TATA COMMUNICATIONS

Overview on cables system

FRNOG
9 décembre 2009
Philippe Duguet

Confidential & Proprietary

Agenda

- **Internet users – Global overview**
- **Cable projects**
  - PPC-1
  - TGN – Eurasia
  - IMEWE
  - Main One
  - TGN - Gulf Cable
  - WACS
  - TGN - Intra Asia
  - SAFE – SAT3
  - Latin American
  - India
- **Example of rerouting – Cable breaks**
- **Backup slides**

Tata Communications at a glance

Industry Leader

- #1 global wholesale voice
- #1 global submarine cable capacity
- Tier-1 IP Backbone provider
- #1 intnl. long distance services in India
- #1 enterprise data services in India
- #1 Internet services in India

State-of-the-art Infrastructure

- 200,000 route km global network
- 300 points of presence (PoPs) on 5 continents
- 20+ terabit submarine capacity
- Non-stop around the world IP backbone
- ~1M sq. feet of data center space

Customers

- 1,500 global service providers
- 600 mobile operators
- 500 ISPs in 150 countries
- "Fortune 1000" of India
- 5,000+ SMEs in India
- 450,000 Internet and broadband subs in India

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**Internet users
Global overview**

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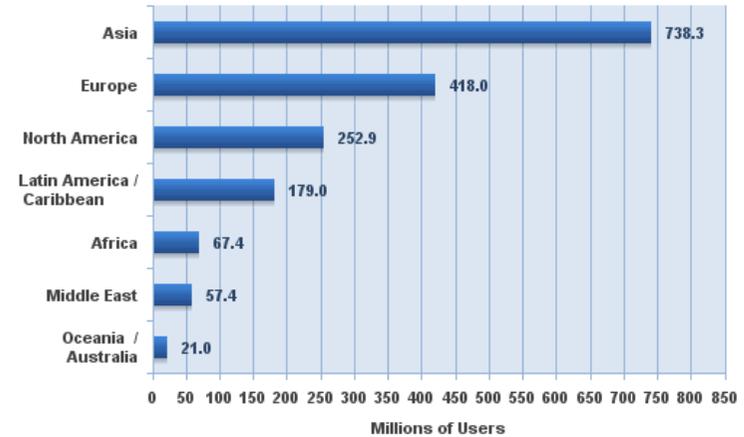
World Internet Users

Key Markets: Asia, Europe, North America

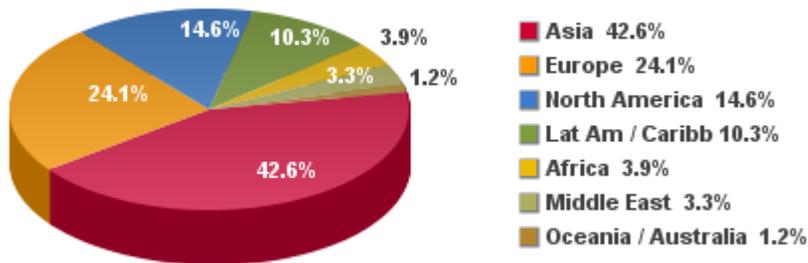- Asia users almost equal Europe and North America combined.

Emerging markets (high user growth, low penetration)

- Middle East
- Africa
- Latin America / Caribbean
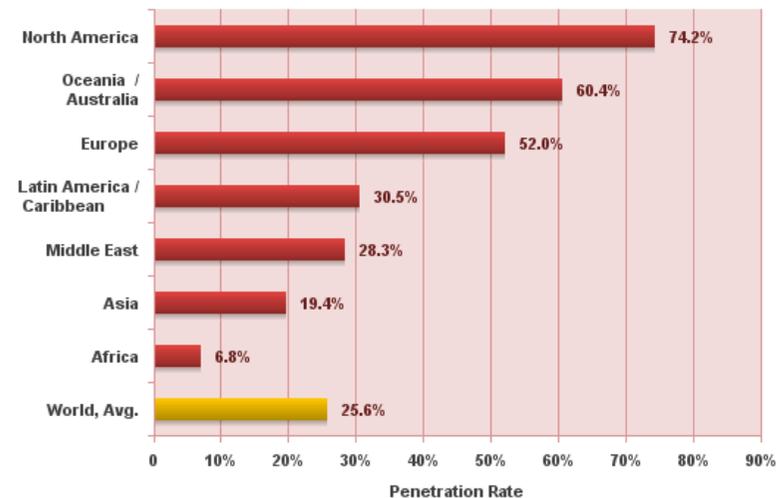
Internet Users in the World by Geographic Regions

Region	Millions of Users
Asia	738.3
Europe	418.0
North America	252.9
Latin America / Caribbean	179.0
Africa	67.4
Middle East	57.4
Oceania / Australia	21.0

World Internet Users by World Regions

Region	Percentage
Asia	42.6%
Europe	24.1%
North America	14.6%
Lat Am / Caribb	10.3%
Africa	3.9%
Middle East	3.3%
Oceania / Australia	1.2%

Source: Internet World Stats - www.internetworldstats.com/stats.htm
1,733,993,741 Internet users for September 30, 2009
Copyright © 2009, Miniwatts Marketing Group

World Internet Penetration Rates by Geographic Regions

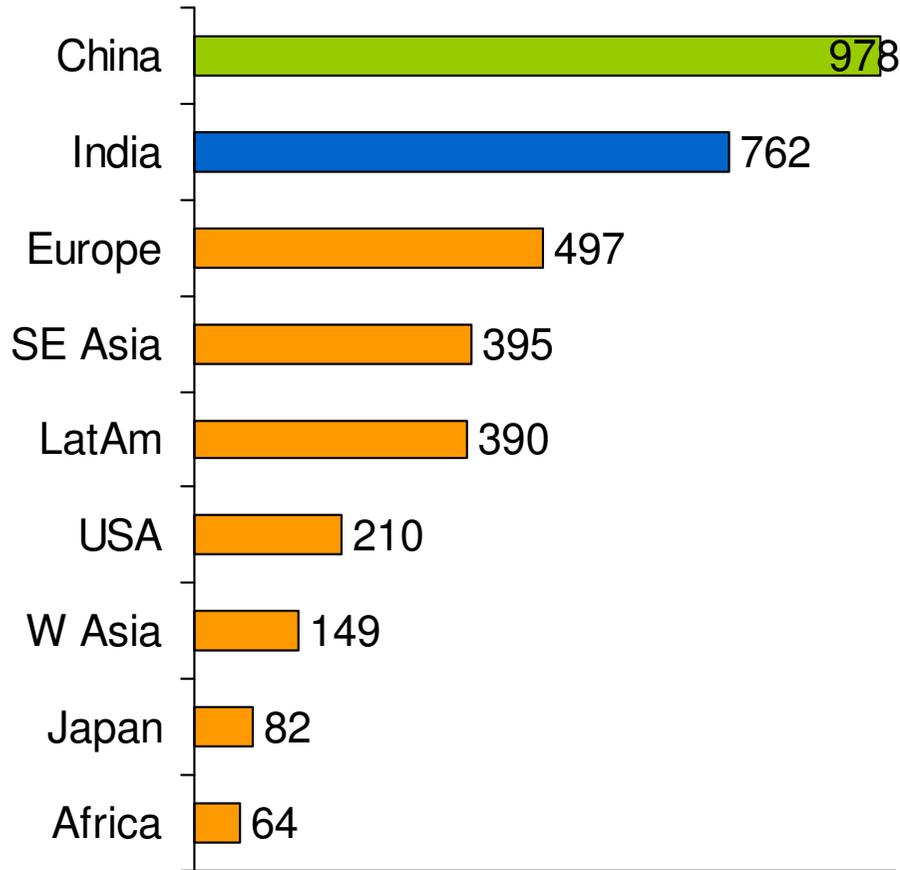| Region	Penetration Rate
North America	74.2%
Oceania / Australia	60.4%
Europe	52.0%
Latin America / Caribbean	30.5%
Middle East	28.3%
Asia	19.4%
Africa	6.8%
World, Avg.	25.6%

