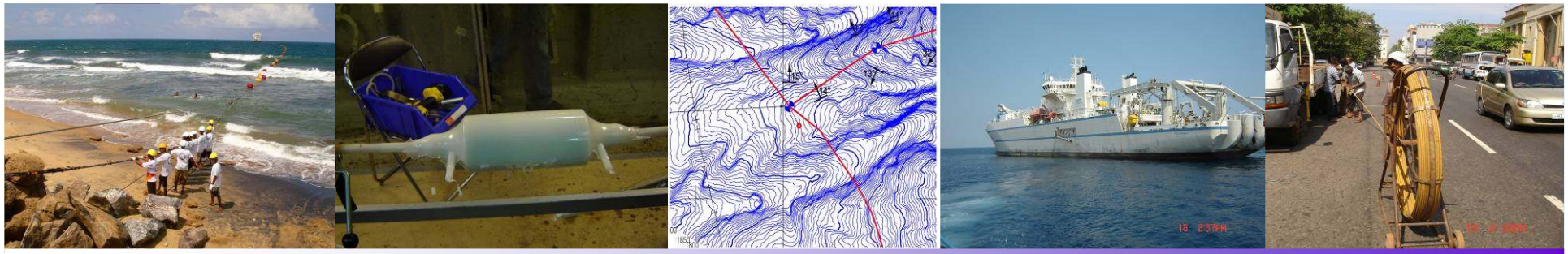

Critically identifying global capacity demand drivers

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Major Topics Addressed

- Identifying global capacity demand trend patterns
- Determining the life span of current demand
- Aligning it with your business objectives

Contents

1. **Introductory Background**
   1. Social Paradigm Shift
   2. Communication Networks
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   5. Technological/Service Paradigm Shift
2. **International Demand Patterns & Observations**
   1. Global Capacity Trend
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   5. Matching the Demand with Available Facilities
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3. **Consortium Cable Systems**
   1. Characteristics of Consortium Cable System
   2. Advantages of Consortium Cables
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4. **Business Aspects**
   1. Sri Lankan Experience
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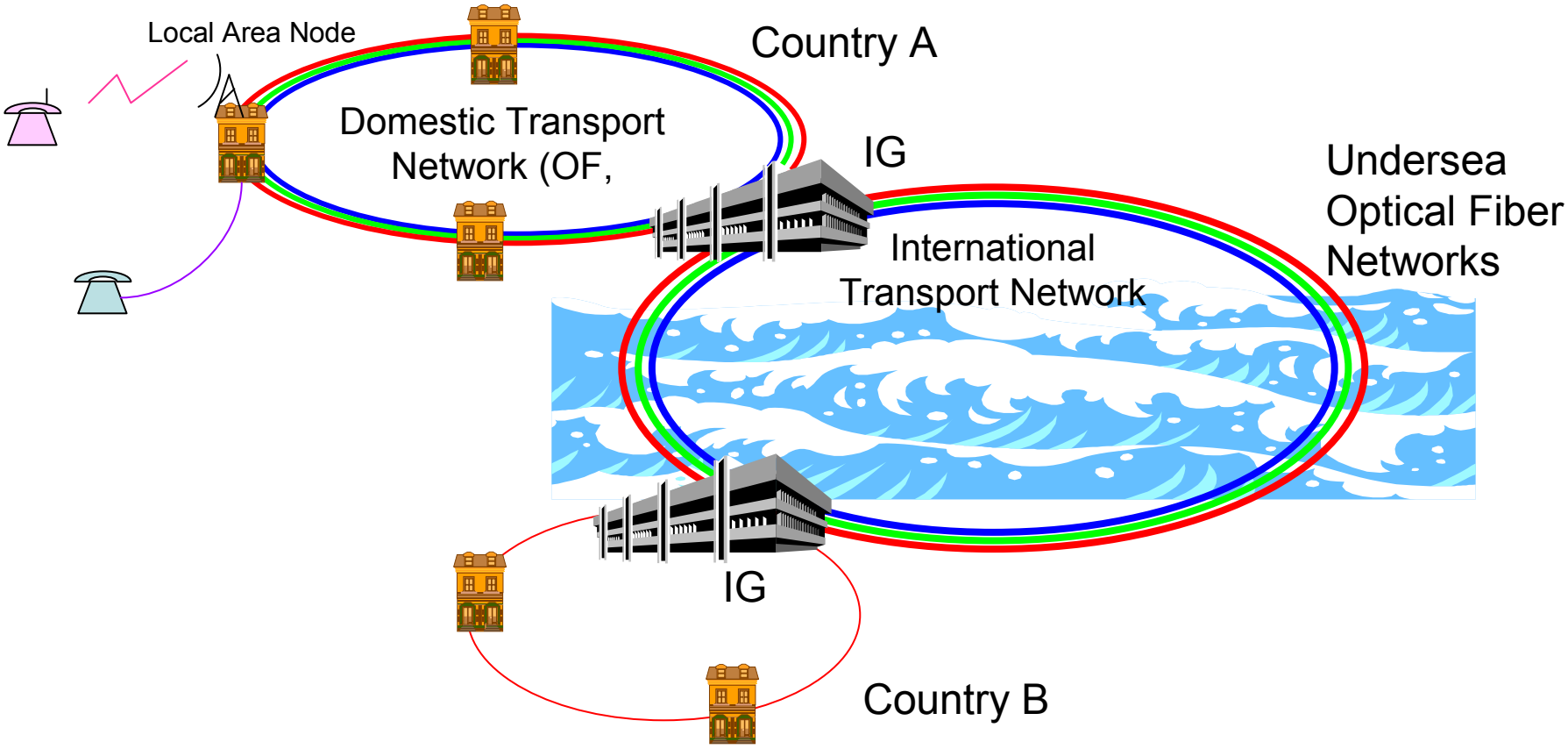
   3. Gap Analysis - Inclusive and Exclusive Economics
   4. Correct Investment Timing
5. **Conclusive Remarks**

Sociological Paradigm Shift
Past – Present - Future

- Past
  - Agriculture Revolution
  - Industrial Revolution
- Present
  - Communication explosion
- Future
  - Transport Revolution
  - Energy Revolution

What is Communication Network



Both Domestic and International Transport will be on Optical Fibers. And Switching Nodes will be on NGN.

Basic Components of Communication Networks

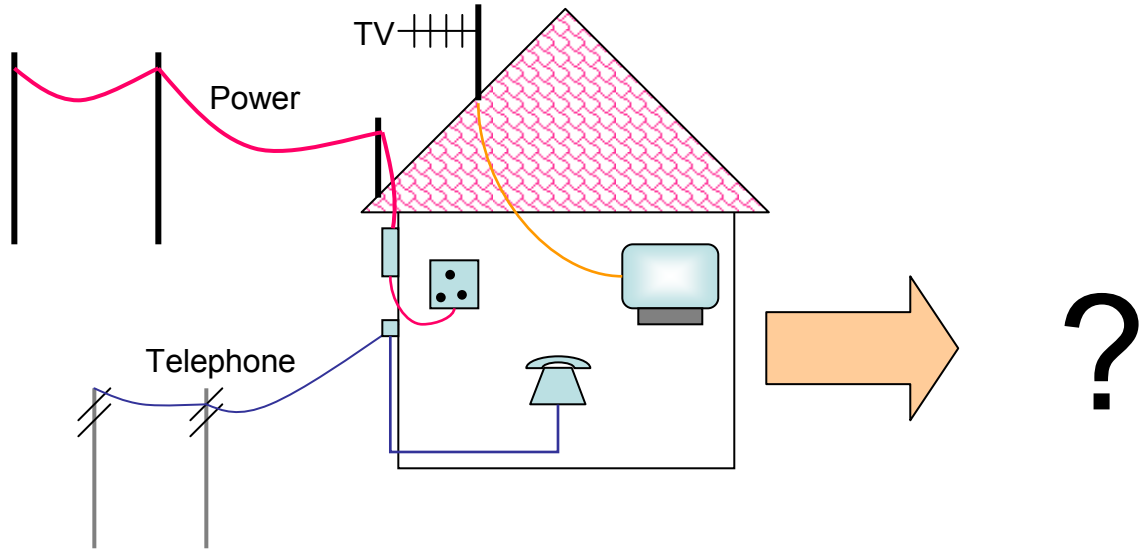
- Following 8 major components can be identified
  - Geographical Location & Terminal
  - Access Networks
  - Local Exchange
  - Domestic Transport Network
  - International Exchange
  - International Transport Network
  - Other Country International Exchange
  - Other Country Domestic Network (With the similar components as above)

Communication Network Paradigm Shift

- Present
  - Transport Network
    - OF
  - Access Network
    - Shift from Copper to Radio (3G, EvDO) & Fiber
- Immediate Future
  - Shift from Radio/OF to Power Line Communication System (PLC) depends upon which revolution comes first in future i.e. Transport or Energy (If energy comes first, access will not be PLC, but radio & OF)
  - Hence most promising access network for next 10y will be either Radio or OF or PLC
  - Most promising transport network will be OF especially undersea OF cable systems

