



Interconnecting ISPs

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Note - The views expressed in this presentation belong to the author and do not necessarily reflect the opinions of ITU or its membership.

Technical demands of Interconnection



- Definition of an interface responding to ITU-T standards (e.g.: R2, SS7);
- Creation of a physical link
 - *Belonging to one of the proponents;*
 - *Co-owned by the proponents using « half circuit » principles*
 - *Made of a combination of two unidirectional dedicated trunks*

Basic responsibility of NRAs

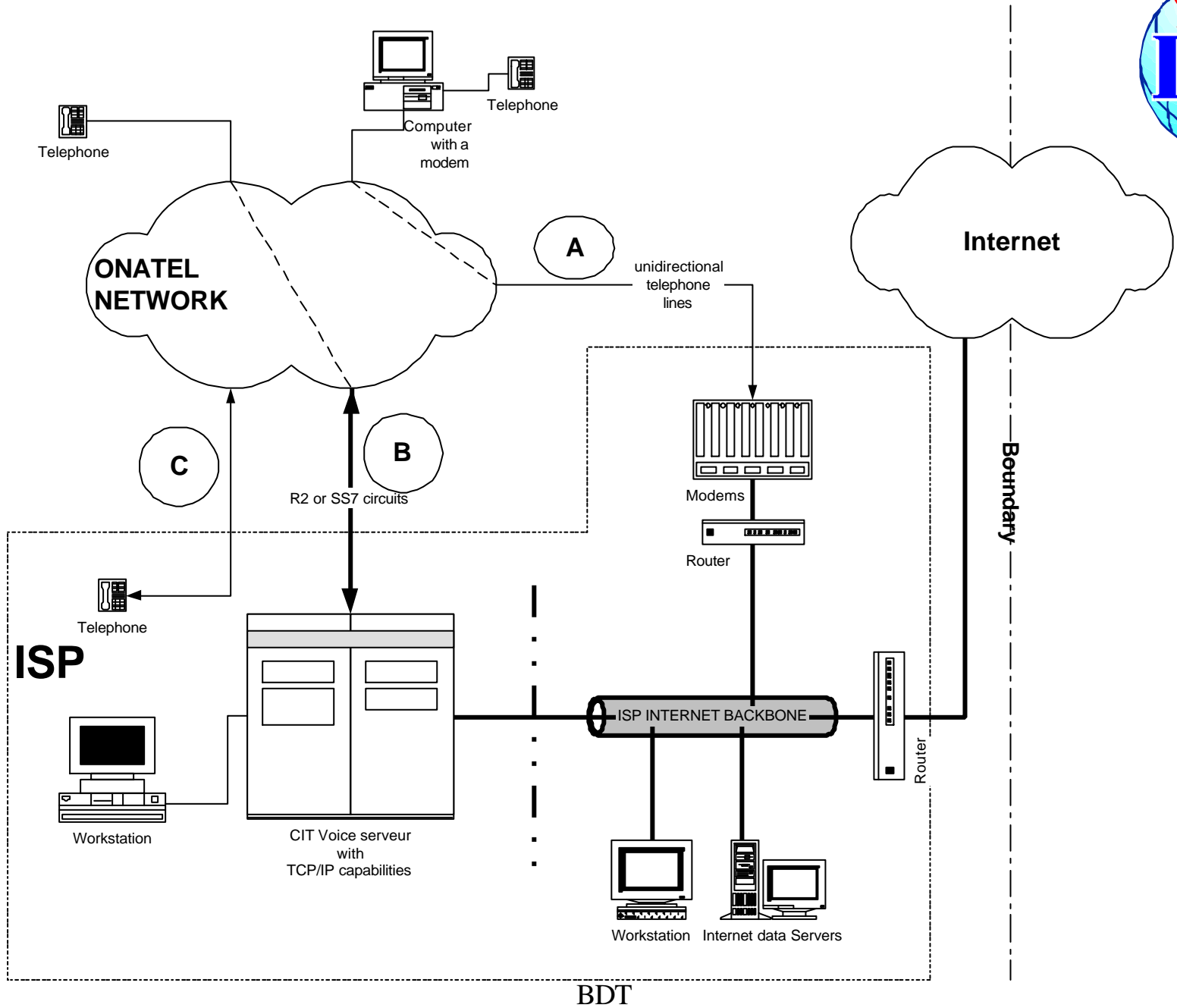


- The interconnection interfaces must be clearly specified and publicly known;
- Should be part of the specifications common to all operators and recognised during the licensing process;
- The basic principles for interconnection rate calculation , including those related to volume discounts, must be public and common to all operators;
- The effect of the enforcement of the USO policy must be equitably shared by all the network operators;
- The main goal of interconnection should be to maximise the economic benefits of externalities and reduce the cost/price of services.

