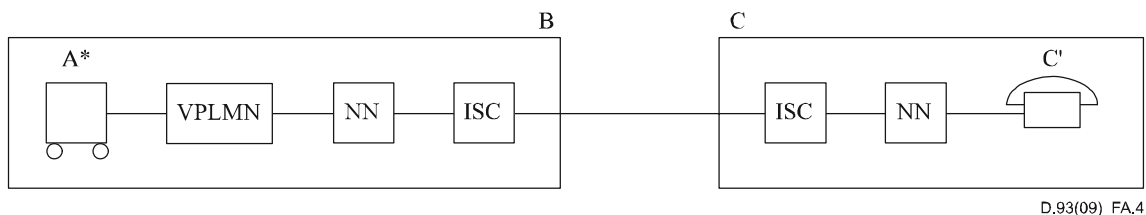
### A.3.1 Case 3A – Call to the home country (see Figure A.3)



**Figure A.3 – Case 3A configuration**

- Charging:** As for Case 2: A\* will be billed by its HPLMN based on data provided by the VPLMN.
- Inter PLMN settlement:** As for Case 2: the HPLMN "A" will reimburse the VPLMN "B" for the charges incurred by the roamer.
- Traffic accounting:** The call from B to A is included in the normal international telephone traffic account of B.

### A.3.2 Case 3B – Call to a third country, C (see Figure A.4)

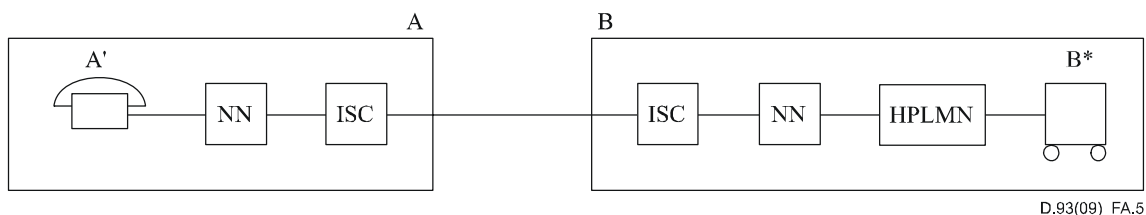


**Figure A.4 – Case 3B configuration**

- Charging:** As for Case 2: A\* will be billed by its HPLMN based on data provided by the VPLMN.
- Inter PLMN settlement:** As for Case 2: the HPLMN "A" will reimburse the VPLMN "B" for the charges incurred by the roamer.
- Traffic accounting:** The call from B to C is included in the normal telephone traffic account of B.

### A.4 Case 4 – Fixed station-to-mobile station

Fixed station A' makes an international call to mobile station B\* in country B (home PLMN) (see Figure A.5).



**Figure A.5 – Case 4 configuration**

Charging: Appropriate fixed station-to-fixed station international telephone charges apply.

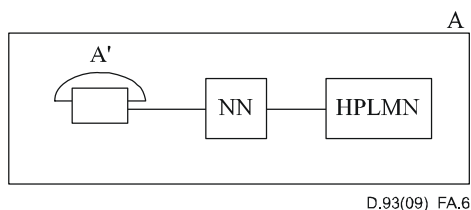
Inter PLMN settlement: Not applicable.

Traffic accounting: The call from A to B is included in A's outgoing traffic account.

### A.5 Case 5 – Fixed station-to-roamed mobile station

Fixed station A' calls mobile station A\* which has roamed to country B.

**A.5.1 Case 5A** – A' is provided with a recorded announcement saying A\* is not available on this PLMN, call is not forwarded (see Figure A.6).



