

# International Termination Rates and International Cooperation

**NTC ITU ASP COE TRAINING WORKSHOP**  
**On**  
**International Roaming and International Traffic Termination**  
**5-8 October 2010**

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# Presentation roadmap



*Termination  
Rates and its  
variations*

*Accounting  
Rate  
System*

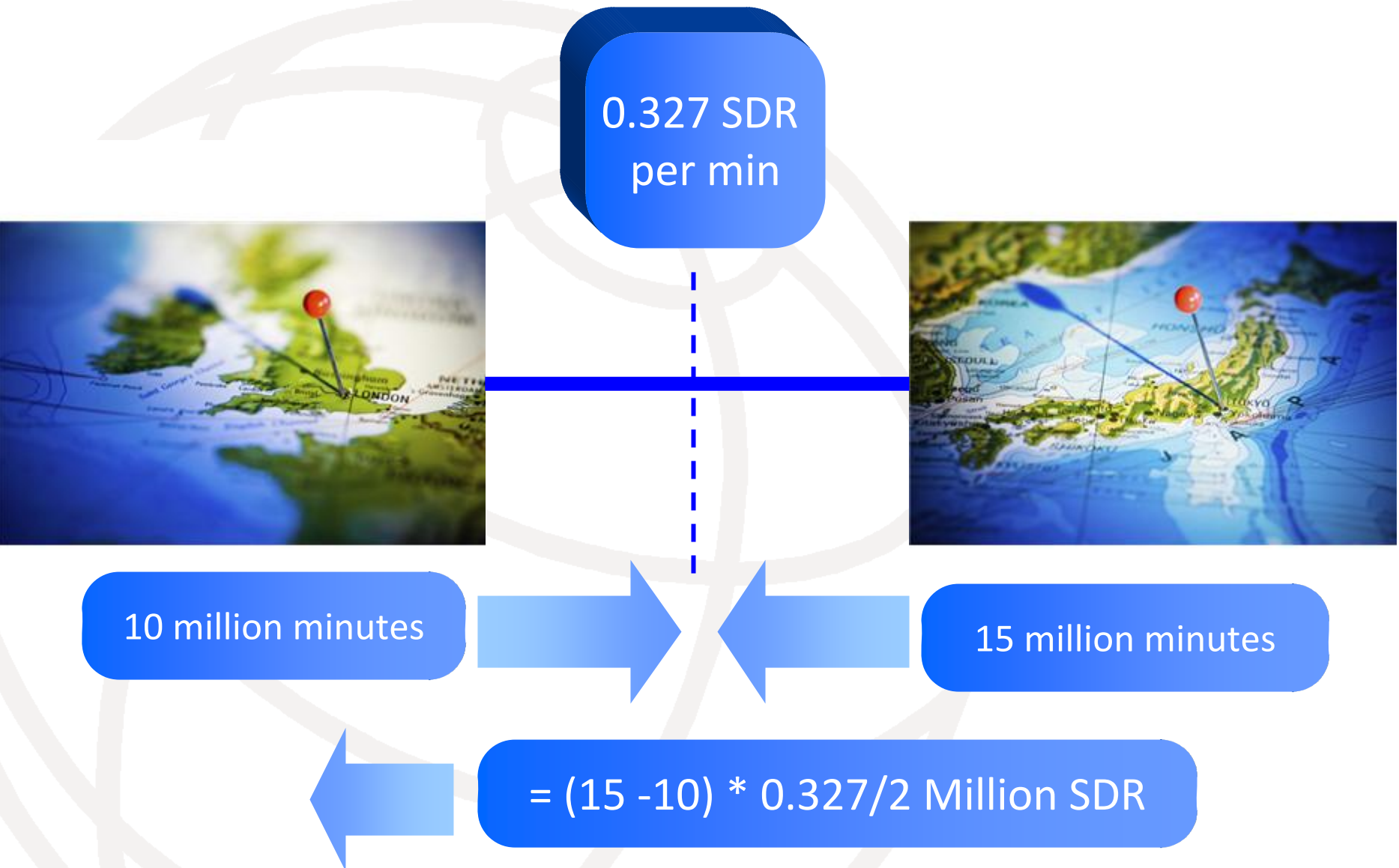
*Internet &  
VoIP Termination*

*Next Generation Access*

*Accounting  
Rate  
System*



# Accounting Rate System



# Challenges to accounting rate - I

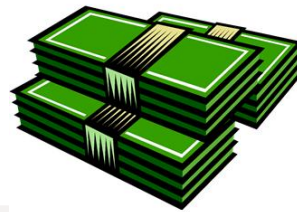
Developed

Developing

Asymmetric Traffic Flow

Net out payment from developed countries  
to developing countries

**1993**



**40 Billion USD\***

**1998**

# Challenges to accounting rate - II

Government  
Ownership



Private  
Ownership



# Challenges to accounting rate – III

Monopoly



Competition



# Account Rate System Under Pressure

*New delivery options in search of lower prices*

*Arbitrage opportunities as regulatory frameworks  
were in transition*



**1997**  
**FCC**  
*imposed ceilings  
on  
US based operators*

# ITU and Accounting Rate Reform

## ITU-T Study Group 3

*WTO (GATS 1994)  
MFN Status not granted as  
no consensus reached*

ITU-T Recommendations  
D.140

*Cost Orientation  
Publication of  
rates  
Periodic Review*

ITU-T Recommendations  
D.150

ITU-T Rec. D.140 Rev.  
Amend 1

ITU-T Rec. D.140  
Amend 2 & 3

ITU-T Rec. D.140  