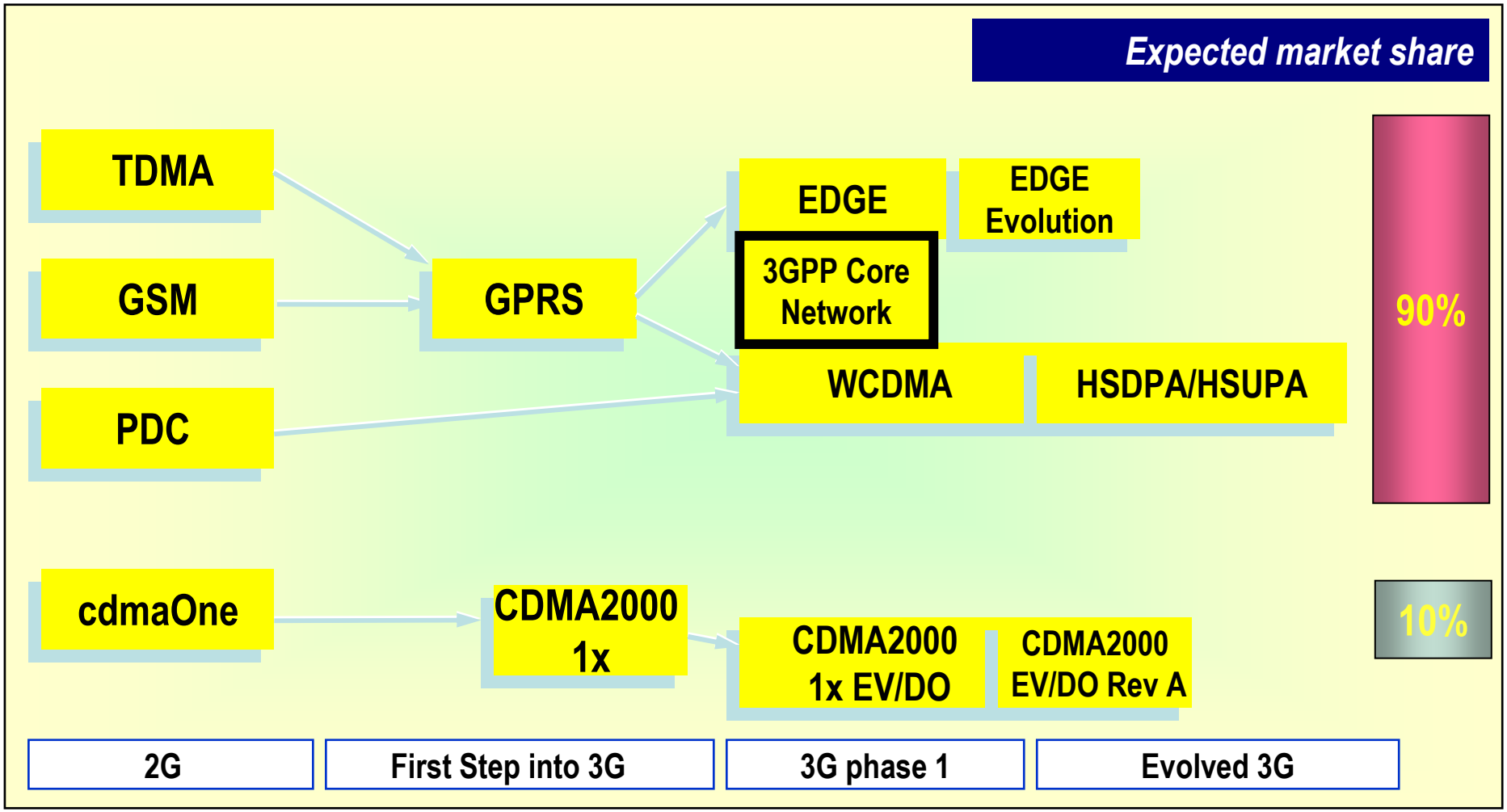
Development of Access Network

- Access Network is developed to accommodate integrated services such as Internet, IPTV, Data with Voice