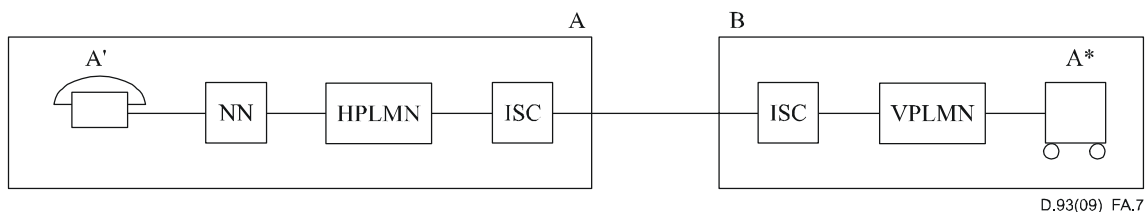
**Figure A.6 – Case 5A configuration**

Charging: The fixed station may be charged for accessing the recorded announcement.

Inter PLMN settlement: Not applicable.

Traffic accounting: Not applicable.

**A.5.2 Case 5B** – The call is automatically forwarded to the mobile network in country B. A' is not made aware (see Figure A.7).



**Figure A.7 – Case 5B configuration**

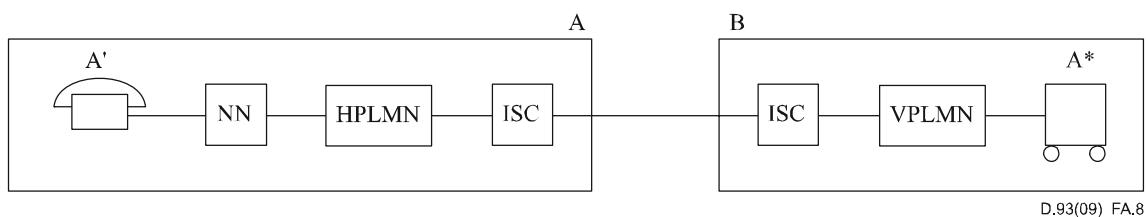
Charging:

- Fixed station is charged for the national call dialled.
- The HPLMN "A" may raise a charge against A\* for the forwarded element of the call.
- A\* may be billed by its HPLMN for charges which may be raised by the VPLMN for the roamer's use of its network to receive the call, based on the data provided by the VPLMN "B".

Inter PLMN settlement: As for Case 2: the HPLMN "A" will reimburse the VPLMN "B" for the charges incurred by the roamer.

Traffic accounting: The call from A to B is included in A's outgoing traffic account.

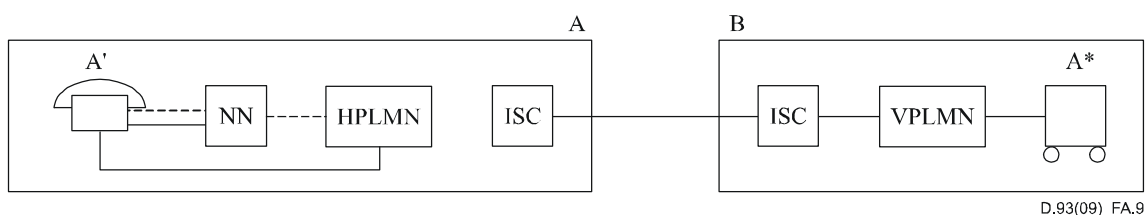
**A.5.3 Case 5C** – Fixed station advised that the mobile station has roamed and given option of completing call at appropriate charge or cancelling (see Figure A.8).



**Figure A.8 – Case 5C configuration**

NOTE – Not yet technically possible – for further study.

**A.5.4 Case 5D** – Fixed station knows the roamer's temporary number in VPLMN (see Figure A.9).



**Figure A.9 – Case 5D configuration**

Charging:

- As for Case 4: appropriate fixed station-to-fixed station international telephone charges apply.
- A\* may be billed by its HPLMN for charges which may be raised by the VPLMN "B" for the roamer's use of its network to receive the call, based on the data provided by the VPLMN.

