Unleashing Infrastructure Synergies Across Sectors

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Unleashing Infrastructure Synergies Across Sectors

- **It depends on decolonizing the planners' mindset.**

- **State-owned incumbents influence national ICT/telecom policy.**

- **Ministry of Finance is often misguided by "lost revenue" of the incumbent.**
  - **National security is also being exploited.**

- **Incumbent's existence remains protected and subsidized at the cost of greater national interests.**

"Main telephone" kept denying mobile

YEARBOOK OF STATISTICS
Telecommunication Services
Chronological Time Series 1996-2005
July 2007

International Telecommunication Union

BANGLADESH

Land area: 143'998 km2   Currency: Taka

Indicators			Unit	Year Ending 30.06									
				1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
DEMOGRAPHY, ECONOMY													
61	Population	1	10x3	118'946	121'426	123'905	126'398	128'916	131'461	134'029	136'615	139'215	141'822
62	Households	2	10x3	22'546	23'118	23'705	24'307	24'925	25'296	25'673	26'050	26'433	26'821
63	Gross domestic product (GDP)	3	10x9	1'663	1'807	2'002	2'197	2'371	2'535	2'732	3'006	3'330	3'685
652	Average annual exchange rate per US$	3		41.79	43.89	46.91	49.09	52.14	55.81	57.89	58.15	59.51	64.33
66_00	Consumer price index (2000=100)	3		80.71	85.06	92.21	97.84	100.00	102.01	105.41	111.38	121.60	130.16
TELEPHONE NETWORK													
112	Main telephone lines in operation	4		316'081	368'017	412'607	432'968	491'303	564'880	605'931	742'048	830'950	1'070'000
91	Main telephone lines per 100 inhabitants			0.27	0.30	0.33	0.34	0.38	0.43	0.45	0.54	0.60	0.75
1111	% households with a telephone	5	%	0.8	0.9	1.0	1.0	1.1	1.2	2.3	2.8	4.8	...
1142	% digital main lines		%	39.5	55.0	61.2	61.6	66.4	81.4	87.2	94.6	95.8	...
1162	% main lines in urban areas	6		...	...	...	...		92	93	95	95	...
1112	Public payphones	7		3'410	1'981	2'023	2'064	2'128	2'180	2'208	1'550	1'507	...
117	Line capacity of local exchanges			387'769	440'491	462'573	474'322	579'794	688'920	746'078	995'302	1'023'899	...
123	Waiting list for main lines			145'854	127'438	135'420	172'096	135'114	199'110	211'111	153'100	172'232	...
MOBILE SERVICES													
271	Cellular mobile telephone subscribers	8		4'000	26'000	75'000	149'000	279'000	520'000	1'075'000	1'365'000	2'781'560	9'000'000
2712	- Digital cellular subscribers			-	21'000	50'800	97'000	155'000	420'000	1'066'222	1'357'959	2'776'560	...
271p	- Cellular prepaid subscribers			...	...	-	15'000	48'000	200'000	681'890	1'160'415	2'216'655	...
271pop	Coverage of population (%)		%	...	...	...	...	...	40.0	44.0	50.0	70.0	80.0
911	Cellular subscribers per 100 inhabitants			-	-	0.06	0.12	0.22	0.40	0.80	1.00	2.00	6.35