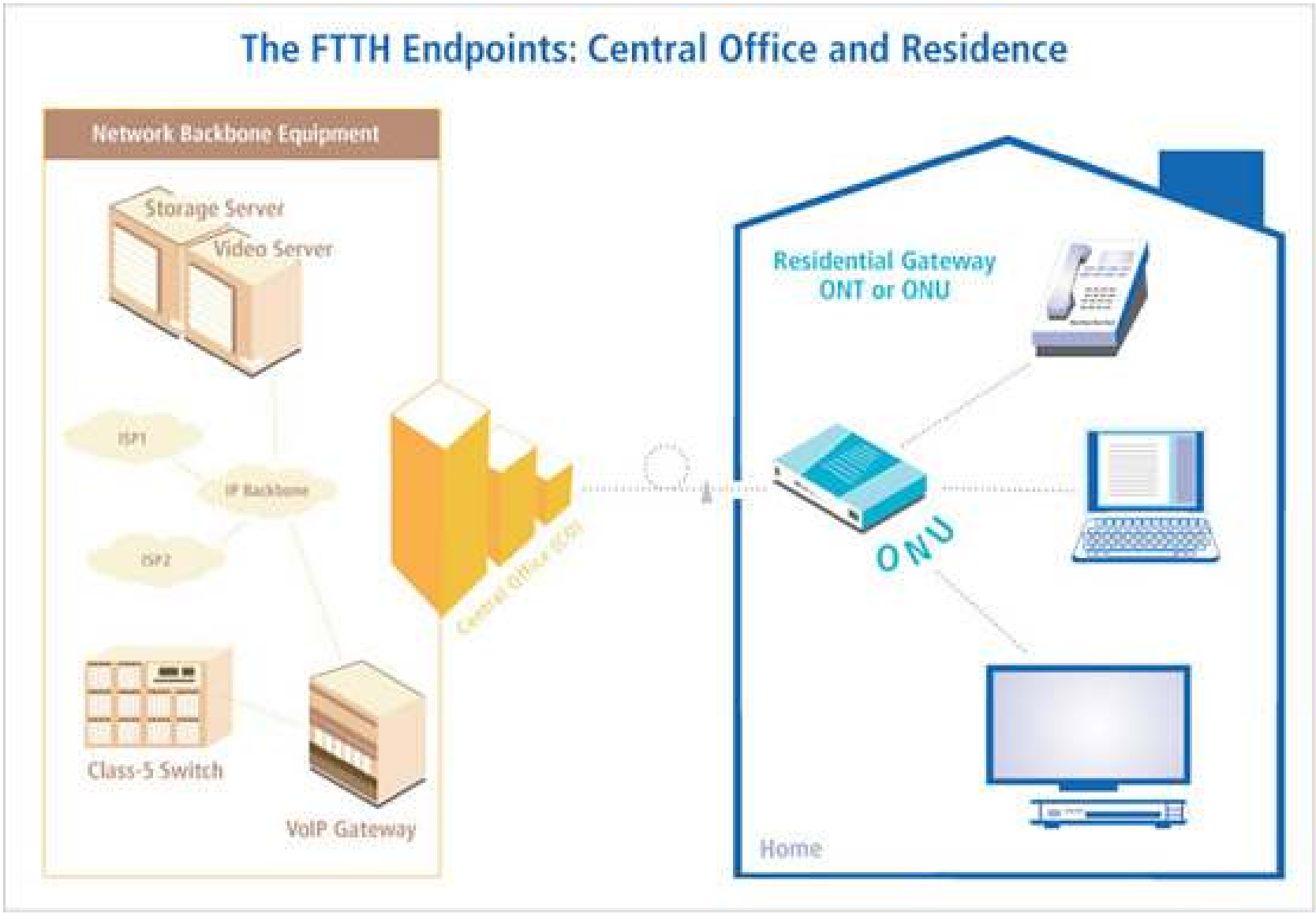


- Radio Options: 3G, EvDO, WiMAX
- DSL, PON, and PLC

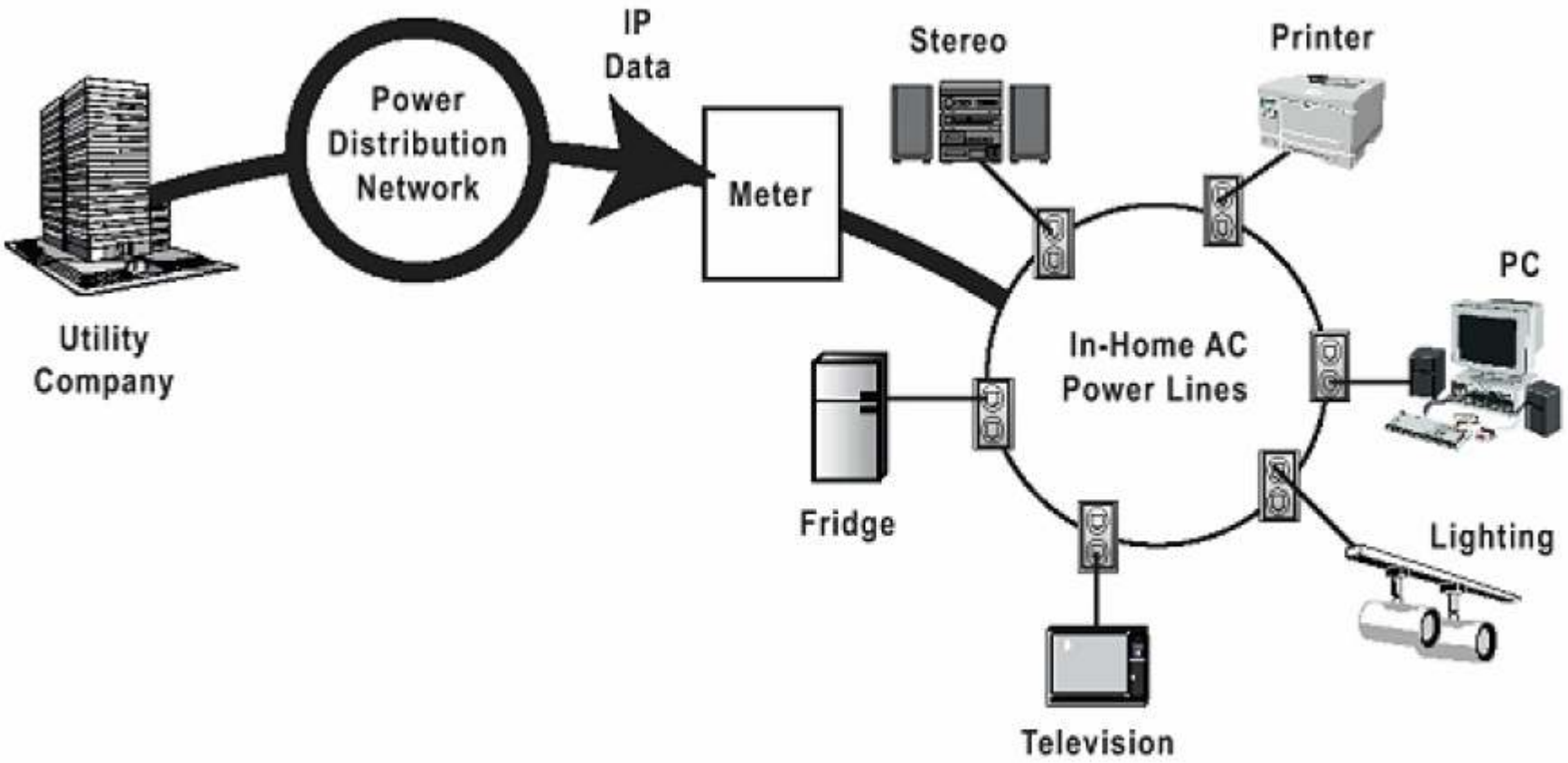
3G, EvDO


Expected market share
TDMA
GSM
PDC
GPRS
EDGE
EDGE Evolution
3GPP Core Network
WCDMA
HSDPA/HSUPA
90%
cdmaOne
CDMA2000 1x
CDMA2000 1x EV/DO
CDMA2000 EV/DO Rev A
10%
2G
First Step into 3G
3G phase 1
Evolved 3G

FTTH, PON


The FTTH Endpoints: Central Office and Residence
Network Backbone Equipment
Storage Server
Video Server
ISP1
IP Backbone
ISP2
Class-5 Switch
VoIP Gateway
Residential Gateway
ONT or ONU
ONU
Home

Power Line Communication System

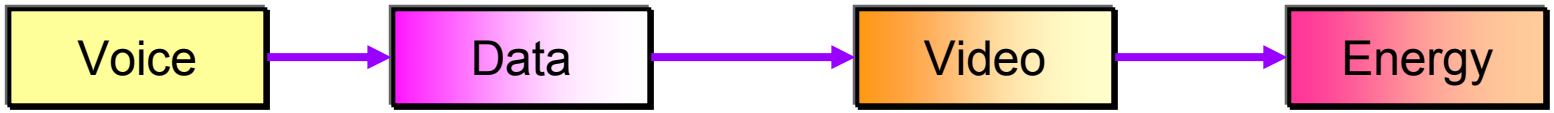


Powerline Networks [Courtesy: Xilinx]

Accommodating Paradigm Shift to Customer Premises

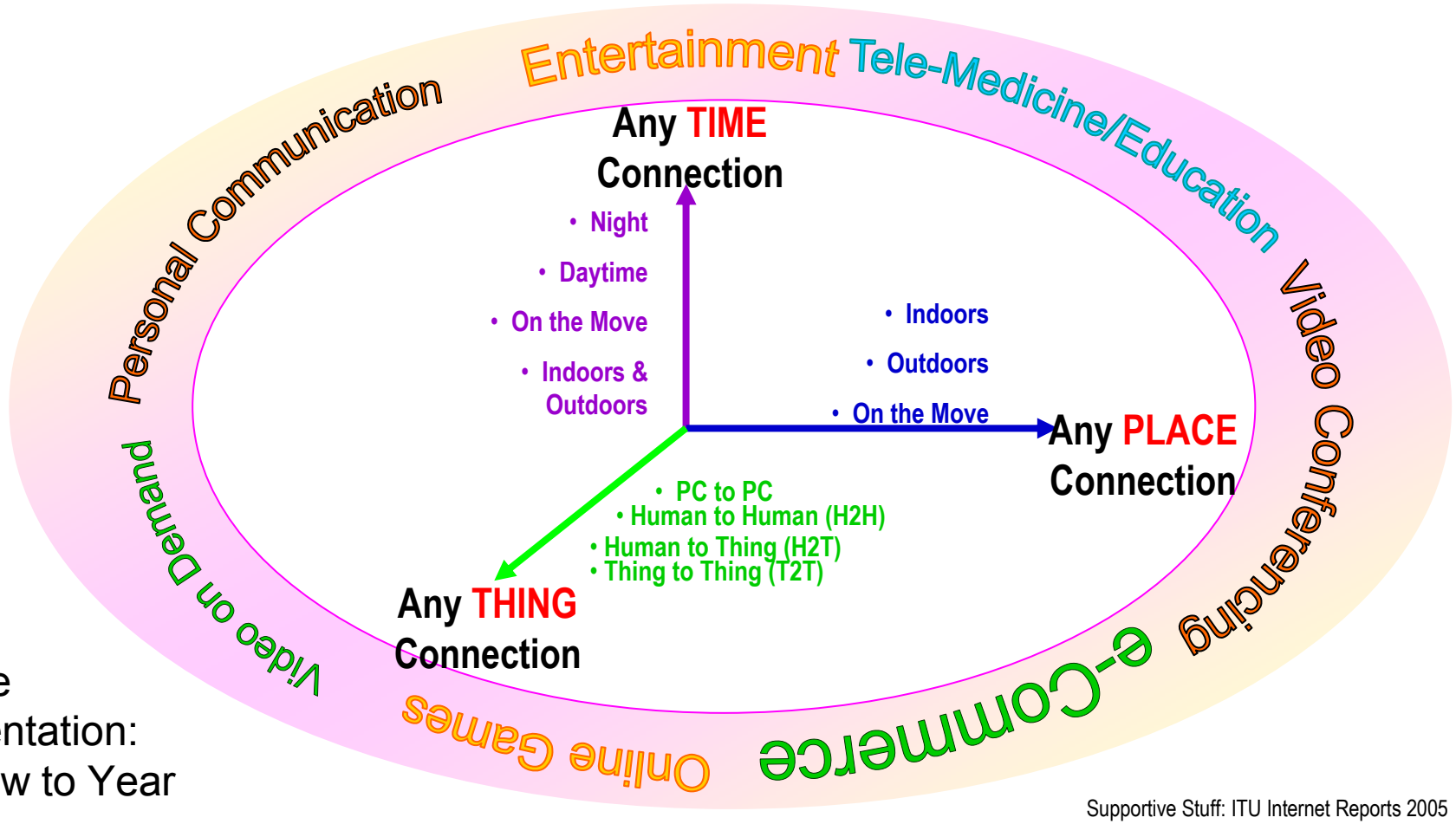
- One terminal
- Will stay for 10y independent of Network shift

Convergence of Telecommunication



Technological/Service Paradigm Shift

All the technological development on Access and Transport will lead to customers to shift from traditional voice services to IP based data services without their knowledge



Probable implementation: From now to Year 2010

Supportive Stuff: ITU Internet Reports 2005

Chapter 2
International Demand Patterns & Observations

Major Paradigm Shift

- Increased Customer Expectations, Demand Growth
- Lowest Cost, Huge Bandwidth and Durability
- Technological Advancement (More Lambdas per Fiber - DWDM, 10G/lambda, Repeater Less Systems)
- Improved Quality of Service Diversification

