

**TATA** COMMUNICATIONS

**Brief update on the Global  
Communications arteries  
and  
A couple of notes on IPv6**

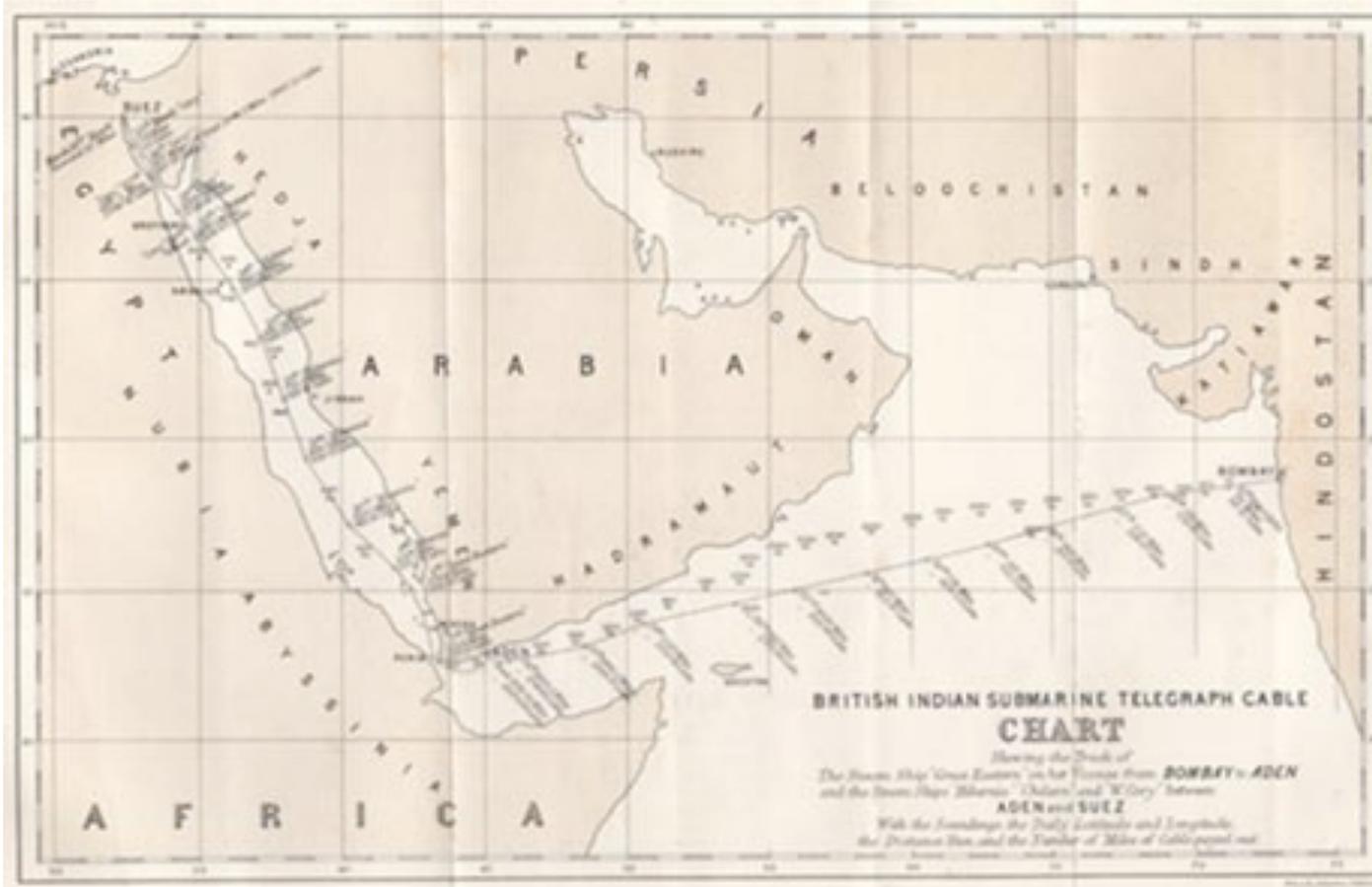
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**SANOG XIV**  
Chennai july 2009

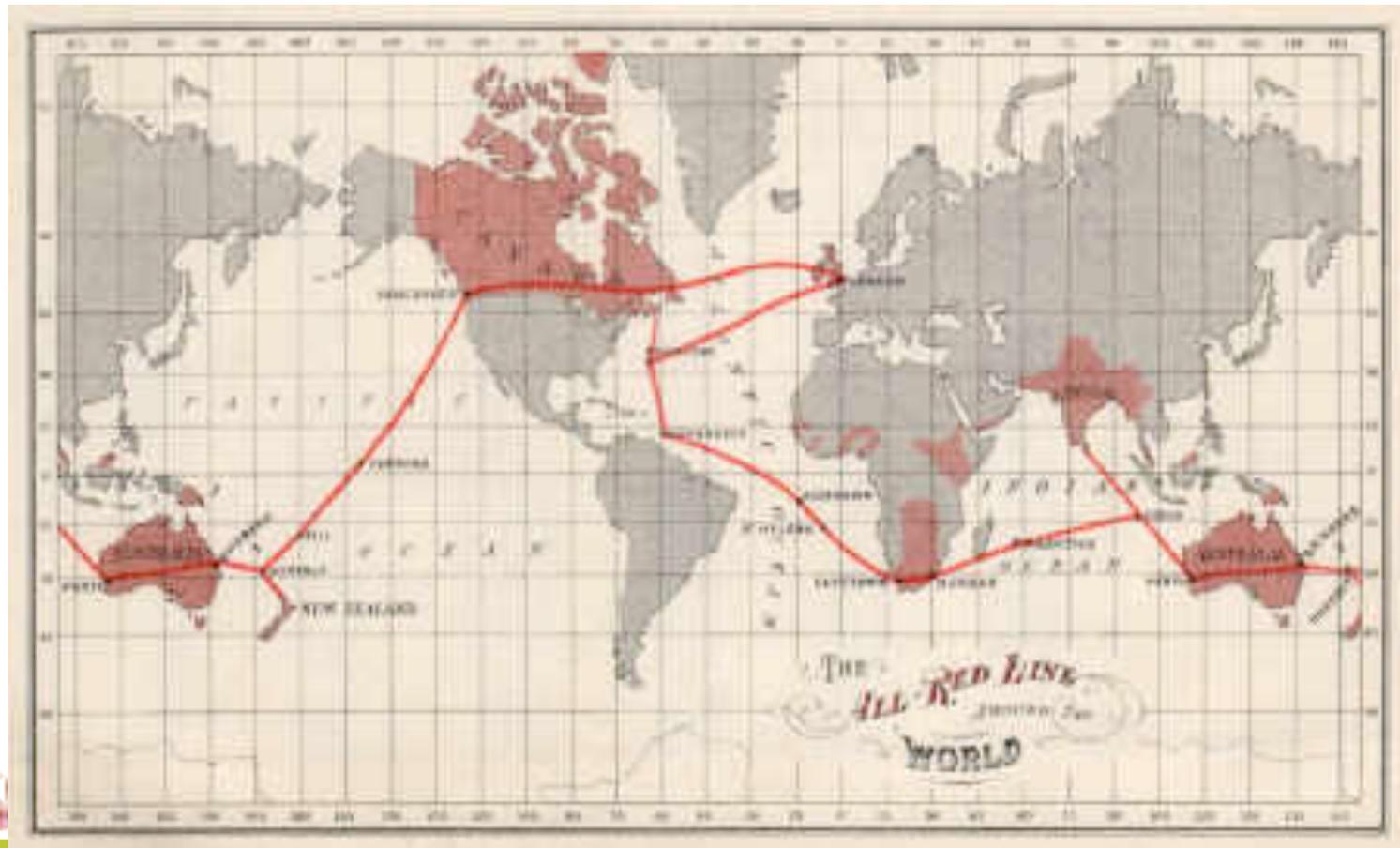
**Yves Poppe**  
Director Bus. Dev IP services