Supplement 3

**1992**

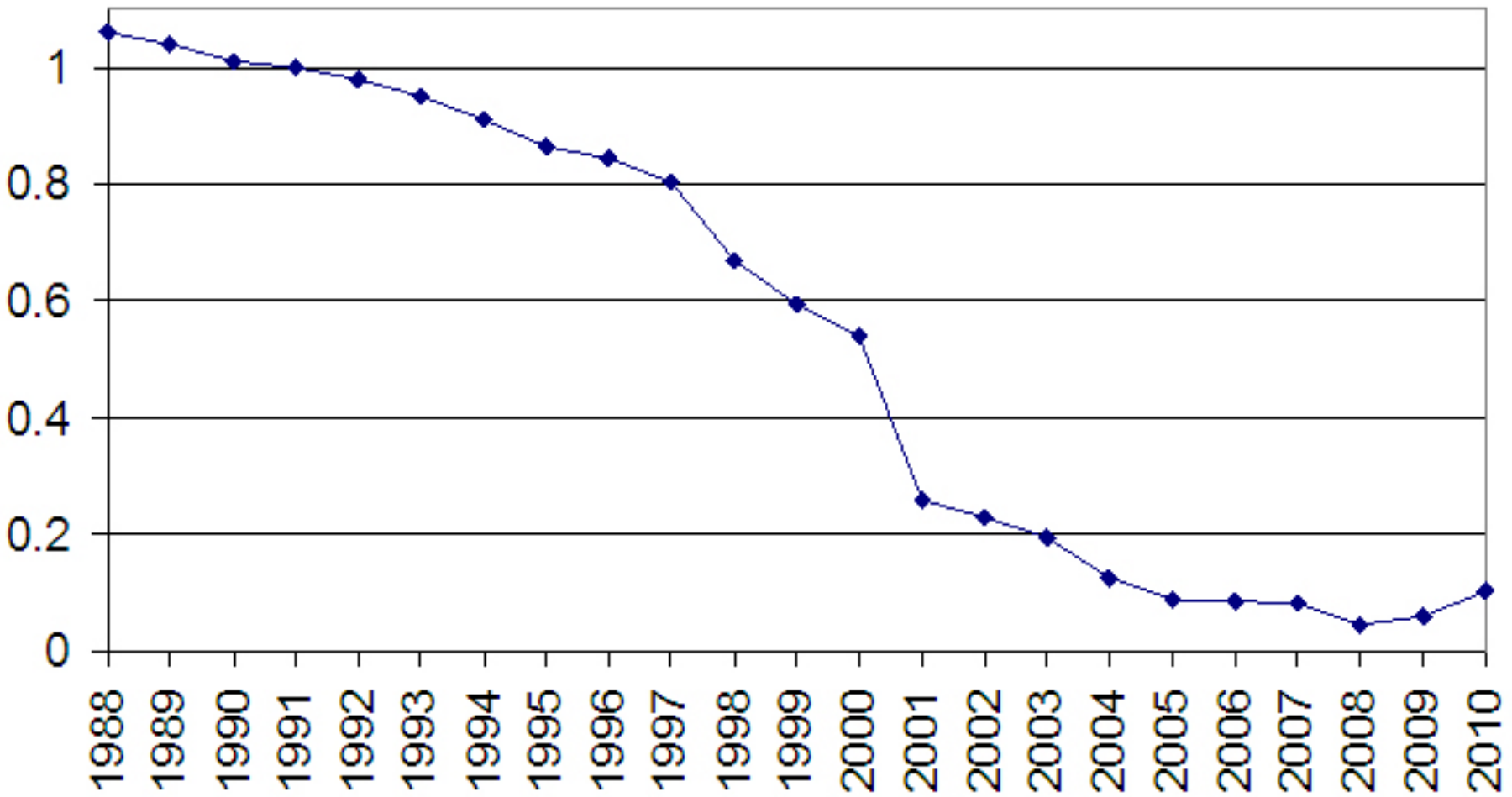
**1998**

**2002**

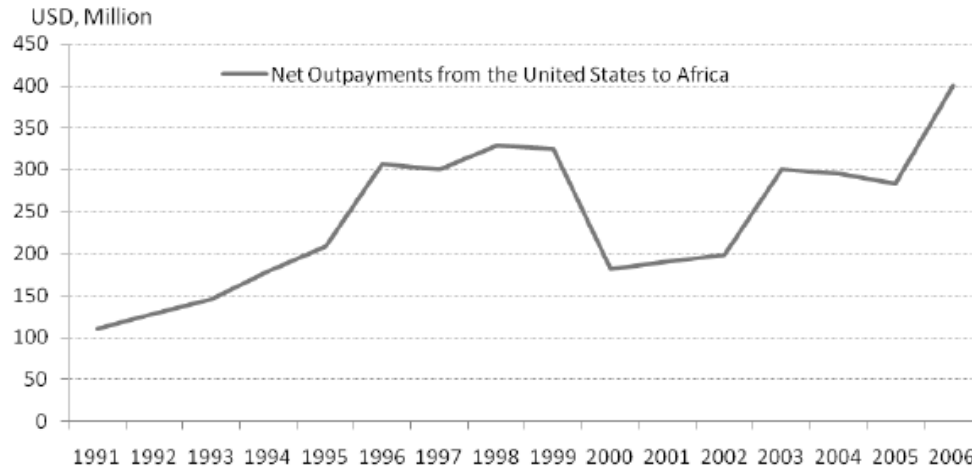
**2003**

**2004**

# Decline of Accounting Rates (in SDR)



# Net out payments: US to Africa



Source: OECD based on FCC International Traffic Data Reports.



Source: OECD based on FCC International Traffic Data Reports.

# Decline of settlement rates

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*“Over the years, the number of respondents started to decline, primarily because the traditional accounting rate system was no longer the main method for settling accounts: rates were increasingly set on a bilateral basis by private operators, and were increasingly based on more complex traffic routing arrangements involving three or more parties.*

*Thus, it was decided in 2010 to discontinue the survey, while recognizing that it had been a very valuable exercise, in particular because it well documented the significant reductions over time in accounting rates.”*

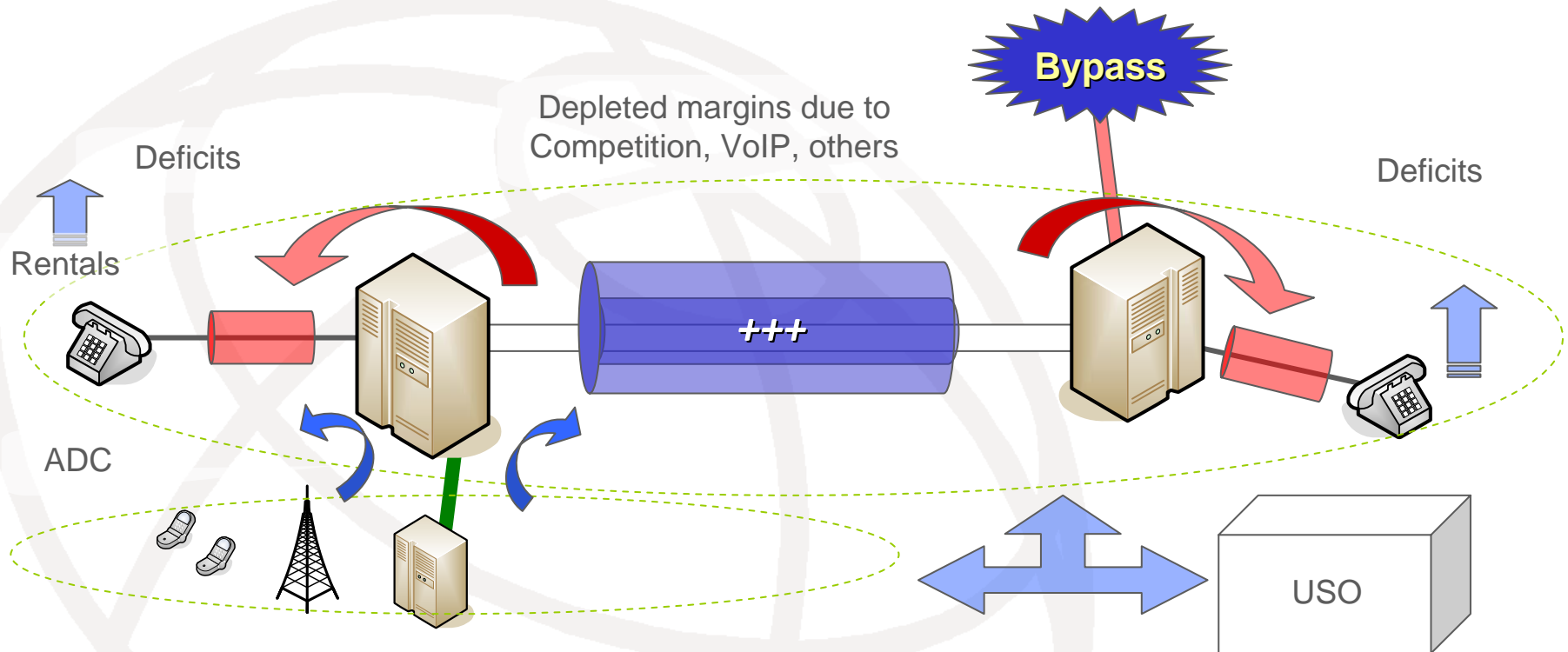
**Source: <http://www.itu.int/ITU-T/studygroups/com03/hs-acctrate.html>**

# The rise of cost oriented termination

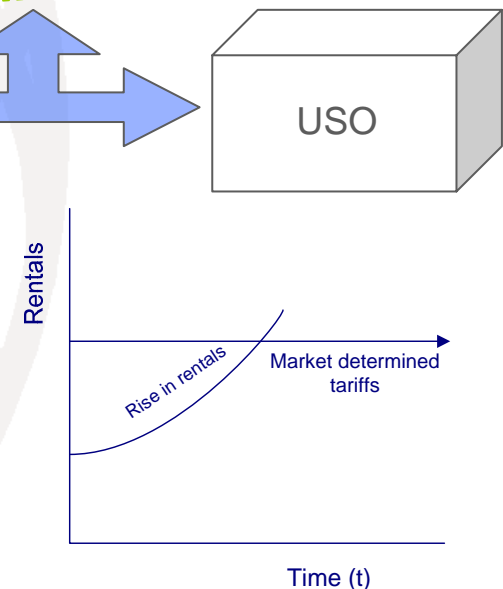


*Termination  
Rates and its  
variations*

# Implementing cost oriented termination



- Cost of providing mobile services lower than fixed forcing greater pressure on tariffs
- Competition from Internet Telephony making high long distance tariffs unsustainable.