Particular case of Internet telephony



- There are three basic ways to access the global telephone network through the Internet:
 - *A direct dedicated link to the ISP (including through cybercafés): no interconnection with other national operators;*
 - *A national call to an ISP's set of modems connected to the Internet backbone;*
 - *A national call to a VoIP server connected to the Internet backbone.*
- The costs incurred to provide end-to-end service in each of those situations are different





Avoid regulatory arbitrage

- Countries that ban Internet telephony may deprive their economies of important opportunities;
- But introduction of VoIP must not be done outside the global regulatory framework only because of the technology used;
- Economic efficiency of VoIP could be reduced if the cost orientation rules are not applied equitably to all the network segments used, where applicable;
- Where access deficit exists, the equitable allocation of USO costs to all network operators, including VoIP providers, will be crucial to the overall service growth.



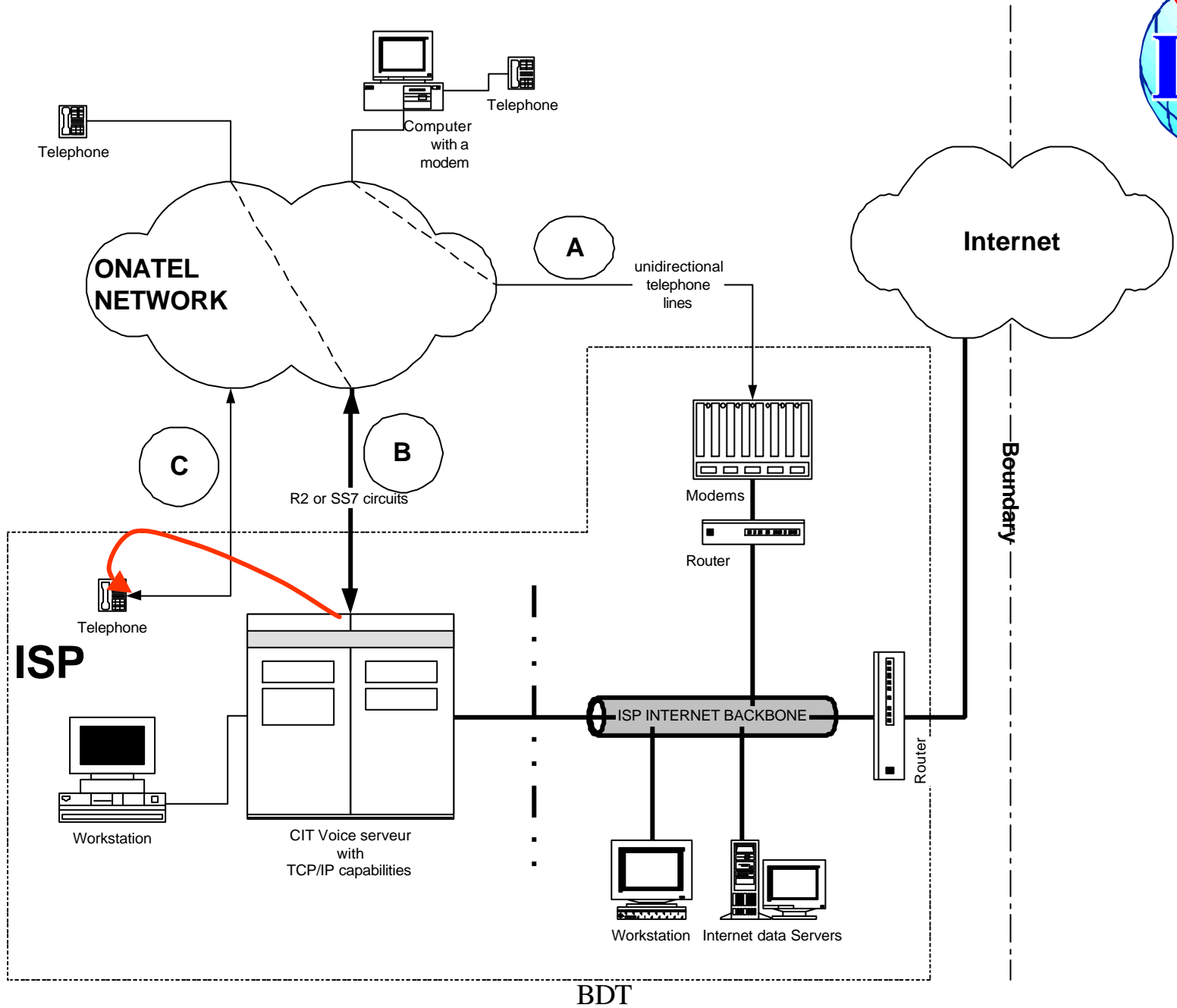
Types of VoIP communications

- The communications in VoIP are different in nature:
 - *C1: A national end user calling through link A (Computer-To-Computer/Phone);*
 - *C2: A national end user calling through link B (Phone-To-Phone);*
 - *C3: An international ISP calling through link A (Computer-To-Computer termination: the connection must be set locally before);*
 - *C4: An international ISP calling through link B (Computer/Phone-To-Phone termination)*



Fraudulent link

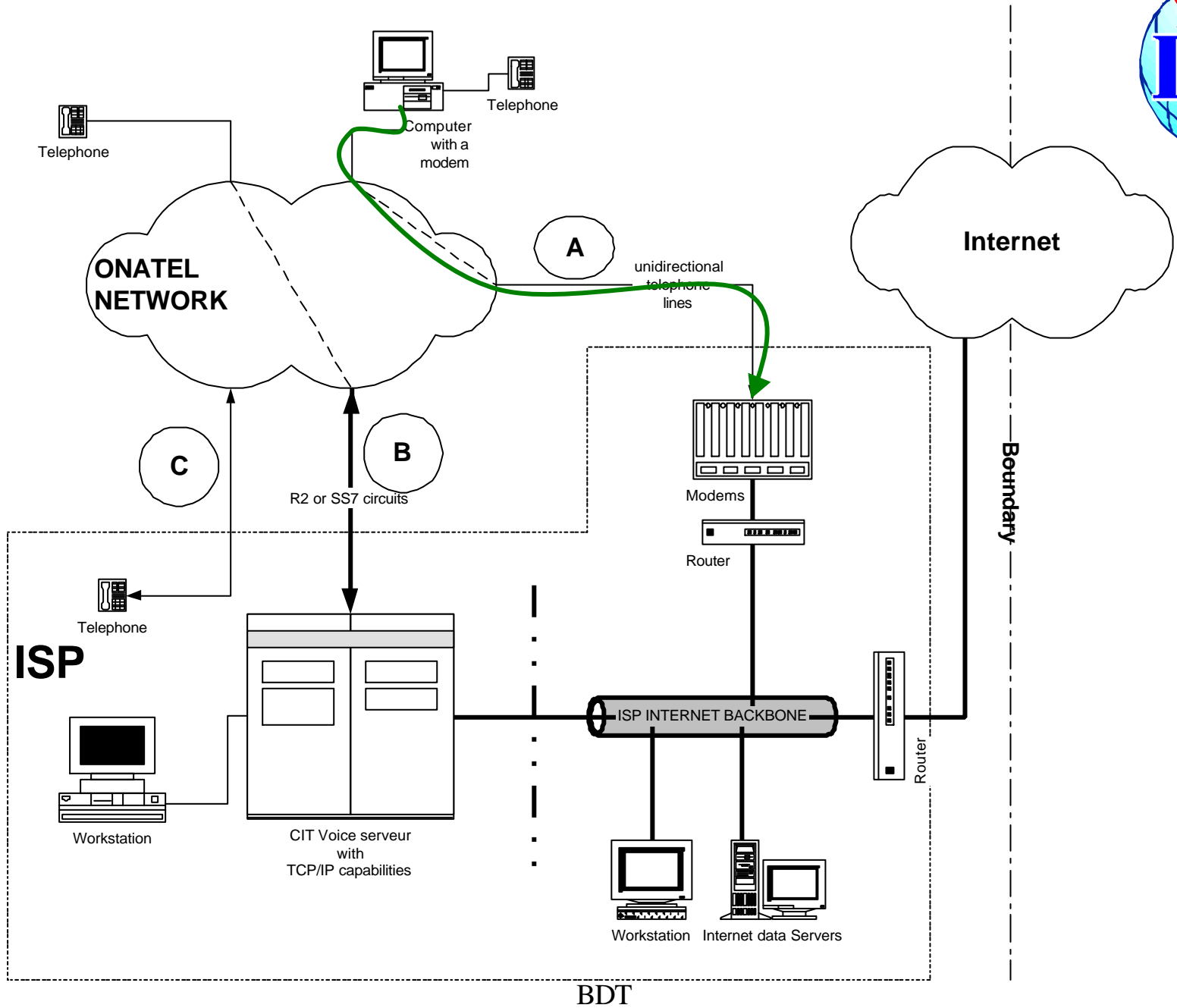
- If the ISP's VoIP gateway is connected to the network through end user lines and terminates calls on those lines at the cost of national calls, the interconnection interface would no longer be respected and the interconnection regulation would then be violated;
- This can be done by deviating regular telephone lines from their basic role;
- To avoid it, « A » type links should be dedicated to outgoing calls, and « C » type line consumption monitored regularly.