## High speed transmission circa 1870



## The Grandfather of Global Networks: All Red Line completed in October 1902



## From undersea telegraph to undersea voice



In the 1950s new technology put cables ahead of radio. Small vacuum tubes that could operate under water for 20 years or more meant that amplifiers could be buried at sea with the cable. This boosted the cable's information capacity to the point that it could even carry telephone signals.

Small vacuum tubes like this could be buried at sea with the cable for years. They helped to increase a cable's information-carrying capacity by more than a thousandfold.

Borrowed from : The Underwater web, Smithsonian Institute

<http://www.sil.si.edu/Exhibitions/Underwater-Web/uw-credits.htm>

## The first decade of subsea fiber optics

- 1986; First international subsea optical cable between U.K. and Belgium
- 1988: TAT-8 becomes the first transoceanic optical cable
- March 2<sup>nd</sup> 1992: TAT-9 with 565mb capacity  
“NEW YORK, N.Y. -- AT&T today activated service on a new \$450-million undersea fiber optic cable system linking the United States and Canada with the United Kingdom, France and Spain, double the capacity of previous-generation submarine fiber optic cables.”
- Late 1992: TAT-10 activated.  
Another 565mb capacity.
- 1993: TAT-11 (2x565mb),  
the first gigabit level transoceanic cable!
- Oct 1994: Cantat-3 with 5gig!
- Who needs all that capacity ?

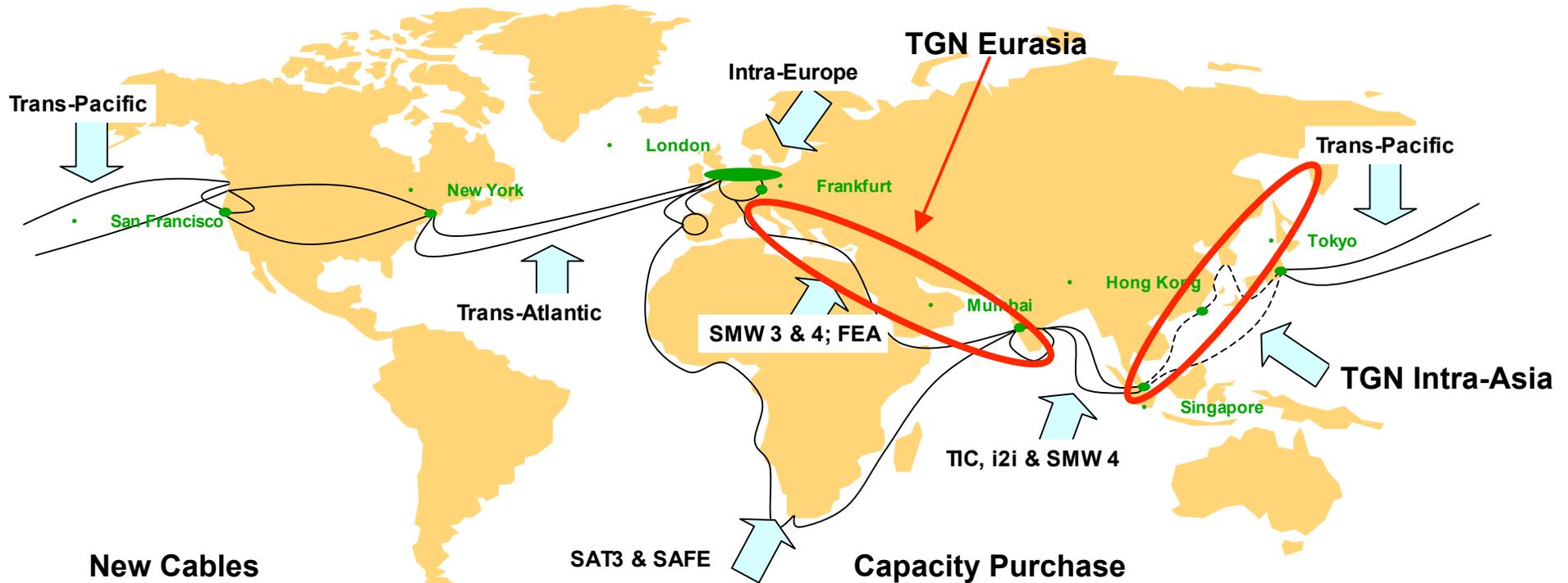


## Boom, bust and rebound

- The internet tsunami took everybody by surprise.
- Tyco, Level3, Global Crossing, FLAG, 360 networks emerged as a fleeting new generation of transoceanic cable builders.
- 3-4 years of spectacular growth peaked in early 2000 and were followed by the dotcom and telecom bust. The bottom was reached in 2003 with a slow recovery accelerating in 2006 especially in Asia and Africa.
- Will the big 2008-2009 recession have an impact?