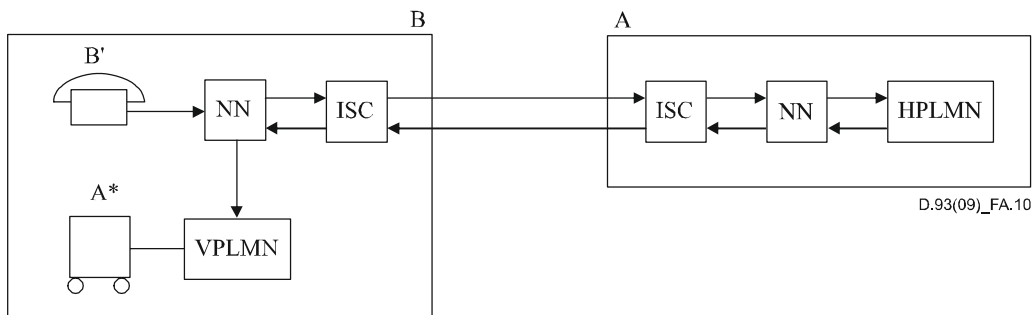
Inter PLMN settlement: As for Case 2: the HPLMN "A" will reimburse the VPLMN "B" for the charges incurred by the roamer.

Traffic accounting: As for Case 4: the call from A to B is included in A's outgoing traffic account.

## **A.6 Case 6 – Fixed station-to-roamed mobile station**

Fixed station B' makes an international call to mobile A\* in country A which has roamed to country B. B' is not made aware.

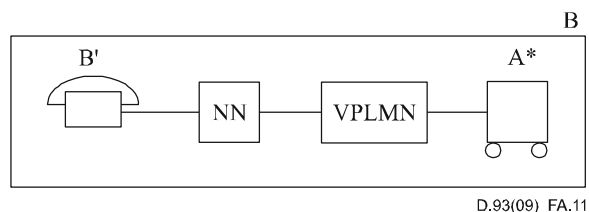
**A.6.1 Case 6A** – Call is automatically forwarded to country B (see Figure A.10).



**Figure A.10 – Case 6A configuration**

- Charging:
- As for Case 5B: fixed station is charged for the international call dialled.
  - The HPLMN may raise a charge against A\* for the forwarded element of the call.
  - A\* may be billed by its HPLMN for charges which may be raised by the VPLMN "B" for the roamer's use of its network to receive the call, based on the data provided by the VPLMN.
- Inter PLMN settlement: As for Case 2: the HPLMN "A" will reimburse the VPLMN "B" for the charges incurred by the roamer.
- Traffic accounting:
- The call from B to A is included in B's outgoing traffic account.
  - The call from A to B is included in A's outgoing traffic account.

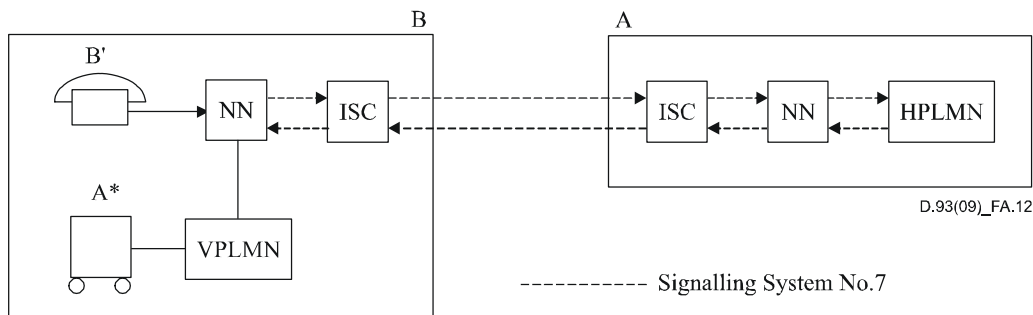
**A.6.2 Case 6B** – Fixed station B' knows roamed station A\*'s temporary number in country B (see Figure A.11).



**Figure A.11 – Case 6B configuration**

- Charging:
- As for Case 4: appropriate national telephone charges apply.
  - A\* may be billed by its HPLMN for charges which may be raised by the VPLMN "B" for the roamer's use of its network to receive the call, based on the data provided by the VPLMN.
- Inter PLMN settlement: As for Case 2: the HPLMN "A" will reimburse the VPLMN "B" for the charges incurred by the roamer.
- Traffic accounting: Not applicable.

**A.6.3 Case 6C** – Using Signalling System No. 7, the mobile switching centre in country A signals to the national network (NN) in B that A\* is now in country B and the call is automatically forwarded via the mobile switching centre in country B (see Figure A.12).



