

ICT IMPACT ON DEVELOPING COUNTRIES

2006

TOPICS FOR DISCUSSION

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- **ICT PROBLEMS, SOLUTIONS, FACTORS AND POLICIES – WHY?**

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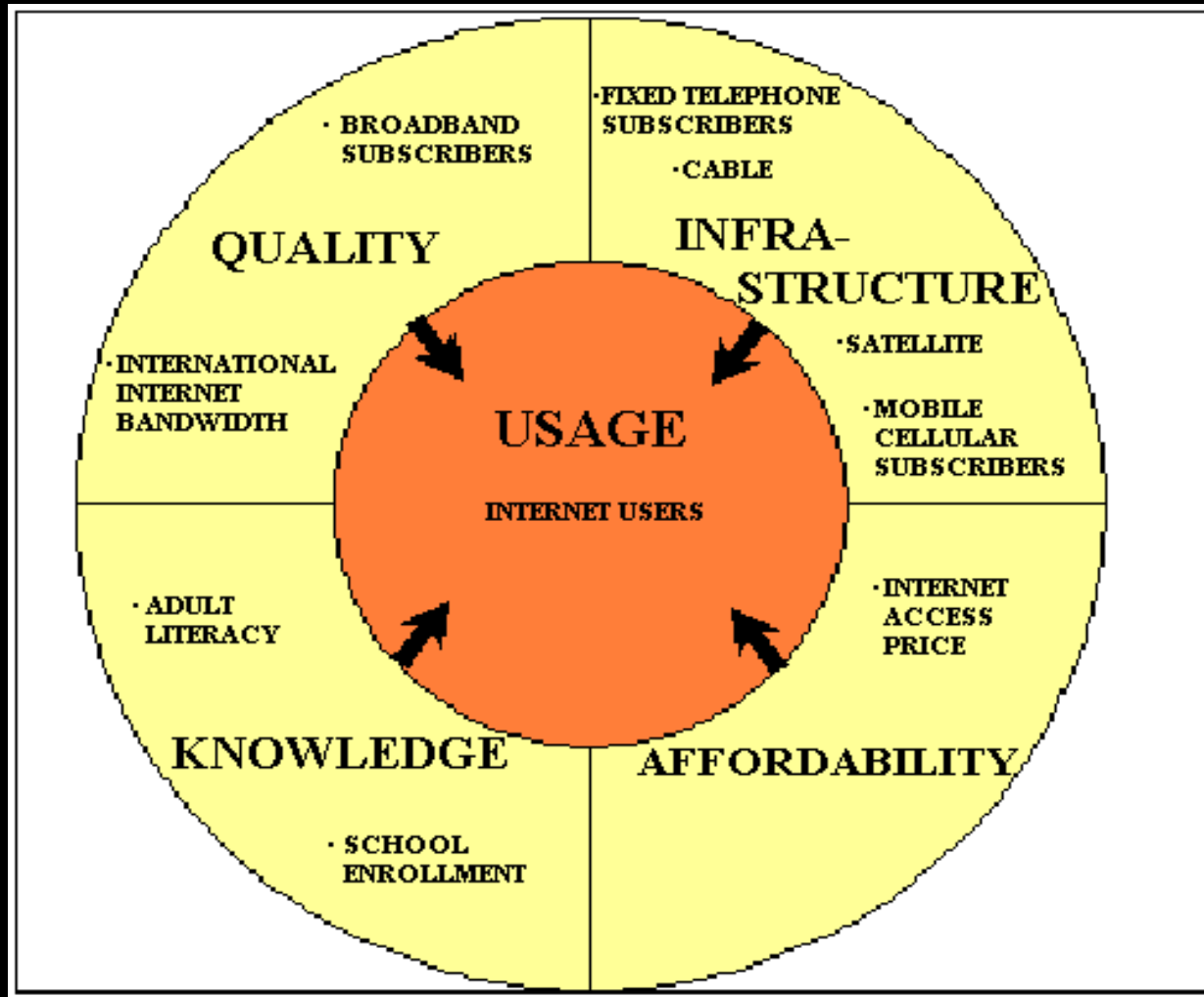
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INFORMATION AND COMMUNICATIONS TECHNOLOGY FACTORS FOR ACCESS



SOURCE: ITU.

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- **UNIVERSAL SERVICE OR UNIVERSAL ACCESS OBLIGATIONS, AND FUNDING ARE A NATIONAL POLICY ISSUE**

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WHY?

**ICT POLICY *ROUGHLY*
CORRELATES TO ECONOMY***

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- **19% OF QATAR'S POPULATION USES THE INTERNET; PER CAPITA INCOME - - \$20,700**
- **17% OF CAYMAN ISLANDS' POPULATION USES INTERNET; PER CAPITA INCOME - - \$35,000**
- **1% OF SYRIA'S POPULATION USES THE INTERNET; PER CAPITA INCOME - - \$1,160**
- **< 1% OF GHANA'S POPULATION USES THE INTERNET; PER CAPITA INCOME - - \$270**

**CONCRETE PROPOSALS TO FUND *DIGITAL DIVIDE*
PROJECTS: AGENDA FOR THE FEBRUARY 17 – 25, 2005,
PREPARATORY MEETING - - THE WORLD SUMMIT OF
THE INFORMATION SOCIETY, GENEVA**

- **FEBRUARY 2005 REPORT TO EU COMMISSION**

LOW-COST COMPUTERS AND MOBILE HANDSETS*

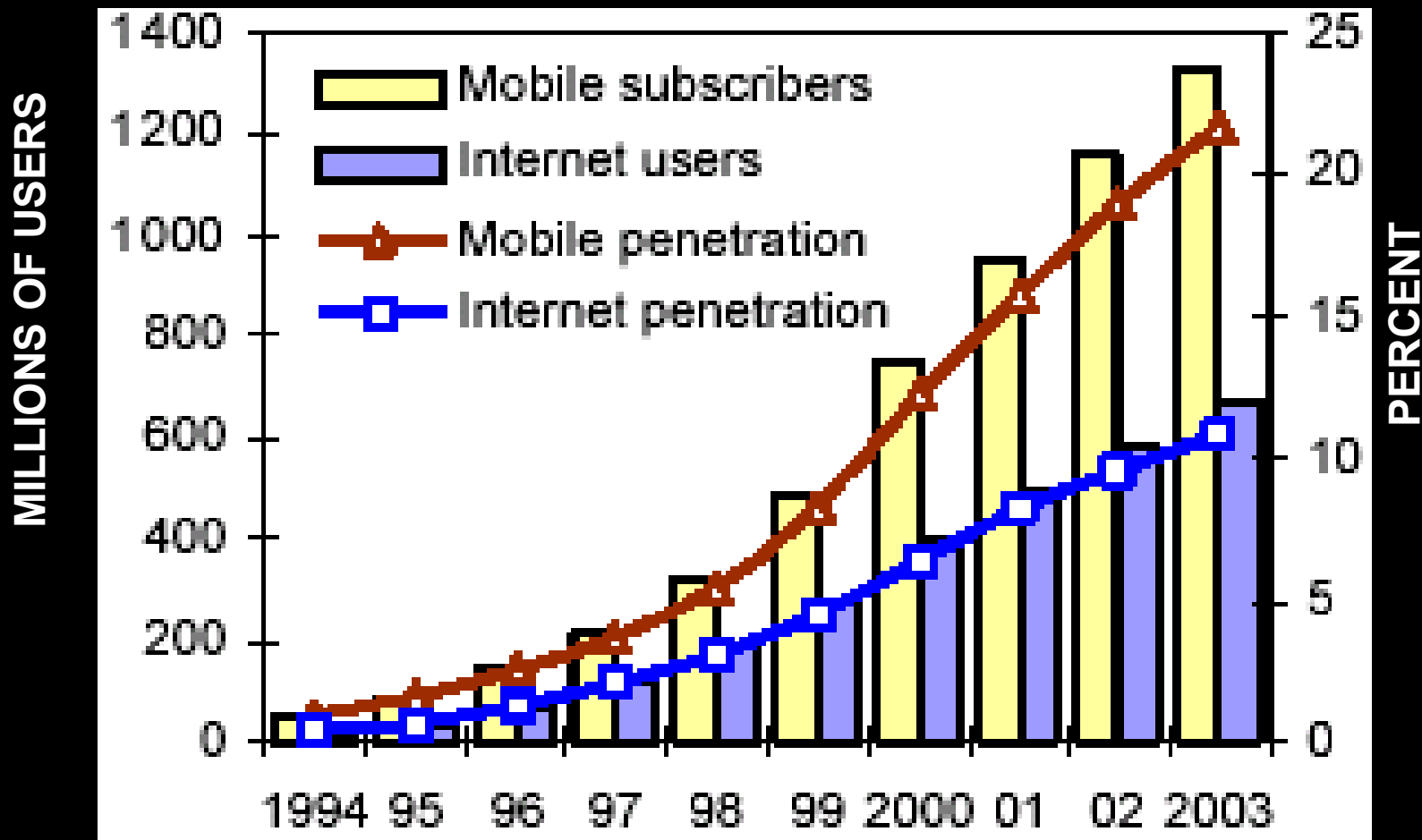
MIT MEDIA LABORATORY HAS DEVELOPED AN EXPERIMENTAL LAPTOP USING LINUX, A 1 GBYTE SOLID-STATE MEMORY (NO HARD DISC), LOW-COST BATTERIES WITH HAND-CRANK CHARGER, AND LOW-COST MINIATURE REAR PROJECTION SCREEN (HALF THE COST OF A LAPTOP TODAY IS THE SCREEN).