# Circling the world on Tata Communication owned Submarine Cable



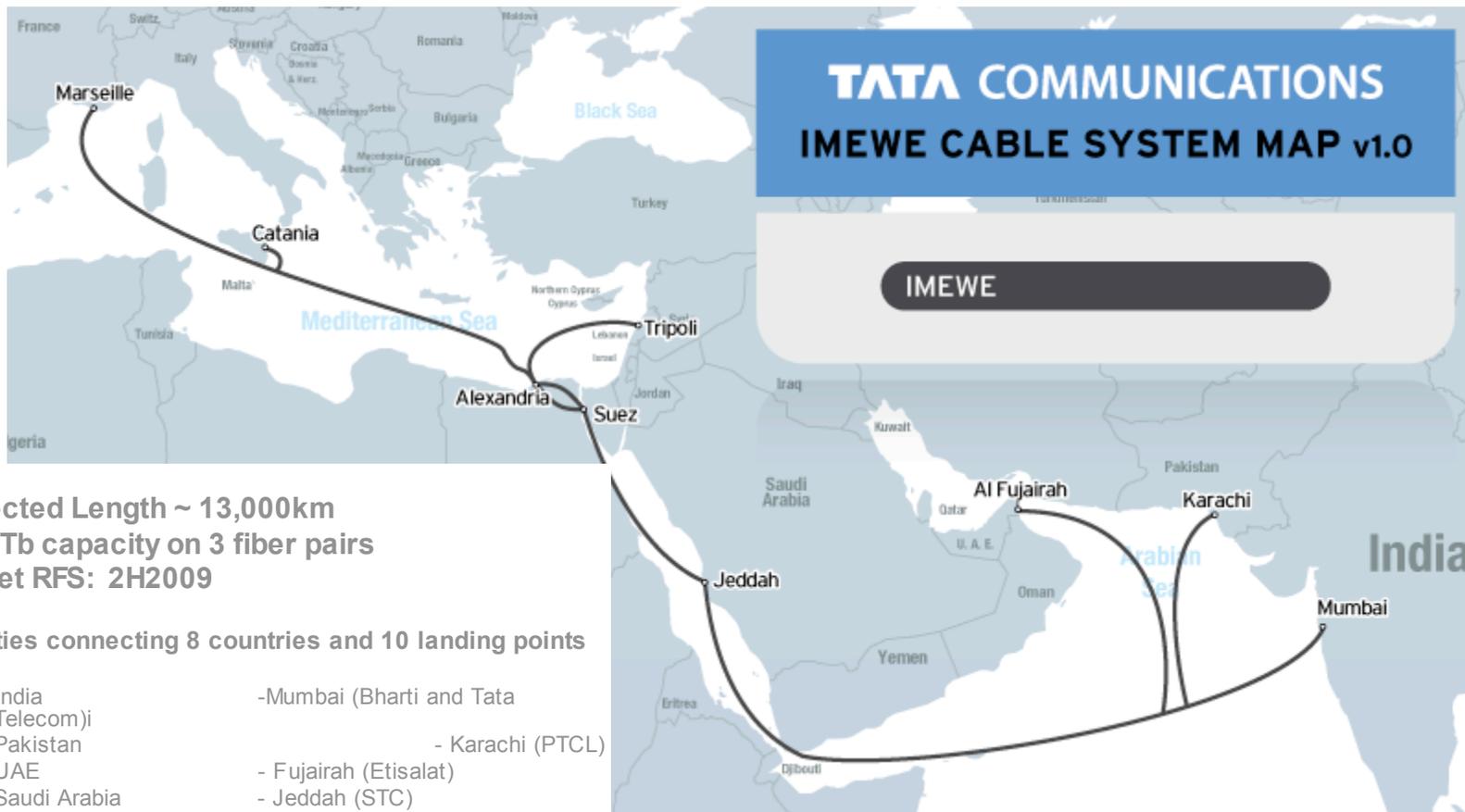
## New Cables

| Cable Name     | Connecting                                       | Ownership      |
|----------------|--------------------------------------------------|----------------|
| TGN-Intra Asia | Singapore Hong Kong, Japan, Vietnam, Philippines | Majority Owner |
| TGN-Eurasia    | India to France via Egypt                        | Majority Owner |

## Capacity Purchase

| Cable Name | Connecting                               | Ownership              |
|------------|------------------------------------------|------------------------|
| IMEWE      | India, Middle East, Egypt, Italy, France | Consortium Member      |
| SEACOM     | India, Egypt, South Africa               | Initial Capacity Owner |

## I-ME-WE as currently under construction



Expected Length ~ 13,000km  
 3.84 Tb capacity on 3 fiber pairs  
 Target RFS: 2H2009

9 parties connecting 8 countries and 10 landing points

- India Telecom) - Mumbai (Bharti and Tata
- Pakistan - Karachi (PTCL)
- UAE - Fujairah (Etisalat)
- Saudi Arabia - Jeddah (STC)
- Egypt - Suez and Alexandria (Ogero Telecom, Telecom Egypt)
- Lebanon - Tripoli
- Italy - Catania (Sparkle)
- France - Marseille (France Telecom)

## SEACom Cable System

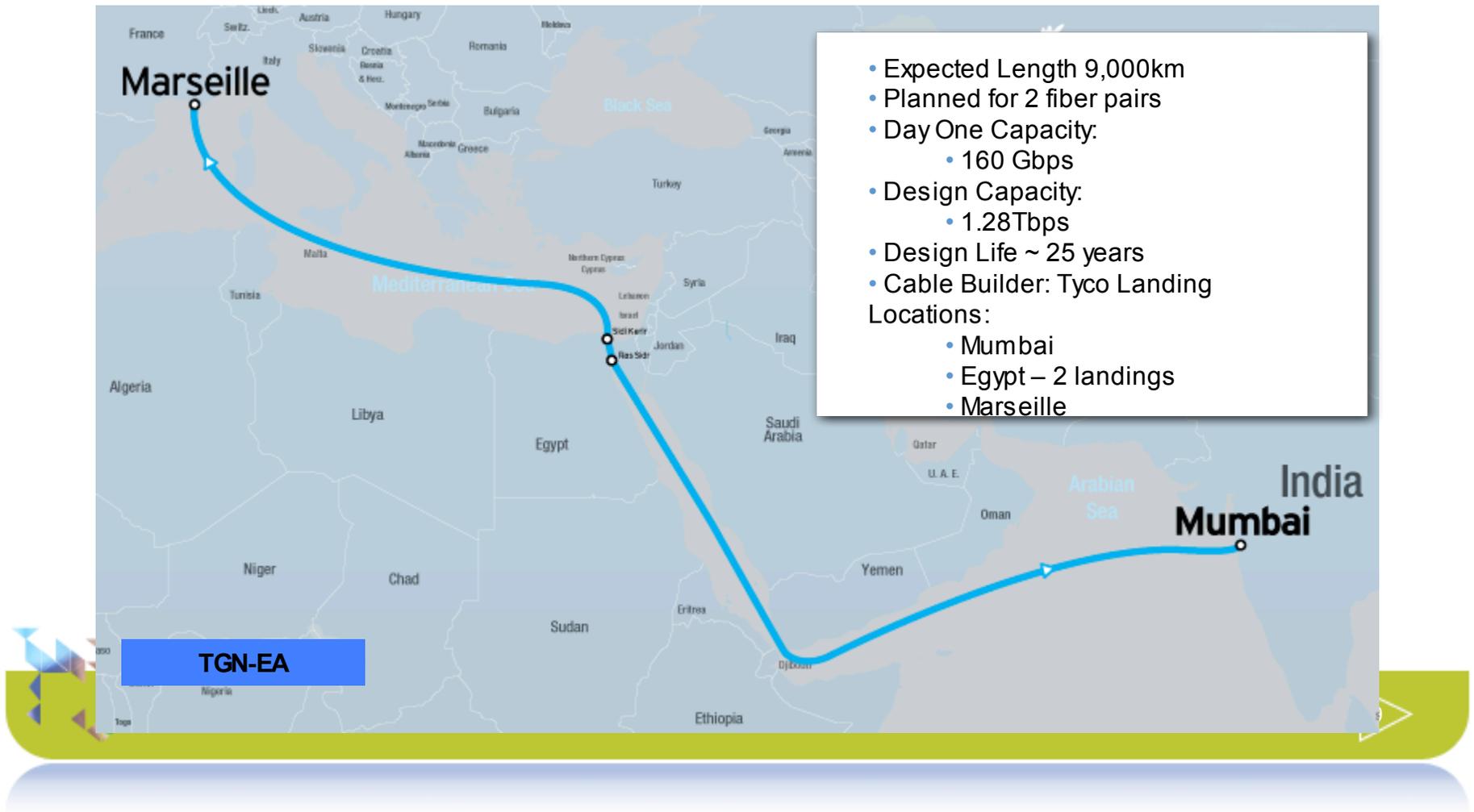
First Cable system connecting E. Africa to S. Africa, India and Europe