Demand Growth

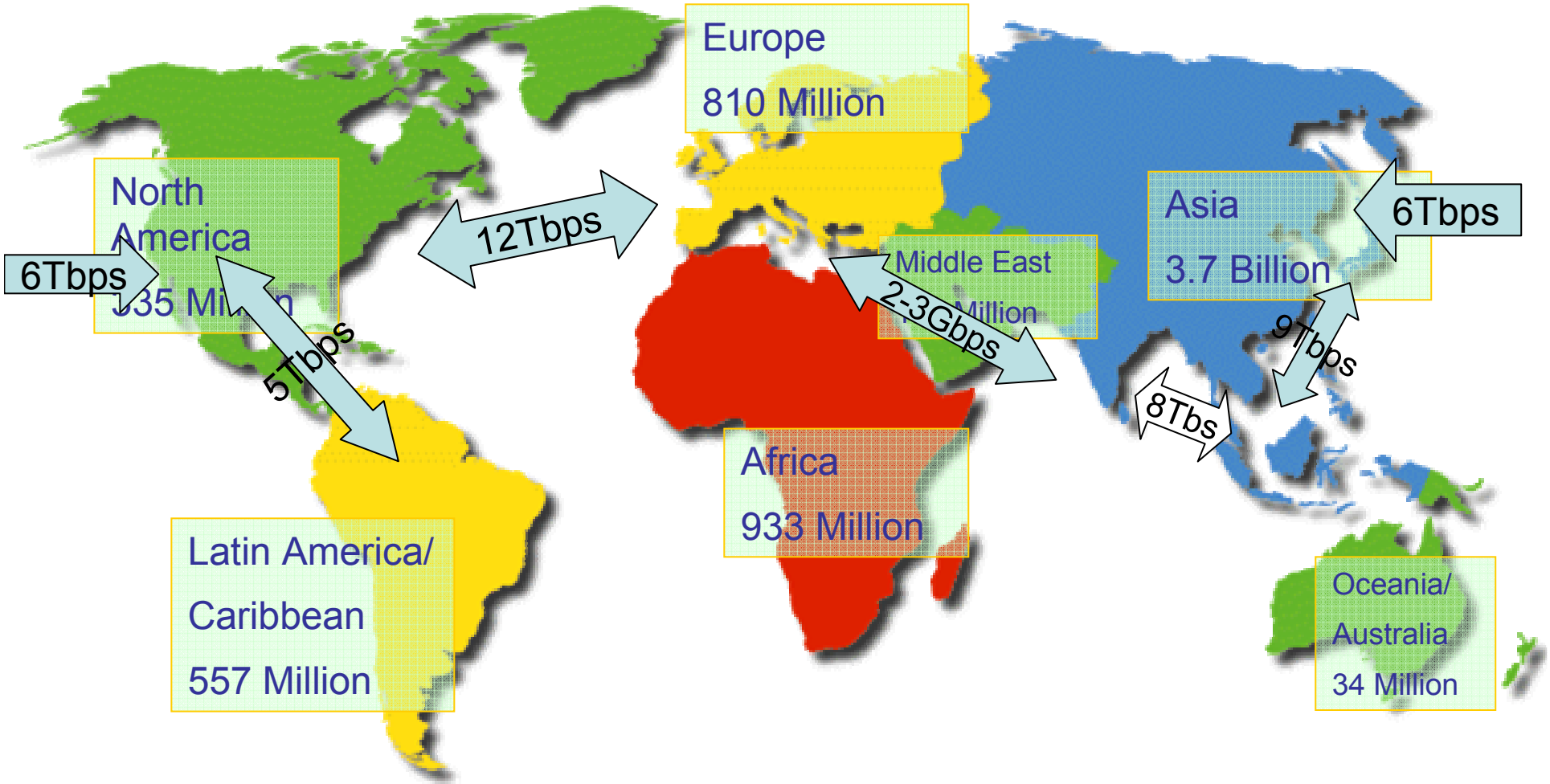
- Global Capacity Trend
- Current Estimated Capacities between Continents
- Current Estimated Capacities between Continents
- Internet Usage
- Lit Submarine Cable Capacity Trends by Route, 1999-2006

Global Capacity Trend

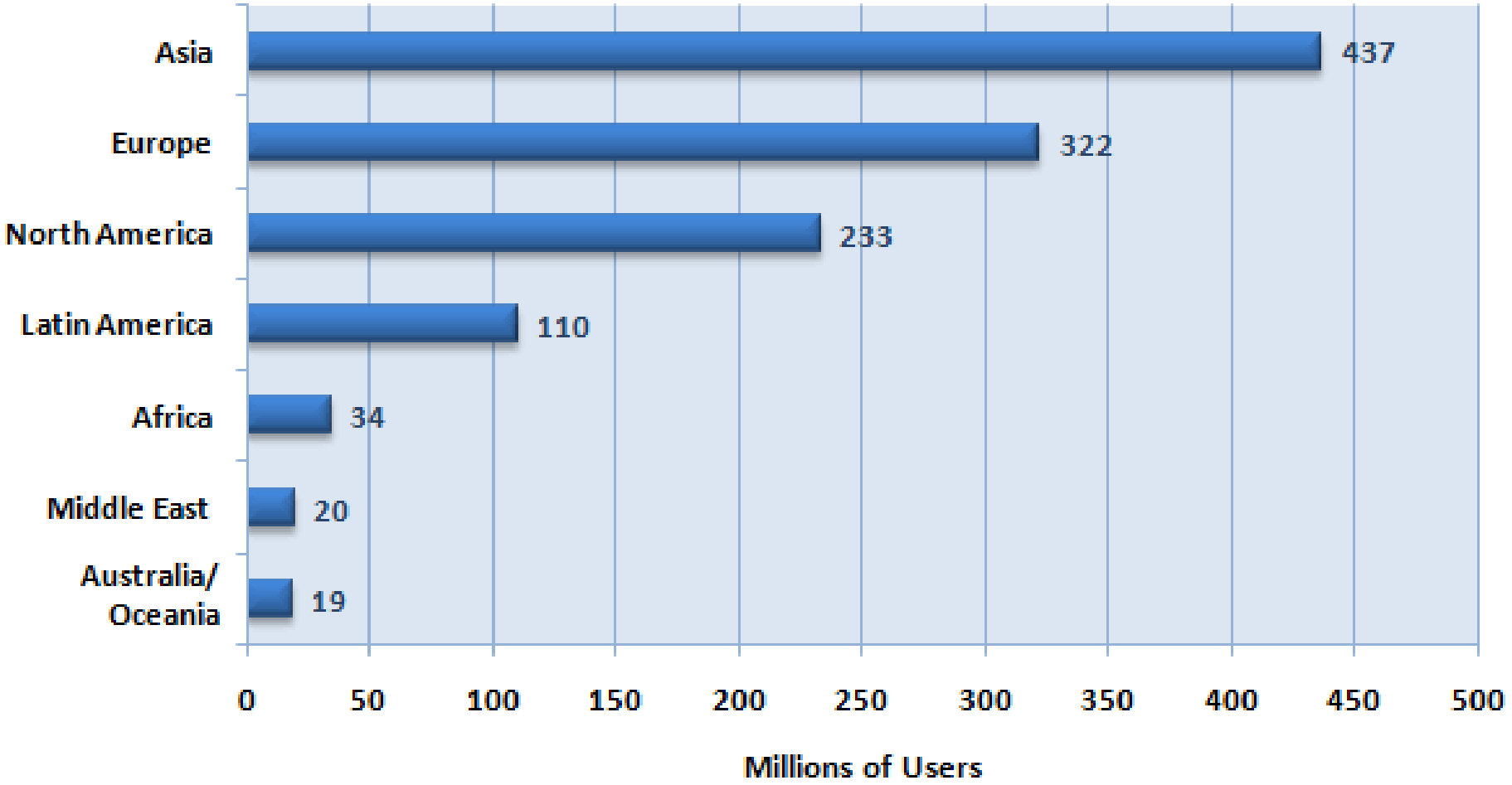
WORLD INTERNET USAGE AND POPULATION STATISTICS						
World Regions	Population (Est 2007) Million	Population % of the World	Internet Usage, Latest Data (Million)	% Population (Penetration)	Usage % of World	Usage Growth 2000-2007
Africa	933	14.2%	34	3.6%	2.9%	643.1%
Asia	3,713	56.5%	437	11.8%	37.2%	282.1%
Europe	810	12.3%	322	39.8%	27.4%	206.2%
Middle East	193	2.9%	20	10.1%	1.7%	494.8%
North America	335	5.1%	233	69.5%	19.8%	115.2%
Latin America/Caribbean	557	8.5%	110	19.8%	9.4%	508.6%
Oceania / Australia	34	0.5%	19	54.5%	1.6%	146.7%
WORLD TOTAL	6,575	100.00%	1,173	17.84%	100.00%	225.00%

Source: www.internetworldstats.com

Current Estimated Capacities between Continents



Internet Usage by World Region



Lit Submarine Cable Capacity Trends by Route, 1999-2006

Lit Submarine Cable Capacity (Gbps)									
Region	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**Fully Upgraded**
Trans-Atlantic	163	533	1,843	2,022	2,338	2,338	2,642	2,983	12,298
Trans-Pacific	43	183	263	1,043	1,043	1,043	1,231	1,457	6,503
Intra-Asia	25	40	560	560	560	560	670	802	15,810
U.S.-Latin America	13	213	293	303	513	518	638	749	5,166
Europe-Africa-Asia	21	31	31	41	61	61	73	88	251

Notes: Capacity figures denote lit, protected capacity at the end of the respective year. Capacity for 2004 is projected based on capacity upgrade announcements and new cable construction information as of March 2004. Capacity for 2005 and 2006 is projected assuming cables with upgradeable capacity will increase total capacity 20 percent each year until fully upgradeable capacity is achieved. Intra-Asia capacity includes cables with landings in both Hong Kong and Japan. Trans-Pacific capacity excludes Southern Cross and PacRim East. Trans-Atlantic capacity excludes Atlantis-2. Cables retired prior to year-end 2004 are excluded from Fully Upgraded capacity. Fully upgraded capacity is based on system design capacity.

Matching the Demand with Available Facilities

- Inter-continental traffic appears to be comparatively lower than the already installed designed capacity
- Certain segments are saturated with designed capacity.
  - E.g. Traffic via Middle-East from Asia to Europe
  - This indicates the market trend in Asia and Middle East is much faster than Africa

Most Promising Future Technology and where it applies

- Transport: Optical Fiber (Especially for International transport Undersea cable)
- Huge development in Asia and Asia towards Europe
- Consortium and private cable system

Chapter 3
Consortium Cable Systems

Characteristics of Consortium Cable System

- Advantages/Disadvantages of Consortium Cables
- Formation of Consortium Cable Systems
- Concepts of Management of Consortium Systems

Advantages of Consortium Cables

- More Connectivity at a low cost
- Opportunity to joint with giant telecom operators
- Opportunity to share knowledge between Parties
- Collectively select most desirable solution
- More bargaining power with suppliers to obtain minimum cost

Disadvantages of Consortium Cables

- Multi Parties with Different disciplines
- Delay in decision makings
- Different import formalities in different countries
- Different Taxation Policies in different countries
- Complex Billing & Collection procedures
- Wide cost variation in right of use (Station Cost) between terminal parties

Nature of Consortium Cables

- Consortium is not a legal entity. It works with business ethics among many parties.
- Consortium Cables are cost effective
- More Connectivity
- More value since it is owned by prominent telecom operators in respective country
- Even if the requirement for a new undersea cable is justified, the relevant party has to wait until a consortium is formed.
- A single party may face great difficulties in constructing a cable between countries due to the operational and regulatory requirements.