Analysis of C1 type communications



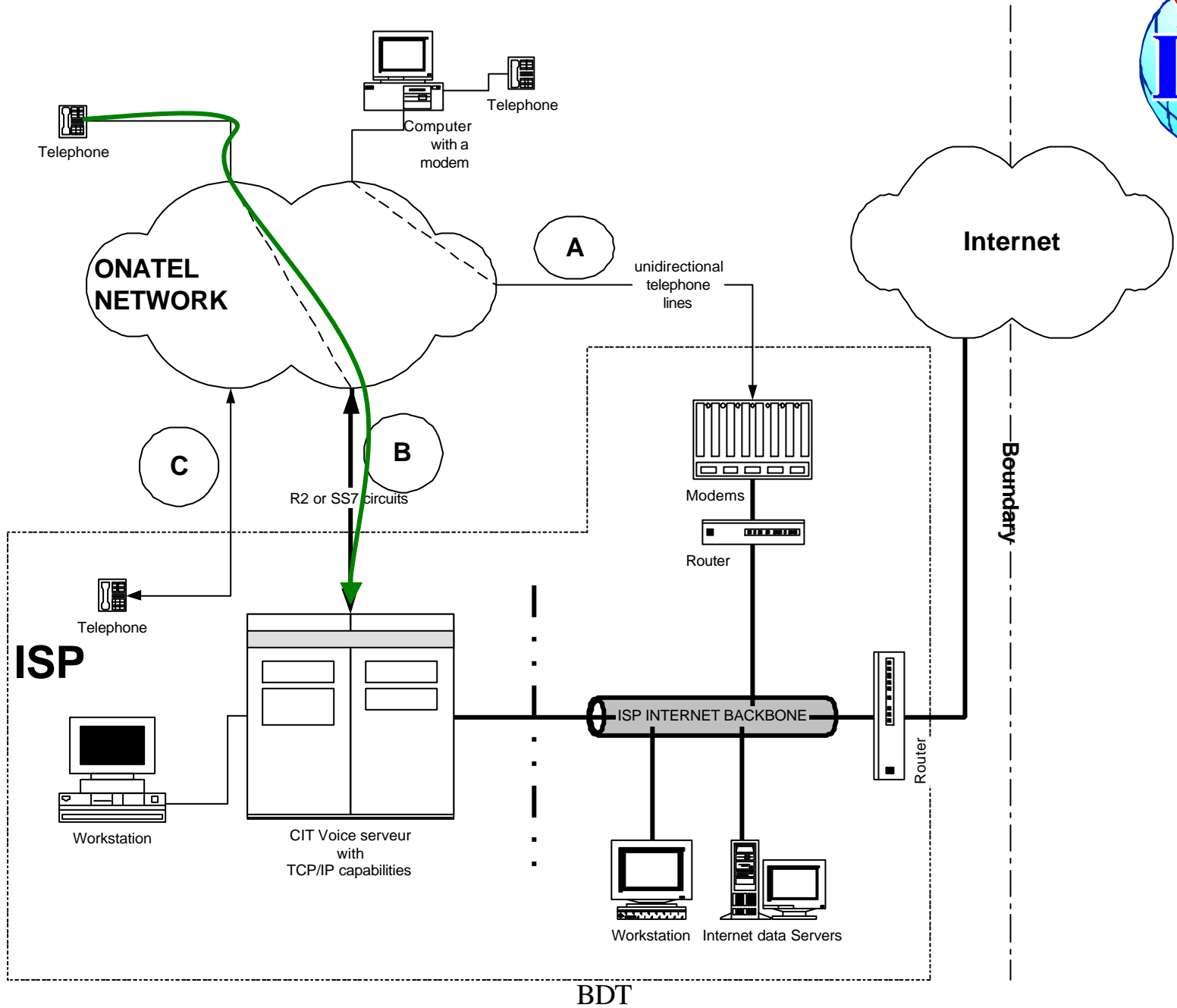
- The end user pays the price of a national call to access the ISP modems;
- If there is access deficit, the telephone call will be subsidised but as it is an end-to-end national call, the Internet access will be considered as a value added service, so no special measure is needed for VoIP outgoing calls using that link;
- But, a « professional rate », if it exists, should be applied to the monthly rental fee applied to the lines of that link. To avoid fraud, those lines should be restricted to outgoing only.