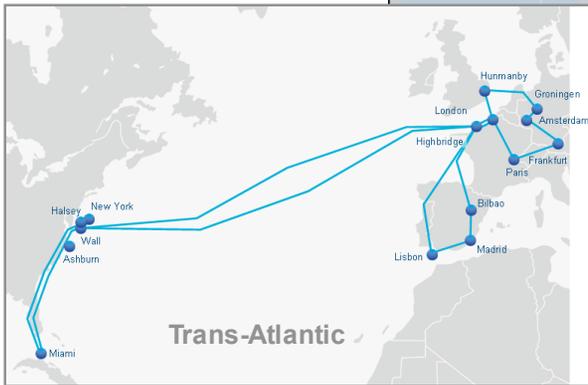
- Length: 13,000km Cable
- Locations:
  - South Africa (Mtunzini)
  - Mozambique (Maputo)
  - Madagascar (Toliary),
  - Tanzania (Dar es Salaam)
  - Kenya (Mombasa)
  - India (Mumbai)
  - Djibouti (Djibouti)
  - France (Marseille)
- Ultimate Capacity: 1,280 Gbps
- City-to-City Connectivity onto the Tata 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

## TGN – EurAsia

Tata Communications Joint Build for an express route cable from India to Europe

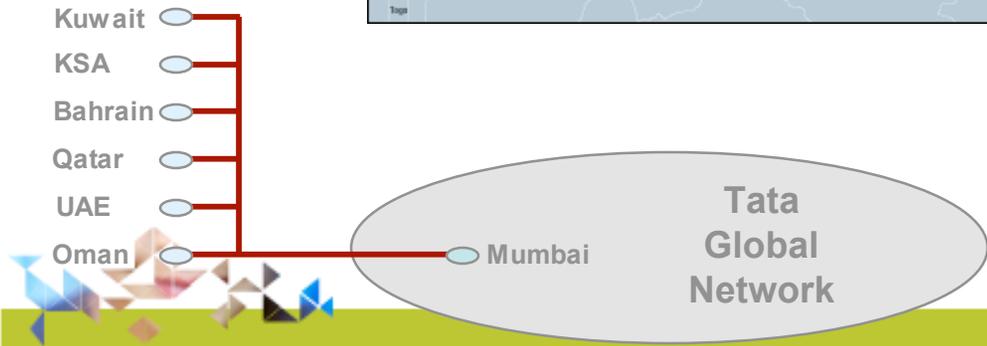
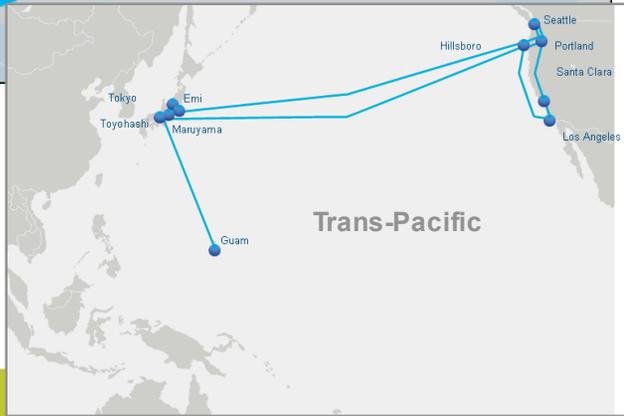


# The Gulf Cable Project



**Gulf - Mumbai Cable**

**Connecting Gulf Countries To the Rest of The World**



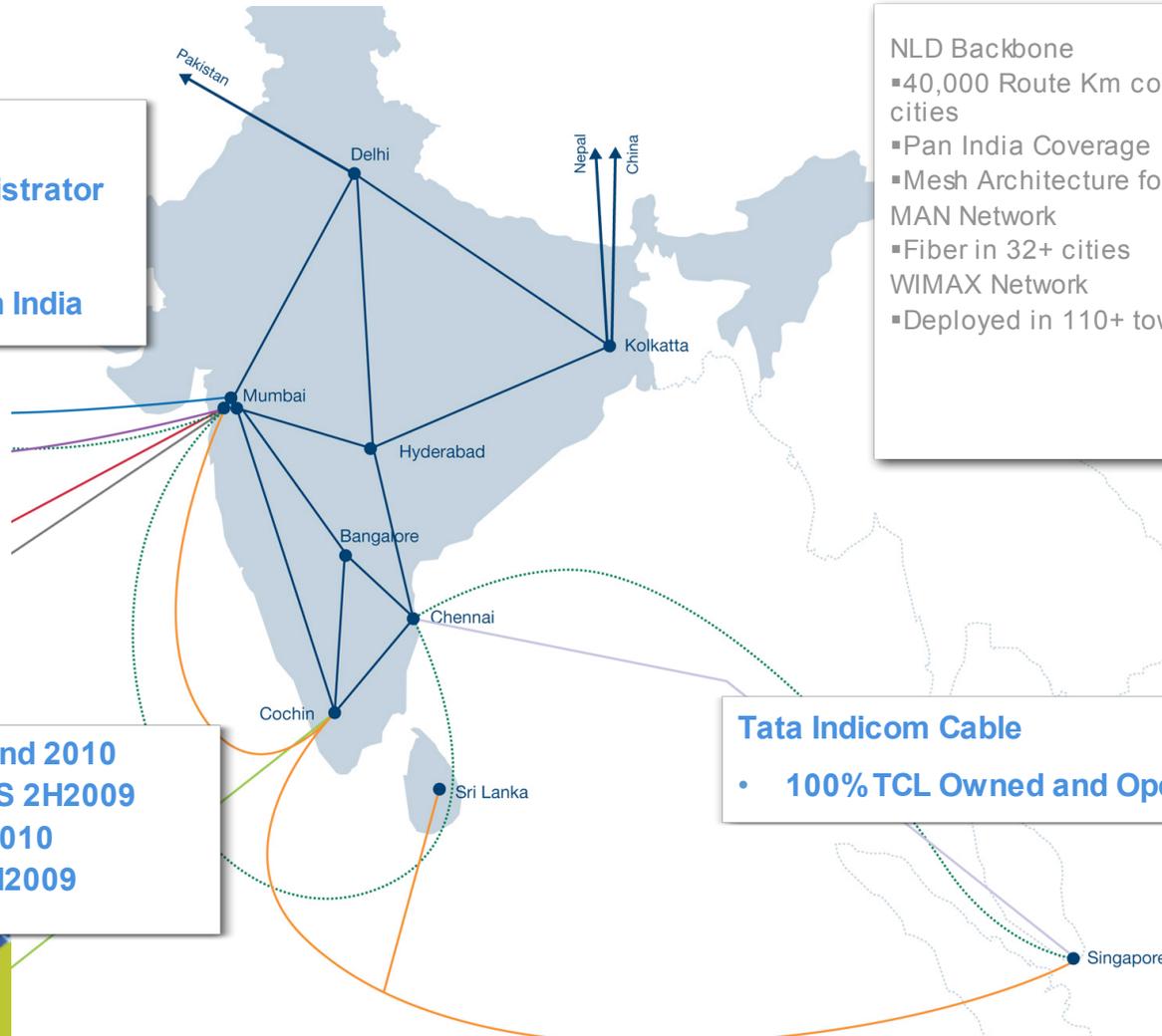
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for discussion purposes only