# *Various termination charge models emerged*

***Senders Keep All  
(Receiving Party Pays)***

***Cost based termination and  
its variations (FAC, LRIC, TSLRIC)***

***Cost based termination ++  
(Access Deficit, Subsidy etc.)***

# Access Deficit Charges

## *In transition to*

- *Termination rate based regime;*
- *Removal of subsidies from long distance;*
- *Cost oriented rentals and local charges*

**Regulators allowed an access deficit charge over cost based termination charges as a transitory mechanism (e.g. Australia, India...)**

**Caution: e.g. competitive neutrality, illegal traffic, refiling**

# Terminates Rates for International Calls

## *Example: Pakistan*

Subsidy charges on all international incoming calls (known as Access Promotion Contribution) for the access providers.

Approved international settlement rate is US 10.5 cents/min and after the allowed discount, LDI operators are allowed to negotiate upto US 7.98 cents/min with foreign carriers. The share of local loop operators is US 5.5 cents/min for each international incoming minute.

The domestic termination rates are as under:

Fixed Termination Rate	-	PKR 0.65/min or US 0.76 cents /min
Mobile Termination Rate	-	PKR 0.90/min or US 1.06 cents/min

# Terminates Rates for International Calls

## Example: India

<b>Origination Charge</b>	Under Forbearance
<b>Termination Charge</b>	Uniform for all types of domestic calls viz fixed to fixed, fixed to mobile, mobile to fixed and mobile to mobile. 20 Paise/minute
<b>Termination charge for 3G voice calls</b>	Same as 2G voice calls
<b>Termination charge for incoming international calls</b>	40 paise per minute
<b>Domestic Carriage charge</b>	Ceiling of Rs 0.65 per minute
<b>International Carriage Charge</b>	Under Forbearance.

# Terminates Rates for International Calls

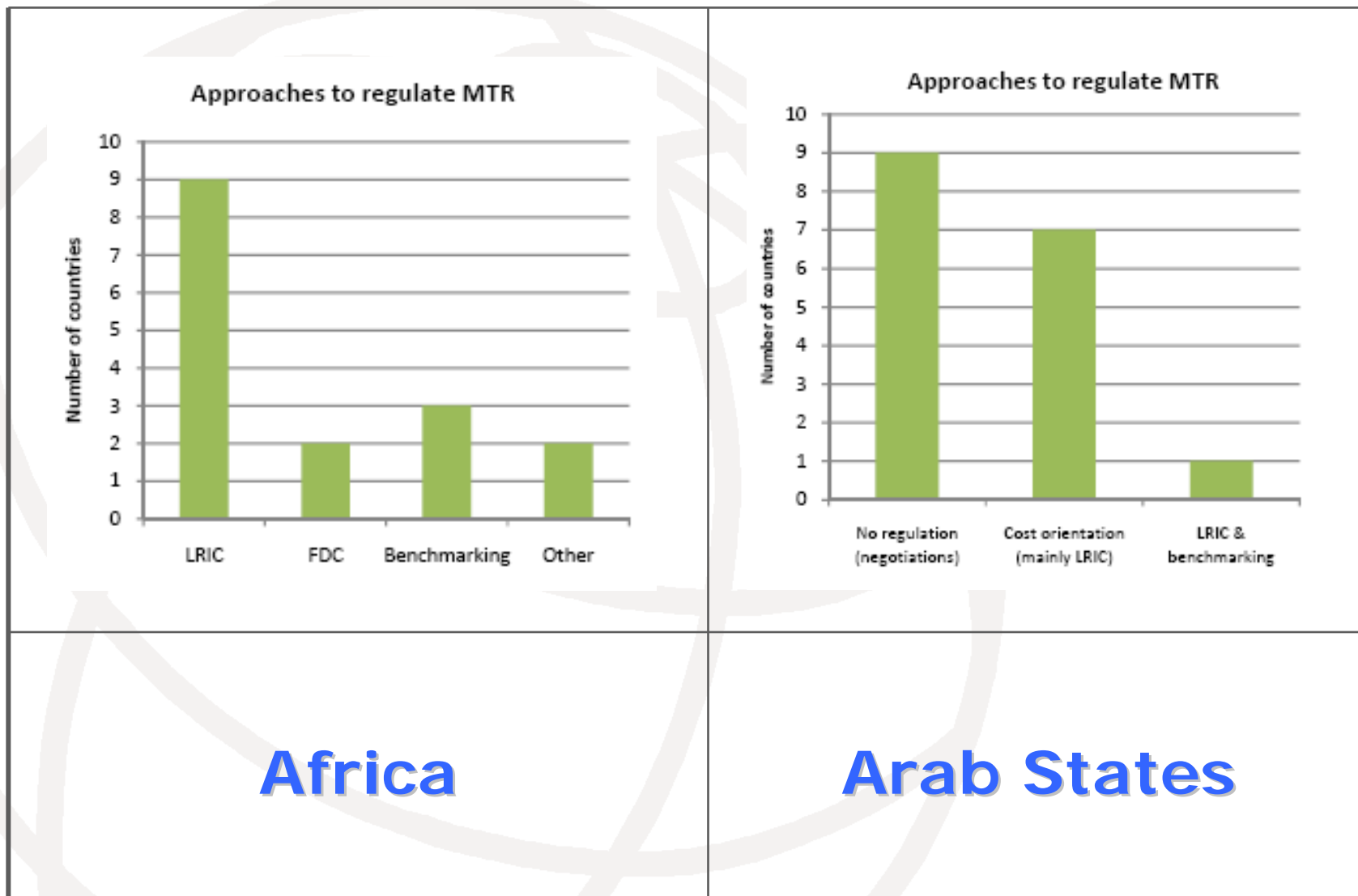
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***Example: Singapore***