Source: Internet World Stats - www.internetworldststs.com/stats.htm
Penetration Rates are based on a world population of 6,767,805,208
and 1,733,993,741 estimated Internet users for September 30, 2009.
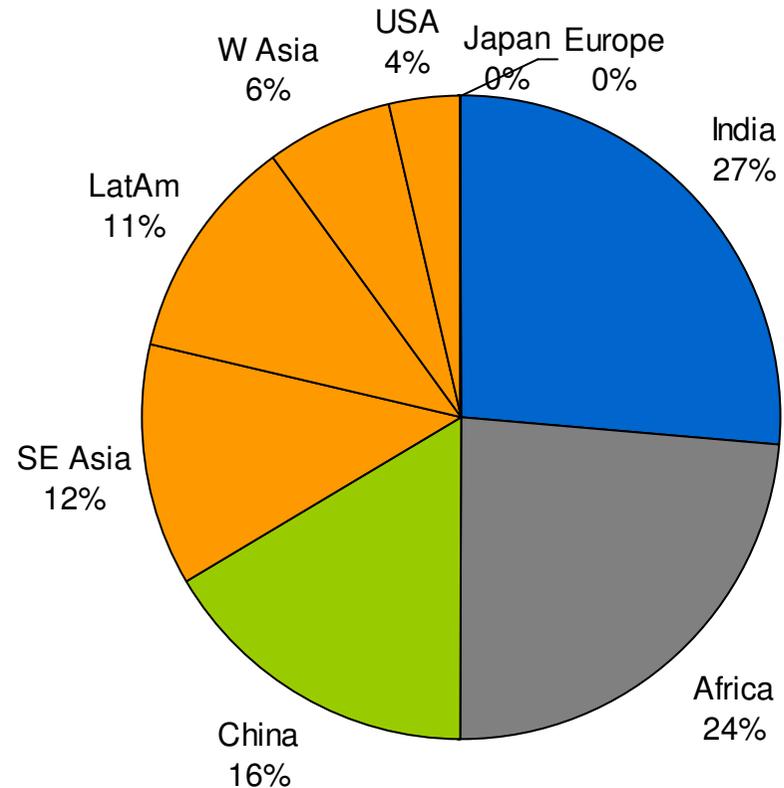Copyright © 2009, Miniwatts Marketing Group

Growing Importance of India & China in the New World

Working Population 2010, millions

|	
China	978
India	762
Europe	497
SE Asia	395
LatAm	390
USA	210
W Asia	149
Japan	82
Africa	64

Addition to Working Pops 2005-2010

- W Asia 6%
- USA 4%
- Japan 0%
- Europe 0%
- India 27%
- Africa 24%
- China 16%
- SE Asia 12%
- LatAm 11%

Source: Morgan Stanley; Tata Communications Research

Growing Importance of India & China in the New World
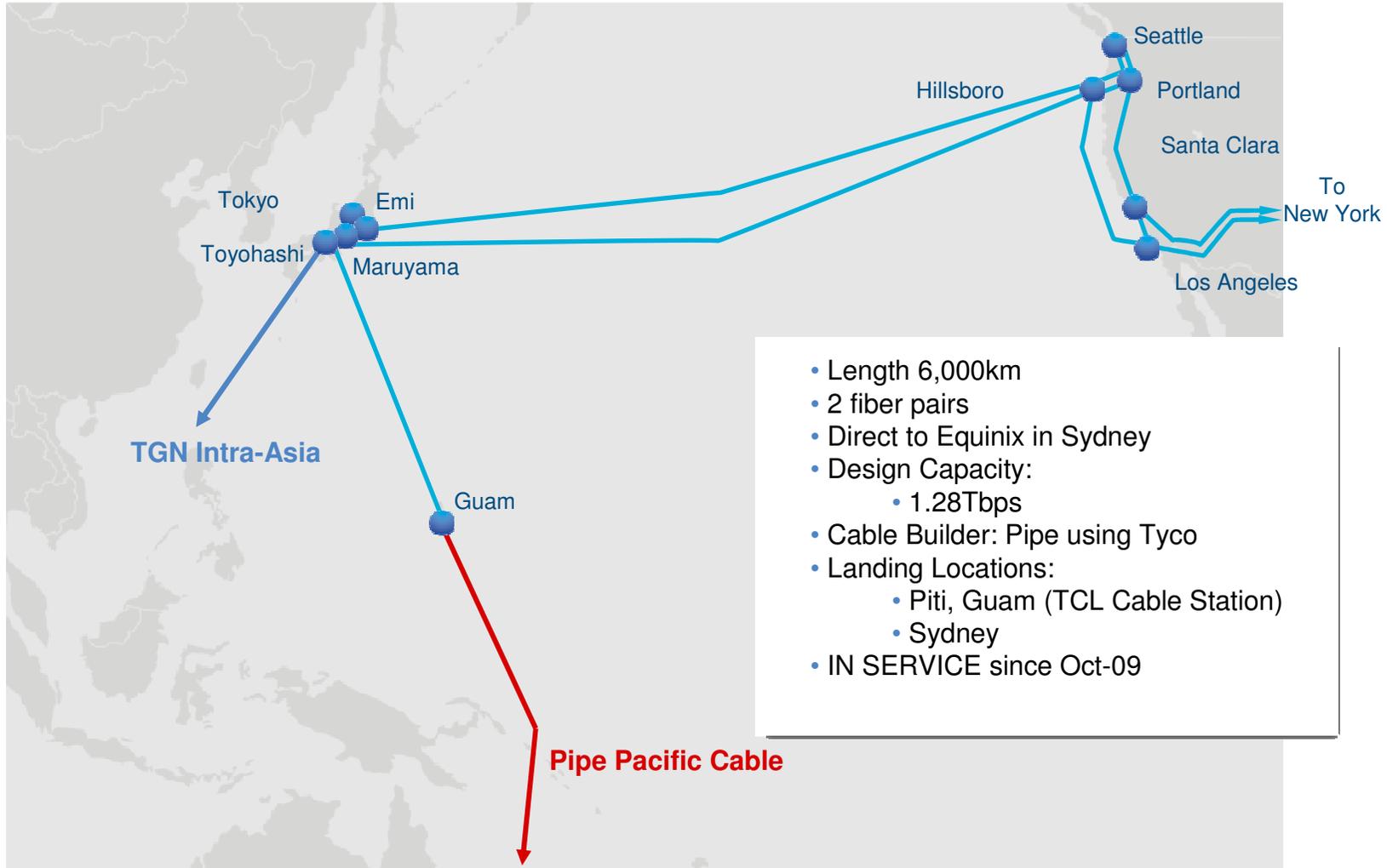
Population Distribution (2007)

China
20%

RoW
36%

India
17%

Other EM
27%
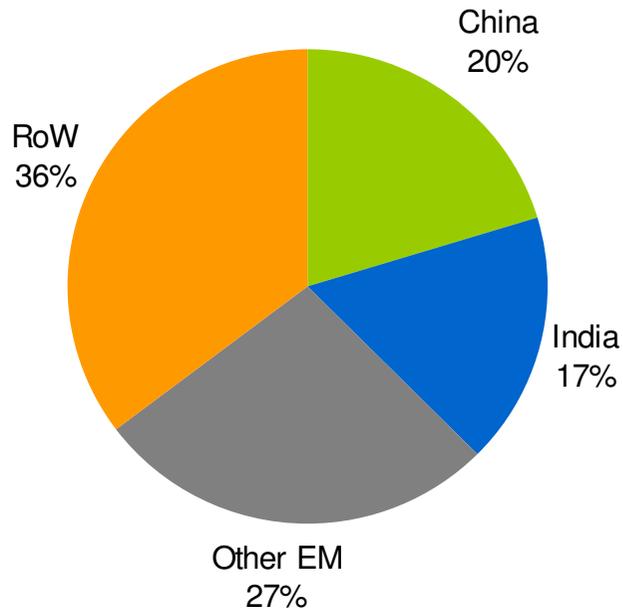
Mobile Subscriber Adds (2007-10)

RoW
10%

China
25%

Other EM
43%
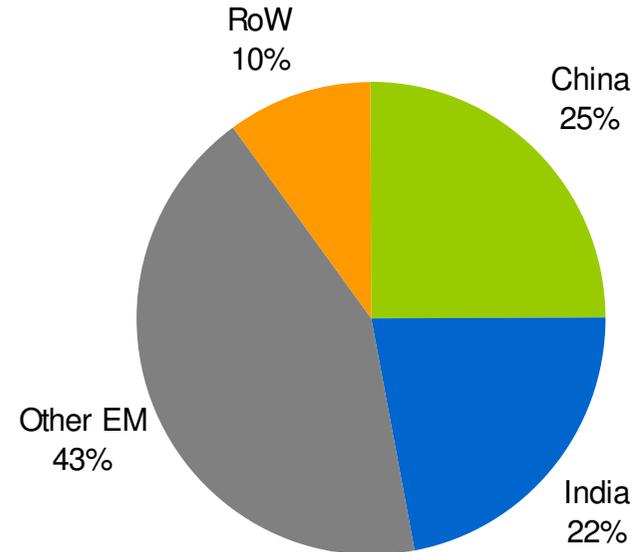
India
22%

Source: Morgan Stanley, Gartner, Tata Comms Research

Cable projects

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Australia : PPC - 1 plus TGN - Pacific