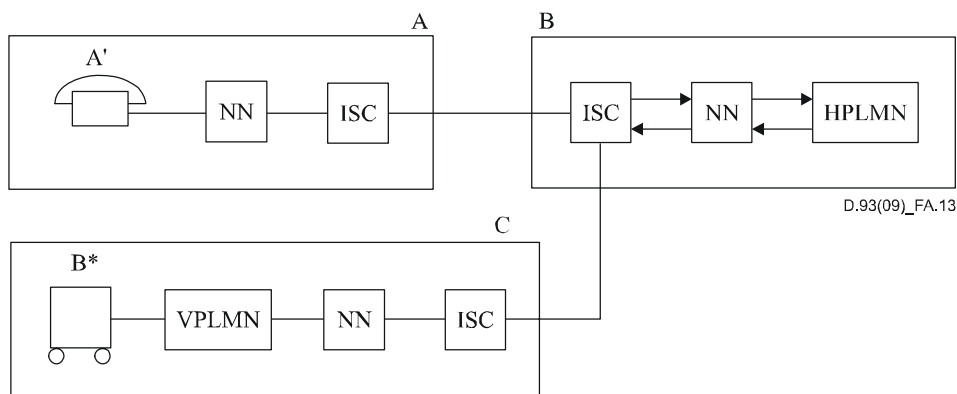
**Figure A.12 – Case 6C configuration**

NOTE – Not yet technically possible – for further study.

**A.7 Case 7 – Fixed station-to-roamed mobile station**

Fixed station A' calls mobile station B\* which has roamed to country C. A' is not aware.

**A.7.1 Case 7A – Call is automatically forwarded to country C (see Figure A.13).**

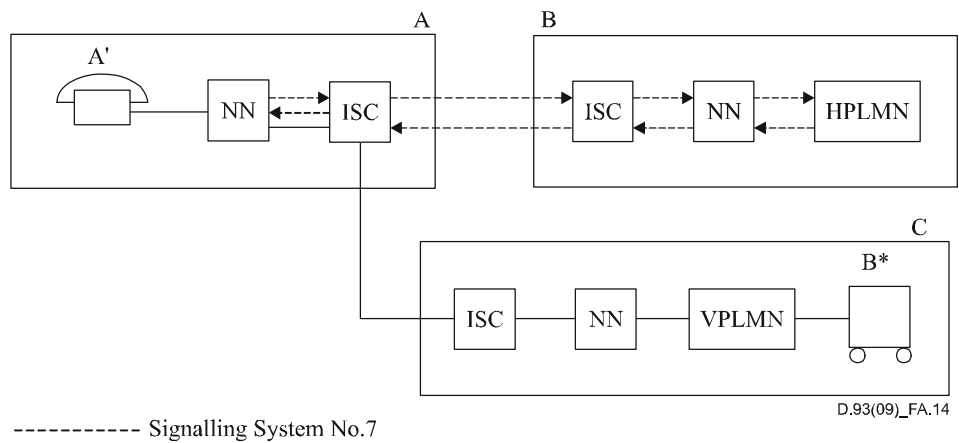


**Figure A.13 – Case 7A configuration**

- Charging:
- As for Case 6A: fixed station is charged for the international call dialled.
  - HPLMN "B" may raise a charge against B\* for the forwarded element of the call.
  - B\* may be billed by its HPLMN for charges which may be raised by the VPLMN for the roamer's use of its network to receive the call, based on the data provided by the VPLMN.
- Inter PLMN settlement: As for Case 2: The HPLMN "B" will reimburse the VPLMN "C" for the charges incurred by the roamer.
- Traffic accounting:
- The call from A to B is included in A's outgoing traffic account.
  - The call from B to C is included in B's outgoing traffic account.

**A.7.2 Case 7B –** Using C7, the MSC/NN in country B signals to NN that B\* is now in country C. Call is automatically forwarded to PLMN in country C (see Figure A.14).