***International Termination Rate not regulated***

***Local Termination is regulated***

# What methodology to determine costs?



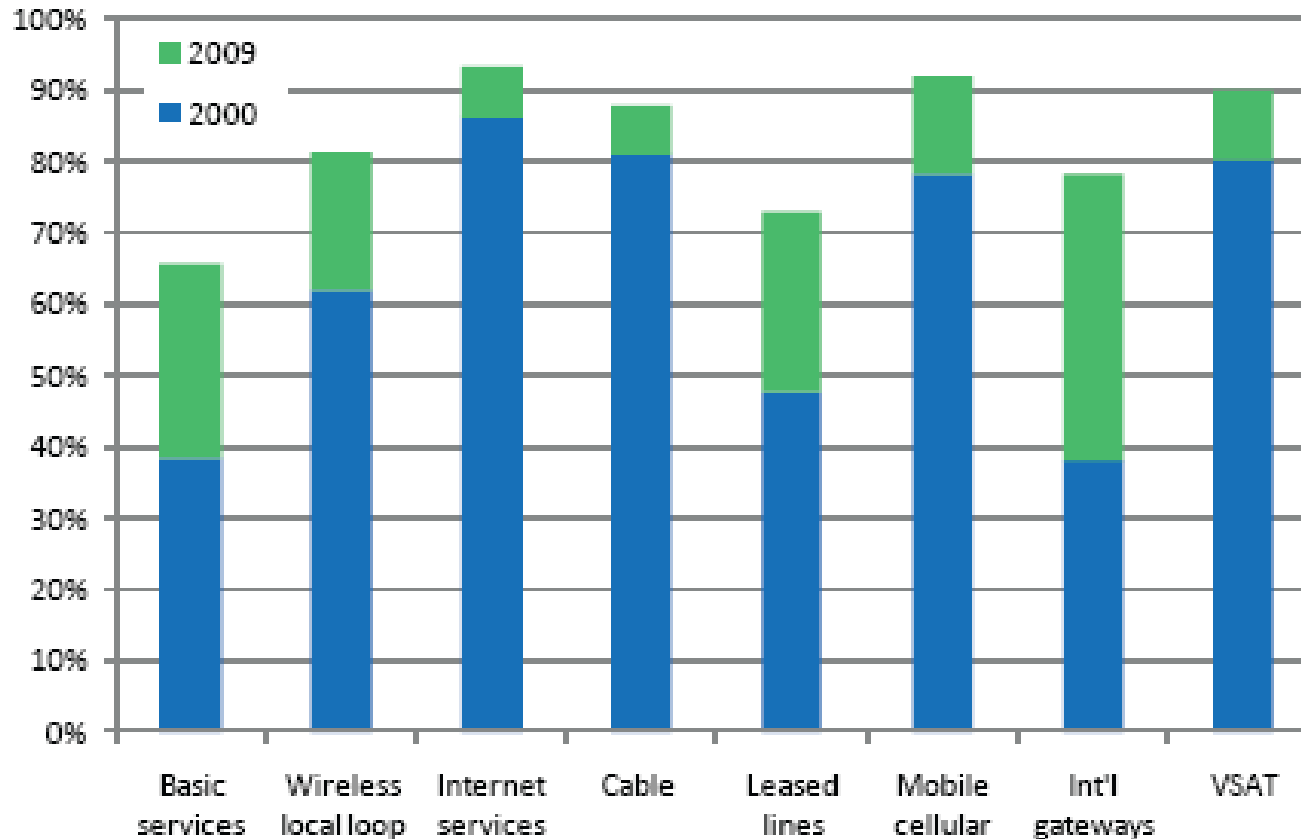
**Africa**

**Arab States**

# Pressure on international termination

## Liberalization of international gateway

Growth in competition, world



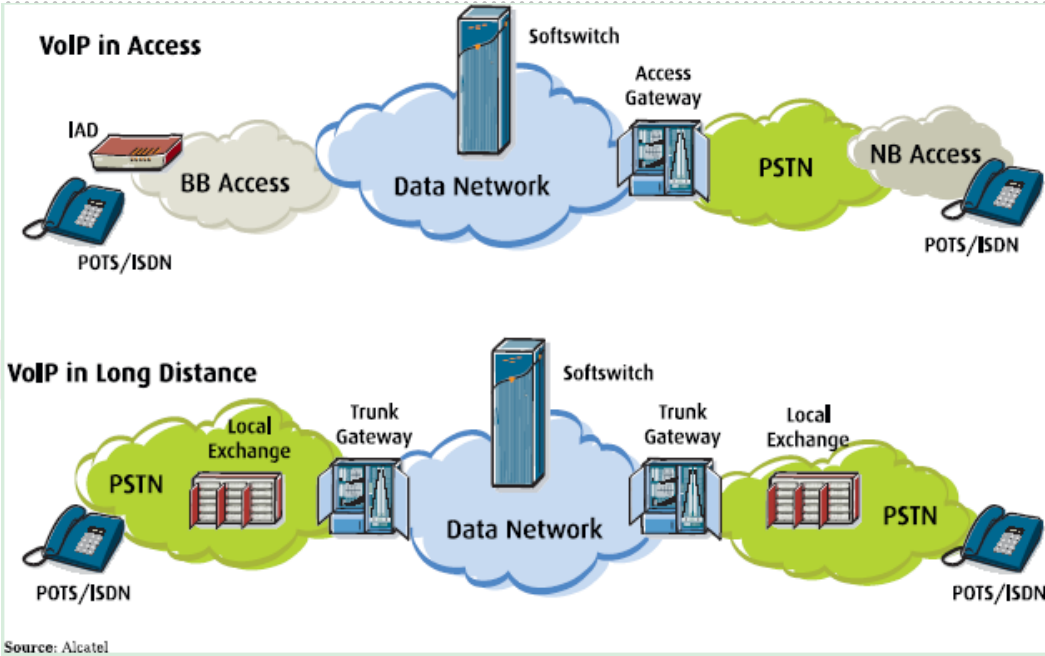
*Note: In blue: level of competition in 2000; in green: percentage of countries having opened up for competition between 2000-2009.*

Source: ITU World Telecommunication/ICT Regulatory Database.

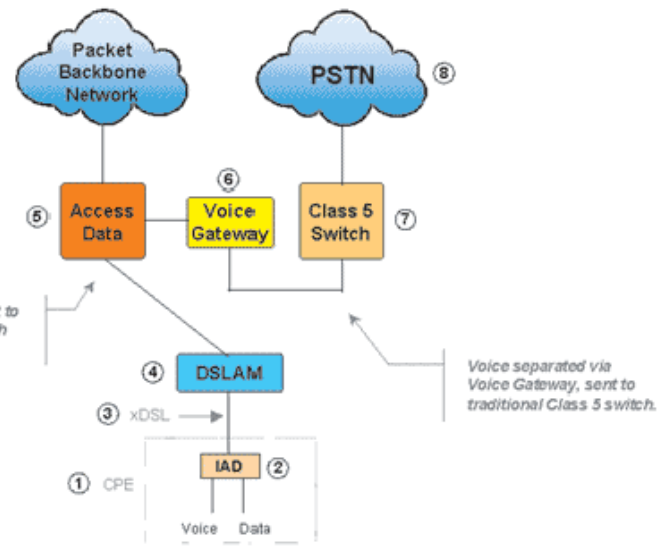


*VoIP  
Interconnection*

# VoIP on Fixed Networks (DSL based)



Source: Alcatel

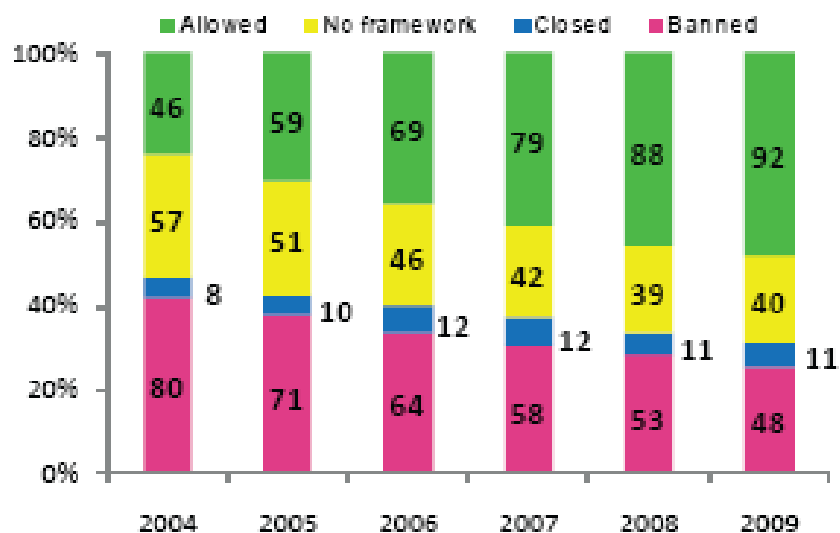


Source: International Engineering Consortium ([www.iec.org](http://www.iec.org))