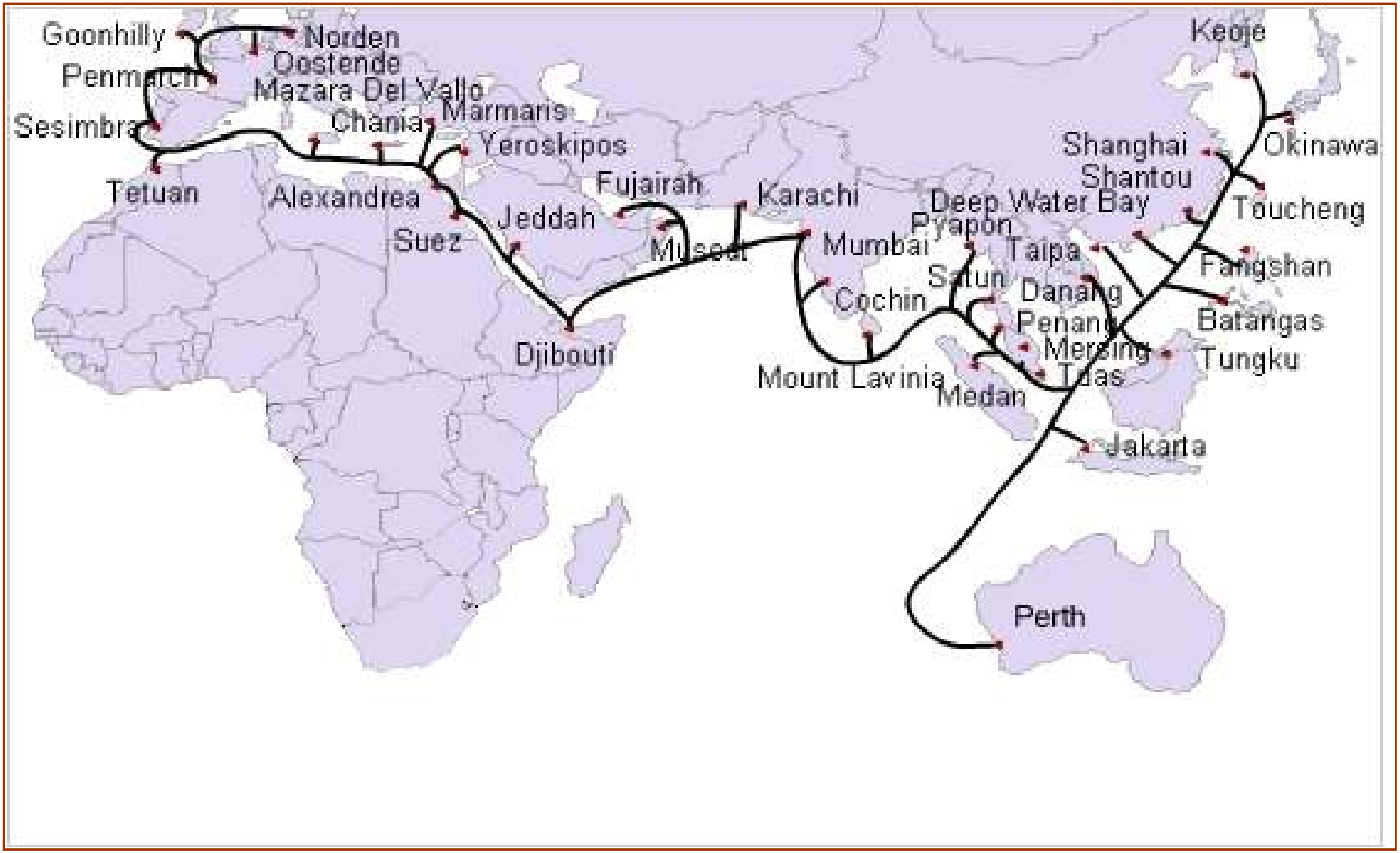
Nature of Consortium Cables…

- The mechanism for managing the relationship among investors (owners).
- In consortium cables investors are generally Operators.
- As the owners/users are often competitors, the application of fair and agreeable rules of use are required and usually observed.
- Cable owners are partners as well as competitors and operate in the international arena. There are unwritten rules of conduct.
- Agreements within consortium parties are not subject to any legal jurisdiction.
- The C&MA is more of a business agreement than a legal contract.

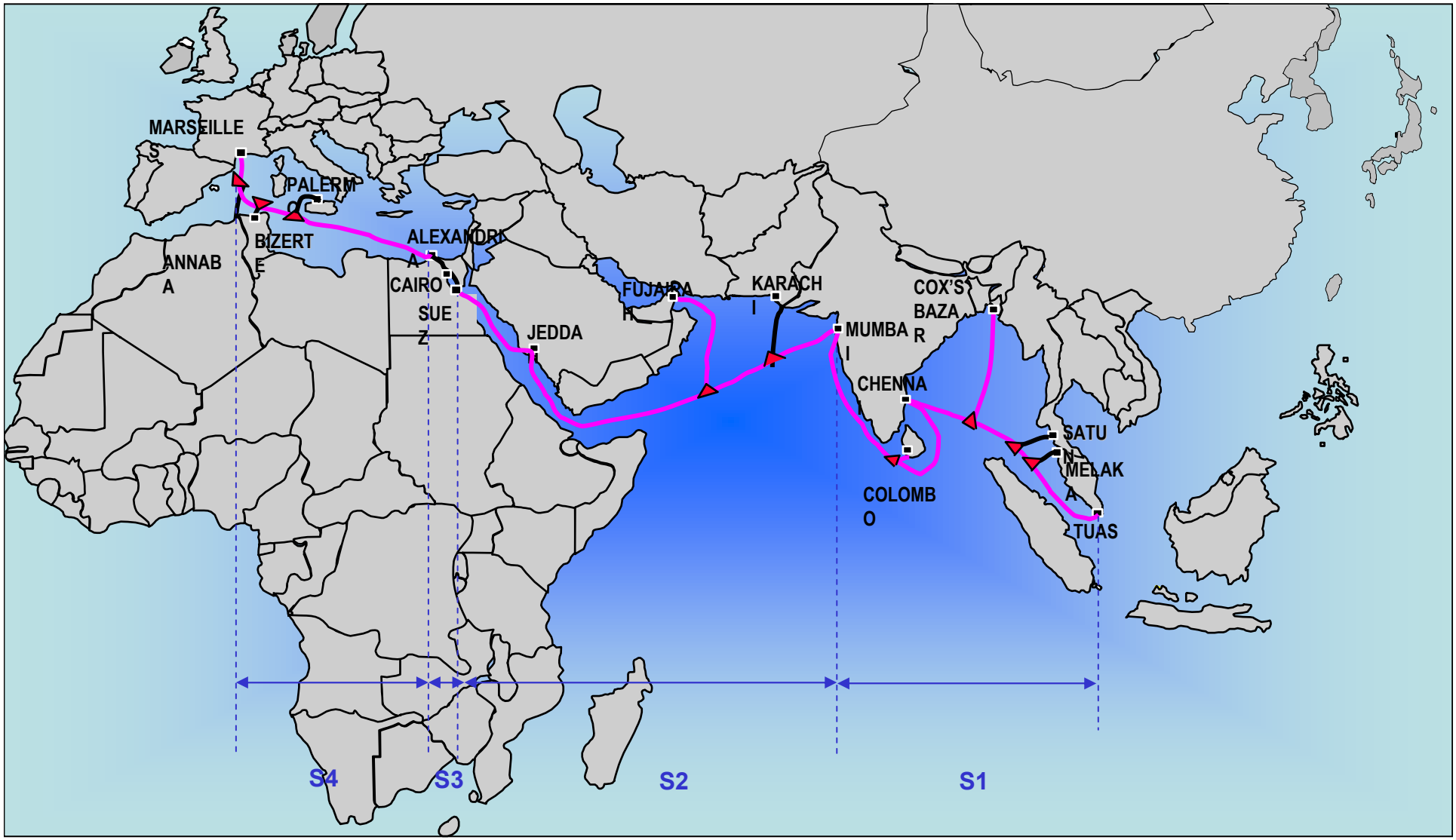
Recent Examples

- SEA-ME-WE 4 Cable System
  - Commissioned in Dec 2005 with 160Gbps
  - SMW 4 designed for 64 lambdas per OF pair with 2 Pairs in operation. Within a matter of two to three years the system experiencing in two upgrades causing certain sections to reach the maximum of 64 lambdas and the SMW4 Consortium is exploring the possibility of increasing the number of lambdas with the latest technologies available. Hence operators are concern about laying more Optical Fiber Cables. Following are the examples.
  - Exhaustion Mutual Restoration Resources between SEA-ME-WE 3 and SEA-ME-WE 4