Analysis of C2 type communications



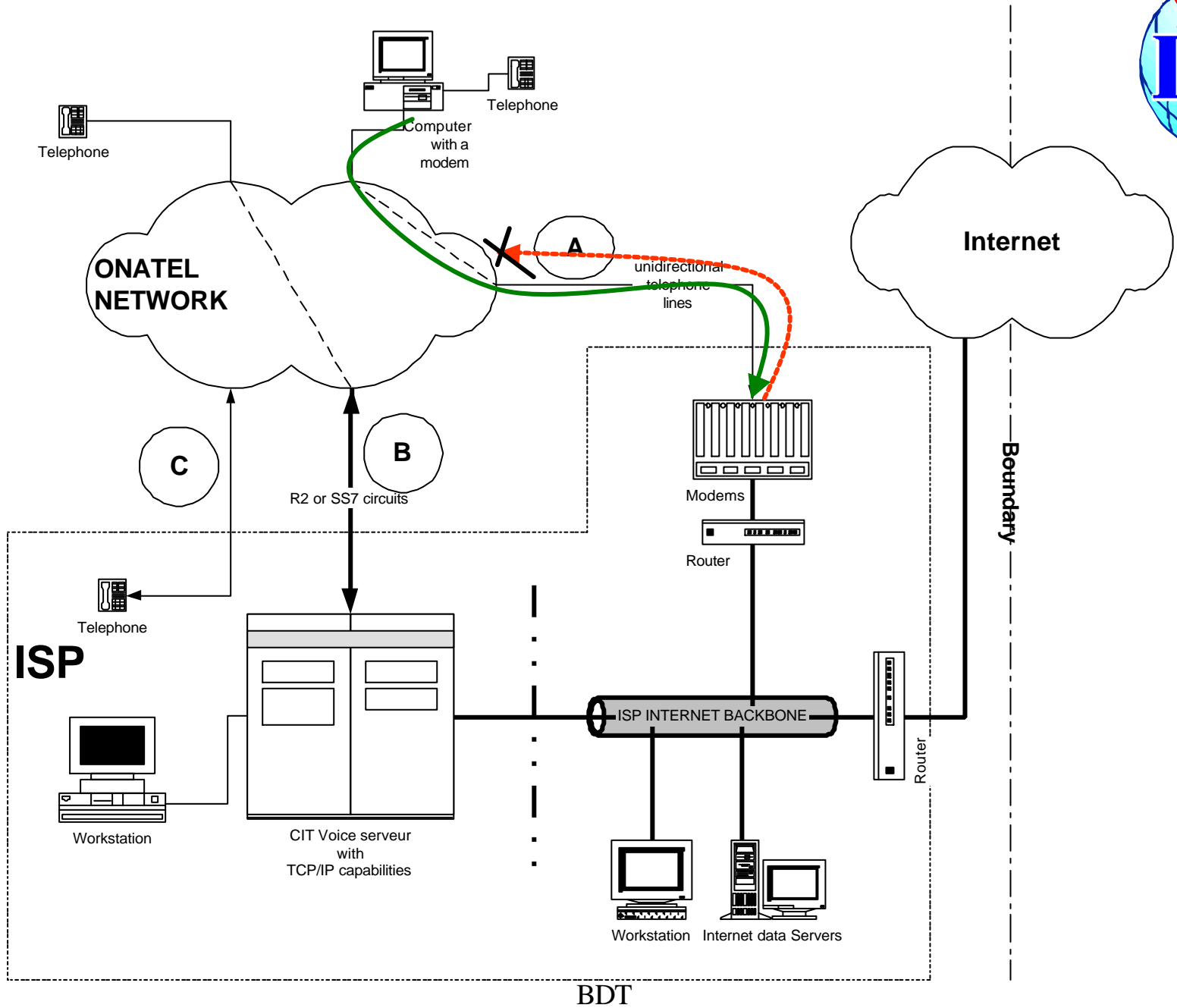
- The link B responds to interconnection rules;
- The telephone network operator will incur the cost of a National outgoing call whose endogenous cost is easily calculated with the TAF cost model;
- It takes into account not only CAPEX , OPEX and capital costs, but also corporation tax and USO cost distribution;
- Depending on who is collecting the rate from the end user (direct or cascade), different kinds of agreements could exist among TPH and VoIP providers