## Tata Communications Diverse Connectivity to and from India Comprehensive Cable Redundancy into India

### SMW4

- Network Administrator
- SMW3 & SAFE
- Landing Party in India



### NLD Backbone

- 40,000 Route Km covering 300 major cities
- Pan India Coverage
- Mesh Architecture for resilience
- MAN Network
  - Fiber in 32+ cities
- WIMAX Network
  - Deployed in 110+ towns

### New cables in 2009 and 2010

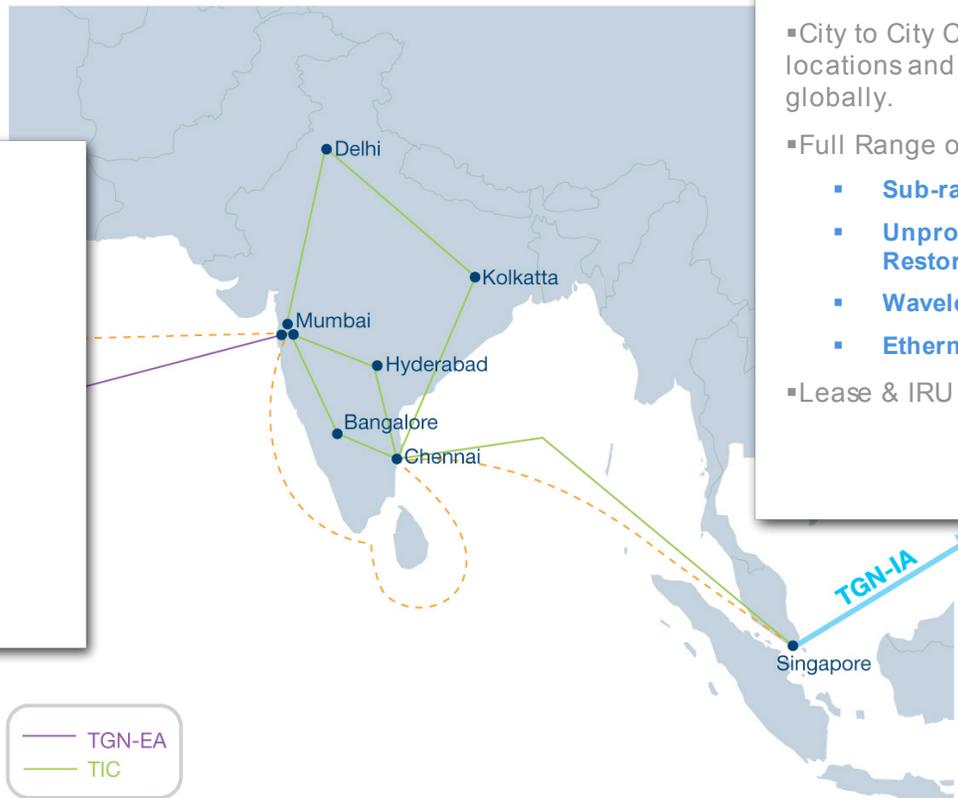
- TGN-EurAsia: RFS 2H2009
- IMEW: RFS 1Q2010
- SEACom: RFS 2H2009

### Tata Indicom Cable

- 100% TCL Owned and Operated

## Tata Indicom Cable (TIC) and TGN-EurAsia (TGN-EA) Owned and operated cable systems East and West from India

- TGN-EA and TIC are High Capacity Systems connecting India to Europe and Asia Pac.
- Direct Links to TCL's India Network
- Deep Shore Burial
- Redundancy East and West from India