Seattle

Hillsboro

Portland

Santa Clara

To
New York

Tokyo Emi

Toyohashi

Maruyama

Los Angeles

TGN Intra-Asia

Guam

- Length 6,000km
- 2 fiber pairs
- Direct to Equinix in Sydney
- Design Capacity:
  - 1.28Tbps
- Cable Builder: Pipe using Tyco
- Landing Locations:
  - Piti, Guam (TCL Cable Station)
  - Sydney
- IN SERVICE since Oct-09

Pipe Pacific Cable

IMEWE

Connectivity from Europe to India and other MENA countries

RFS expected 2Q 2010

IMEWE

- ## Other Parties

  - Major investors: Bharti, FT, STC, TIS
  - Middle investors: Etisalat, Ogero, PTCL
  - Minor investors: TE

- ## Length

  - Approx 14,000km

- ## Landing Stations

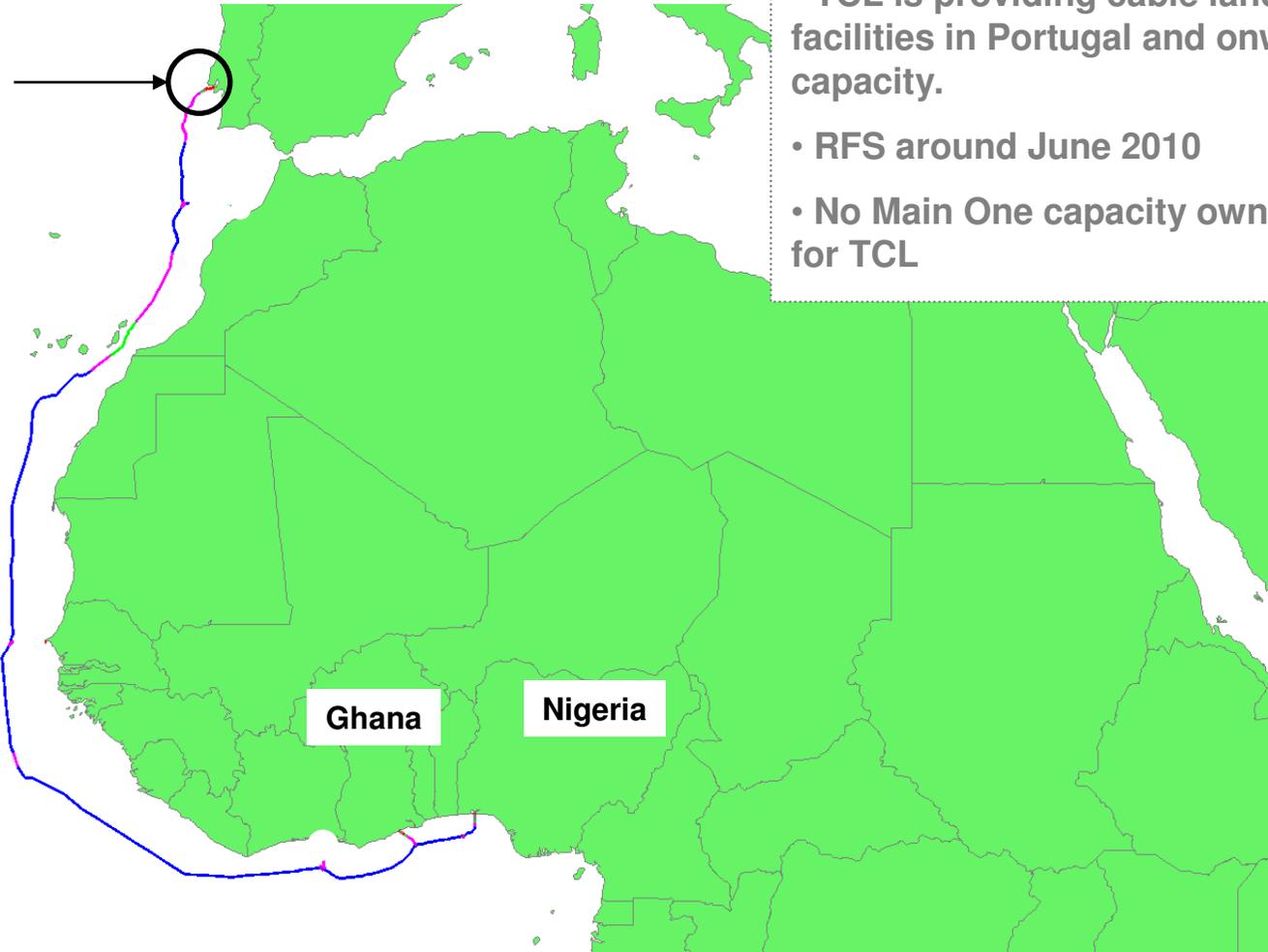 - Mumbai Landing – TCL's BKC (plus Bharti Mumbai landing)
  - Marseille Landing – FT

- ## Backhaul

  - TCL is building backhaul from the Marseille Landing Station

Main One

TCL's Seixal Cable Station in Portugal

- **Main One is a Private System**
- **TCL is providing cable landing facilities in Portugal and onward capacity.**
- **RFS around June 2010**
- **No Main One capacity ownership for TCL**

Ghana

Nigeria

TGN Gulf

- Under development since October 2008
- MoU's signed during summer of 2009
- Supplier selected during October 2009
- System RFS in 2H 2011

- **Consortium**

  ➢ Major investors: Bahrain Internet Exchange, Oman's Nawras, Qatar Telecom Q.S.C. (QTEL.DO), Saudi Arabia's Mobily United Arab Emirates' Etisalat

- **Capacity**

  ➢ Approx 1.28 TBit/s of additional international connectivity in the region

- **Lead time**

  ➢ 22 months to complete

West Africa Cable System - WACS

WACS

- **Other Parties**
  - ➢ Major investors: Angola Cables, C&W, Infraco, MTN,
  - ➢ Middle investors: Vodacom, Telecom Namibia, Telkom SA, PTC
  - ➢ Minor investors: Togo Telecom, Sotelco

- **Fully Funded**
  - ➢ US$ 650M project

- **Supply Contract**
  - ➢ Signed: March 2009
  - ➢ Supplier: Alcatel

- **Ready for Service**
  - ➢ Expected 2H 2011

- **Benefit for TCL:**
  - ➢ When combined with SEACom, EASSy and SAT3/SAFE then TCL will have best network connectivity to Africa and especially SA
  - ➢ No third party backhaul costs compared with SAT3 at Sesimbra