Analysis of C3 type communications



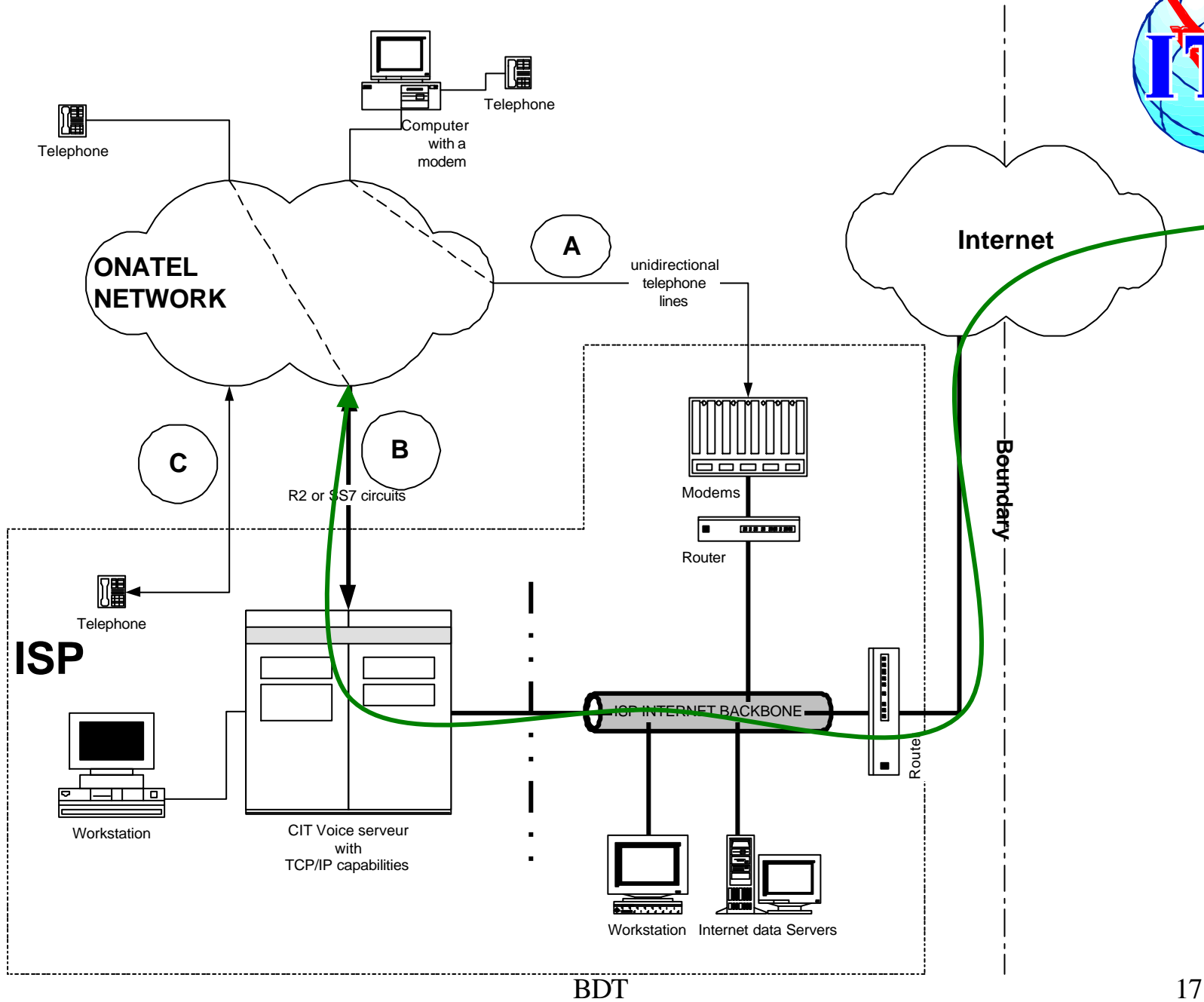
- In order to avoid frauds, the phone call from the VoIP provider to the TPH provider should be barred;
- But if the call is set by the local user, an international call using IP can be established (e.g.: Netmeeting call);
- The VoIP is then a value added service;
- No impact on the interconnection rules.