Fiber didn't exist when mobile came to Bangladesh in 1997
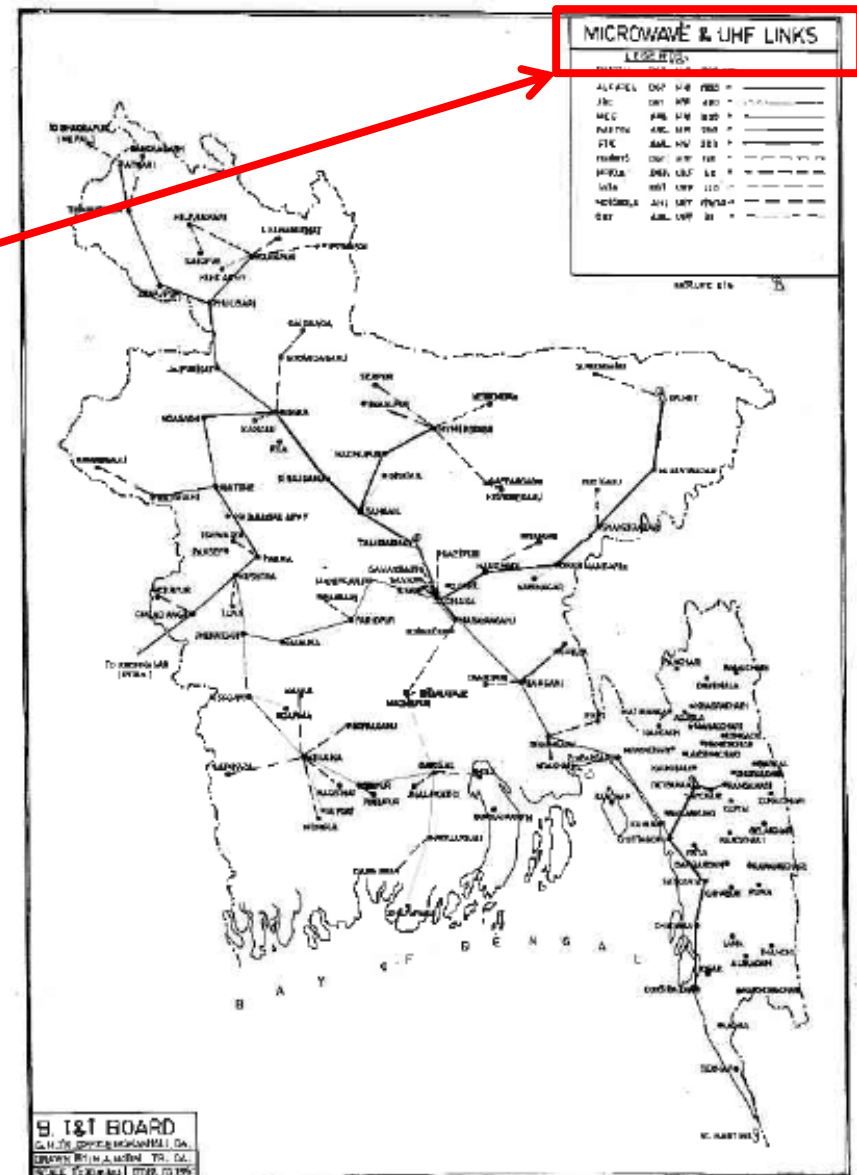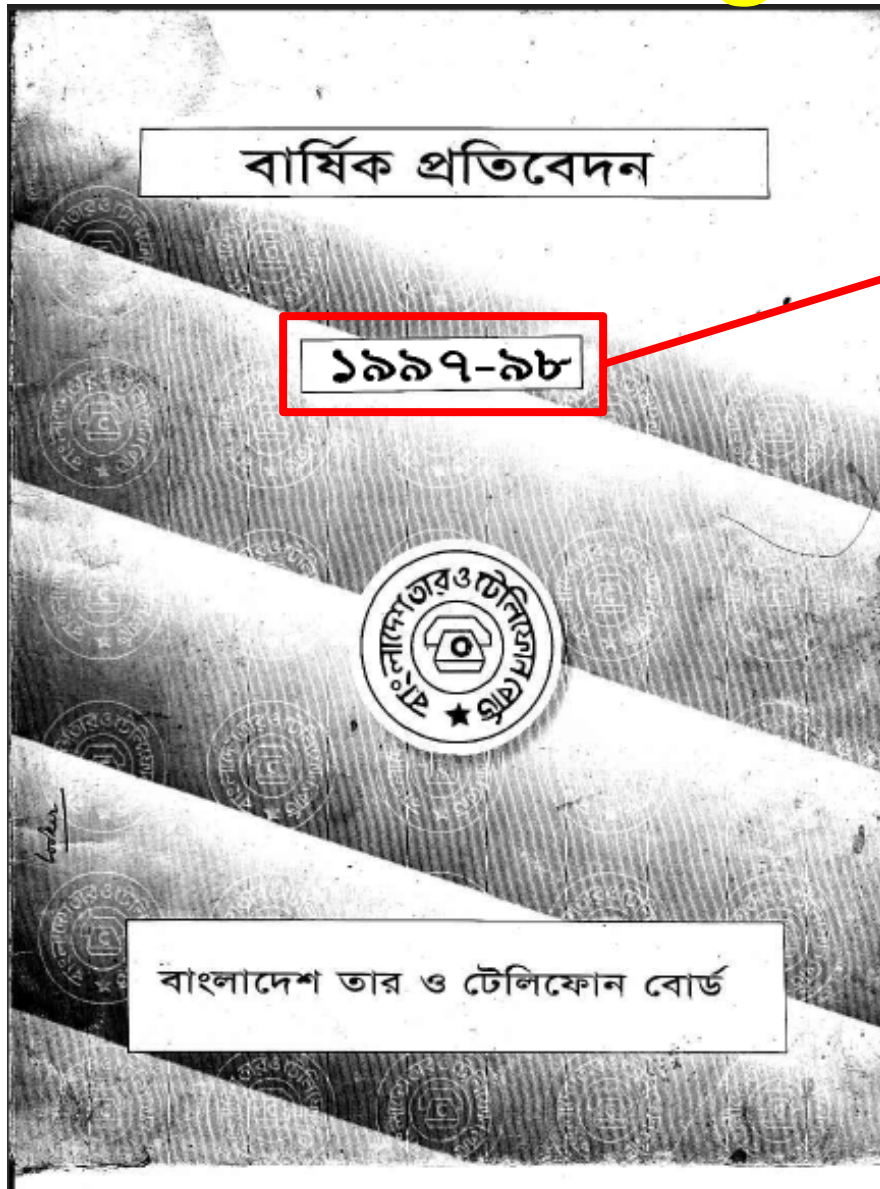
Operators invested >US$400 MM in nationwide TX backbone