TGN-Intra Asia Cable System


6700 Km

Avoids Earthquake Zone

3.84 Terabits/sec

Onwards TGN-Pacific

Onwards TGN-India Asia

Tokyo

Hong Kong

Philippines

Vietnam

Guam

Singapore

In service: **Singapore, Hong Kong, Philippines, Japan**

Expected Dec 2009 : Vietnam

TGN-IA's Resilient Architecture

Design away from Taiwan Earthquake Zone

Taiwan East
Earthquake Scale
6.6 on 7 Sep. 07

Taiwan South
Earthquake Scale
7.2 on 26 Dec. 06
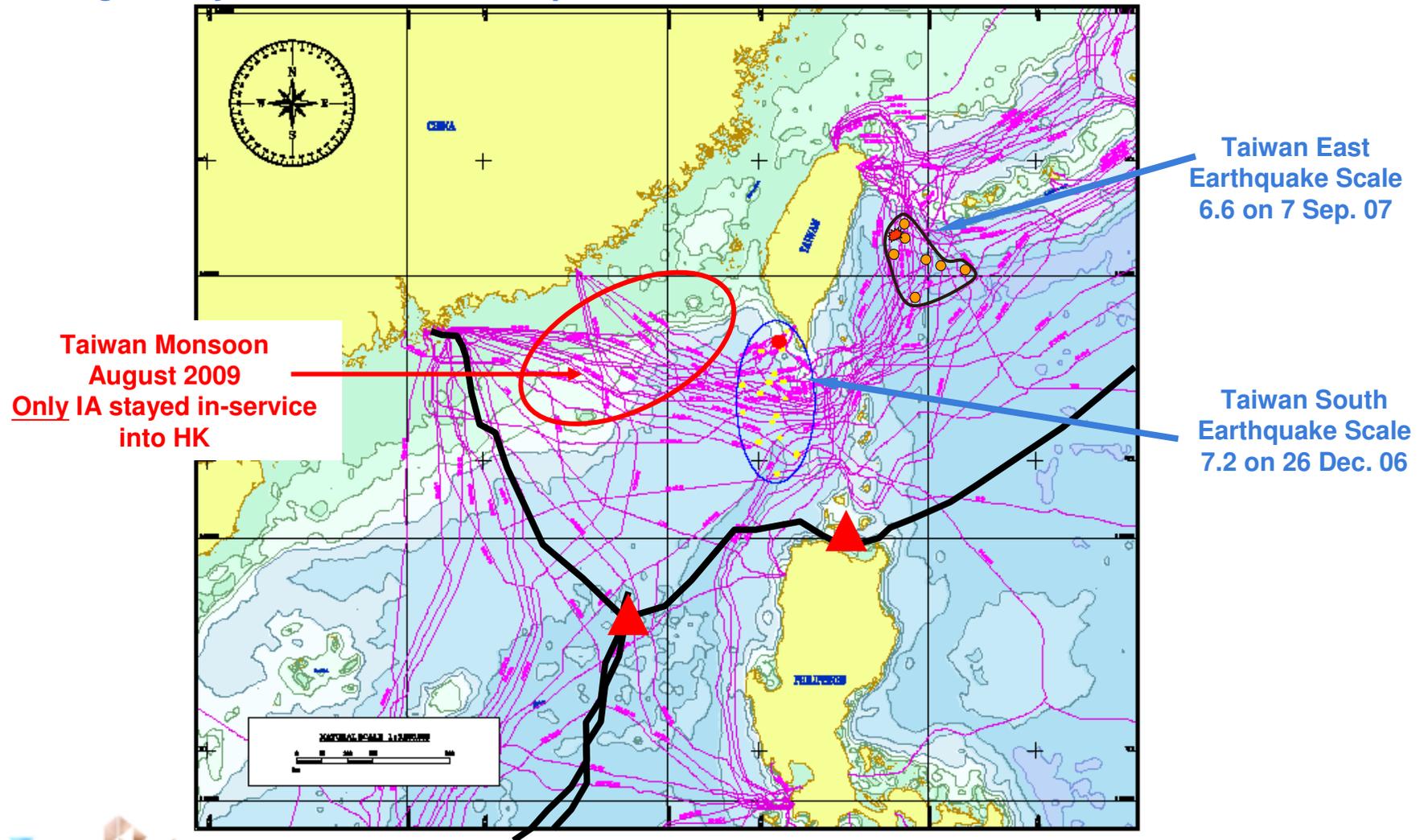
Taiwan Monsoon
August 2009
Only IA stayed in-service
into HK

TGN-IA Key Features and Benefits

- **Direct landing into Hong Kong and Japan from Singapore in Asia region**
  - Express direct route between Singapore and Japan providing lowest latency (65ms) of any submarine cable.
  - The cable system has 2 additional branching units allowing for future cable extensions to other Asian counties.

- **City to City connections**
  - Conventional consortium approach is only cable station-to-cable station
  - City to city enables ease of maintenance, cost effective and faster time-to-market delivery

- **Completes the TCL network**
  - Connecting TIC, and TGN-P, providing a wholly owned Tata Communications route from India, and Singapore to US

- **Upgrade to increase available capacity is being planned**

Africa: SEACom Cable System

First Cable system connecting E. Africa to S. Africa, India and Europe

- Length: 13,000km Cable

- Locations:
  - **South Africa (Mtunzini)**
  - **Mozambique (Maputo)**
  - **Madagascar (Toliary),**
  - **Tanzania (Dar es Salaam)**
  - **Kenya (Mombasa)**
  - **India (Mumbai)**
  - **Djibouti (Djibouti)**
  - **France (Marseille)**

- Ultimate Capacity: 1,280 Gbps

- City-to-City Connectivity onto the Tata Communications Networks in Europe, India, & USA

- Full Range of Service Offerings including:
  - **E1, DS-3, STM-1 through STM-64**

- Lease and IRU Contracts available

- Expected RFS: 2H2009

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SEACOM CABLE SYSTEM MAP

19

Africa: SAT-3/SAFE

Connectivity Into S. Africa with Tata Communications partner, Neotel
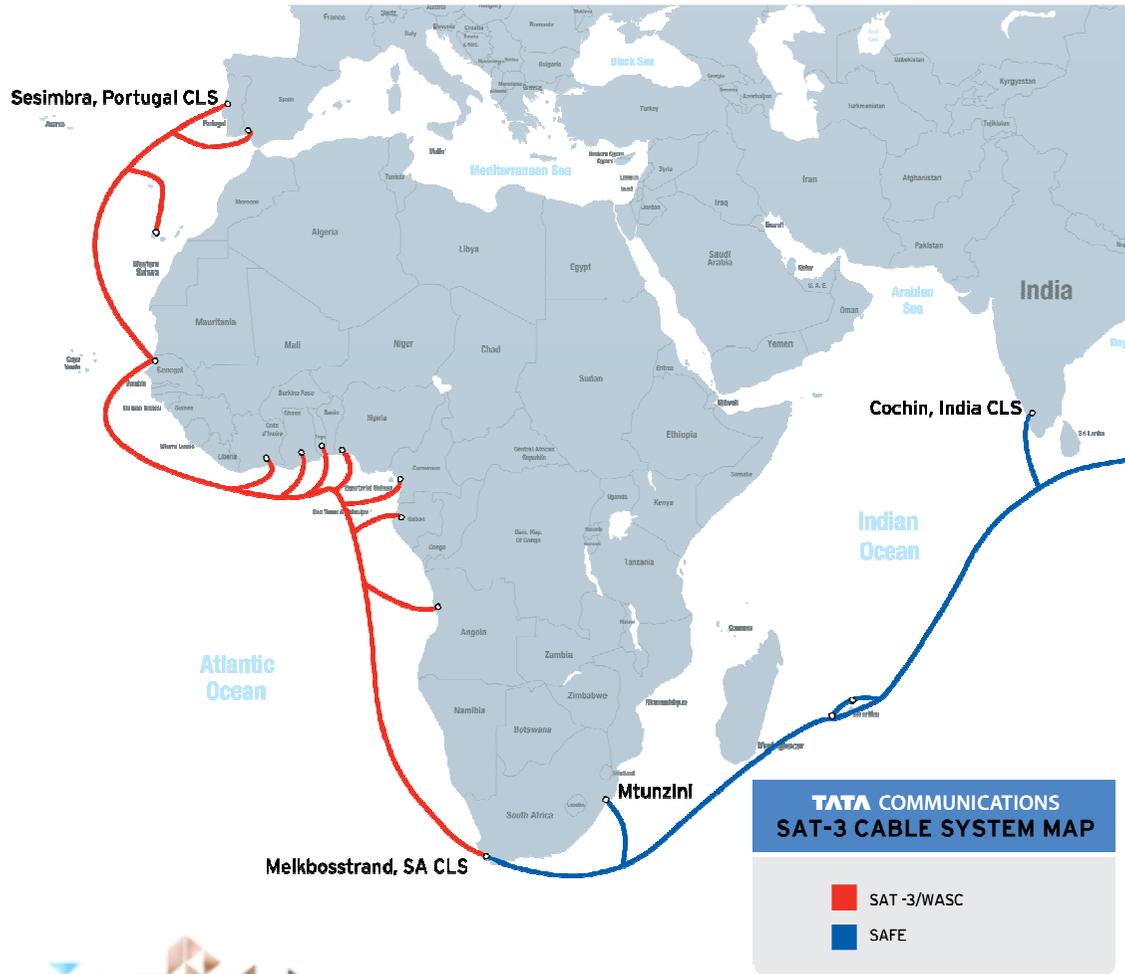
- Sister company Neotel is second national operator in South Africa
  - **Joint Neotel-Tata international service**
  - **Both International and domestic data service**
  - **Neotel owned national long distance and metro network in South Africa provides diversity from existing networks**
    - **Johannesburg**
    - **Cape Town**
    - **Durban**
- City-to-City Connectivity in Europe, India, and S. Africa
- Full Range of Service Offerings including
  - **E-1, DS-3, STM-1,and STM-4**
  - **Consortium Restored on SMW-3**
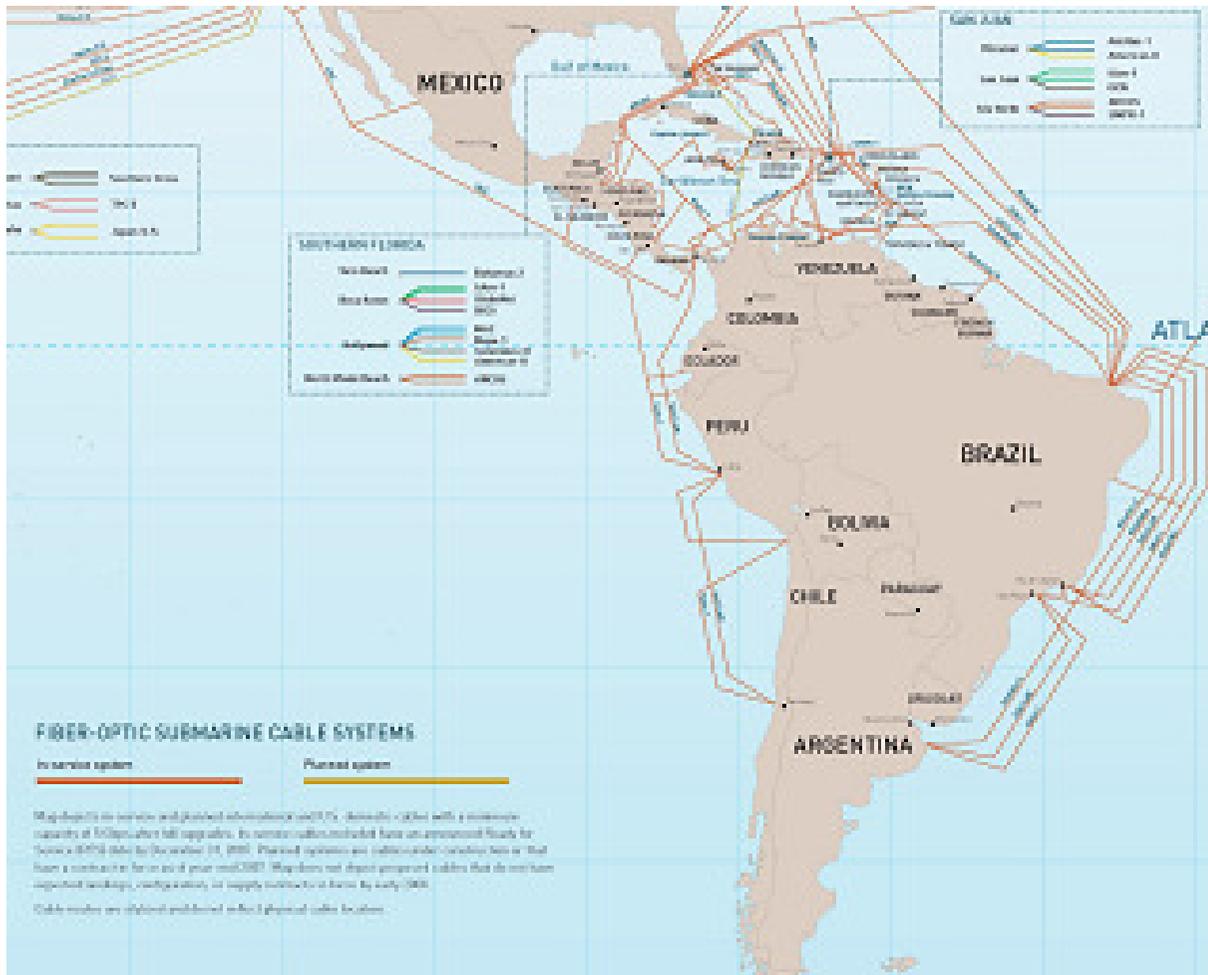 - **Ethernet Services**
- Backhaul is included