SEA-ME-WE 3

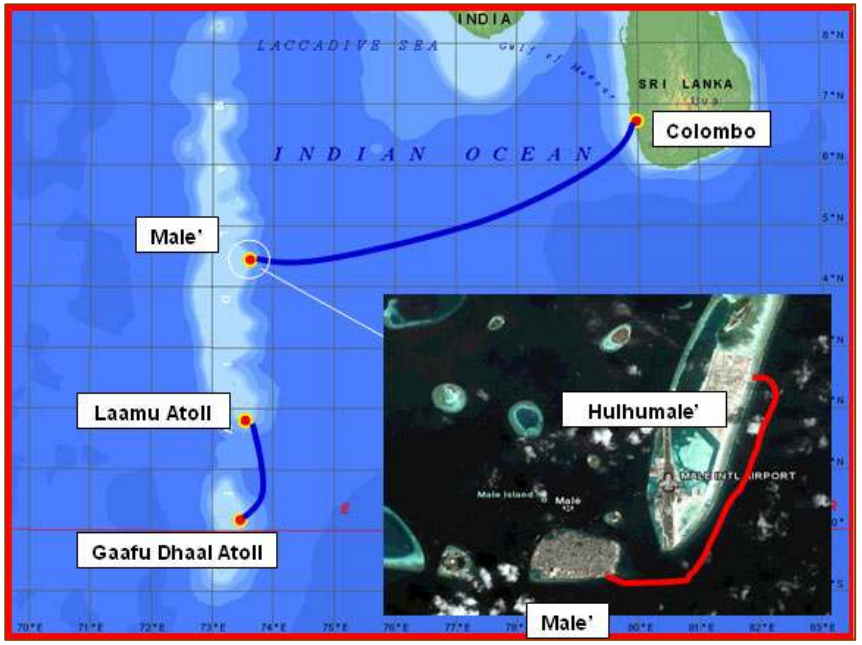

Goonhilly
Norden
Penmarch
Oostende
Mazara Del Vallo
Sesimbra
Chania
Marmaris
Yeroskipos
Tetuan
Alexandrea
Fujairah
Karachi
Jeddah
Suez
Muscat
Mumbai
Djibouti
Cochin
Mount Lavinia
Deep Water Bay
Pyapon
Taipa
Satun
Danang
Penang
Mersing
Tuas
Medan
Jakarta
Perth
Keoje
Shanghai
Shantou
Okinawa
Toucheng
Fangshan
Batangas
Tungku

SEA-ME-WE 4


MARSEILLES
PALERMO
BIZERTE
ANNABA
ALEXANDRIA
CAIRO
SUEZ
JEDDA
FUJAIRAH
KARACHI
MUMBAI
COX'S BAZAR
CHENNAI
COLOMBO
SATU N
MELAKA
TUAS
S4
S3
S2
S1