Duct Laying

Fiber Assemble inside Tray

Fiber Hand Hole

Fiber Trenching

Company TransTeleCom (TTK)

TTK at a glance

- Founded in 1997. The open joint-stock company Russian Railways owns 100 percent equity in TTK.

- TTK's fiber-optic network spans the entire country of Russia, <u>covering over 55,000 route kilometers</u>. The company operates <u>21 international gateways</u> that link to nearby countries.

- With its Eurasia Highway network, TTK is one of the few competitors in Russia on the Europe-Asia route.

- Capacity on the Eurasia Highway network reaches 220 Gbps. TTK is upgrading portions of the system with 40 Gbps wavelengths. Once completed, this upgrade will enable throughput of 1.6 Tbps per fiber pair.

- TTK jointly owns with NTT a submarine cable from Sakhalin Island to Japan called the Hokkaido Sakhalin Cable System (HSCS).

India: Railtel and GAILTEL

Railtel

Gas Authority of India Ltd. (GAIL)

Railtel and GAILTEL at a glance

Railtel

- Established in 2000 by the publicly owned Ministry of Railways, was created to develop and market the extensive communications network associated with the rail system in India.
- RailTel currently has over 42,000 route kilometers of optical network and has plans to lay another 12,000 route kilometers of fiber in the near future.
- Railtel's network is much more extensive than shown.

GAILTEL

- GAILTEL operates a 13,000 route-kilometer fiber-optic network both for internal GAIL communications and to offer leased bandwidth services for corporations.
- The company has a national backbone consisting of 10 Gbps links between major population centers and reaches 150 cities throughout India.
- City list is not exhaustive. Please consult GAIL directly for a list of all Points of Presence.

World's first: 100G OPGW Network of CFE Telecom in Mexico

- Mexican state-owned monopoly utility
- Nationwide 22,000-km optical network with 100G channel rate
- Key differentiators:
  - Unique All-Raman – EDFA hybrid approach
  - Longest reach and highest capacity
  - Large distribution of span lengths (from 8 to 250 km)
  - Avoid installation of numerous repeaters and costly new huts
  - Data paths in excess of 2,400 km with no regenerators
  - Best usage of existing outside plant
  - Lowest CapEx & OpEx

Monterrey

Mexico City

— DWDM Network

Oil-rich GCC consortium MEETS Europe

- Middle East-Europe Terrestrial System (MEETS):
  - Vodafone Qatar, du of the United Arab Emirates (UAE), Zain and Zajil of Kuwait.

- MEETS has rented 1,400-km OPGW from the power transmission grid of Gulf Cooperation Council's (GCC) interconnection authority for 15 years.

- MEETS network will run from Kuwait to Fujairah (UAE) via Saudi Arabia, Bahrain and Qatar. Its final destination is Turkey via Iraq.
  - The consortium is yet to disclose its mode of transport while crossing the highly challenging (in every respect) terrains of Iraq.