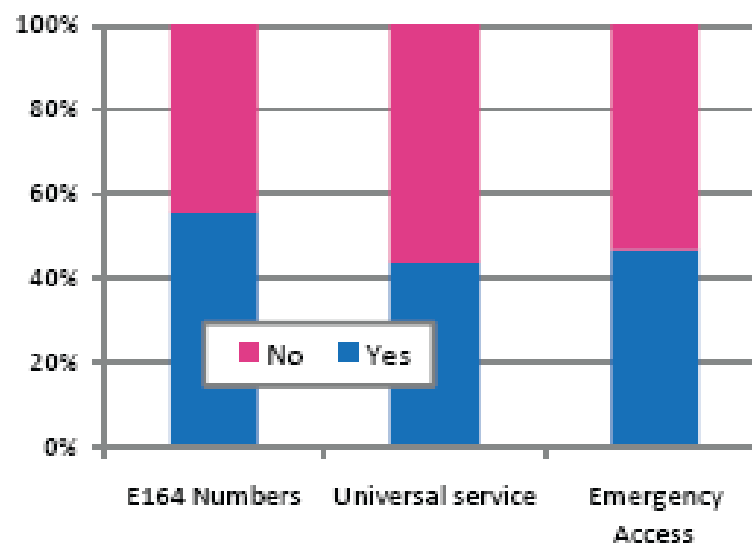
# Pressure on international termination

## Legal acceptance of VoIP

Worldwide regulation of VoIP, 2004-2009



Regulatory frameworks for VoIP, 2009

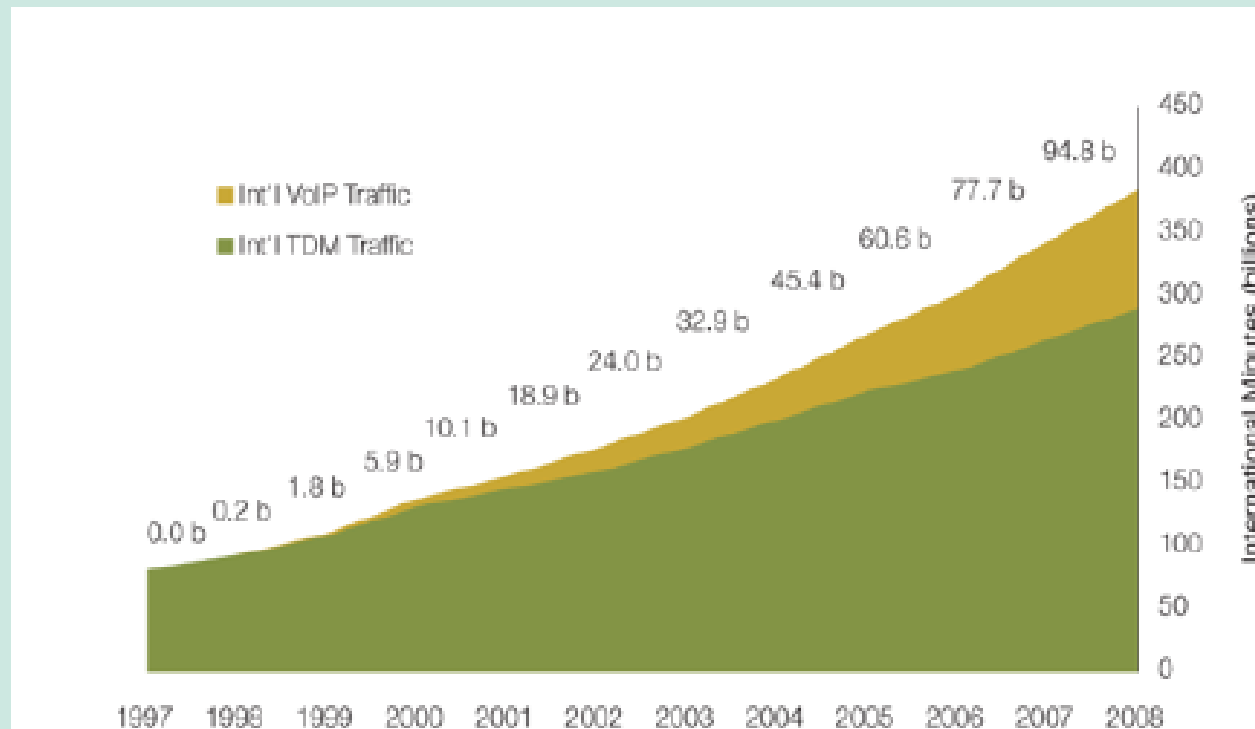


Source: ITU World Telecommunication/ICT Regulatory Database.

# Pressure on international termination

## Rise of VoIP Traffic

Figure 8.1: International VoIP and Time Division Multiplexing (TDM) Traffic Growth, 1997-2008

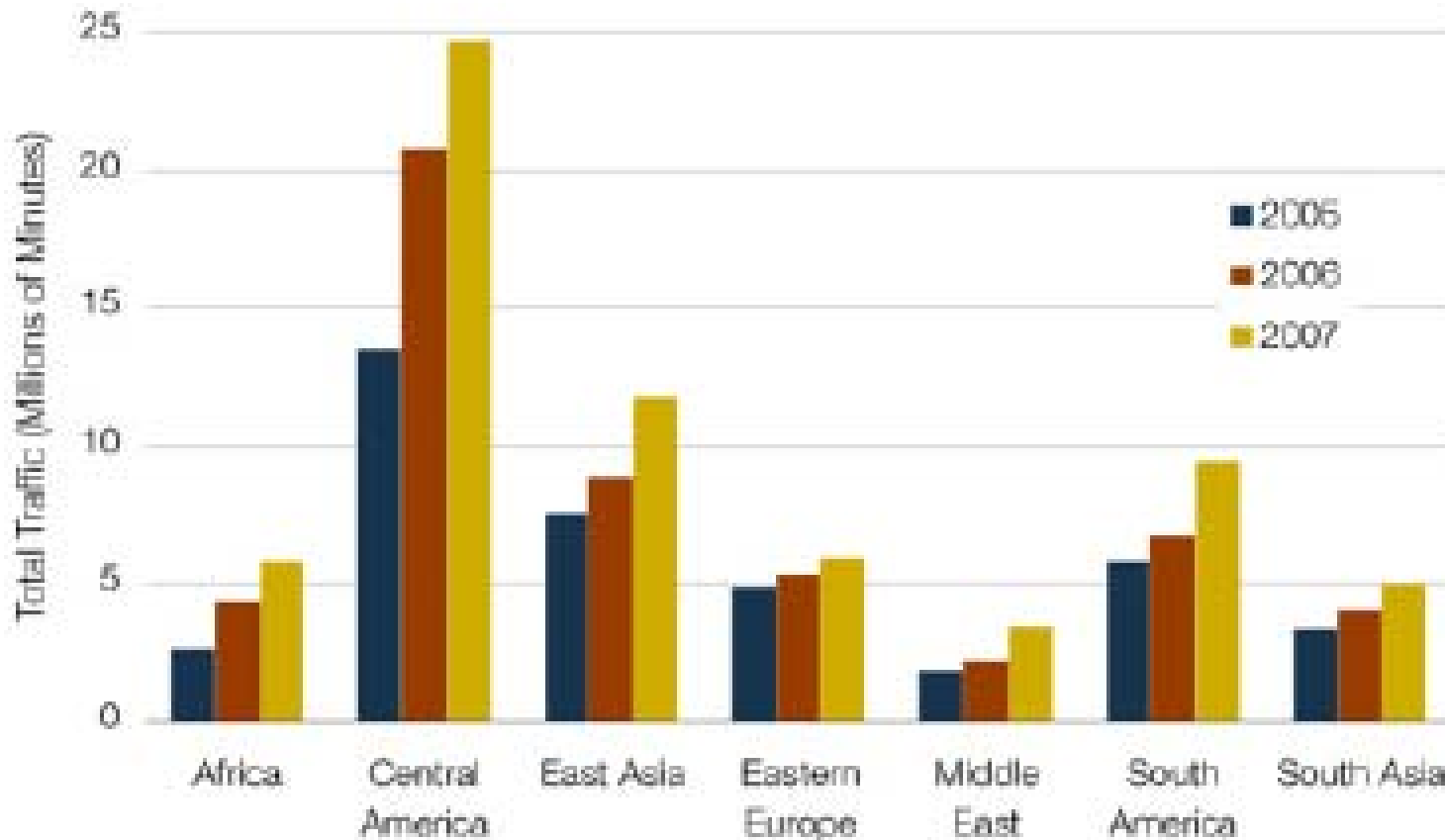


Source: TeleGeography Inc. (2008).

Note: VoIP traffic includes all cross-border voice calls over IP networks, but terminated on the PSTN. Personal computer-to-personal computer (PC-to-PC) and private network traffic are excluded, and 2008 figures are projections.