Analysis of C4 type communications



- Regular call termination
- The TPH operator will be paid for a national incoming call, depending on where it terminates:
 - *single transit rate if it terminates at the interconnection point tariff zone;*
 - *Double transit rate if it terminates beyond.*
- The TAF model easily calculates the basis for those rates;
- If this type of call is terminated on the TPH network through a « C » type of link, this will lead to a fraudulent situation because the price of domestic calls is very likely highly subsidised where access deficit exists (see TAF Model)





Case of AFRICOM

Actual prices



Supplementary data for tariff calculations [?] [X]

Corporate tax rate:	<input data-bbox="927 405 1021 459" type="text" value="38,%"/>	Icx To Me Simple Transit:	<input data-bbox="1594 405 1729 459" type="text" value="0,15"/>
Universal Services Obligation rate (%):	<input data-bbox="927 485 1021 539" type="text" value="0,%"/>	Icx To Me Double Transit:	<input data-bbox="1594 485 1729 539" type="text" value="0,17"/>
Incoming USO funds:	<input data-bbox="788 564 1021 619" type="text" value="0"/>	Me To Icx:	<input data-bbox="1594 564 1729 619" type="text" value="0,17"/>
Price of a minute of urban communication:	<input data-bbox="887 644 1021 699" type="text" value="0,04"/>	Icx To the Whole international:	<input data-bbox="1594 644 1729 699" type="text" value="0,54"/>
Price of a minute of interurban communication:	<input data-bbox="887 724 1021 778" type="text" value="0,1658"/>	The Whole international To Icx:	<input data-bbox="1594 724 1729 778" type="text" value="0,25"/>
Installation fee:	<input data-bbox="887 804 1021 858" type="text" value="76,78"/>	Transit between Local Operators Via Me:	<input data-bbox="1594 804 1729 858" type="text" value="0,02"/>
Monthly subscription fee:	<input data-bbox="887 884 1021 938" type="text" value="5"/>		
<hr/>			
Average price of a minute of incoming international traffic:	<input data-bbox="887 1027 1021 1082" type="text" value="0,53"/>		
Average price of a minute of outgoing international traffic:	<input data-bbox="887 1107 1021 1161" type="text" value="0,81"/>		
Average price of a minute of incoming sub-regional traffic:	<input data-bbox="887 1187 1021 1241" type="text" value="0,64"/>		
Price of a minute of outgoing sub-regional traffic:	<input data-bbox="887 1267 1021 1321" type="text" value="0,82"/>		



Cost orientated tariffs basis

Telephone Services Tariffs [?] [X]

Terminal traffic tariffs	
Urban	0,0368
Interurban	0,1658
International Incoming	0,3524
International Outgoing	0,3601
Sub-regional Incoming	0,2698
Sub-regional Outgoing	0,2775

Interconnection	
Nat. Incoming Simple Transit	0,1109
Nat. Incoming Double Transit	0,2227
Internat. Outgoing	0,2474
National Outgoing	0,1425
International Incoming	0,2474
National Transit	0,088

Tarif Transit	
Int <-> Int	0,19
Int <-> SRég	0,22
SRég <-> SRég	0,

Profits and Losses	
Int IN	0,1734
Int OUT	0,452
SRég IN	0,3742
SRég OUT	0,5385

Interconnection	
Inc. Simple	0,0342
Inc. Double	-0,0509
Int. Outgoing	0,2911
Nat. Outging	0,0262
Int. Incoming	0,0016
Nat. Transit	-0,0707

National policy parameters	
Outgoing contribution to USD:	%
USD incoming funds:	0
Price of a minute of urban:	0,0368
Price of a minute of interurban:	0,1658
Connection rate	77
Monthly subscription fees	5
Increase domestic tariffs by ----->	0,%
Access Deficit	123.126.645
Reset	
Rebalance	
Return to calculations	

Trading Account



Cost based tariffs basis

Telephone Services Tariffs [?] [X]

Terminal traffic tariffs		Tarif Transit		National policy parameters	
Urban	0,074	Int <-> Int	0,19	Outgoing contribution to USO:	%
Interurban	0,1325	Int <-> SRég	0,22	USO incoming funds:	0
International Incoming	0,2115	SRég <-> SRég	0,	Price of a minute of urban:	0,0368
International Outgoing	0,2162	Profits and Losses		Price of a minute of interurban:	0,1658
Sub-regional Incoming	0,162	Int IN	0,3143	Connection rate	77
Sub-regional Outgoing	0,1666	Int OUT	0,5959	Monthly subscription fees	5
Interconnection		SRég IN	0,482	Increase domestic tariffs by ----->	0,%
Nat. Incoming Simple Transit	0,0666	SRég OUT	0,6494	Access Deficit	
Nat. Incoming Double Transit	0,1337	Interconnection		0	
Internat. Outgoing	0,1485	Inc. Simple	0,0785	Reset	
National Outgoing	0,0817	Inc. Double	0,0381	Rebalance	
International Incoming	0,1485	Int. Outgoing	0,39	Return to calculations	
National Transit	0,0528	Nat. Outging	0,087	Trading Account	
		Int. Incoming	0,1005		
		Nat. Transit	-0,0355		