COST \approx \$100

GSM ASSOCIATION HAS DEVELOPED A LOWCOST HANDSET IN RESPONSE TO DEMAND FROM DEVELOPING COUNTRIES. STATED GOAL IS “TO HELP CONNECT THE UNCONNECTED PEOPLE OF THE WORLD”. EIGHTEEN OPERATORS AND MANUFACTURERS (AIS, BHARTI, COMPAL, COMPEQ, GLOBE, INFINEON, MAXIS, MOTOROLA, NOKIA, ORASCOM, ROYAL PHILIPS, SAMSUNG, SINGTEL, SMART, TECHFAITH, TELENOR, TEXAS INSTRUMENTS, AND TURKCELL) ARE PARTICIPATING IN THIS INITIATIVE. SIX MILLION PHONES ARE BEING DISTRIBUTED IN THE FIRST PHASE OF THIS PROGRAM CALLED “EMERGING MARKET HANDSET INITIATIVE”.

**COST GOAL $<$ \$40 (ACTUAL = \$46, DEPENDING ON TAXES)
(SEEKING A UNIT THAT COSTS $<$ \$30)**

WORLDWIDE INTERNET AND MOBILE PENETRATION PER 100 POPULATION



SOURCE: ITU WORLD TELECOMMUNICATION INDICATORS DATABASE, 2004

ITU, DEC. 2004: ICT WORLDWIDE VALUE = \$1.1 TRILLION

INTERNET?

INTERNET?

**THE INTERNET HAS ENABLED THE
CREATION OF BUSINESSES
WITHOUT MUCH CAPITAL. IT HAS
ENLARGED THE COMPETITION --
NOT ONLY THE SHOP DOWN THE
STREET BUT THE SHOP HALFWAY
AROUND THE WORLD.
GEOGRAPHICAL BOUNDARIES ARE
DISAPPEARING.**

INTERNET USERS

(JUNE 2004)

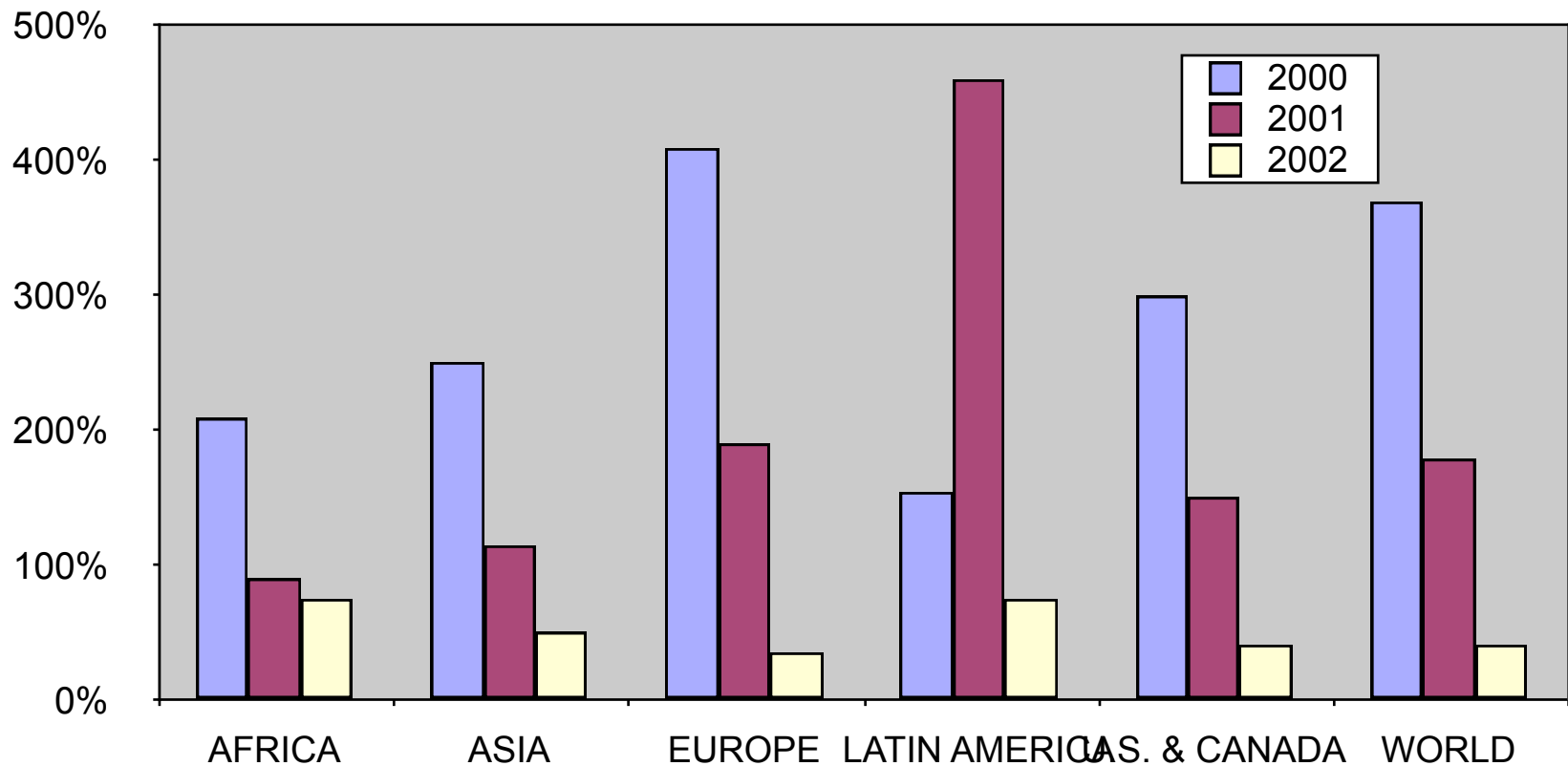
ASIA-PACIFIC	223 MILLION
NORTH AMERICA	175 MILLION
EUROPE	173 MILLION
OTHER	129 MILLION
GLOBALLY	700 MILLION
	(OUT OF 6.4
	BILLION - -
11%)	

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- **PROGRESS TOWARD THIS CONSOLIDATION WILL BE VIA DEVELOPMENTS SUCH AS UBIQUITOUS BANDWIDTH, INCREASED EASE OF USE, GREATER CONNECTIVITY AND IMPROVED SECURITY**

INTERNET BANDWIDTH GROWTH



MAJOR DOMAINS*

.ASIA

.AERO

.ARPA

.BIZ

.COM - 47%

.COOP

**.COUNTRY CODES: (.de - 12%
and .uk - 8%)**

.EDU

.EU

.GOV

.MOBI

.INFO

.INT

.JOBS**

.MAIL

.MIL

.MUSEUM

.NAME

.NET – 7%

.ORG – 4%

.PRO

.TEL

.XXX (PENDING)

INTERNET CONCERNS

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FRAUD - AUTHENTICITY

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**FRAUD - AUTHENTICITY
CYBERSTALKING OR VOYERISM**

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GAMBLING

INTERNET CONCERNS

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INTERNET CONCERNS

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TAXES
SPAM**

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QUALITY**

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QUALITY

INTELLECTUAL PROPERTY RIGHTS

INTERNET CONCERNS

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MONEY LAUNDERING**

**DRUG TRAFFICKING
PORNOGRAPHY**

TAXES

SPAM

QUALITY

INTELLECTUAL PROPERTY RIGHTS

VIRUSES

INTERNET CONCERNS

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PORNOGRAPHY**

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VIRUSES

CULTURE

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MONEY LAUNDERING

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TAXES

SPAM

QUALITY

INTELLECTUAL PROPERTY RIGHTS

VIRUSES

CULTURE

SECURITY (PRIVACY)

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PORNOGRAPHY

TAXES

SPAM

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VIRUSES

CULTURE

SECURITY (PRIVACY)

WIRELESS NUMBER DIRECTORY

WHAT IS VoIP / INTERNET VOICE?