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SAT-3 CABLE SYSTEM MAP

🟥	SAT -3/WASC
🟦	SAFE

Africa: the three SAT's
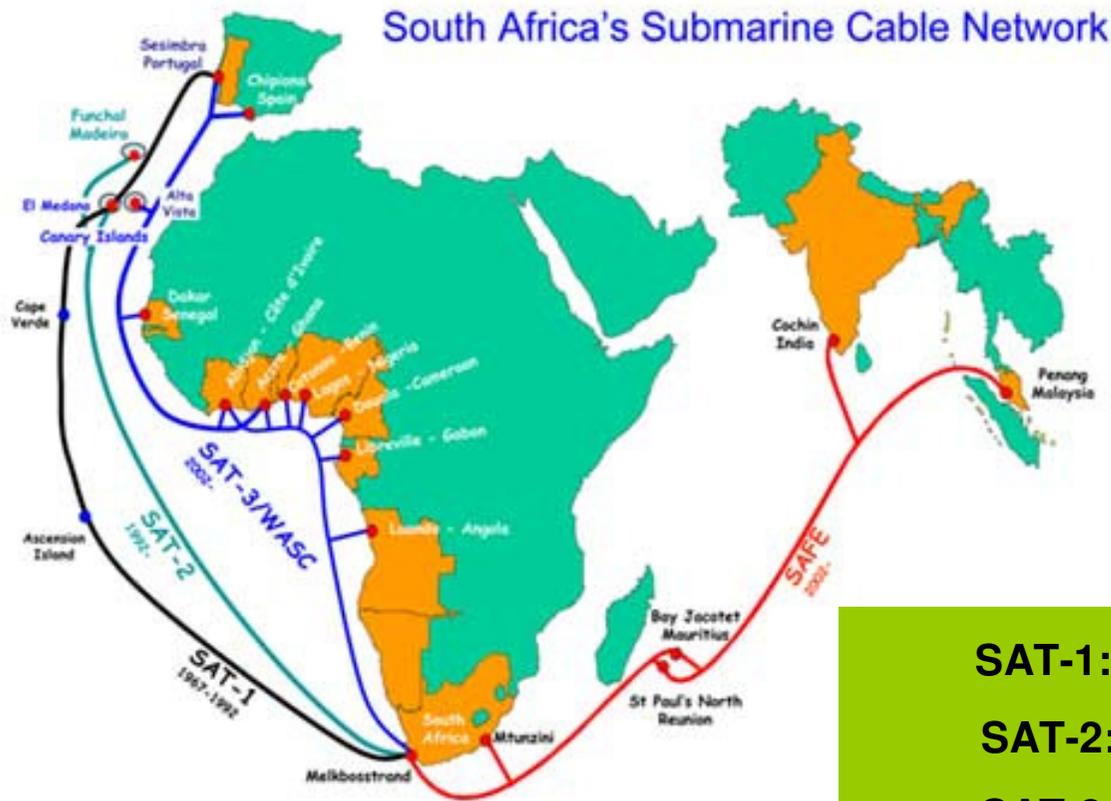
South Africa's Submarine Cable Network

SAT-1: 1968

SAT-2: 1993

SAT-3: 2001

WASC/SAFE: 2002

See: http://atlantic-cable.com/CableCos/SouthAfrica/index.htm

Latin America/ Caribbean


Mercosur countries

- **SAM1 (Telefonica)**
  - New landing of SAM1 Cable in Columbia
- **SAC/LAN (GlobalCrossing)**
- **Globenet**
- **Columbus Networks**
  - completed its Caribbean Crossing (east)
- **Maya**
- **Arcos**

- **New systems announced for DR, NL Antilles**

Tata National India Network

- **40,000 km transmission network**

- **170 points of presence across India**

- **Covering 300 cities and towns**

- **High service uptimes through diverse fiber routes and state of the art Ciena core director network**