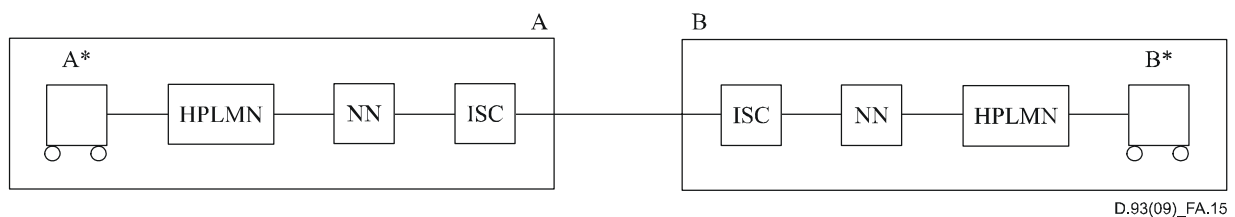


**Figure A.14 – Case 7B configuration**

NOTE – Not yet technically possible – for further study.

**A.8 Case 8 – Mobile station-to-mobile station**

In this case, the mobile station A\* is in its HPLMN and makes an international (non-roaming) call to mobile station B\*, its home PLMN (see Figure A.15).

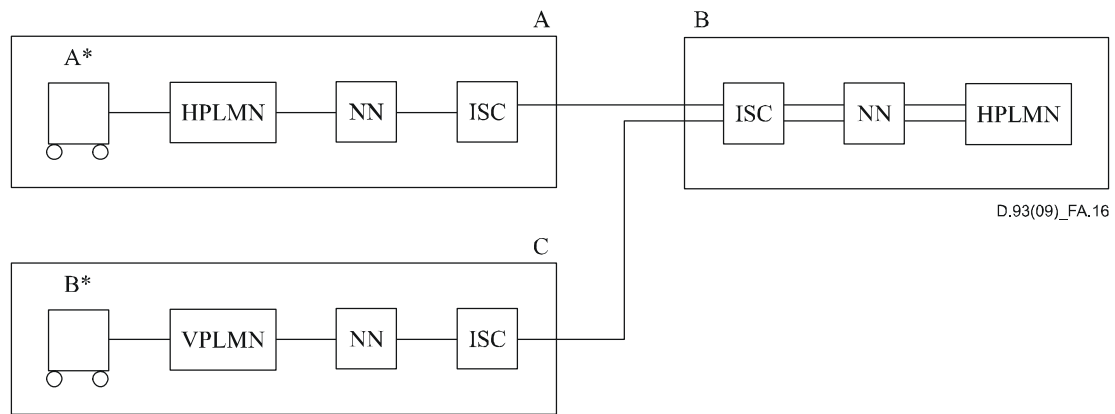


**Figure A.15 – Case 8 configuration**

- Charging: A\* will be billed by its HPLMN for call to country B.
- Inter PLMN settlement: Not applicable.
- Traffic accounting: The call from A to B is included in A's outgoing traffic account.

**A.9 Case 9 – Mobile station-to-roamed mobile station**

In this case, mobile station A\* is in its HPLMN and makes a call to mobile station B\* which has roamed to country C (see Figure A.16).

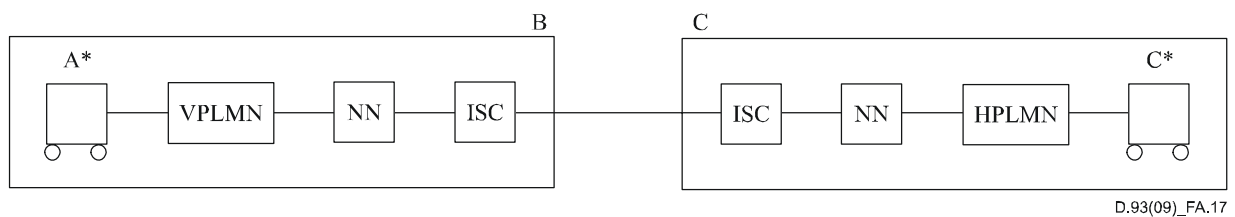


**Figure A.16 – Case 9 configuration**

- Charging:
- Mobile station A\* is charged for the international call dialled.
  - B\*'s HPLMN may raise a charge for the forwarded element of the call.
  - B\* may be billed by its HPLMN for charges which may be raised by the VPLMN "C" for the roamer's use of its network to receive the call, based on the data provided by the VPLMN.
- Inter PLMN settlement:     The HPLMN "B" will reimburse the VPLMN "C" for the charges incurred by the roamer.
- Traffic accounting:
- The call from A to B is included in A's outgoing traffic account.
  - The call from B to C is included in B's outgoing traffic account.