VOICE OVER INTERNET PROTOCOL (VoIP) ALLOWS TELEPHONE CALLS USING A COMPUTER NETWORK - - A DATA NETWORK, LIKE THE INTERNET:

- VoIP CONVERTS THE VOICE SIGNAL FROM YOUR TELEPHONE INTO A DIGITAL SIGNAL THAT TRAVELS OVER THE INTERNET THEN CONVERTS IT BACK AT THE OTHER END SO YOU CAN SPEAK TO ANYONE WITH A REGULAR PHONE NUMBER.**
- WHEN PLACING A VoIP CALL USING A PHONE WITH AN ADAPTER, YOU'LL HEAR A DIAL TONE AND DIAL JUST AS YOU ALWAYS HAVE.**
- VoIP ALSO ALLOWS YOU TO MAKE A CALL DIRECTLY FROM A COMPUTER USING A CONVENTIONAL TELEPHONE OR A MICROPHONE.**

VOICE OVER INTERNET PROTOCOL

VoIP IS NOT JUST ANOTHER WAY OF PROVIDING TRADITIONAL TELEPHONE SERVICE. IT IS A NEW APPLICATION ON A NEW KIND OF NETWORK THAT WILL CREATE NEW OPPORTUNITIES FOR BUSINESSES AND CONSUMERS. VoIP WILL RAISE STANDARDS ISSUES THAT NEED SOLUTIONS SUCH AS:

- **ARRANGEMENTS FOR FINANCE / PSTN CONNECTION**
- **SUPPORTING EMERGENCY RESPONSE NEEDS OF PUBLIC SAFETY AUTHORITIES, ESPECIALLY AS RELATED TO THE RESPONSE LOCATION**
- **VoIP TECHNOLOGIES HELPING ACCESSIBILITY AND USABILITY OF COMMUNICATIONS NETWORKS BY PERSONS WITH DISABILITIES**
- **SECURITY AND LEGAL ISSUES NEED RESOLUTION IN RESPONSE TO APPROPRIATE LEGAL REQUIREMENTS**
- **OTHER STANDARDS ISSUES RAISED BY VOIP**

IP FOR PERSONS WHO ARE DEAF

- n IP BROADBAND (DSL OR CABLE MODEM) CAN SUPPORT VIDEO CALLING, AND BECAUSE A PC CAN BE USED FOR VIDEO, IN MANY CASES THE ONLY COST TO THE CONSUMER IS A USB VIDEO CAMERA**
 - l IP VIDEO CALLING WILL LIKELY BECOME WIDELY USED IN THE NEAR FUTURE, BOTH FOR BUSINESS AND HOME CALLERS**
 - l THIS WILL BENEFIT THE DEAF AND HARD-OF-HEARING COMMUNITIES, AS THEY WILL BE ABLE TO USE SIGN LANGUAGE AND LIP READING ON VIDEO CALLS, AND AFFORD THE INEXPENSIVE HARDWARE**
- n GALLAUDET UNIVERSITY IS ALREADY EXPERIMENTING WITH VIDEO CALLING, AND EVEN HAS INSTALLED MANY "VIDEO TELEPHONE BOOTHS" ON ITS CAMPUS, FOR STUDENTS TO MAKE IP VIDEO CALLS TO EACH OTHER.**

VoIP FOR PERSONS WHO ARE BLIND

- n TECHNOLOGY AND COST LIMITATIONS OF PTSN PHONES CREATE BARRIERS FOR ACCESS BY BLIND USERS (FOR EXAMPLE, A BLIND USER CANNOT SEE A DISPLAY WITH CALLER ID ON IT)**
- n VoIP "PHONES" CAN ACTUALLY BE CREATED BY INSTALLING A SOFTWARE-BASED TELEPHONE ONTO A STANDARD PC WITH AUDIO CARD AND SPEAKERS, AND THEN CAN BE EASILY AND CHEAPLY CUSTOMIZED FOR ACCESSIBILITY FEATURES**
 - l PCs (WINDOWS AND APPLE) ALREADY HAVE QUITE A BIT OF EXISTING "ACCESSIBILITY FEATURES" THAT THE VoIP SOFTPHONE CAN TAKE ADVANTAGE OF, SUCH AS TEXT-TO-SPEECH FOR AUDIBLE CALLER ID AND MESSAGE WAITING INDICATION.**
 - l IT IS MUCH CHEAPER TO MAKE A BLIND-ACCESSIBLE TELEPHONE BASED ON A PC, THAN TO CREATE SPECIAL HARDWARE FOR A STANDALONE PHONE, AND THIS MAKES BLIND-FRIENDLY TELEPHONES AFFORDABLE FOR MORE USERS.**

PSTN AND IP TELEPHONY

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- **INTERNET IS HEADED TO REPLACE THE PSTN BY A “NEXT GENERATION NETWORK” (NGN) – ITU-T STUDY GROUP**

VoIP AND PSTN RELATIVE COSTS

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- **VoIP TODAY MEANS A TRADE-OFF BETWEEN QUALITY AND COST**

VoIP vs SWITCHED CIRCUIT NETWORK COST

SOLUTION	INVESTMENT	CAPACITY	ADVANTAGES
CLASS 5 SWITCH	US \$20 MILLION	20,000 LINES	<ul style="list-style-type: none"> • QUALITY • RELIABLE • PROVEN TECHNOLOGY
INTERNET POP	US \$0.1 MILLION	400,000 MINUTES PER MONTH	<ul style="list-style-type: none"> • EFFICIENCY • NEW SERVICES POTENTIAL • SCALABILITY
IP FULL OPERATION	US \$3 TO 5 MILLION	35 MILLION MINUTES PER MONTH	

TRADITIONAL
TELCO SWITCH

IP TELEPHONY

IP TELEPHONY

VoIP PERMITTED

**ANGOLA
ANTIGUA AND BARBUDA
ARGENTINA
AUSTRALIA
AUSTRIA
BELGIUM
BHUTAN
CANADA
CHINA
CONGO
COSTA RICA
CYPRUS
CZECH REPUBLIC
DENMARK
DOMINICAN REPUBLIC
ESTONIA
ETHIOPIA
FINLAND
FRANCE
GAMBIA
GERMANY
GREECE**

**GUATEMALA
GUYANA
HONG KONG SAR
HUNGARY
ICELAND
INDIA
IRELAND
ITALY
JAPAN
KENYA
KOREA (REP)
KYRGYZSTAN
LUXEMBOURG
MADAGASCAR
MALAYSIA
MALTA
MAURITIUS
MEXICO
MOLDOVA
MONGOLIA
NEPAL
NETHERLANDS**

**NEW ZEALAND
NIGERIA
PERU
PHILIPPINES
POLAND
PORTUGAL
SINGAPORE
SLOVAK REPUBLIC
SOUTH AFRICA
SPAIN
SRI LANKA
ST. LUCIA
ST. VINCENT
SWEDEN
SWITZERLAND
TONGA
UGANDA
UNITED KINGDOM
UNITED STATES
VIET NAM**

64/189

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- **VoIP TRAFFIC TO INDIA, PAKISTAN, AND BANGLADESH MORE THAN DOUBLED IN 2003 OVER 2002**