- The consortium will invest US$36 million to primarily inject 2300 Gbps capacity using 100G optical transport network (OTN) technology.
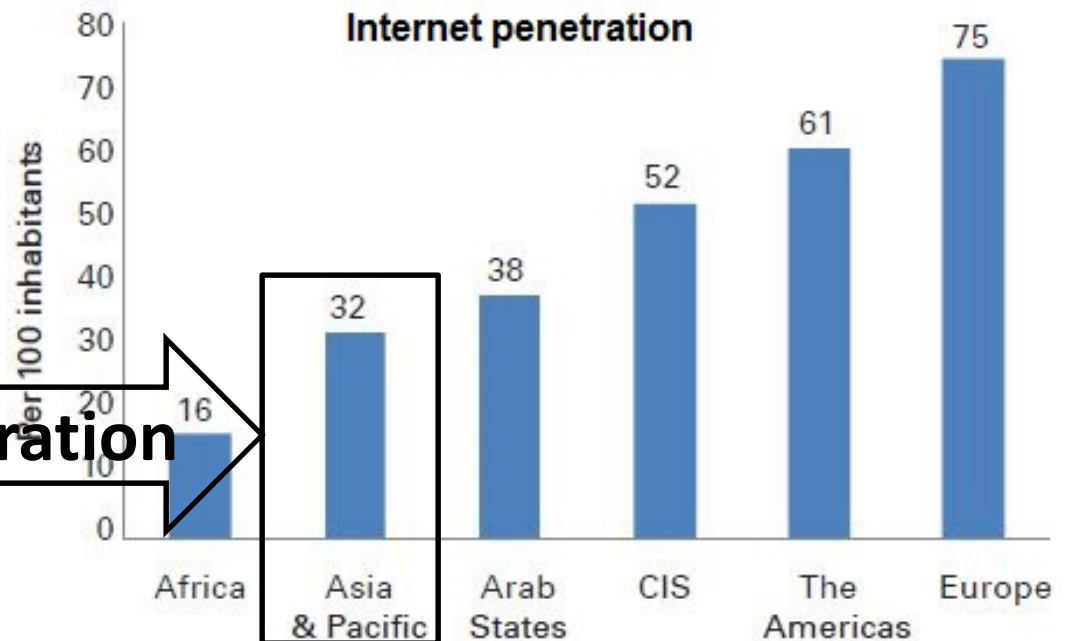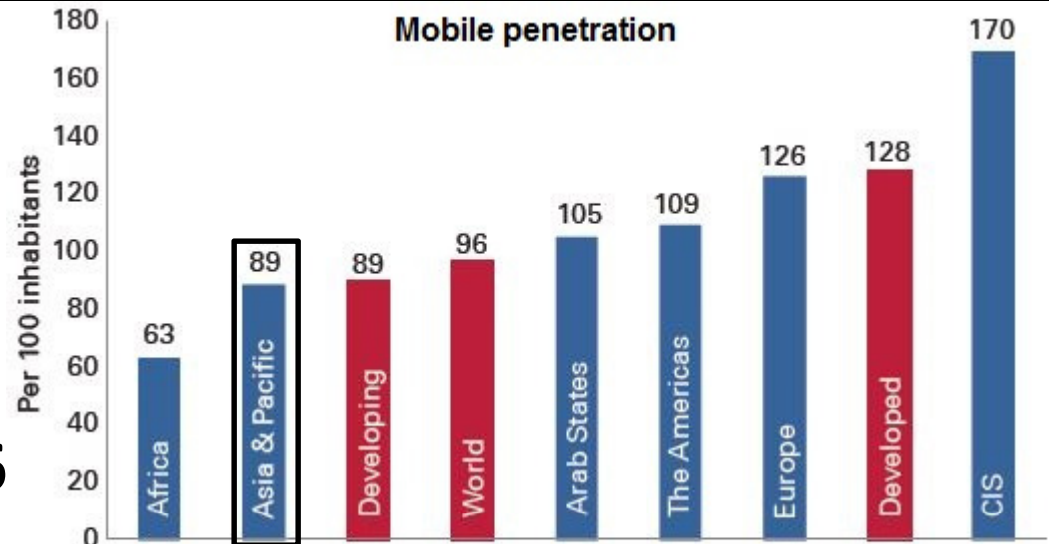
Timeline

- **Regional Expert Consultation on Connecting Asia-Pacific's Digital Society for Building Resilience.**
  - 5-6 September 2012, Colombo, Sri Lanka

- **Building E-Resilience through ICTs and Space Technology.**
  - 20-21 November 2012, Bangkok, Thailand

- **Expert Consultation on the Asian Information Superhighway and Regional Connectivity.**
  - 24-25 September 2013, Manila, Philippines

Now: Expert Consultation on the Asian information superhighway and regional connectivity, 3-4 December 2013, Baku, Azerbaijan.