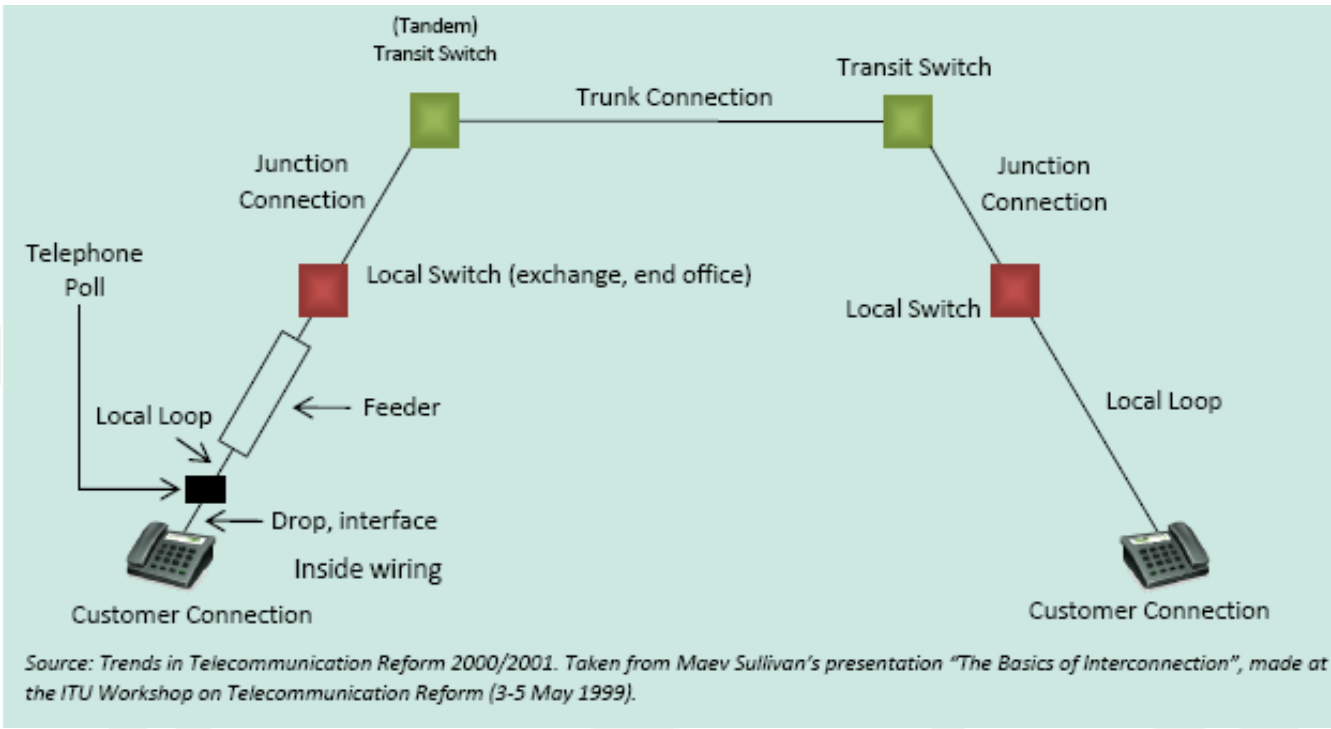
# Pressure on international termination

## Rise of VoIP Traffic



Source: TeleGeography Inc. (2008)

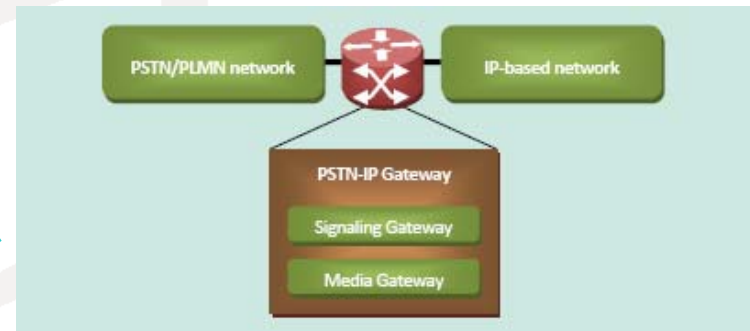
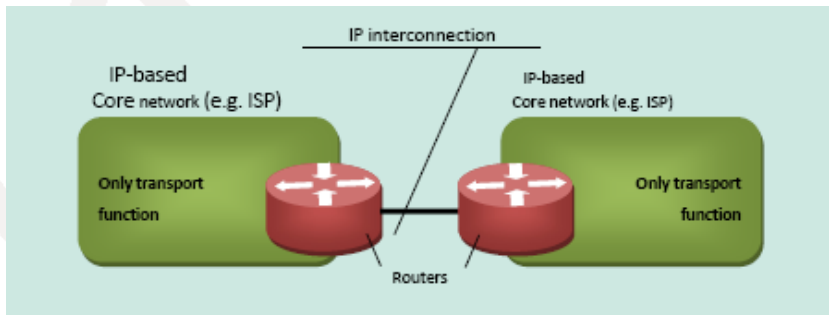
# The change in interconnection architecture I



**PSTN - PSTN**

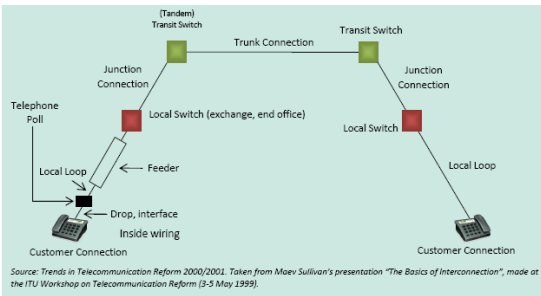


## IP - IP

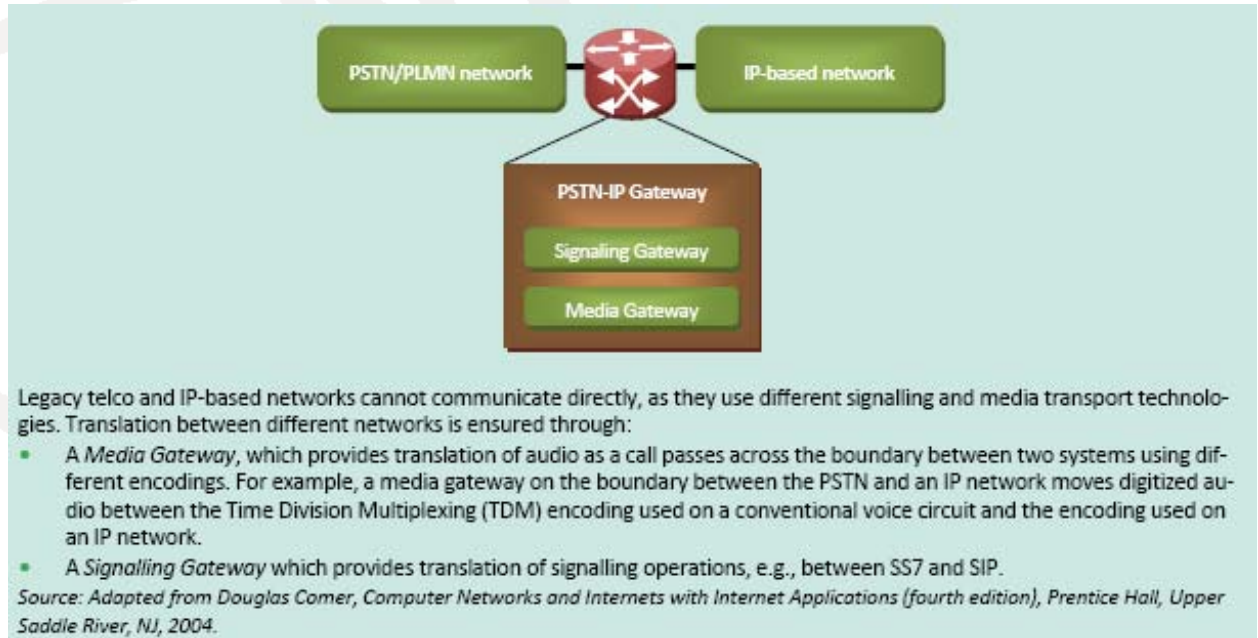


**PSTN - IP**

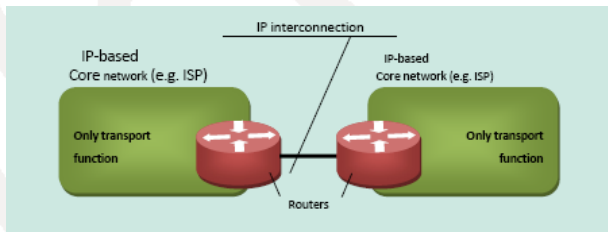
# The change in interconnection architecture II