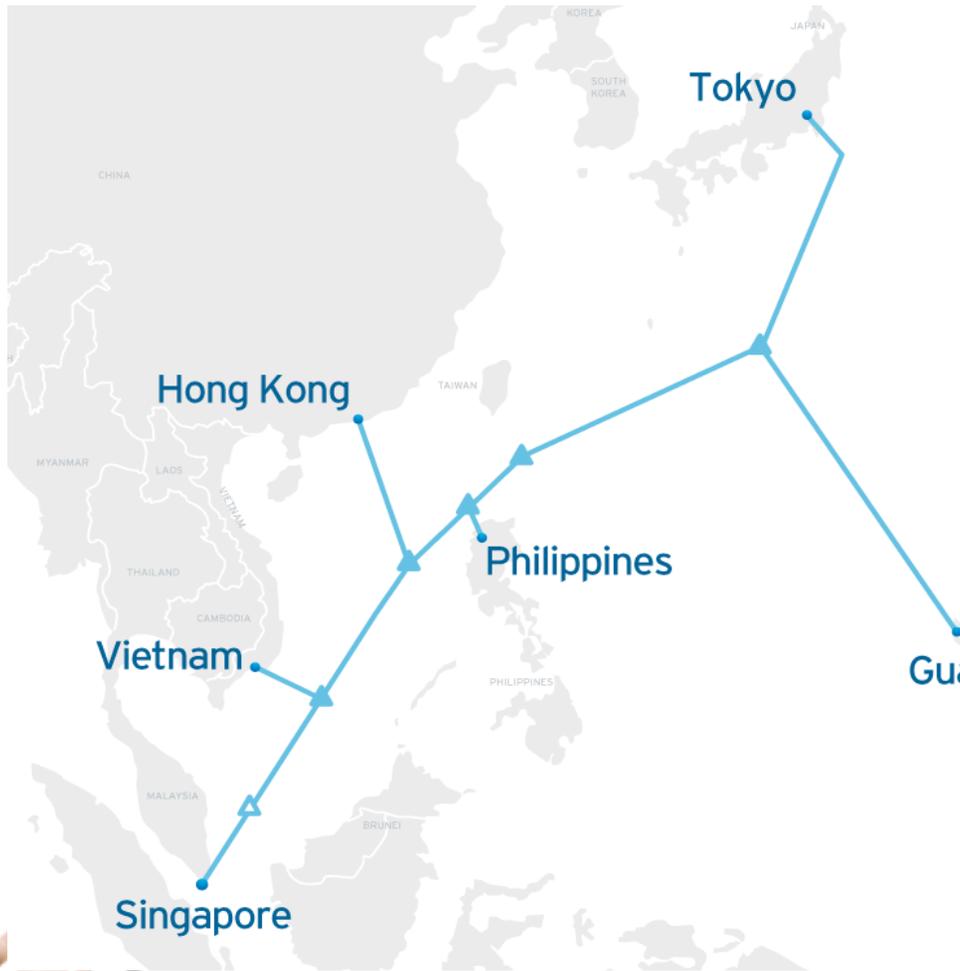


- City to City Connectivity to all India locations and major business centers globally.
- Full Range of Services including:
  - **Sub-rate through STM-64**
  - **Unprotected and Protected and Restored Services**
  - **Wavelengths Services**
  - **Ethernet Services**
- Lease & IRU contracts available

— TGN-EA  
— TIC



## TGN - Intra Asia



**Length: 6,800 km**  
**# of Fiber Pairs: 4**  
**Initial Capacity: 320Gbps**  
**Design Capacity: 3.84Tbps**  
**Speeds available: STM-1/4/16 & 10G**  
**Day One Landing Points:**

- Singapore
- Tokyo
- Guam
- Philippines
- Hong Kong
- Vietnam

**Expected Latencies**

- SNG- JP = 63msec RTD
- SNG - HK = 33msec RTD
- HK - JP = 45msec RTD
- SNG - Vietnam CLS= 16.5msec RTD
- Vietnam CLS - Philippines CLS = 24msec RTD
- Philippines CLS - Japan = 33msec RTD

**Ready For Service: went live 2Q 2009**

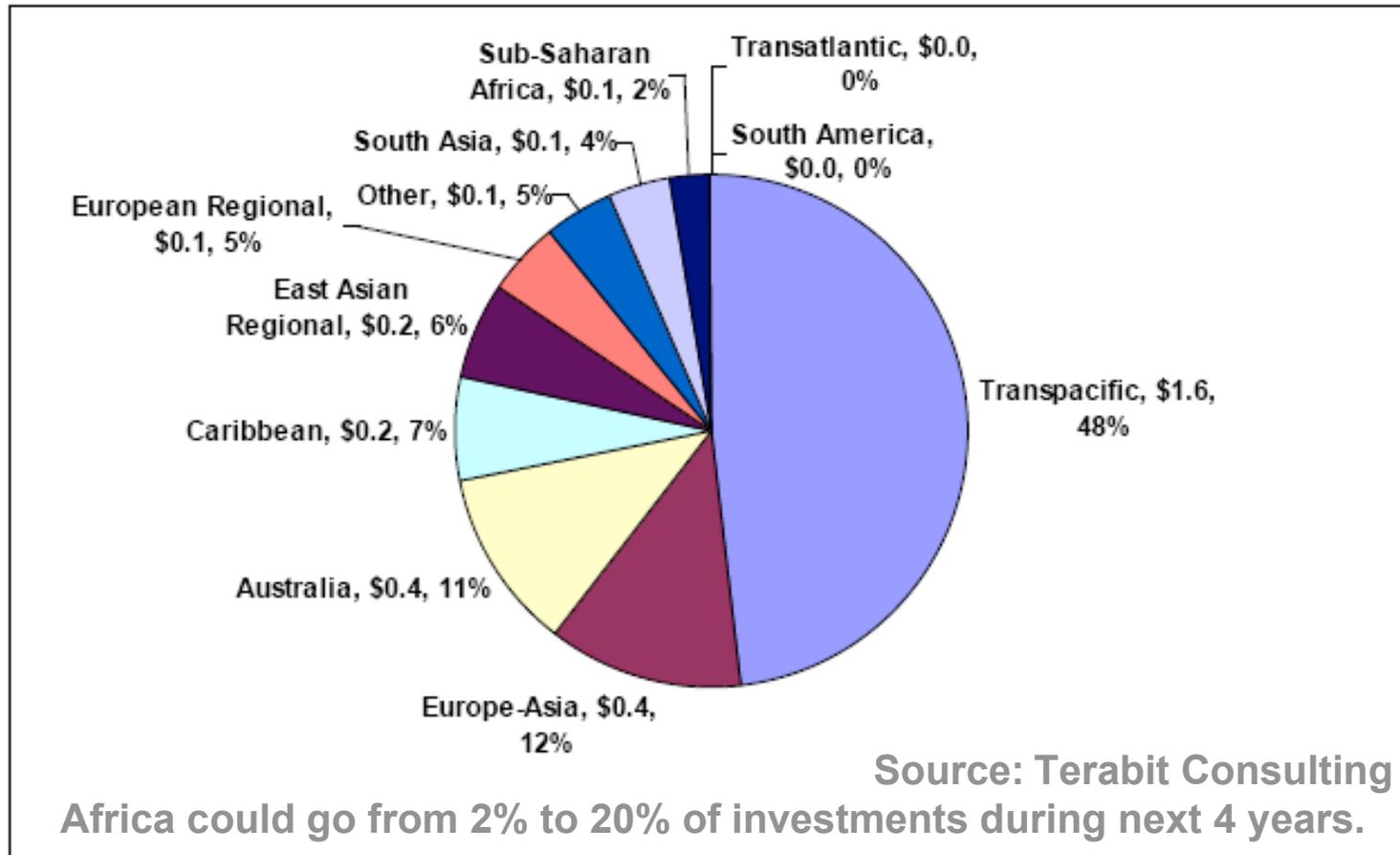
## PIPE Cable System

High Speed Connectivity Into Australia via Pipe



- **2 fibre pair system**
- **Support 96x10G waves per fiber pair**
- **Total of 1.92 Terabits of capacity**
- **City-to-City Connectivity to:**
  - \_ Sydney
  - \_ Guam
  - \_ Japan
  - \_ USA, India, Asia Pac, Europe
- **Full range of Service Offerings including:**
  - \_ E-1, DS-3, STM-1 through STM-16
  - \_ Unprotected Services
  - \_ Ethernet Services
- **Lease and IRU Contracts available**
  