Asia and Pacific lags behind
(Graphs: ITU World Telecommunication /ICT Indicators database)

- **APAC is economic growth engine of the world.**

- **Altogether more than $16 trillion economies.**

- **Home of more than 60% global population.**

- **Only 32% Internet penetration**

Mobile penetration — Per 100 inhabitants: Africa 63, Asia & Pacific 89, Developing 89, World 96, Arab States 105, The Americas 109, Europe 126, Developed 128, CIS 170

Internet penetration — Per 100 inhabitants: Africa 16, Asia & Pacific 32, Arab States 38, CIS 52, The Americas 61, Europe 75

Median 10 GigE IP Transit Prices in Major Global Cities, Q2 2010-Q2 2013
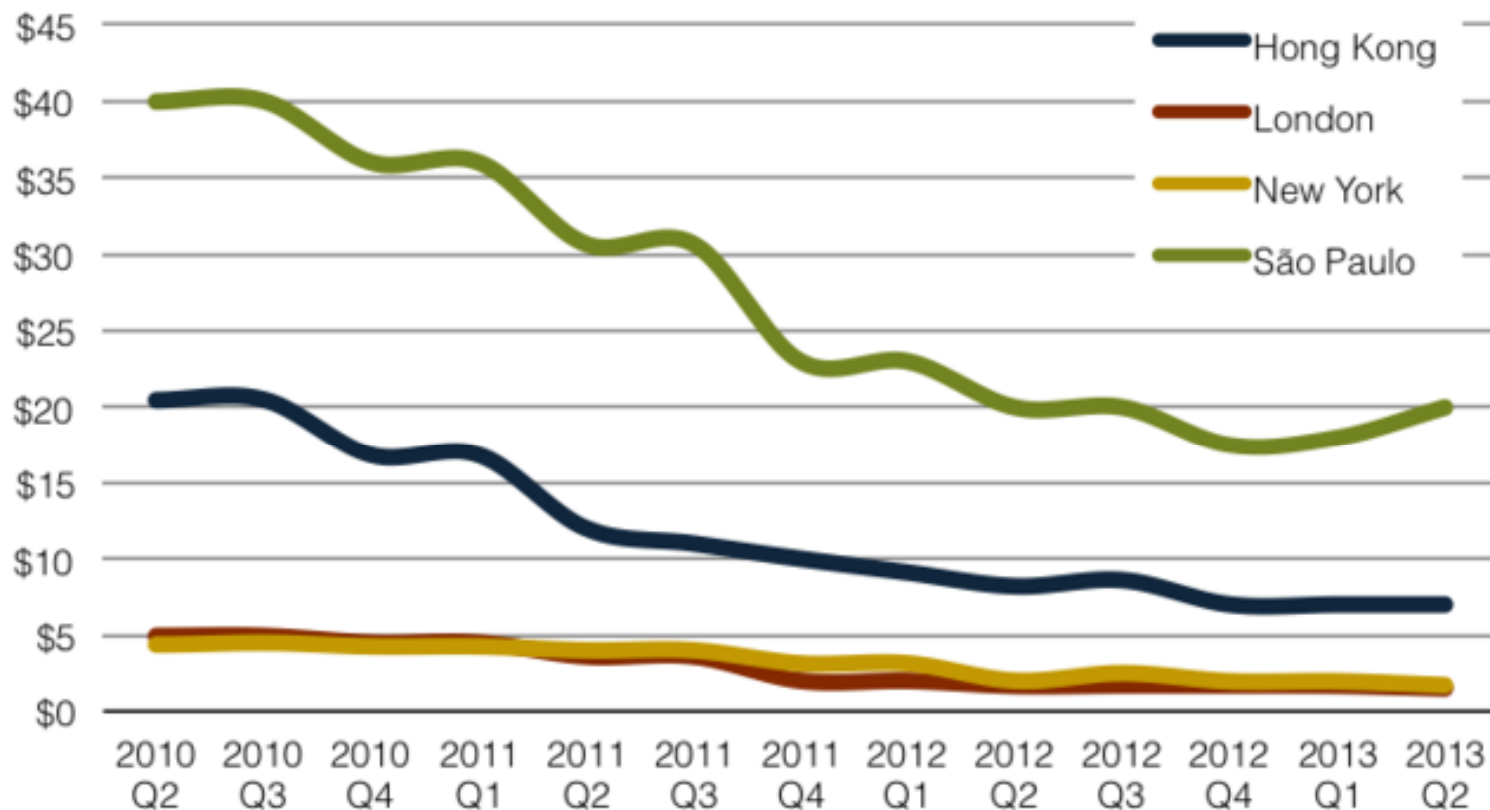
"While prices have declined globally, significant geographic differences persist. For example, the median Hong Kong 10 GigE price has remained 3 to 5 times the price of a GigE port in London over the past 3 years. Developing Asian nations procure wholesale Internet bandwidth mostly from Singapore and Hong Kong at price 11-times that of Europe." - TeleGeography and Terabit Consulting.