**PSTN - PSTN**

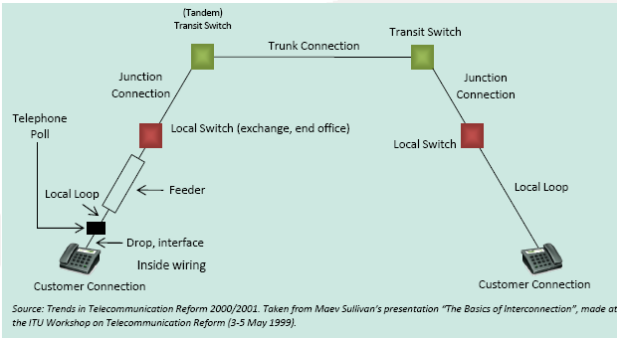


**IP - IP**



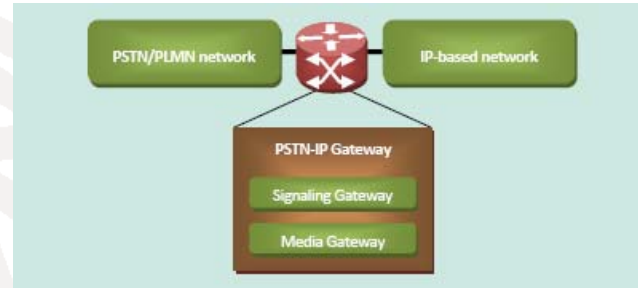
**PSTN - IP**

# The change in interconnection architecture III

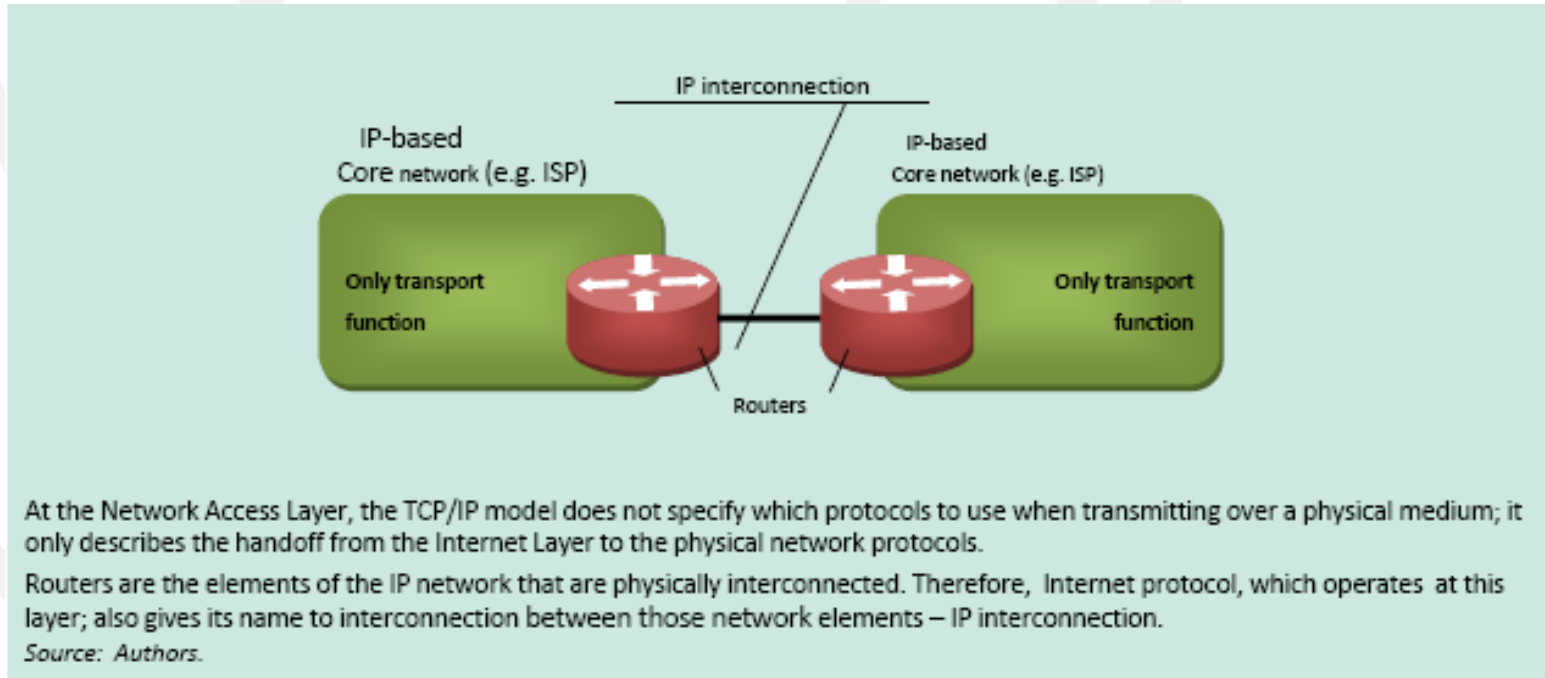


Source: Trends in Telecommunication Reform 2000/2001. Taken from Maev Sullivan's presentation "The Basics of Interconnection", made at the ITU Workshop on Telecommunication Reform (3-5 May 1999).

**PSTN - PSTN**



**PSTN - IP**



**IP - IP**

At the Network Access Layer, the TCP/IP model does not specify which protocols to use when transmitting over a physical medium; it only describes the handoff from the Internet Layer to the physical network protocols.

Routers are the elements of the IP network that are physically interconnected. Therefore, Internet protocol, which operates at this layer; also gives its name to interconnection between those network elements – IP interconnection.

Source: Authors.

## *ITU-T Recommendations D.50 WTSA 2000, 2004, 2008*

“that administrations take appropriate measures nationally to ensure that parties (including operating agencies authorized by Member States) involved in the provision of international Internet connections negotiate and agree to bilateral commercial arrangements, or other arrangements as agreed between administrations, enabling direct international Internet connections that take into account the possible need for compensation between them for the value of elements such as traffic flow, number of routes, geographical coverage and cost of international transmission, and the possible application of network externalities, amongst others;

2 that the General Considerations in Appendix I should be used to accelerate the objectives of the Tunis Agenda number 50.”

*General considerations include Connection criteria,  
charging options, International link capacity\*  
\* (reservations from China on Appendix)*

## APEC principles on international charging arrangements for Internet services

Internet connectivity is an essential element of the global information infrastructure that should be encouraged to strengthen the Asia-Pacific Information Infrastructure.

Governments need not intervene in private business agreements on International Charging Agreements for Internet Services achieved in a competitive environment, but where there are dominant players or *de facto* monopolies, governments must play a role in promoting fair competition.

Internet charging arrangements between providers of network services should be commercially negotiated and, among other issues, reflect:

- The contribution of each network to the communication;
- The use by each party of the interconnected network resources; and
- The end-to-end costs of international transport link capacity.