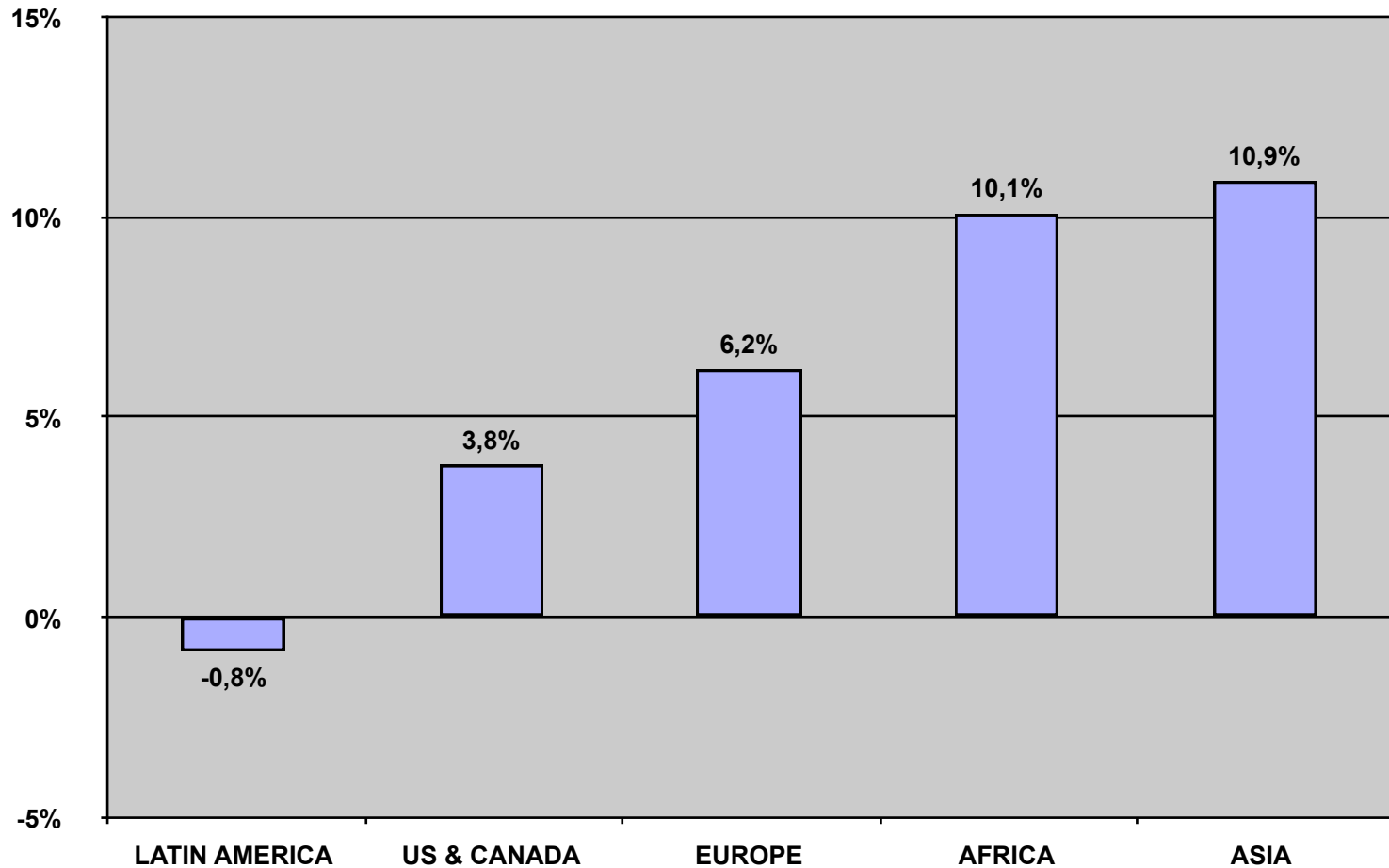
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- **VoIP TRAFFIC SURGED 80 PERCENT IN 2002 TO 18 BILLION MINUTES, ACCOUNTING FOR MORE THAN 10 PERCENT OF INTERNATIONAL TRAFFIC; IN 2003 TO 22 BILLION MINUTES (17% INCREASE)**
- **VoIP APPEARS TO HAVE A NOTABLE IMPACT IN LATIN AMERICA, WHERE SWITCHED TRAFFIC VOLUMES DECREASED IN 2002.**
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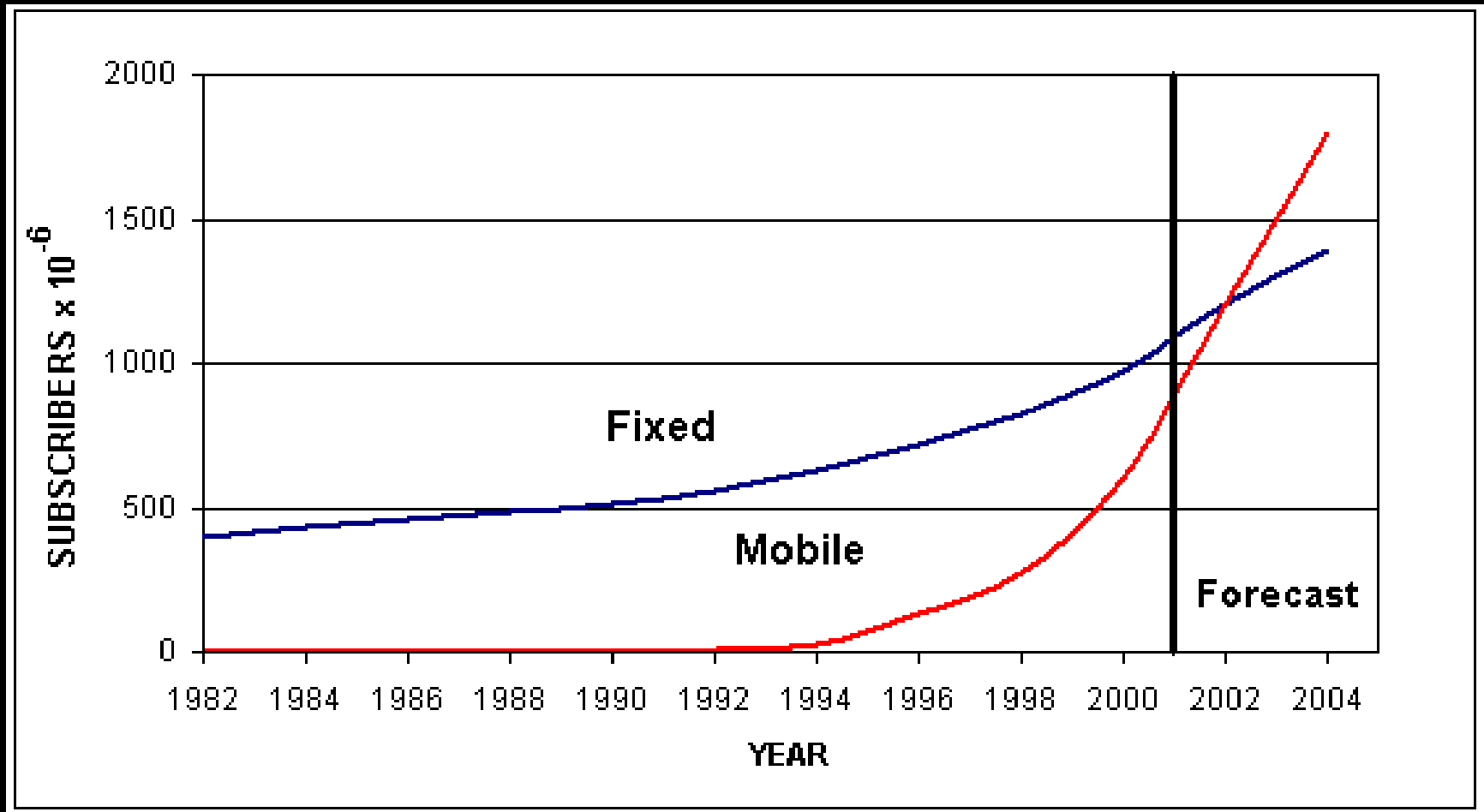
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- **VoIP IS STILL PRIMARILY USED TO BYPASS HIGH SETTLEMENT RATES IN DEVELOPING COUNTRIES**