**A.10 Case 10 – Roamed mobile station-to-mobile station**

In this case, roamed mobile station A\* has roamed to a PLMN in country B and makes an international call to mobile C\* operating in its HPLMN (see Figure A.17).

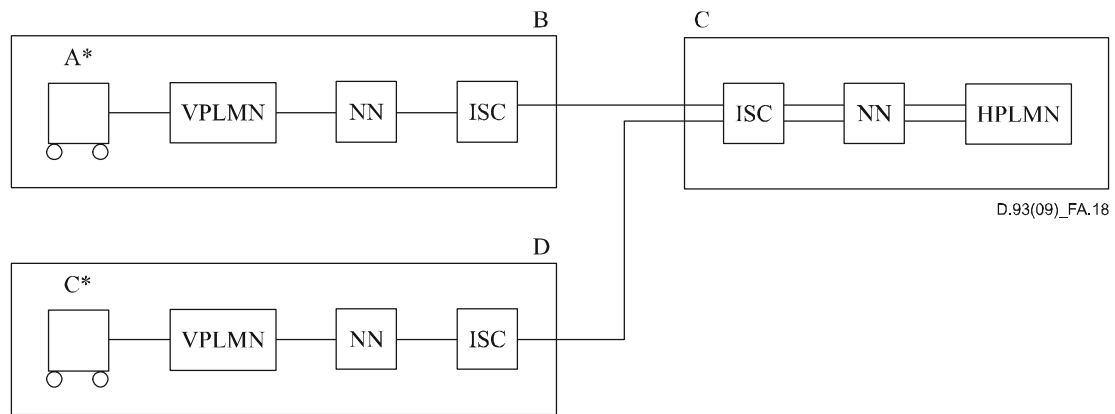


**Figure A.17 – Case 10 configuration**

- Charging:                     A\* will be billed by its HPLMN based on data provided by the VPLMN.
- Inter PLMN settlement:     The HPLMN "A" will reimburse the VPLMN "B" for the charges incurred by the roamer.
- Traffic accounting:         The call from B to C is included in the normal international telephone traffic account of B.

**A.11 Case 11 – Roamed mobile station-to-roamed mobile station**

In this case, roamed mobile station A\* makes an international call to roamed mobile station C\* operating in country D (see Figure A.18).



**Figure A.18 – Case 11 configuration**

- Charging:** A\* will be billed by the HPLMN based on data provided by the VPLMN.
- Inter PLMN settlement:**
- For A\*, its HPLMN will reimburse the VPLMN "B" for charges incurred by A\*'s roaming in country B.
  - For C\*, its HPLMN may raise a charge for the forwarded element of the call.
  - C\* may be billed by its HPLMN for the charges which may be raised by the VPLMN "D" for the roamer's use of its network to receive the call, based on the data provided by the VPLMN.
- Traffic accounting:**
- The call from B to C is included in B's outgoing traffic account.
  - The call from C to D is included in C's outgoing traffic account.

**Reference**

[1] Final Acts of the World Administrative Telegraph and Telephone Conference, Telegraph Regulations, Telephone Regulations, ITU, Geneva, 1973. (See also the Preliminary Note No. 3, page XIV.)





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Series A	Organization of the work of ITU-T
<b>Series D</b>	<b>General tariff principles</b>
Series E	Overall network operation, telephone service, service operation and human factors
Series F	Non-telephone telecommunication services
Series G	Transmission systems and media, digital systems and networks
Series H	Audiovisual and multimedia systems
Series I	Integrated services digital network
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Series R	Telegraph transmission
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