Source: APEC Principles on International Charging Arrangements for Internet Services, available at: [www.apec.org/apec/ministerial\\_statements/sectoral\\_ministerial/telecommunications/2000/annex\\_b.html](http://www.apec.org/apec/ministerial_statements/sectoral_ministerial/telecommunications/2000/annex_b.html)

***Transit***

*Consumer ISP covers  
all the costs*

***Peering***

***Public Peering  
(Sender Keep All)***

***Private Peering  
(Based on Peering Policy)***

# ISPs Peering Criteria Examples

**Table 5.2: Some Peering Policies**

ISP	Peering policy	Peering criteria
AT&T	<a href="http://www.corp.att.com/peering/">http://www.corp.att.com/peering/</a>	Location and number of Pops; Interconnection bandwidth; Type of traffic (on-net); Amount of traffic (in Gbps).
TeliaSonera International Carrier	<a href="http://www.teliasoneraic.com/tsicWeb/tsic/faqlist/begin.do">http://www.teliasoneraic.com/tsicWeb/tsic/faqlist/begin.do</a>	Amount of traffic (in Gbps); Location and number of Pops; requirement to operate a particular number of IP backbone nodes; the prospective peer shall not be a customer of TeliaSonera's existing peers.
France Telecom	<a href="http://vision.opentransit.net/docs/peering_policy/">http://vision.opentransit.net/docs/peering_policy/</a>	Amount of traffic (in Gbps); Location and number of Pops; France Telecom will not enter into peering relationship with customers of existing peering partners.
Interoute	<a href="http://www.interoute.com/files/peering_policy_000.pdf">http://www.interoute.com/files/peering_policy_000.pdf</a>	Number of Pops; having a network operations center (NOC) operating on a 24/7/365 basis; Significance of traffic volumes; the prospective peer is not an IP customer of Interoute and has not been an IP customer within the previous six months.

All of the presented criteria apply for international settlement-free peering. For an exact and full list of applied peering criteria, refer to appropriate operator peering policies.

Source: Authors.

# PSTN - Internet Interconnection Compared

Table 5.4: Co-existence of Interconnection models

Feature	PSTN interconnection	Trends	Internet interconnection
<b>Organizational and regulatory features</b>			
Ex-ante regulation	Ex-ante prices/ interconnection obligations	In PSTN: Consistent regulatory decisions leading to lower termination rates, and also a trend towards possible introduction of zero termination rates (settlement – free peering);	None
Contractual relations	(Bill and Keep where applicable) Transit and Termination	In the Internet: Spread of interconnection settlements based on route Announcements.	(Settlement free) peering, Transit
Charging principle	Principle of initiation (mutuality)	In PSTN: In the long-term possible rejection of principle of initiation;	One pays all (one-sidedness)
	Cost sharing principle for inter-connection capacity (Pol)	In PSTN: Associated facilities tend to remain of critical importance. Cost-sharing principle likely to persist. In the Internet: Pressure toward possible introduction of cost-sharing principle of IIC. Principle of one-sidedness may not be applicable in the future;	
Main pricing factor	Distance	In PSTN: change of pricing factor from distance to quality.	Quality
Main billing factor	Time	In PSTN: change of billing factor from time-based to capacity-based.	Volume
Partners	Any-to-any Coequal	Both types of relationships co-exist at the moment. In PSTN: Some trends may be noted towards Hierarchical model (i.e. operators of international connectivity differentiate themselves, i.e. IPX providers)	Classes (tiers 1-3); Hierarchical

**Table 5.3: Main industry groups working on international IP-interconnection approaches**

Organization	Activities
The GSM Association (GSMA) was formally created as the “GSM MoU Association” in 1995. It represents the interests of the worldwide mobile communications industry. Spanning 219 countries, the GSMA unites nearly 800 of the world’s mobile operators, as well as more than 200 companies in the broader mobile ecosystem, including handset makers, software companies, equipment providers, Internet companies, and media and entertainment organizations.	Created GPRS Roaming Exchange (GRX), as well as a new “IP eX-change” (IPX).
The IP Interworking Alliance (IPIA), established under GSMA, has been formed with the mission of supporting the development of global interoperability of IP Services.	Supports GSMA’s IPX. Certifies IPX providers.
The i3 Forum was founded in Q3 2007 by eight major international operators, and it now includes 28 such carriers. It makes use of existing standards (from e.g., ITU-T, ETSI TISPAN, IETF, 3GPP) for specifying how to achieve IP-based international interconnections.	Developing collaborative recommendations for an industry-wide transition of voice and related services to Internet Protocol (IP)
The Fixed Mobile Convergence Alliance (FMCA) was formed in 2004 and incorporated as a not-for-profit trade association. It promotes the acceleration and adoption of convergence technologies by encouraging consistency across product and equipment standards. FMCA includes both operators and a significant number of equipment makers. It focuses on areas of interoperability and interconnection between members to enable global roaming and access to convergent services.	In general encourages and supports interoperability and interconnection between members. Undertakes and supports trials to test and validate prioritized convergent solutions.

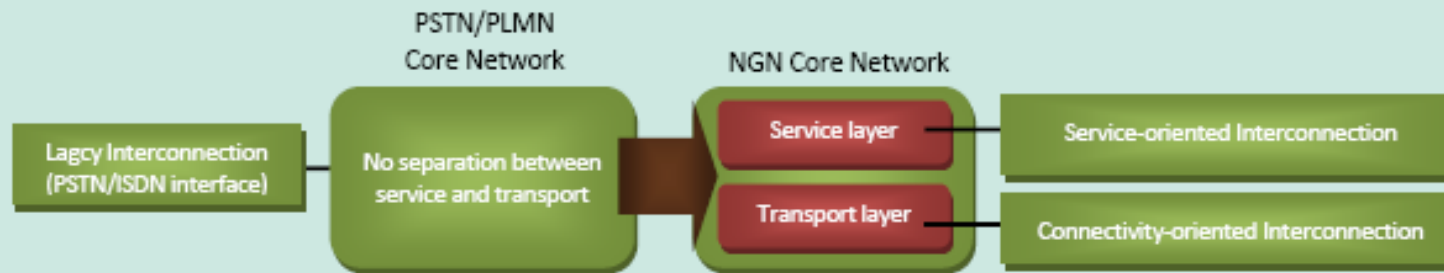
Source: GSMA, IPIA, i3 Forum, FMCA.

# Next Generation Access: The next frontier



*Next Generation Access*

# Differences in Implementation of Interconnection, PSTN vs. NGN



Legacy telco networks are interconnected through standard E1/T1 interfaces. Signalling and connectivity are combined within one interconnection link, which connects two elements of respective core networks.

Changes in the implementation of interconnection are related to changes in the core network. A feature of NGN core network architecture is the separation of the main functional layers: transport and service. Consequently, interconnection in an NGN is split into two separate interconnection services: service-oriented and connectivity-oriented. Below are presented definitions of both interconnection services as they are defined by ETSI TS 181 005: "Service and Capability Requirements."

<b>Service-oriented Interconnection (Solx)</b>	The physical and logical linking of NGN domains that allows carriers and service providers to offer services over NGN <...> with control, signalling (i.e. session-based), which provides defined levels of interoperability. This does apply for carrier-grade voice and/or multimedia services over IP interconnection. The level of interoperability depends e.g., on services, Quality of Service, security.
<b>Connectivity-oriented Interconnection (Colx)</b>	The physical and logical linking of carriers and service providers based on simple IP connectivity, irrespective of the levels of interoperability. For example, an IP interconnection of this type is not aware of the specific end-to-end service and, as a consequence, service-specific network performance, QoS and security requirements are not necessarily assured. This definition does not exclude that some services may provide a defined level of interoperability. However, only Solx fully satisfies NGN interoperability requirements.

Source: Natalija Gelvanovska; ETSI TISPAN, NGN Interconnection, ETSI Workshop on NGN Interconnection, June 2008, available at: [http://portal.etsi.org/docbox/Workshop/2008/200806\\_NGN\\_INTERCONNECTION/](http://portal.etsi.org/docbox/Workshop/2008/200806_NGN_INTERCONNECTION/)

***Calling Party Network Pays***

***Bill and Keep***

*Accounting Rate  
System is now outdated*

*Termination  
Rates and its  
variations*

*Coexisting  
at  
present*

*Internet &  
VoIP Termination*

*Next Generation Access is the future*



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