FIXED LINE TRAFFIC GROWTH 2001 TO 2002

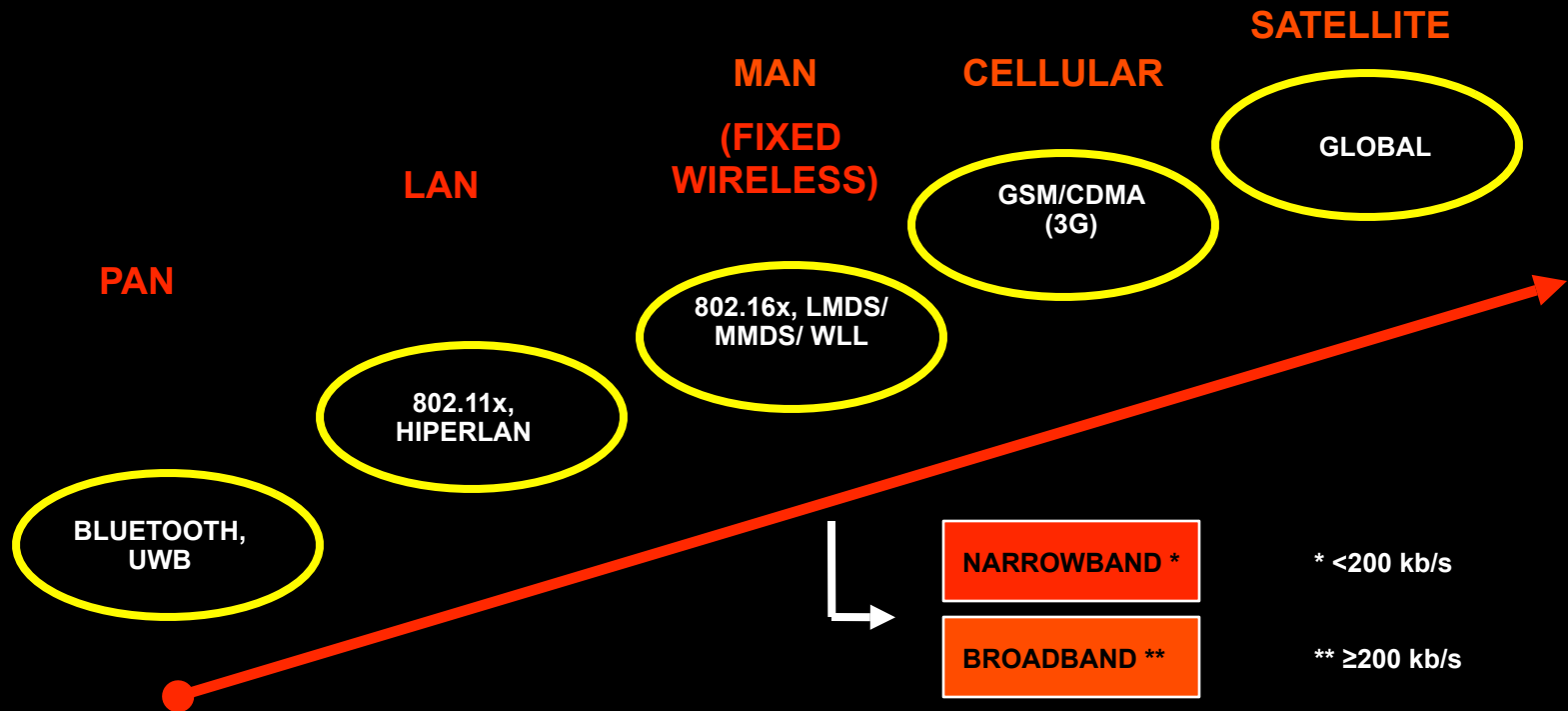


NOTES: GLOBAL TRAFFIC WAS 155.2 BILLION MINUTES IN 2002. DATA DO NOT INCLUDE VoIP TRAFFIC.

MOBILE AND FIXED TELEPHONE SUBSCRIBERS (WORLDWIDE) AS A FUNCTION OF YEARS HAS PROVEN

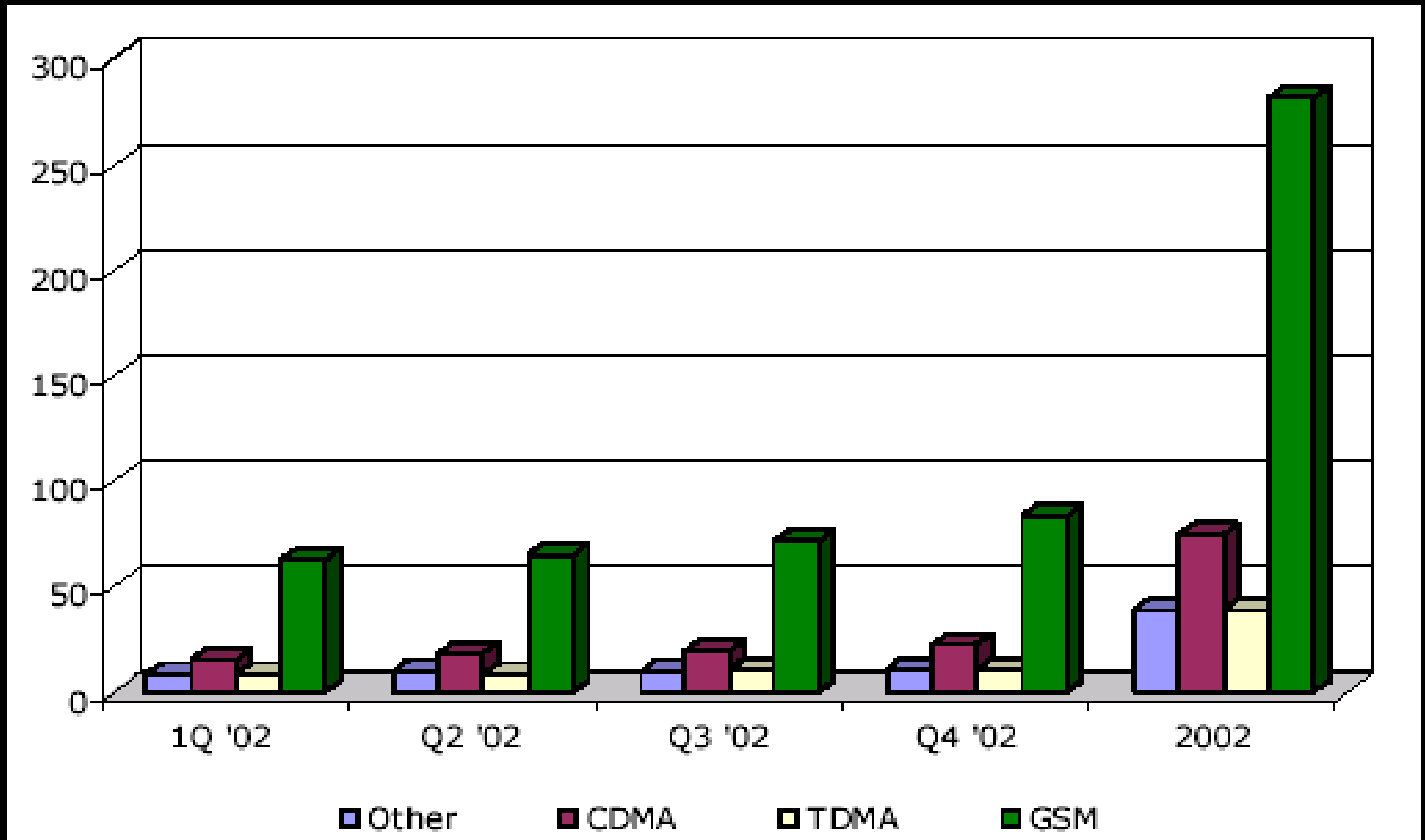


WIRELESS MARKET



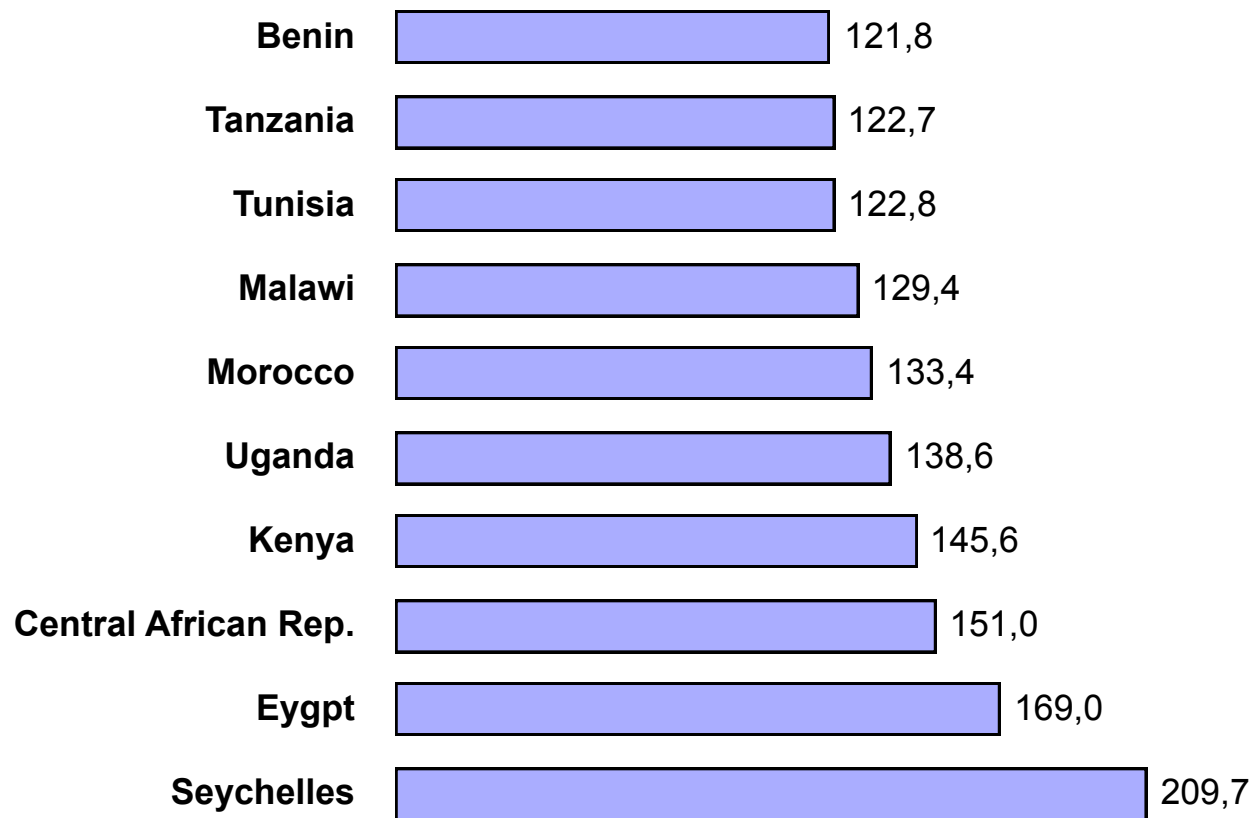
<u>PAN</u>	<u>LAN</u>	<u>MAN</u>	<u>3G</u> <u>CELLULAR</u>	<u>SATELLITE</u>
CORDLESS PHONES	WLANs:	RESIDENTIAL TOWERS	MULTIMEDIA (VOICE, VIDEO, DATA)	GLOBAL CELLULAR PHONES
PCs	HOTELS	BUSINESSES	CELLULAR PHONES	RNSS
PDA's	RETAIL	MUNICIPALITIES		
HOME GATEWAYS	CONFERENCES			
	BUSINESS			