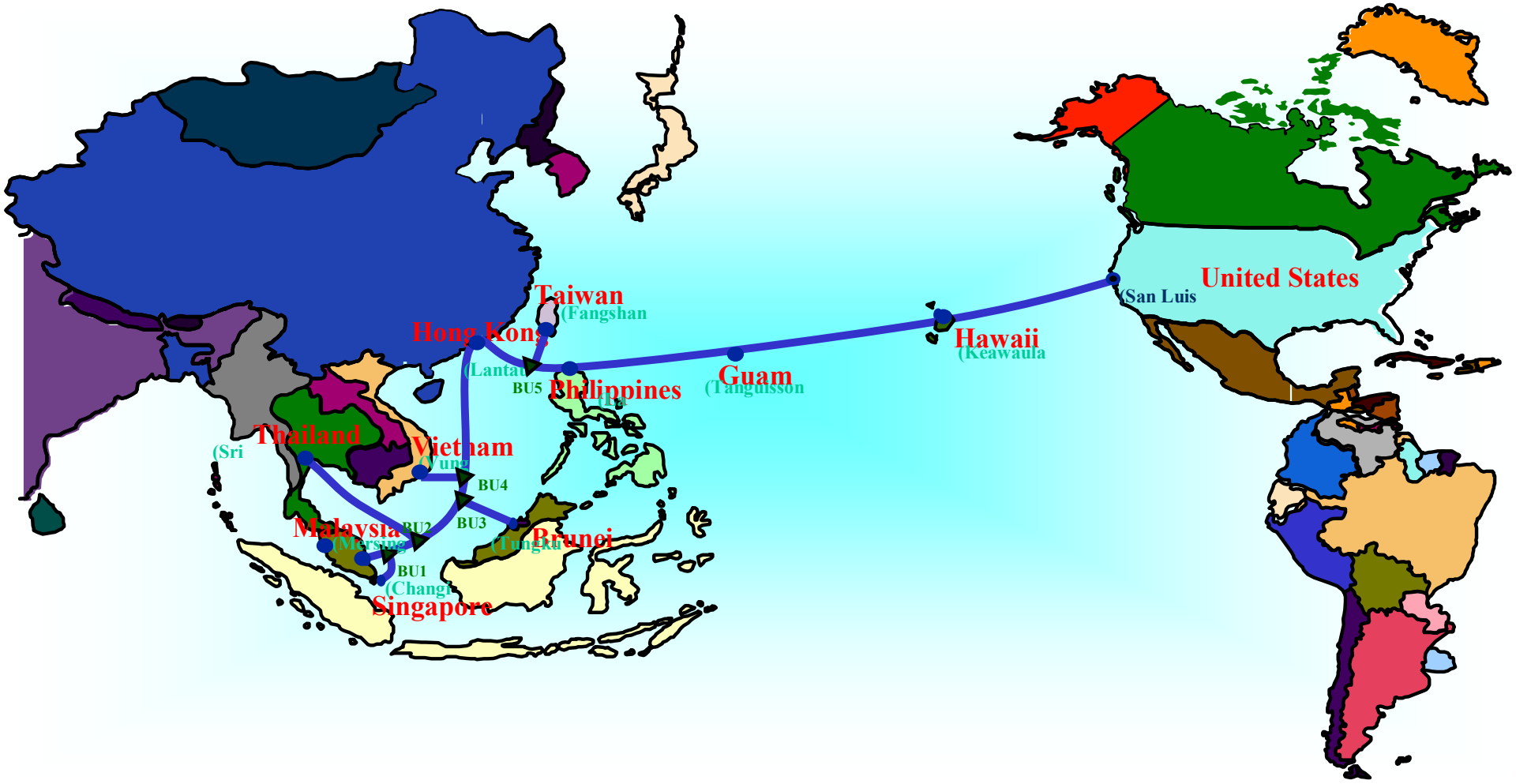
Recent Examples…

- SLT installed two cables - BL, DL



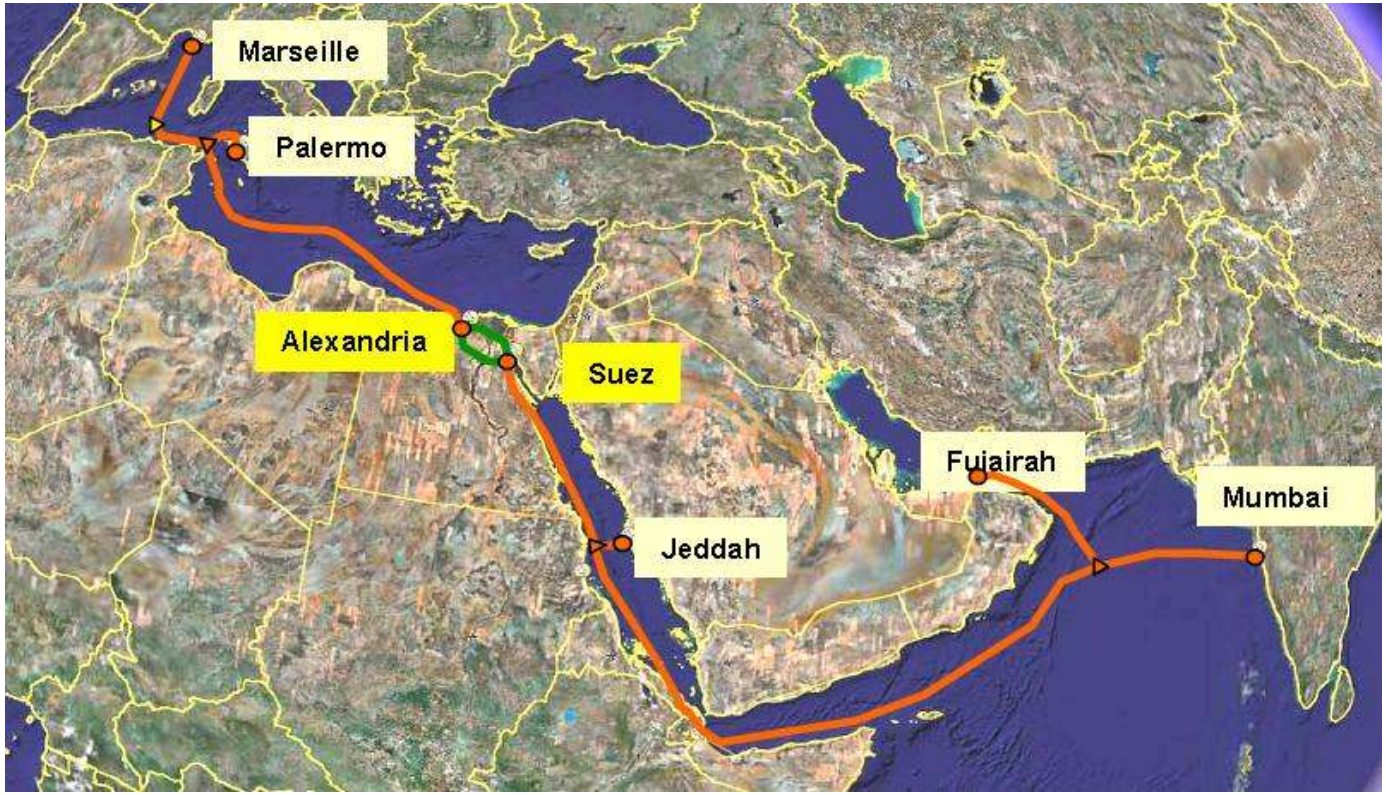
Resent Examples…

- AAG - Asia America Gateway



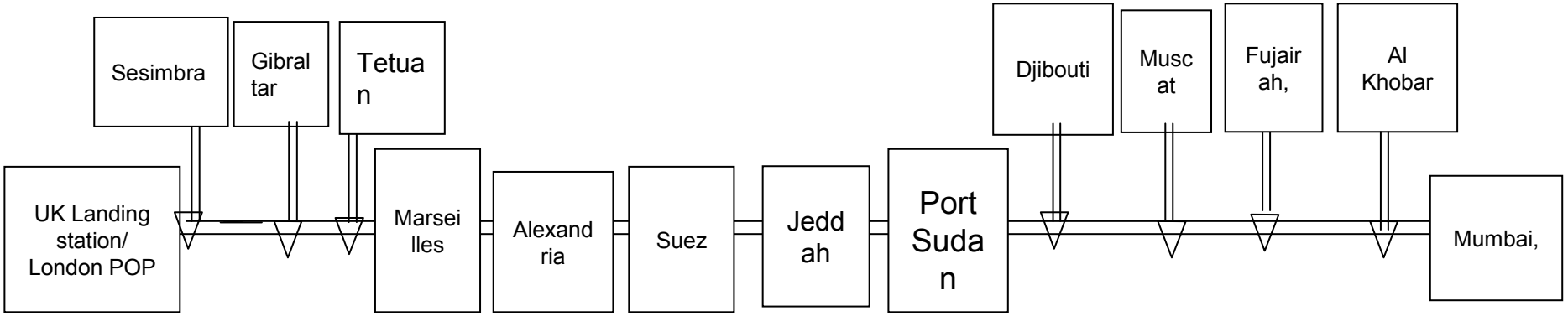
Resent Examples…

- I-ME-WE *India Middle East West Europe Cable System*



Resent Examples…

SEA-ME-WE 5

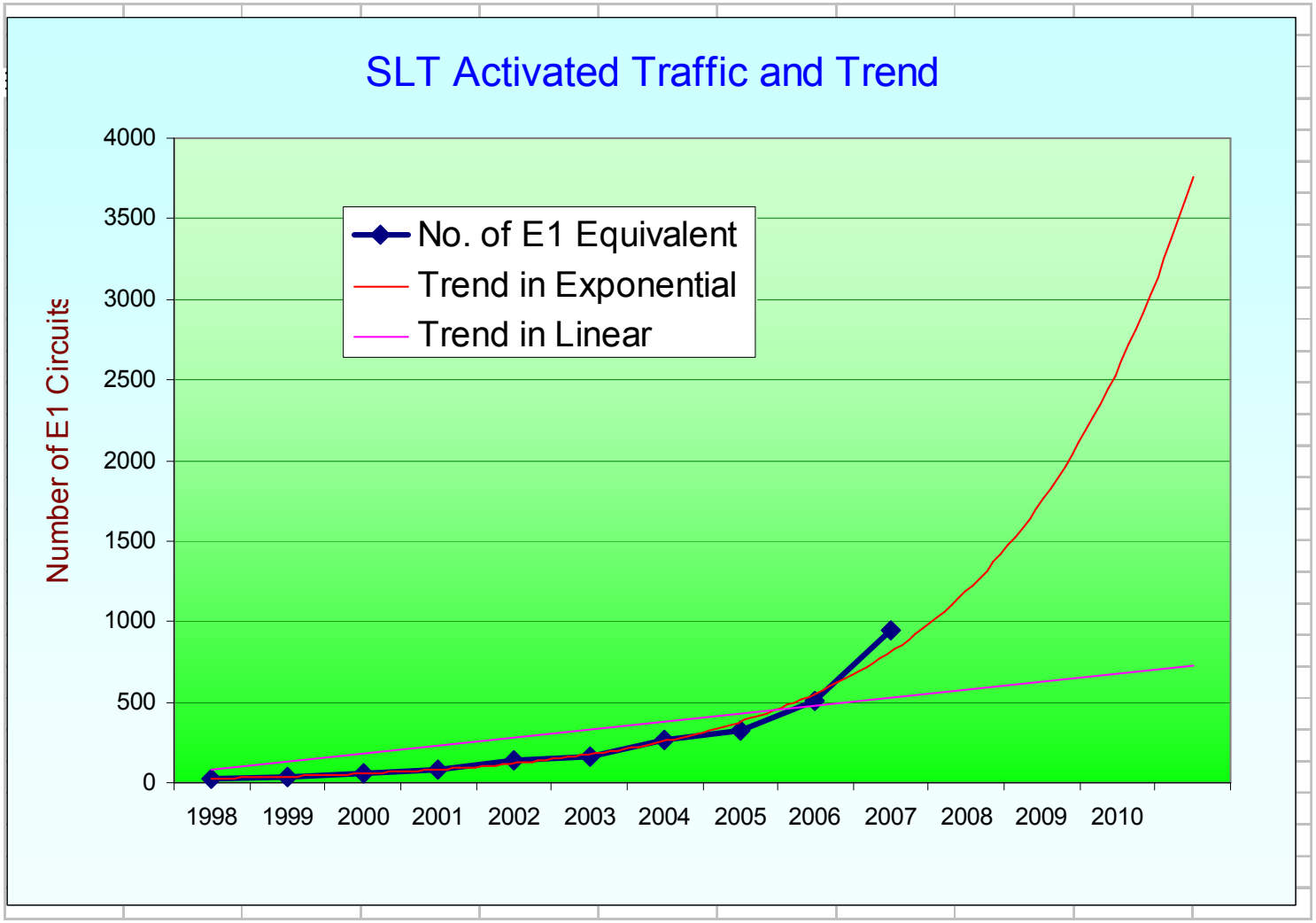


Chapter 4
Business Aspects

How to Satisfy the Needs?

- Sri Lankan Experience
- Satisfaction of Basic Needs
- Correct Investment Time
- Gap Analysis
  - Inclusive and Exclusive Economics
- Correct Investment Timing
- Financial Risks of Investing in Undersea Cable Projects