- **Dual Pop architecture in 4 metros**

- **Cost effective DWDM network**

- **Aggressive expansion across India**

- **Creation of express network connecting major metros**
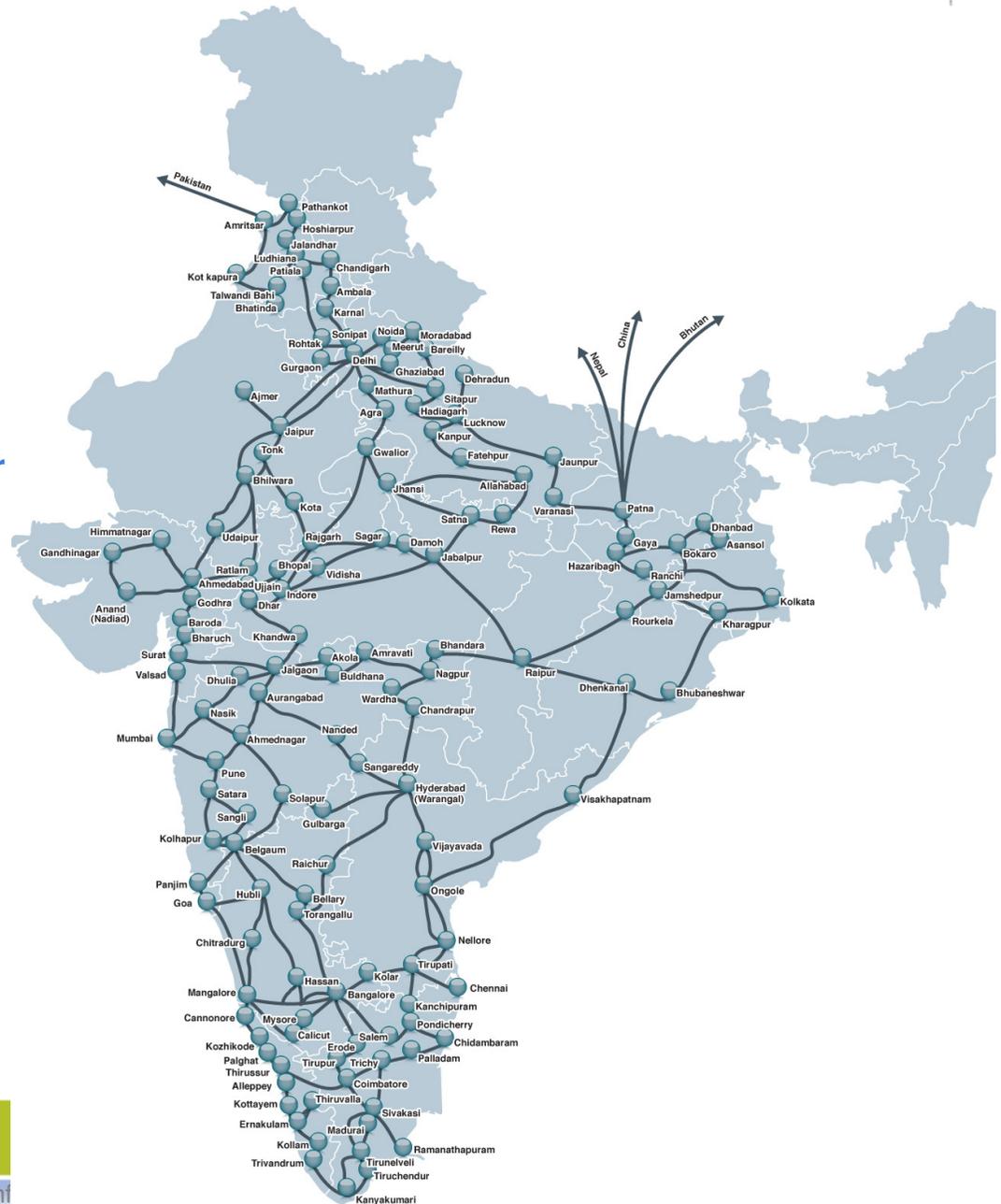
Largest Submarine Cable Network in the World

Ownership of one the most advanced, seamless global transmission networks

OWN	CONSORTIUM	NEW BUILDS
• TGN-Atlantic	• SMW-3	• TGN-Eurasia
• TGN Western Europe	• SMW-4	• IMEWE
• TGN Northern Europe	• SAFE/SAT-3	• SEACOM
• TGN-Pacific	• APCN-2	• WACS
• TGN-India Asia	• …	• TGN-Gulf
• TGN-Intra Asia		

TATA COMMUNICATIONS **TATA** COMMUNICATIONS **TATA** COMMUNICATIONS

Cable breaks

Part I : Taiwan Earthquake 26 Dec 2006
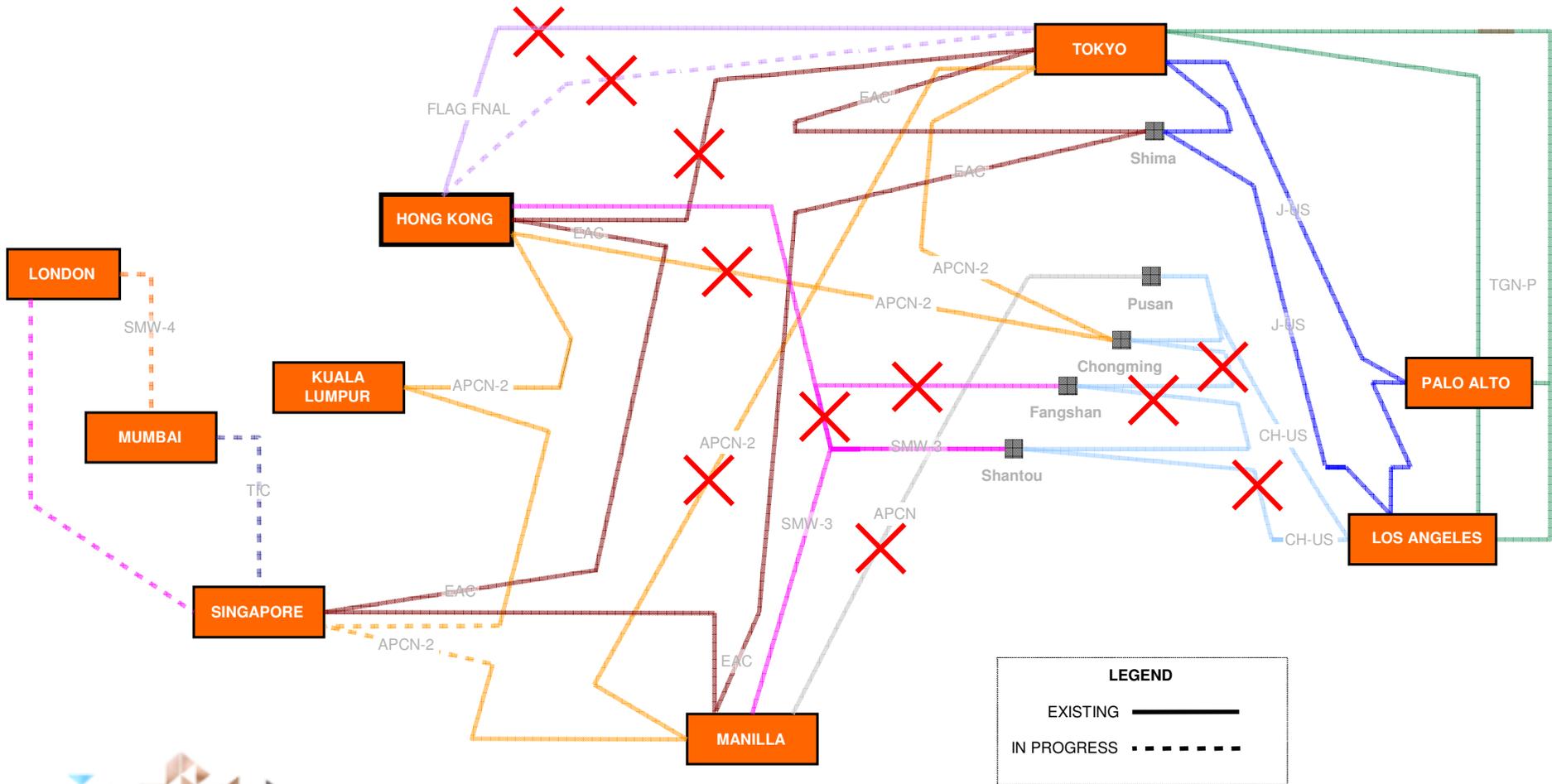**Part II: Triple Break off Italy Dec 2008**

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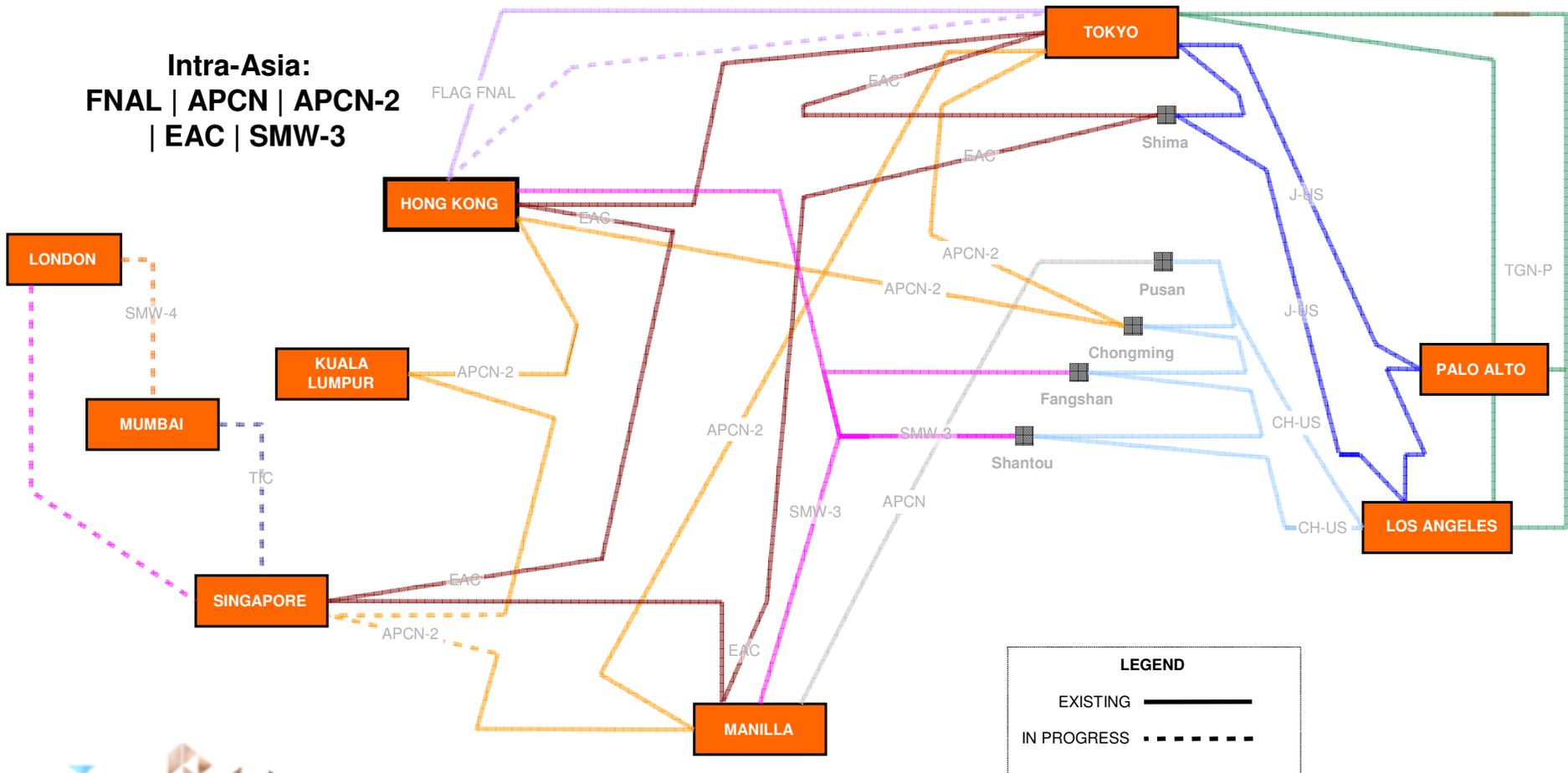
Part I
Taiwan Earthquake December 26, 2006 | Cable Faults