- **Expected RFS: July 2009**

## Investments in subsea cables 2006-2008



# AS6453: Globe spanning Tier-1 dual stack IPv4-IPv6 IP Backbone



## Explosive growth

- OC48/192 MPLS backbone
- 70% year over year traffic growth
- Courtesy of User generated Content and p2p: Youtube, Myspace etc

**TATA COMMUNICATIONS**  
GLOBAL IP FOOTPRINT v4.2

**ICONS**

- IPV4 POP
- NATIVE IPV6 & IPV4 POP
- EARTH STATION
- DATA CENTER
- NDC NETWORK OPERATIONS CENTER

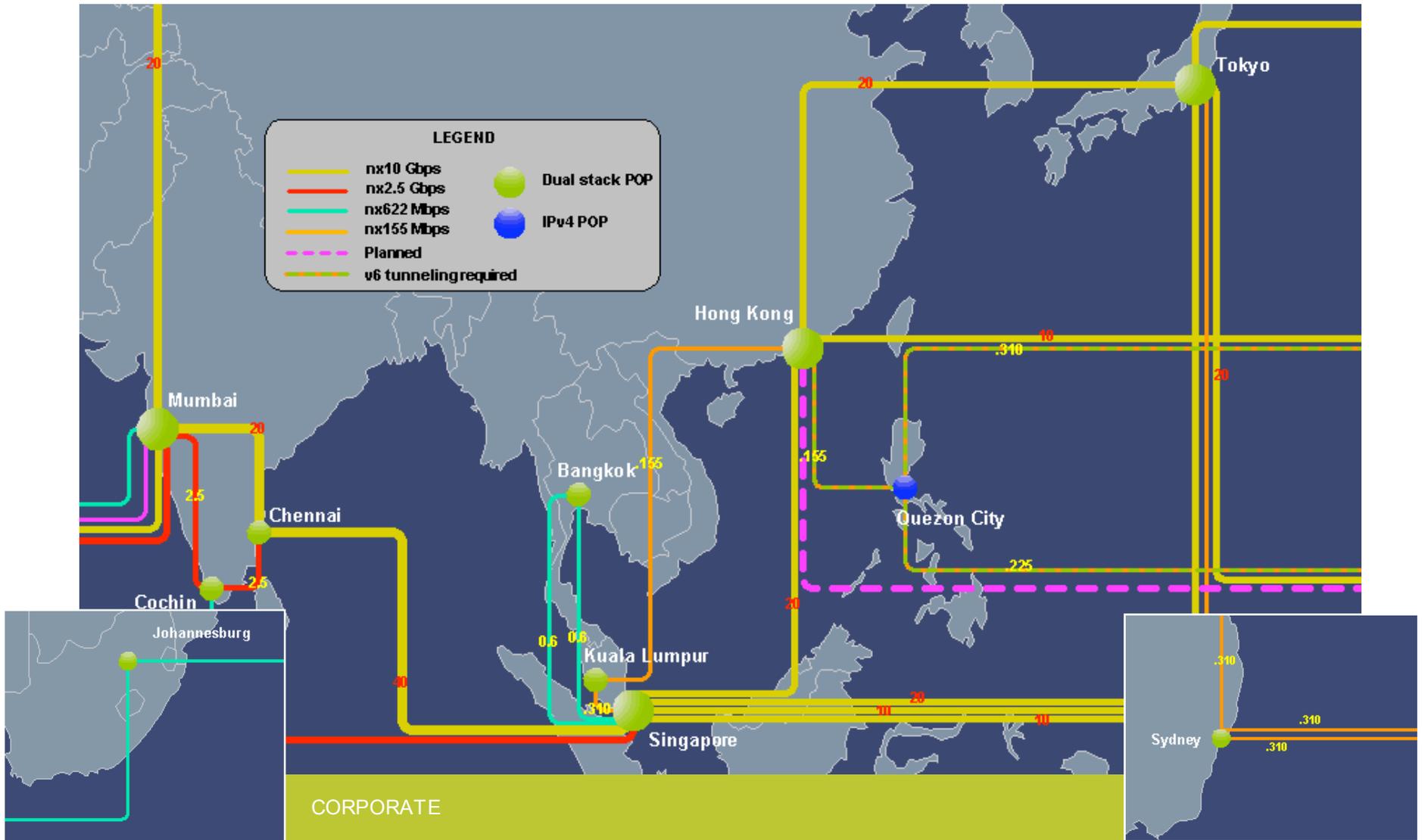
**LINKS**

- IP LINK
- PLANNED IP LINK

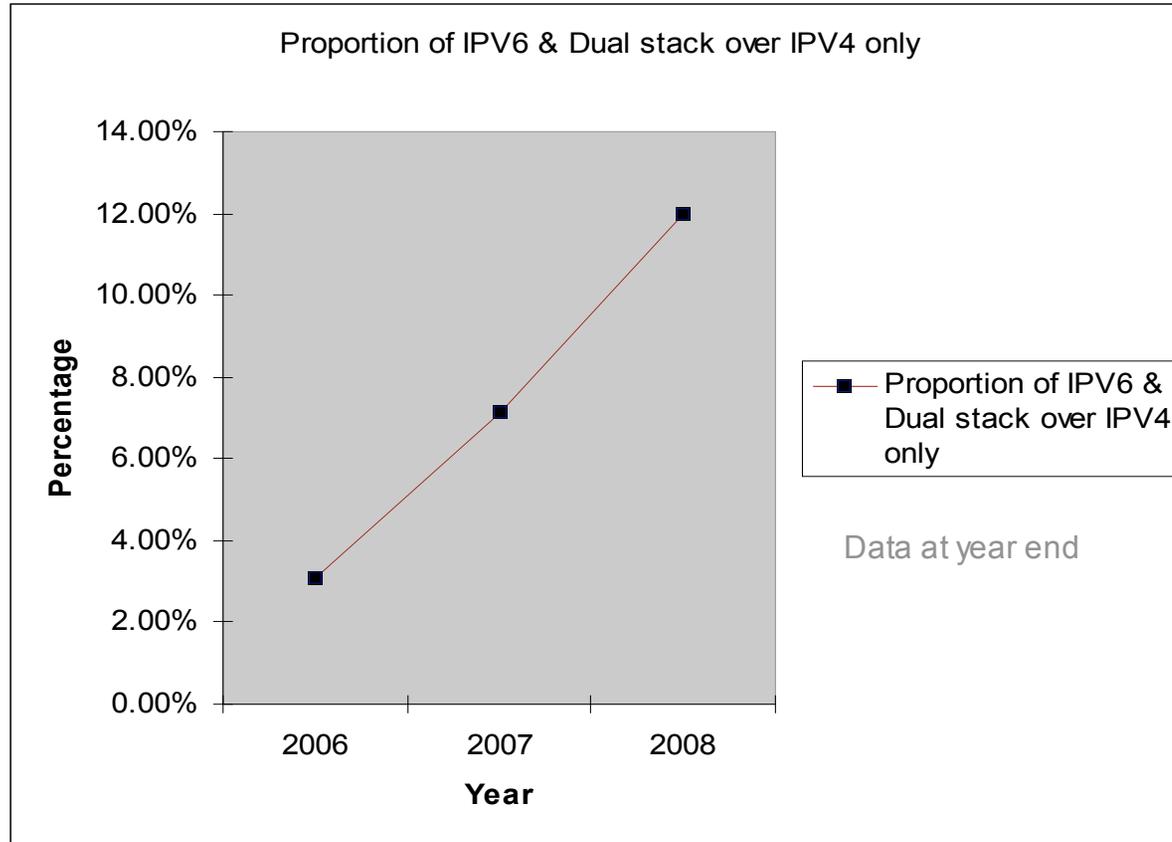
## IP Network at a glance

- 1500+ Gbps of Backbone Capacity
- Carries 750+ Petabits globally per month;

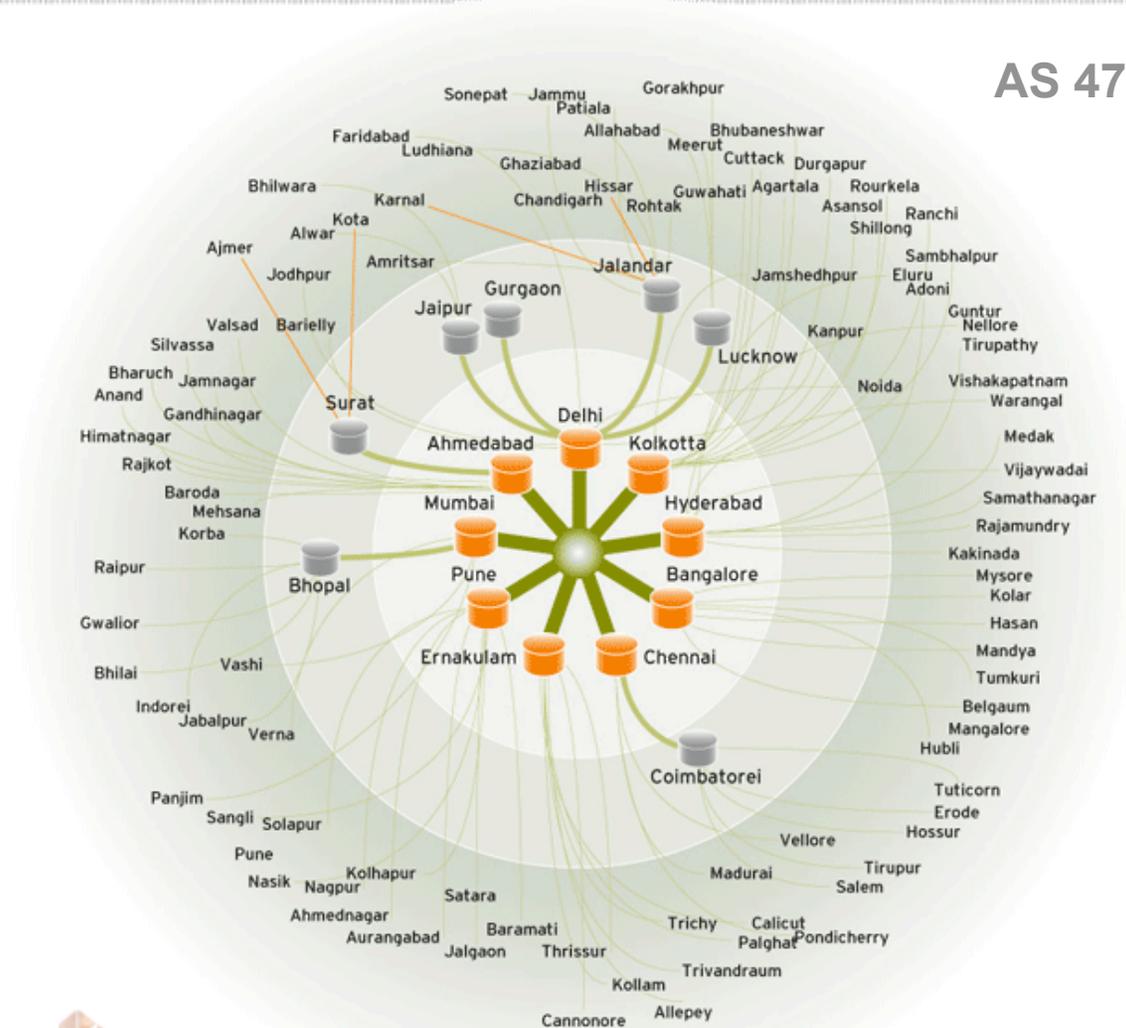
# Tata AS6453 - Asia IPv6 Network



## Proportion of customers AS'es connecting in dual stack to AS6453



## AS 4755



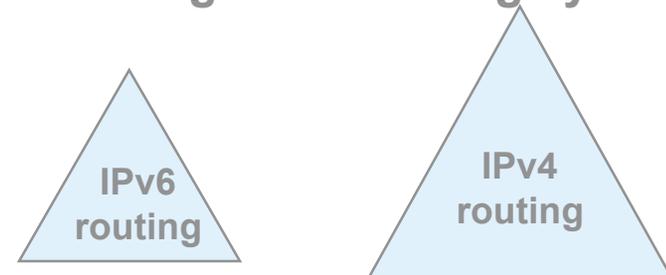
- 117 location across the the India.
- 3-tier Hierarchical topology for better management.
- 9 Big Tier 1 cities including 4 metros
- 7 Major Tier 2 cities.
- 101 Tier 3 cities
- IPv6 dual stack edge 6PE with MPLS core



## Need for IPv4 and IPv6 inter AS routing Congruence

Google made a set of measurements of the deterioration of the user experience in IPv6 compared to IPv4 due in part to longer RTT's largely to blame on excessive use of inter-AS tunnels.

Call for action:



Part of the answer is to make IPv4 and IPv6 routing as congruent as possible. This is only achieved if all transit providing AS'es in the ecosystem connect to each other in dual stack. The major IP wholesale providers already connect dual stack with each other and can greatly accelerate the percolation process down the internet fabric, closer to the eyeballs, by more actively promoting and facilitating dual stack connectivity for their respective AS customers.



Farther  
is the place  
where value  
is born.



**« These days all competitive advantages are fleeting. So the smartest companies are learning to create new ones – again and again and again »**

**Robert D. Hof , Business Week,**

BUSINESS

[www.tatacommunications.com](http://www.tatacommunications.com)