2002 GLOBAL MOBILE TERMINAL SHIPMENTS (1000's) BY TECHNOLOGY

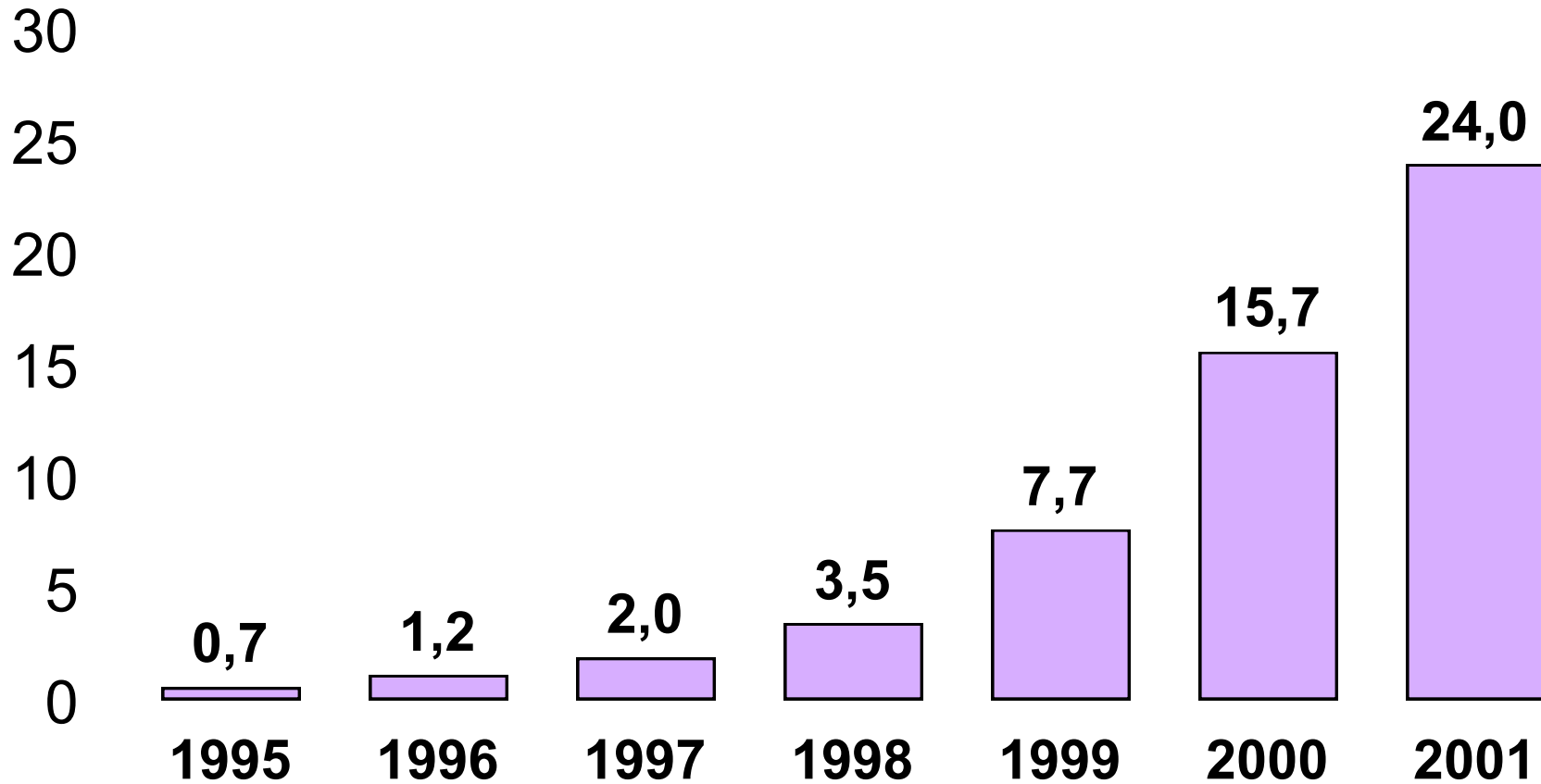


MOBILE GROWTH IN AFRICA (1995-2001)

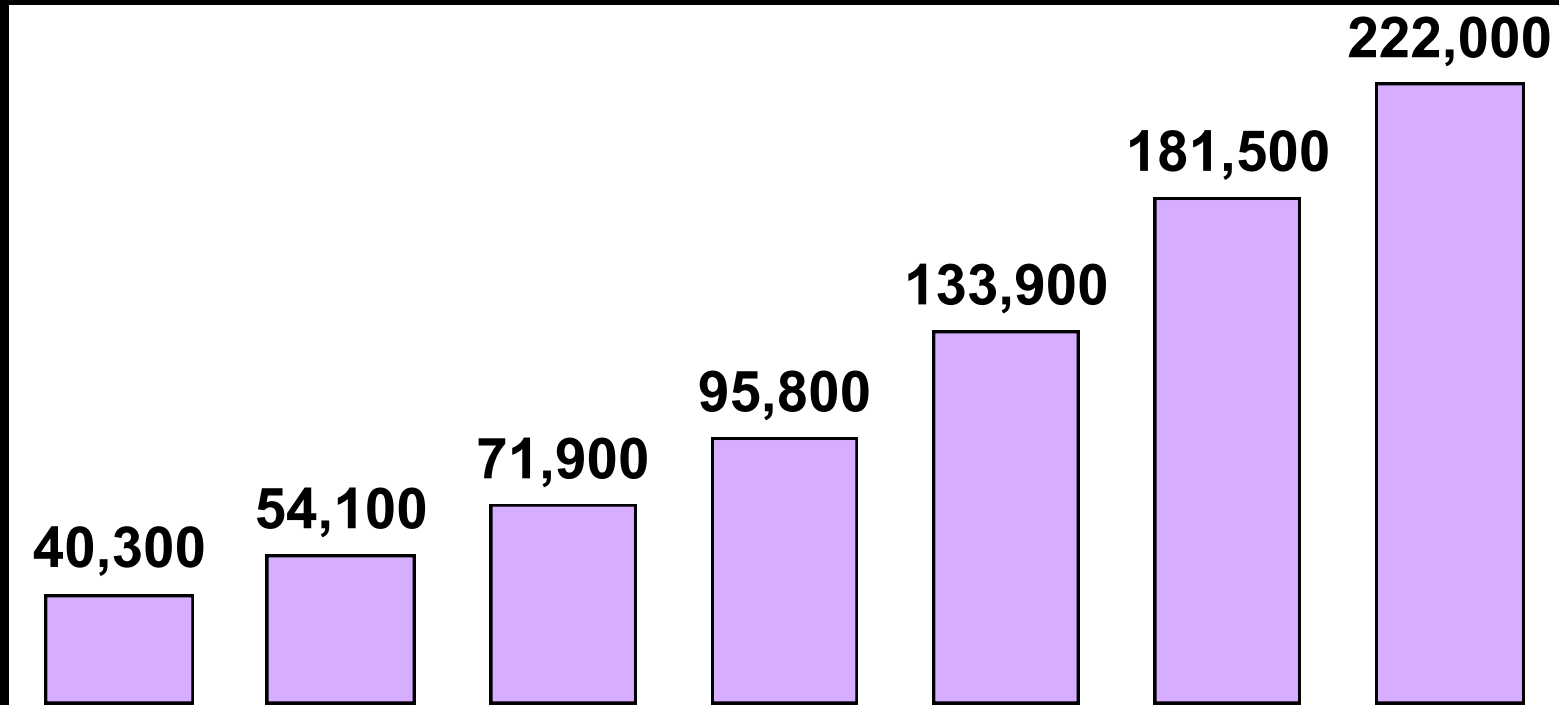
TOP 10 ECONOMIES, COMPOUND ANNUAL GROWTH RATE (%)