Status of VoIP service providers in Afriland



- The USO choices of the policy maker in Afriland creates an Access Deficit of 123 million dollars for Africom;
- With such a deficit, any telephone service provider must bear an equitable part;
- If those service providers are running a network, regardless of the technology, they must be recognised as operators and be subject to the prescribed USO constraints;
- This should apply to VoIP providers

Levelling out tax



- The USO policy of Afriland creates a transfer of charges from domestic to international and from domestic to national;
- The charge transferred to international outgoing is equal to the difference between the cost orientated and the cost based levels, ie.: $\$0.36 - \$0.21 = \$0.15$;
- That additional charge, free of any inefficiency cost and exclusively due to the USO policy, is called « levelling out tax »;
- It should be applied to all international telephone service providers who are not participating in USO costs through the interconnection mechanism, in order to avoid regulatory arbitrage: e.g.: cybercafés;
- The levelling out tax is a State tax, the incumbent cannot claim it.



Monthly rental fee

- The telephone lines composing the « A » type link must not be subsidised. Africom should apply a monthly rental fee of \$17.5 instead of the actual \$5

Interconnection fees through « B » link



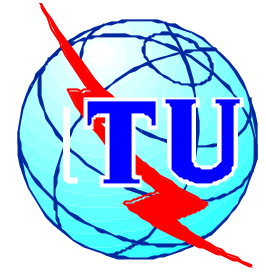
From	To	Via	Africom share
Africom	International or National	National	\$0.1425
International	National	Africom	\$0.2474
National 1	National 2	Africom	\$0.088
National	International	Africom	\$0.2474
National	Africom single	Africom	\$0.1109
National	Africom double	Africom	\$0.2227

Example 1: Africom customer to international via ISPTTEL



- Afriland-ISPTTEL to Euroland-ISPTTEL termination: \$0.10;
- Afriland-ISPTTEL endogenous costs: \$0.15
- Lowest rate when an Africom customer calls a Euroland customer via ISPTTEL:
 $0.1425 + 0.15 + 0.10 = \$0.3925$
- Africom keeps \$0.1425 and gives \$0.25 to ISPTTEL and other partners

Example 2: International call from a cybercafé



- Afriland-ISPTTEL endogenous costs from the cybercafé, including the cybercafé costs: \$0.12;
- Afriland-ISPTTEL to Euroland-ISPTTEL termination: \$0.10;
- Lowest rate when the cybercafé customer calls a Euroland customer via ISPTTEL:
 $0.15+0.12+0.10=\$0.37$
- ISPTTEL passes \$0.15 on to Afriland Finance Department

Example 3: ISPTTEL routes a call to be terminated by Africom



- For instance, ISPTTEL terminates an international call within the interconnection point tariff zone:
 - *ISPTTEL pays \$0.1109 to Africom*
- ISPTTEL terminates an international call beyond the interconnection point tariff zone:

ISPTTEL pays \$0.2227 to Africom
- If 60% of the terminated traffic are of « single transit » type, ISPTTEL and Africom could negotiate a unique termination charge equal to $0.1109*0.6+0.2227*0.4=\$0.1562$

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Publication:

 **Trends in Economics and Finance Volume I :**
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Next Events

- [African Seminar on Costs and Tariffs](#)
Arusha, Tanzania,
15-17 April 2002

Results from recent Seminars and Workshops

- [Tariff Seminar and meeting of the Tariff Group for Latin America and the Caribbean \(TAL Group\)](#)
(Organized by ITU-T)
La Havana, Cuba,
22-25 October 2001
- [Seminar on new trends in tariff policies \(EUR\)](#)
Bratislava, Slovakia,
25-27 September 2001

Coming Soon


- **Study:** [Macroeconomic Study on Financing Telecommunication Development](#)
- **Software:** [Development of Costs, Tariffs and Interconnection Rates Calculation Tool for national and international telephone services](#)

Databanks

- [Financial Institutions / Private Sources](#)
- **Question 12/1:** [Tariff policies, tariff models and methods of determining the cost of national telecommunication services](#) [Survey of Tariffs and Costs: The Results](#)

Direct Assistance

- [Assistance given to Burundi on cost sharing between interconnected operators](#)
Bujumbura, Burundi,
October 2001
- [Network Interconnection Economic Studies and Strategies Assistance to Paraguay](#)
Asunción, Paraguay,
September 2001
- [Assistance on Tariffs and Cost Calculation to Syria](#)
Damascus, Syria,

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