As of December 26th, 2006
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Part I
Taiwan Earthquake December 26, 2006 | Remaining Cable Routes

As of December 26th, 2006
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Dec. 19, 2008

Dec. 20, 2008

Dec. 21, 2008

0:00 8:00 16:00 0:00 8:00 16:00 0:00 8:00 16:00 24:00

08:06 GMT - FLAG
07:33 GMT - SMW3
07:28 GMT - SMW4

20:00 GMT - S'pore-India

08:00 GMT - S'pore-USA
09:30 GMT - India-USA

19:00 GMT - MENA-S'pore

ONE WAY

ONE WAY

ONE WAY

Europe

Middle-East

Japan and USA

India **Singapore**
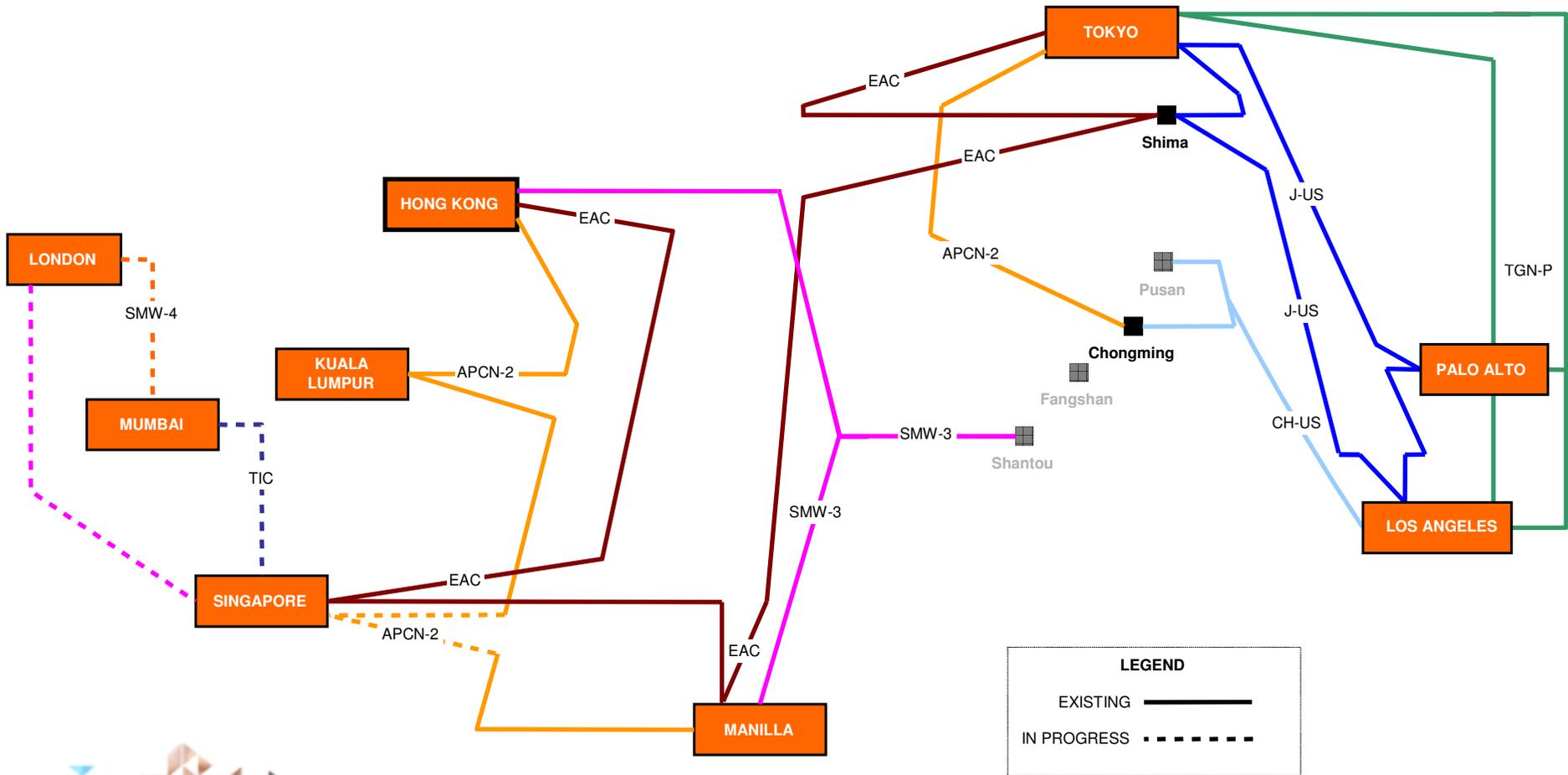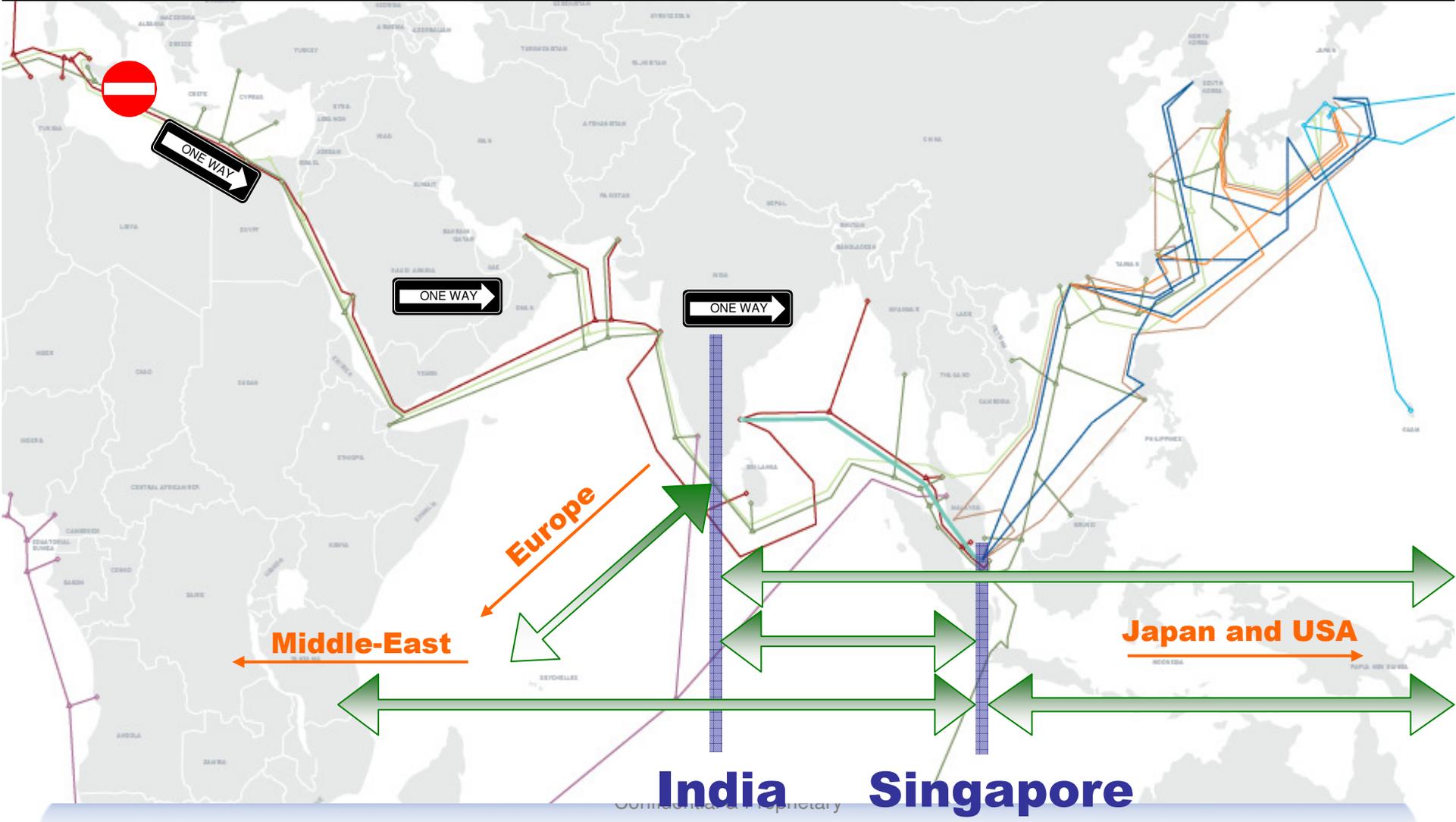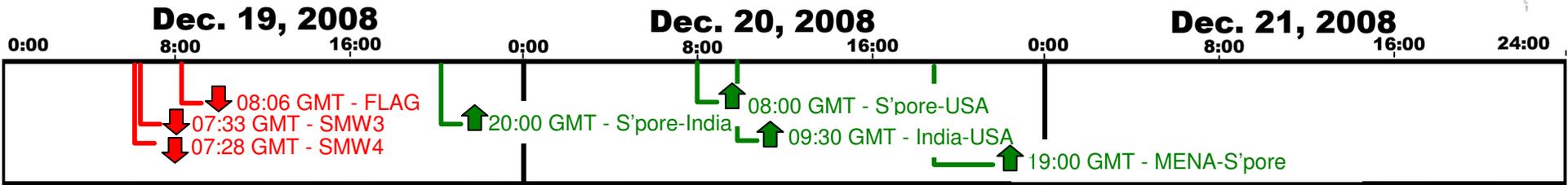
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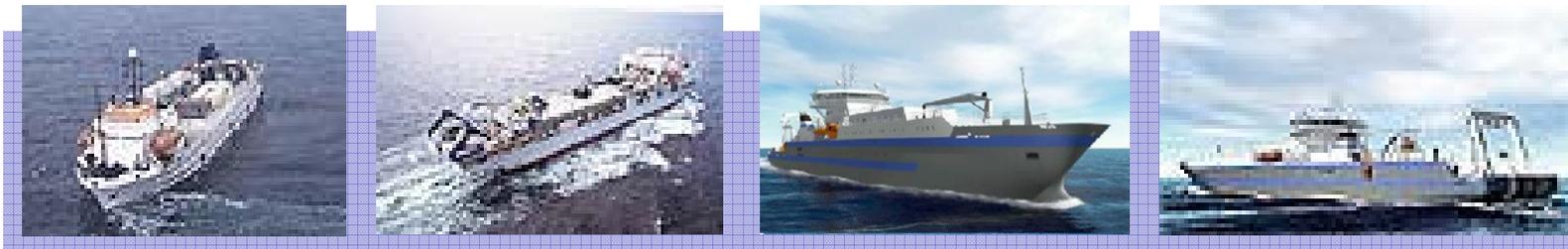
BACKUP SLIDES