MOBILE SUBSCRIBERS IN AFRICA (MILLIONS)



MOBILE SUBSCRIBERS IN THE AMERICAS (MILLIONS)



WORLD TRADE ORGANIZATION (WTO) AND TELECOMMUNICATION TRADE LIBERALIZATION

- **WTO MEMBERSHIP ALLOWS MEMBERS TO MAKE BINDING TREATY COMMITMENTS IN SPECIFIC SECTORS, INCLUDING TELECOMMUNICATIONS SERVICES**
- **GENERAL AGREEMENT ON TRADE IN SERVICES (GATS) AS OF OCTOBER 2003:**
 - **105 WTO MEMBERS HAVE MADE SPECIFIC GATS COMMITMENTS IN SOME OR ALL ASPECTS OF TRADE IN TELECOMMUNICATIONS SERVICES**
 - **98 IN BASIC TELECOMMUNICATIONS; ORIGINAL COMMITMENTS IN 1997 KNOWN AS BASIC TELECOM AGREEMENT**

WTO AND TELECOMMUNICATIONS SERVICES

- **WTO REFERENCE PAPER, ADOPTED BY MAJORITY OF MEMBERS MAKING COMMITMENTS IN BASIC TELECOMMUNICATIONS, IMPOSES OBLIGATIONS REGARDING:**
 - **COMPETITIVE SAFEGUARDS**
 - **INTERCONNECTION**
 - **UNIVERSAL SERVICE**
 - **LICENSING**
 - **REGULATOR INDEPENDENCE**
 - **SCARCE RESOURCE ALLOCATION (E.G., NUMBERS, SPECTRUM)**

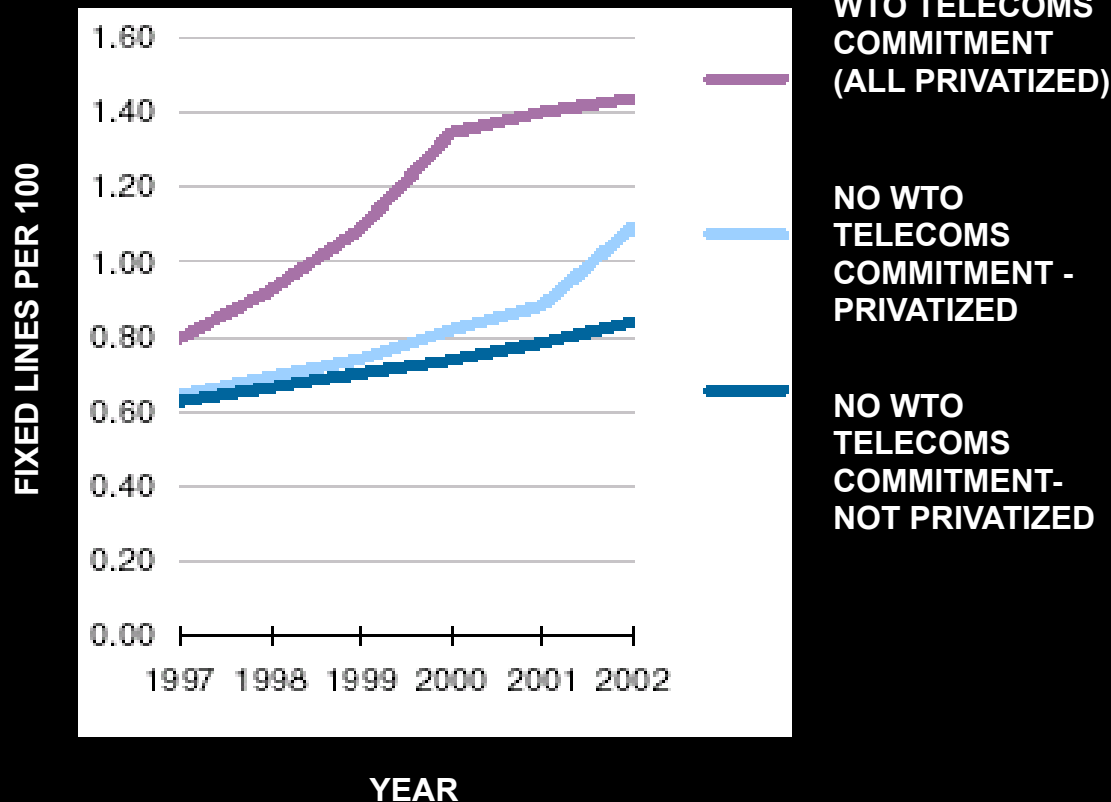
WHY GATS COMMITMENTS IN TELECOMMUNICATIONS SERVICES ARE UNIQUE

- **GATS COMMITMENTS IN TELECOMMUNICATIONS ENTAIL COMPLEX DOMESTIC SECTORAL REFORMS, INCLUDING THE INTRODUCTION OF COMPETITION AND THE ESTABLISHMENT OF AN EFFECTIVE REGULATOR AND REGULATIONS**
- **FUNCTIONS AS A MULTILATERAL INVESTMENT AGREEMENT, GRANTING RIGHTS TO THE SERVICE SUPPLIERS OF OTHER WTO MEMBERS, ALLOWING SOME FOREIGN OWNERSHIP AND CONTROL IN TELECOMMUNICATIONS**
- **WTO REFERENCE PAPER FUNCTIONS AS A MULTILATERAL AGREEMENT REGARDING COMPETITION REGULATION, IMPOSING A COMMON SET OF PRO-COMPETITIVE REGULATORY PRINCIPLES**

WHY GATS COMMITMENTS IN TELECOMMUNICATIONS MATTER TO DEVELOPING COUNTRIES

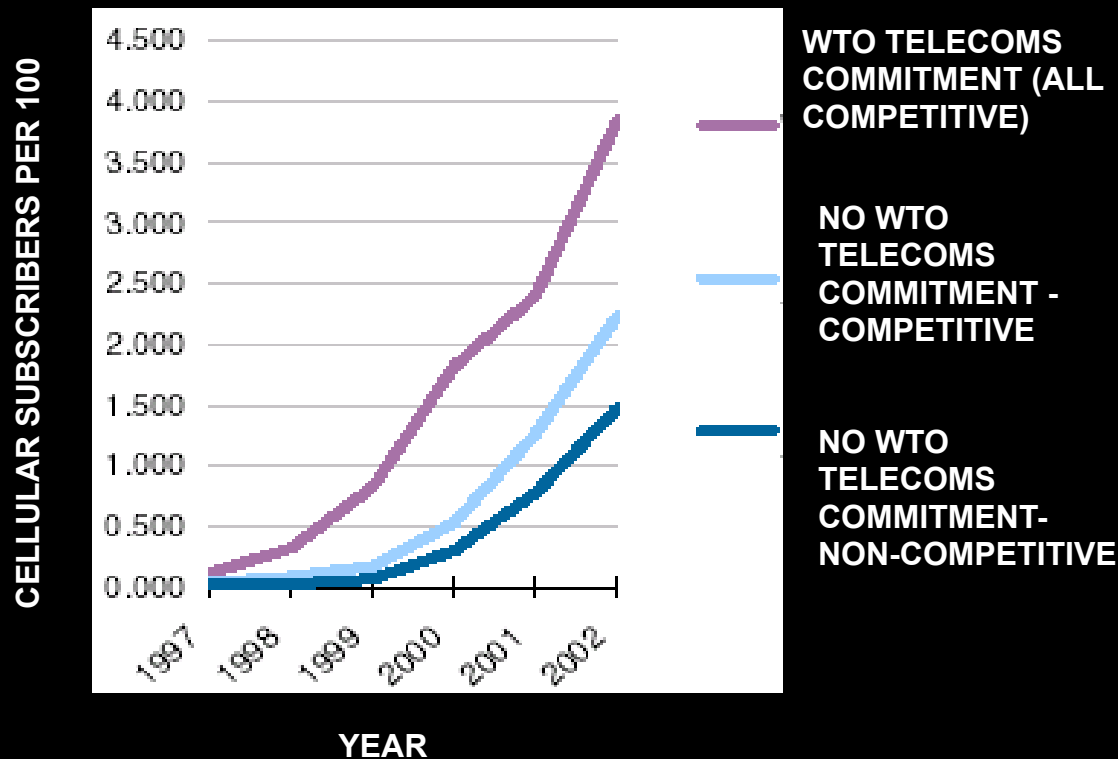
- **COMMITMENTS FUNCTION AS A WELL-KNOWN SIGNALING DEVICE TO INVESTORS AND FOREIGN SERVICE SUPPLIERS**
- **COMMITMENTS CAN CREATE MOMENTUM FOR FURTHER DOMESTIC SECTOR REFORM, AND IT CAN ALSO ANCHOR THOSE REFORMS WITHIN AN INTERNATIONAL LEGAL FRAMEWORK TO GUARD AGAINST POLICY REVERSAL**
- **DEPENDING ON SPECIFICS, COMMITMENTS COULD PROMOTE CONSUMER WELFARE AND TELEDENSITY, COMPETITION, AND PRIVATIZATION INITIATIVES**