Infrastructure divide = Broadband divide

Fierce competition
- Coast-coast terrestrial

Good competition
- Terrestrial & submarine

Broadband's biggest barrier
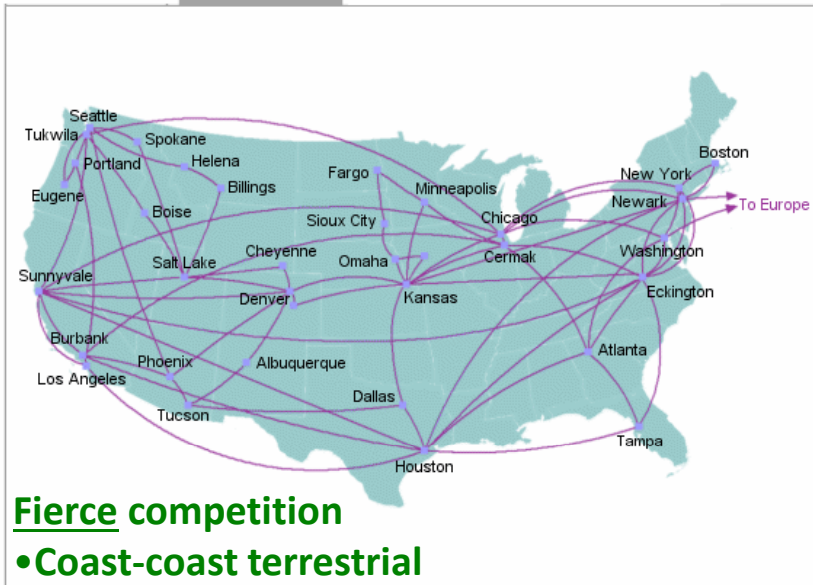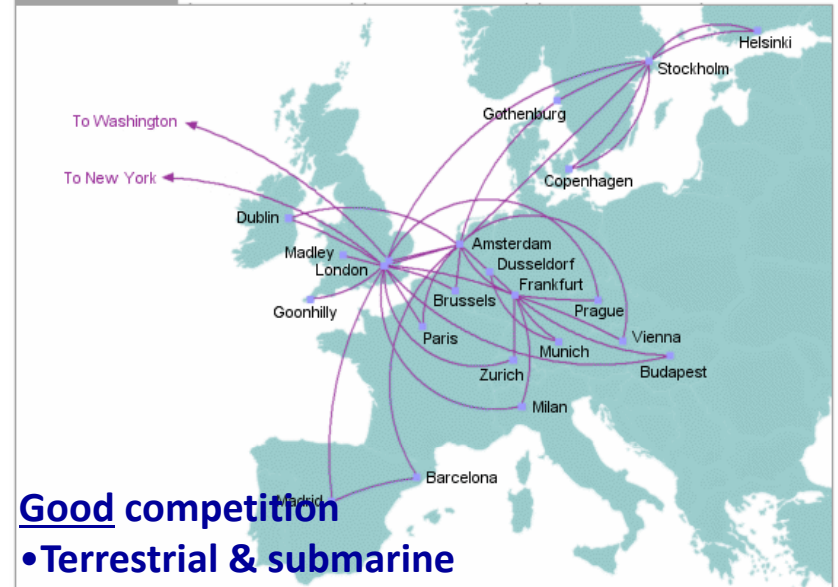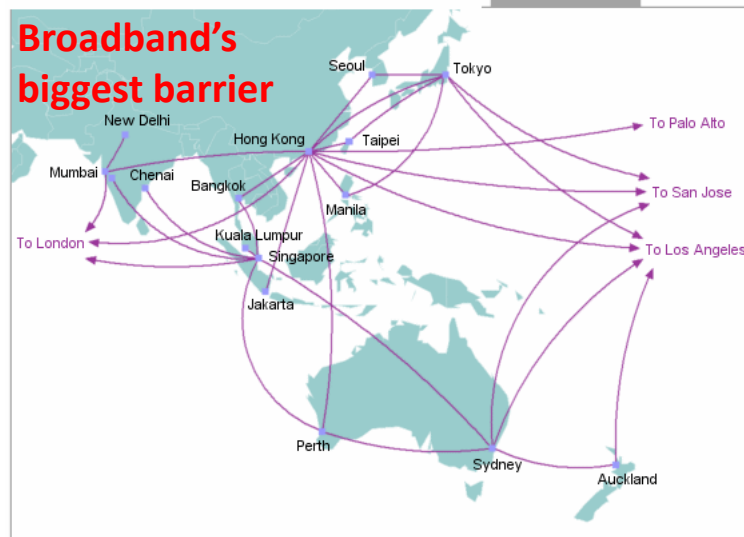
Poor competition