Operating Submarine Cables

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Cable Laying

Specialist Ships – Laying, Repair, ROVs

Several Key Players

Cable Depots Worldwide

Specialist Equipment

Burial capability,
Work to 2500m,
Most Cables now trenched offshore where permitted,
Pre/Post Lay Inspections

Cable Faults

JOLT - external aggression, anchor or skid from commercial fishing net but not actually breaking cable.

Sometimes the bend is so sharp fibers will attenuate but not break, other times cable will part elsewhere along the cable.

Planned restoration and repair required.

Shunt Fault – external aggression, friction damage has caused damage to

the cable but not actually breaking the cable. The damage extends to the core power cable causing a leakage to ground; though not always traffic affecting indicative of a larger problem.

Planned Restoration and Repair required.

Cable Break – immediate restoration and repair required
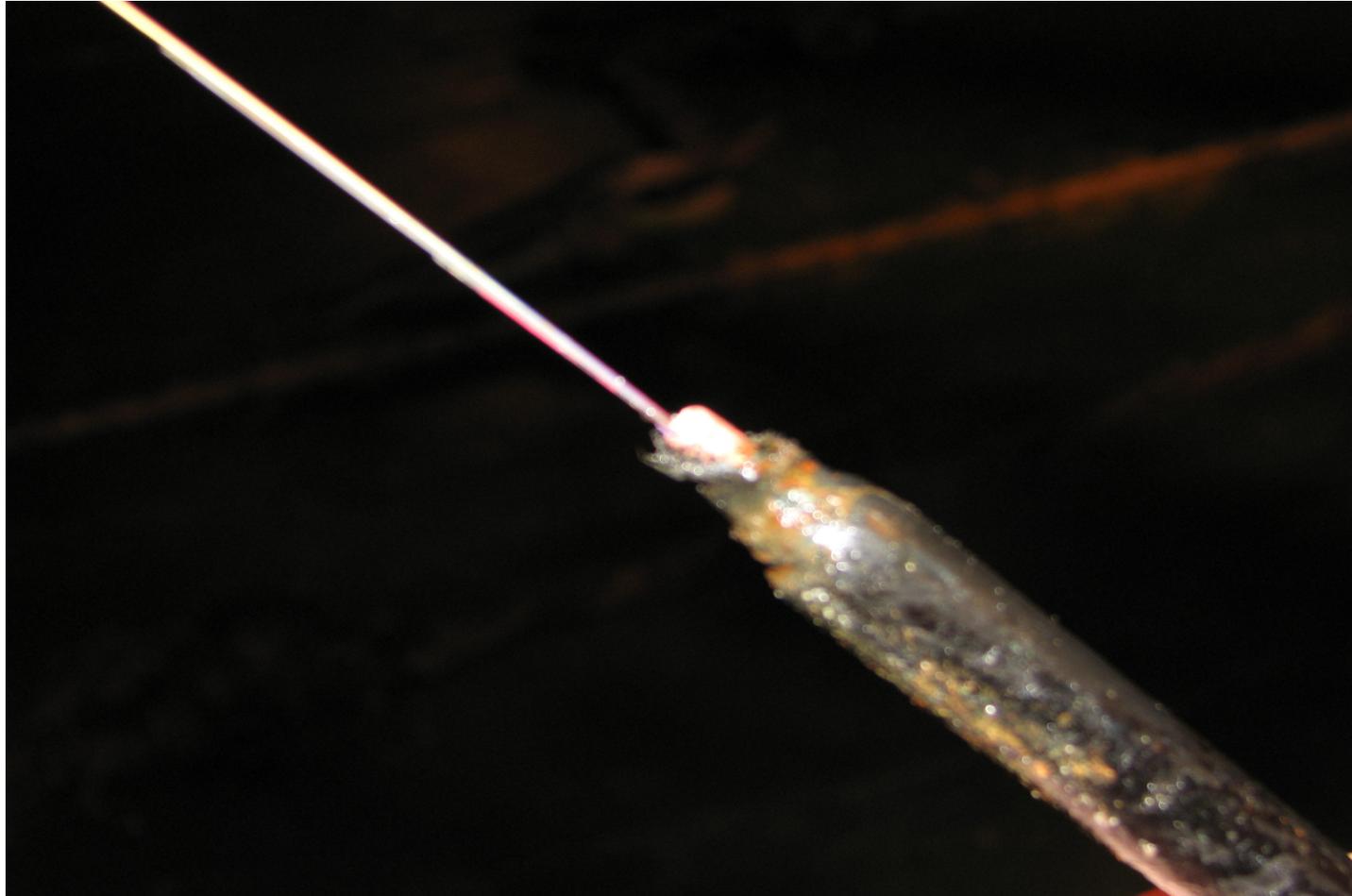Executed by Cable Administrator and RCO/RLO.

JOLT

Severe JOLT

Cable Break

Cable Break – Recovered Internal Section

TGN Break – Net Material

24/03/2008

Backhaul Systems – Terrestrial and Landing

Backhaul Systems – Terrestrial and Landing

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Thank You

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