EFFECT OF WTO ON GROWTH OF FIXED LINES IN SUB-SAHARAN AFRICA



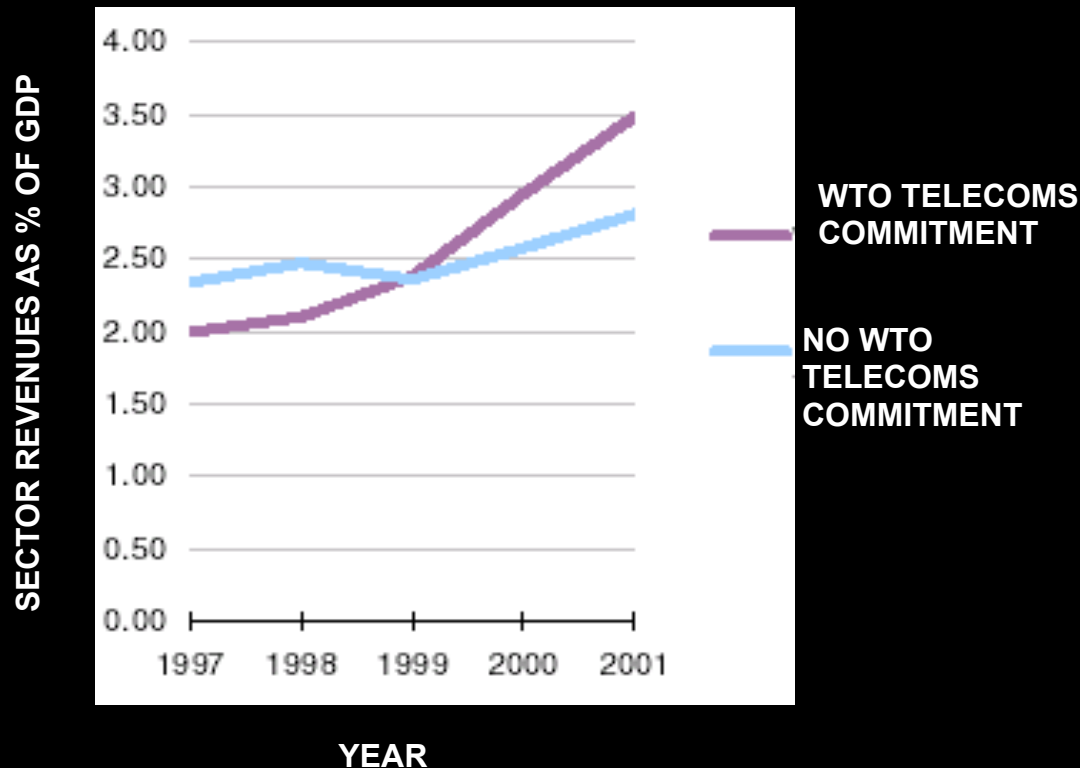
- **COUNTRIES WITH WTO TELECOMS COMMITMENTS PERFORM BETTER**
 - GREATER FIXED LINE PENETRATION
 - FASTER GROWTH
- **COUNTRIES WITHOUT BASIC TELECOM COMMITMENTS HAVE GREATER FIXED LINE PENETRATION IF THE INCUMBENT IS PRIVATIZED**

EFFECT OF WTO ON GROWTH OF MOBILE LINES IN SUB-SAHARAN AFRICA



- **COUNTRIES WITH BASIC TELECOM COMMITMENTS HAVE GREATER MOBILE SUBSCRIPTION**
- **COUNTRIES WITHOUT BASIC TELECOM COMMITMENTS HAVE GREATER PENETRATION IF THERE IS COMPETITION IN MOBILE**

EFFECT OF WTO ON REVENUES IN SUB-SAHARAN AFRICA



- **COUNTRIES WITH BASIC TELECOM COMMITMENTS PERFORMED BETTER**
 - **GREATER SECTOR REVENUES THAN COUNTRIES WITHOUT BASIC TELECOM COMMITMENTS**
 - **FASTER GROWTH RATES**

WTO CONCLUSIONS

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- **GATS COMMITMENTS ACT AS A MECHANISM FOR A COUNTRY TO ATTRACT MORE PRIVATE SECTOR INVESTMENT**

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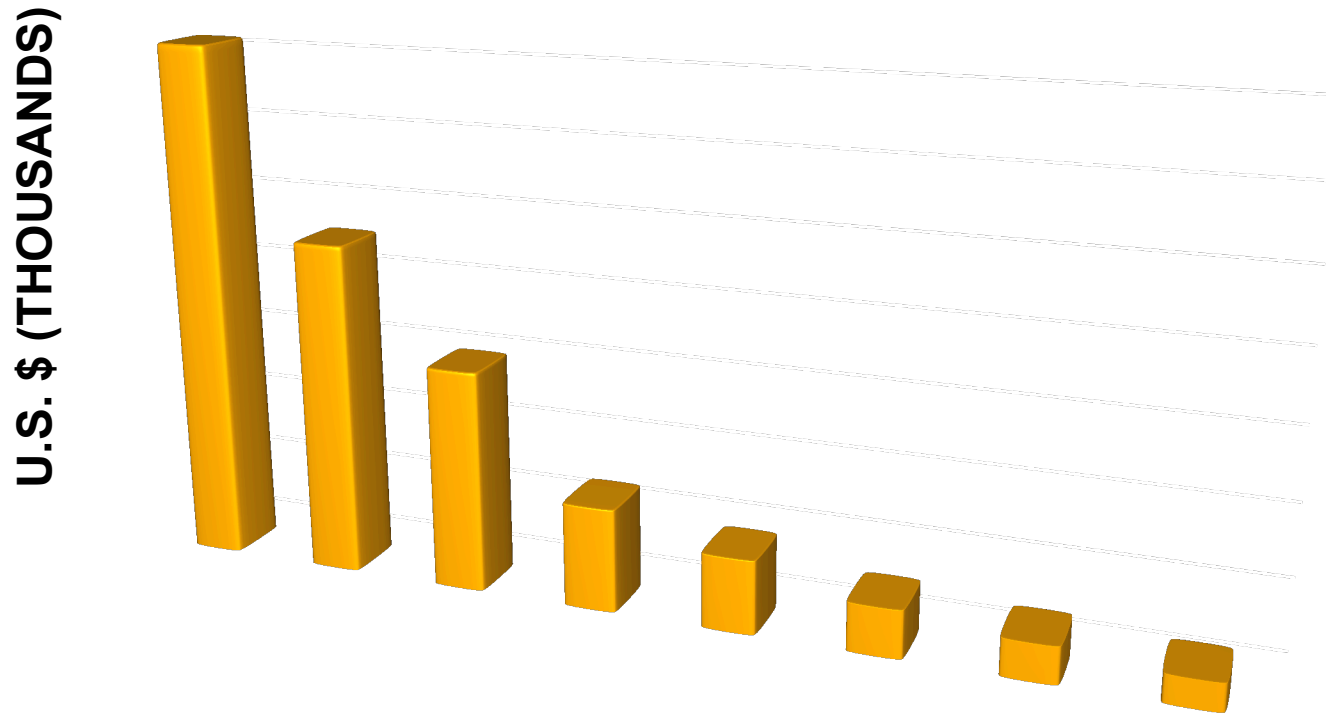
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- **AS EXISTING COMMITMENTS ARE FURTHER IMPLEMENTED AND NEW COMMITMENTS MADE, MORE REFINED METRICS WILL BE AVAILABLE TO FURTHER SUBSTANTIATE THESE FINDINGS**

VSAT TERMINAL PRICING TRENDS



Source: COMSYS

MOBILE SATELLITE TERMINAL COST TREND



SOURCE: INMARSAT

COMPROMISE

**“ALL GOVERNMENT, INDEED
EVERY HUMAN BENEFIT AND
ENJOYMENT, EVERY VIRTUE,
AND EVERY PRUDENT ACT, IS
FOUNDED ON *COMPROMISE*
...”**

**- Edmund Burke -
*Irish philosopher, 1775***