Sri Lankan Experience

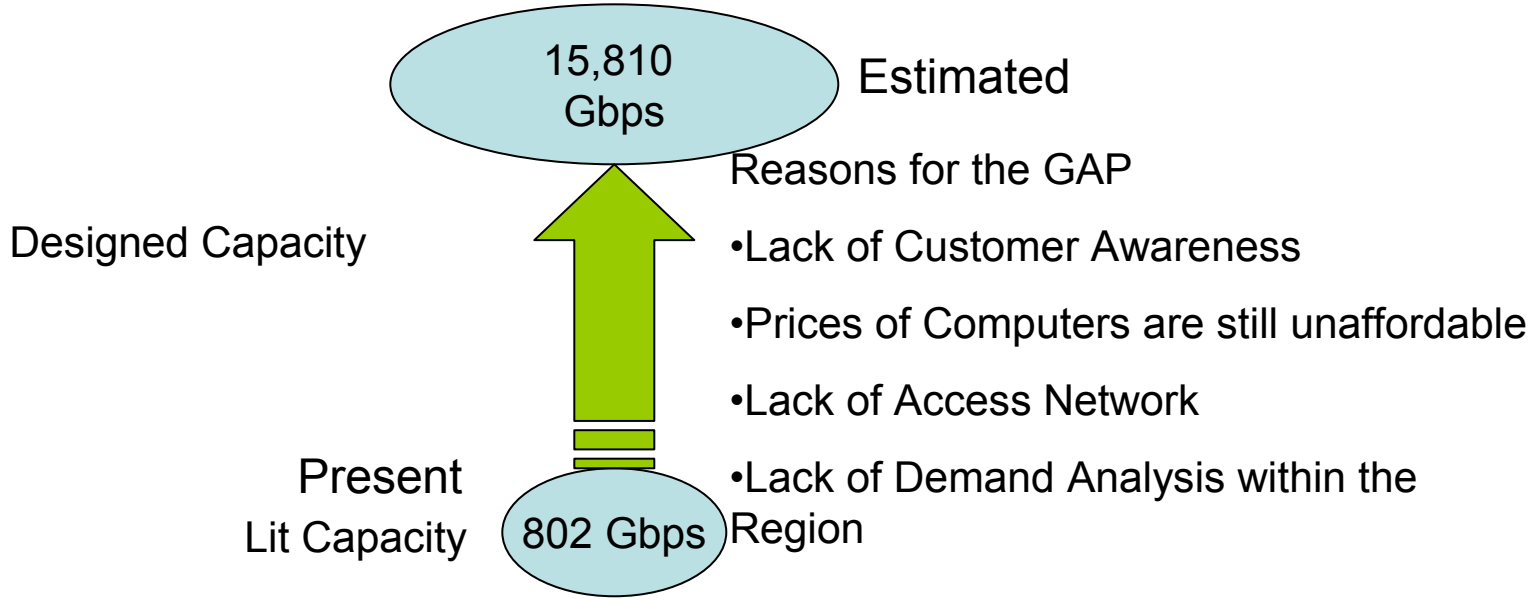


In Sri Lanka the activations appears to be exponential

Satisfaction of Basic Needs

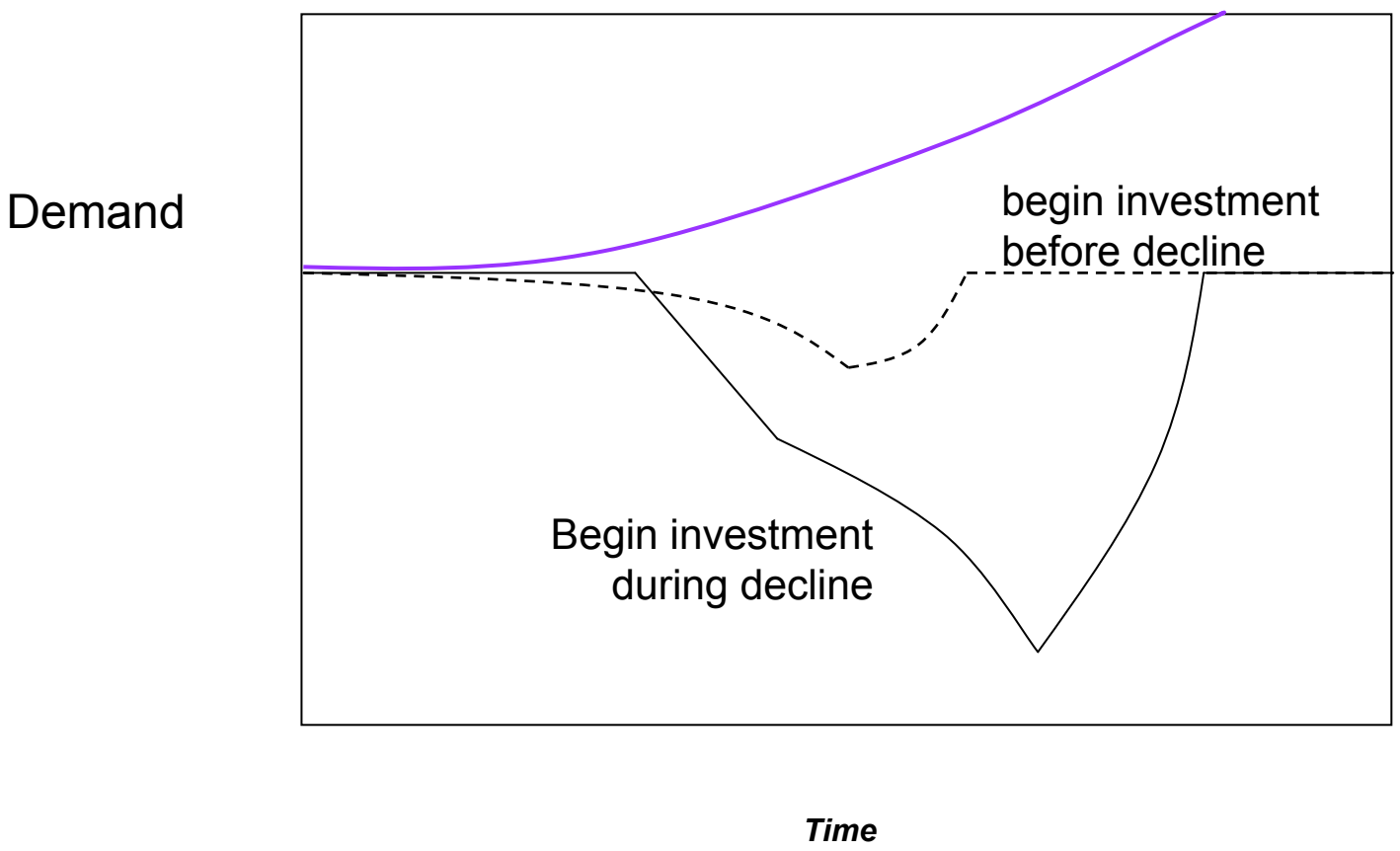
- Voice Communication through Mobile - now becoming independent to the affordability, has become a basic needs
- Similarly data communication will become a basic need in time to come

  Example for Asia

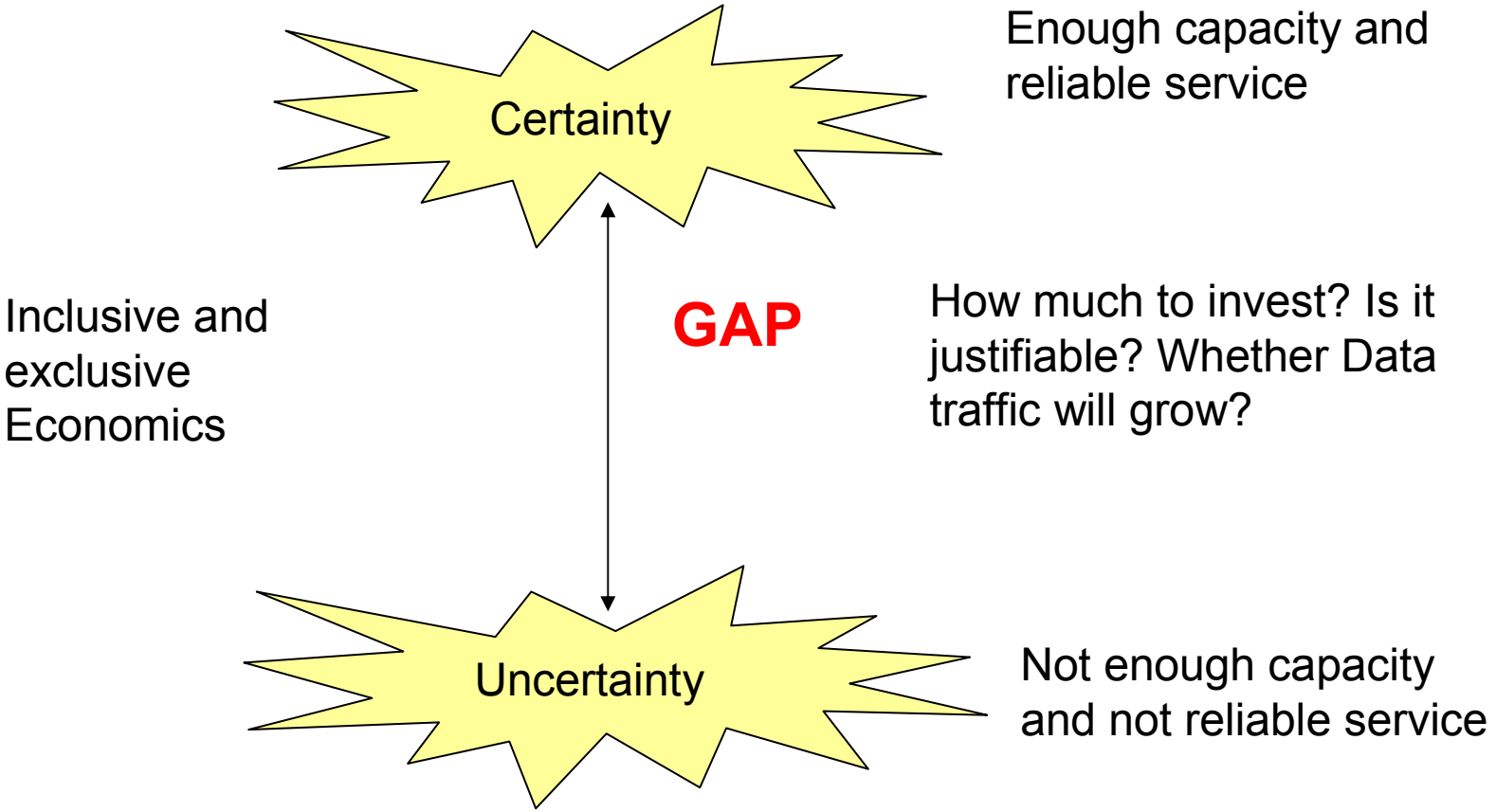


Similar to Vice Communication Society will drive to IP based solution independent to the affordability with gradual development and low cost solutions for the reasons given in the Gap.

Correct Investment Time



Financial Risks of Investing in Undersea Cable Projects



GAP Analysis

- Inclusive Economics
  - More concern about NPV Value
- Exclusive Economics
  - More concern about IRR Value

  Both IRR & NPV based on cash flows whereas NPV will show the absolute cash value.
- Large and small countries and their inter-dependency
- Chicken and egg situation

Risk Analysis

- Risks associated with Supply & Demand Forecast
- Technological advancements and its impact.
- Financial risk to the system performance
- Natural and Man made environmental risks
- Lack of knowledge on international laws.
- Complicated law suites for compensations derived from third party damages.
- The influence of political instabilities
- Reliability and service level agreements

Chapter 5
Conclusive Remarks

- Technological Paradigm Shift from Voice to Data is now on-going irrespective of the affordability of the customers
- Operators will be challenged to provide supportive network solutions to convert voice to data with most economical solutions which certainly includes NGN networks coupled with Optical Fibers (especially submarine)
- The latest technological network components prices are drastically coming down
- The digital divide of a given country will be minimized in the next three years especially in the region of Asia and Middle-East


Thank You