All submarine
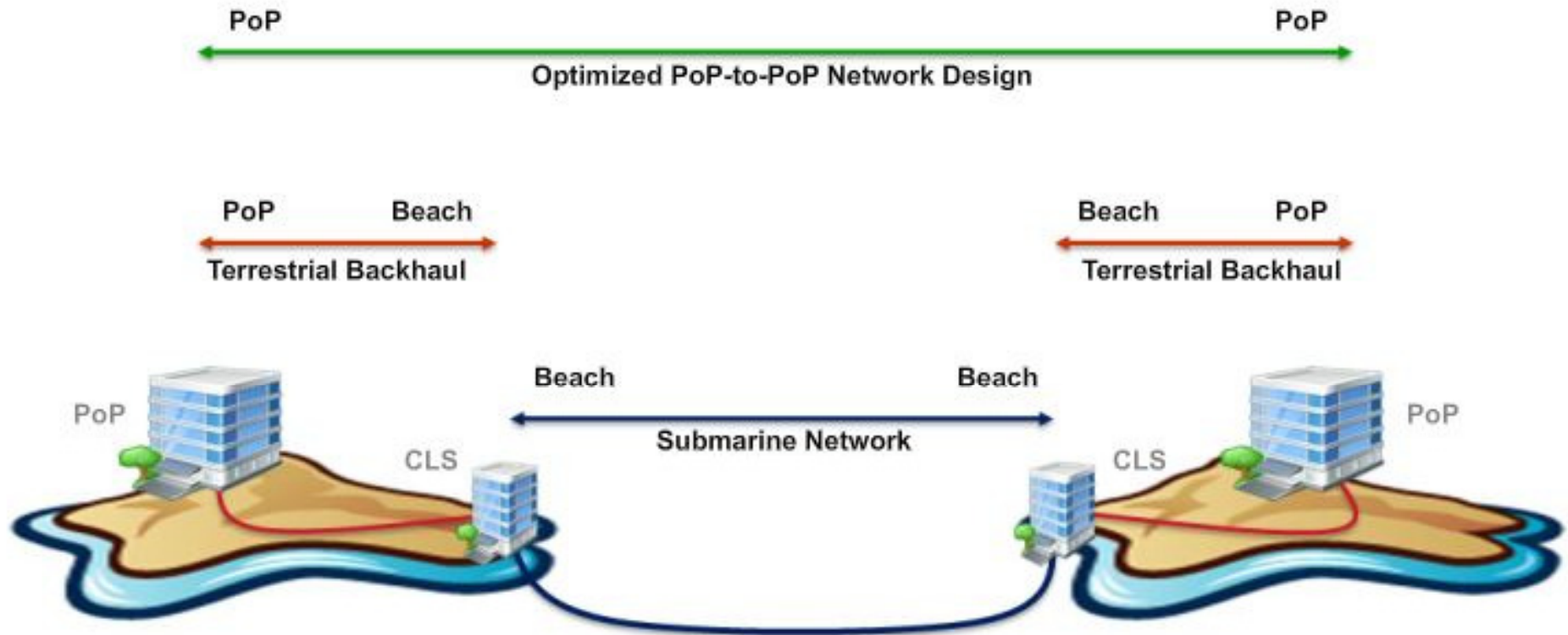
Courtesy: Ciena

Submarine networks = Terrestrial networks

Courtesy: Ciena

OECD wired broadband penetration 2012 demystifies access to submarine cable
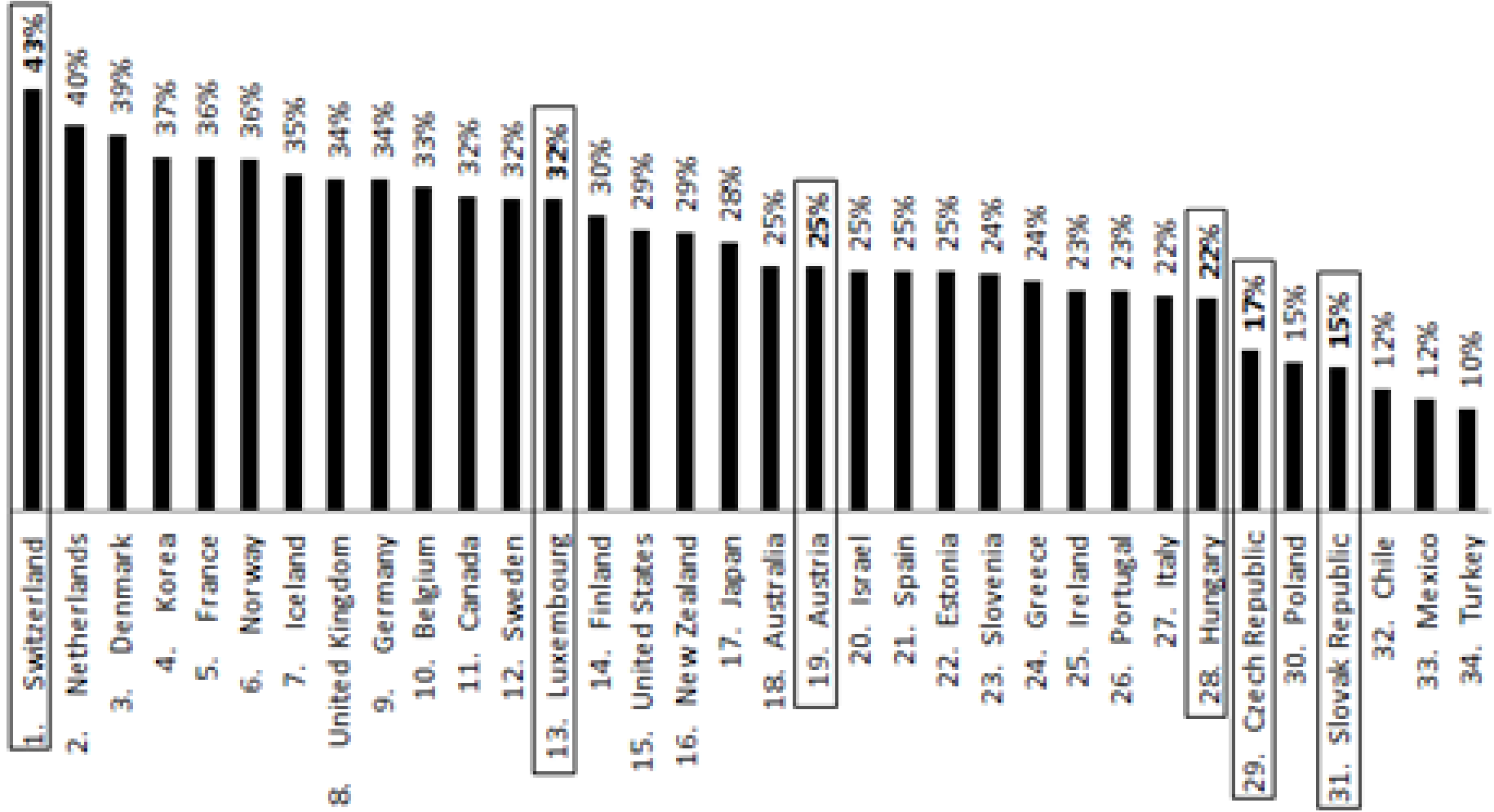
OECD wireless broadband penetration 2012 also demystifies access to submarine cable

Rank	Country	Penetration
1.	Finland	107%
2.	Sweden	103%
3.	Australia	103%
4.	Korea	103%
5.	Denmark	97%
6.	United States	90%
7.	Japan	85%
8.	Norway	84%
9.	Luxembourg	79%
10.	New Zealand	77%
11.	Estonia	74%
12.	Iceland	72%
13.	United Kingdom	72%
14.	Ireland	66%
15.	Poland	61%
16.	Netherlands	61%
17.	Switzerland	58%
18.	Austria	56%
19.	Spain	54%
20.	Czech Republic	54%
21.	Italy	52%
22.	Israel	51%
23.	France	51%
24.	Greece	45%
25.	Canada	42%
26.	Portugal	42%
27.	Germany	41%
28.	Slovak Republic	40%
29.	Belgium	33%
30.	Slovenia	31%
31.	Chile	28%
32.	Turkey	16%
33.	Hungary	15%
34.	Mexico	11%
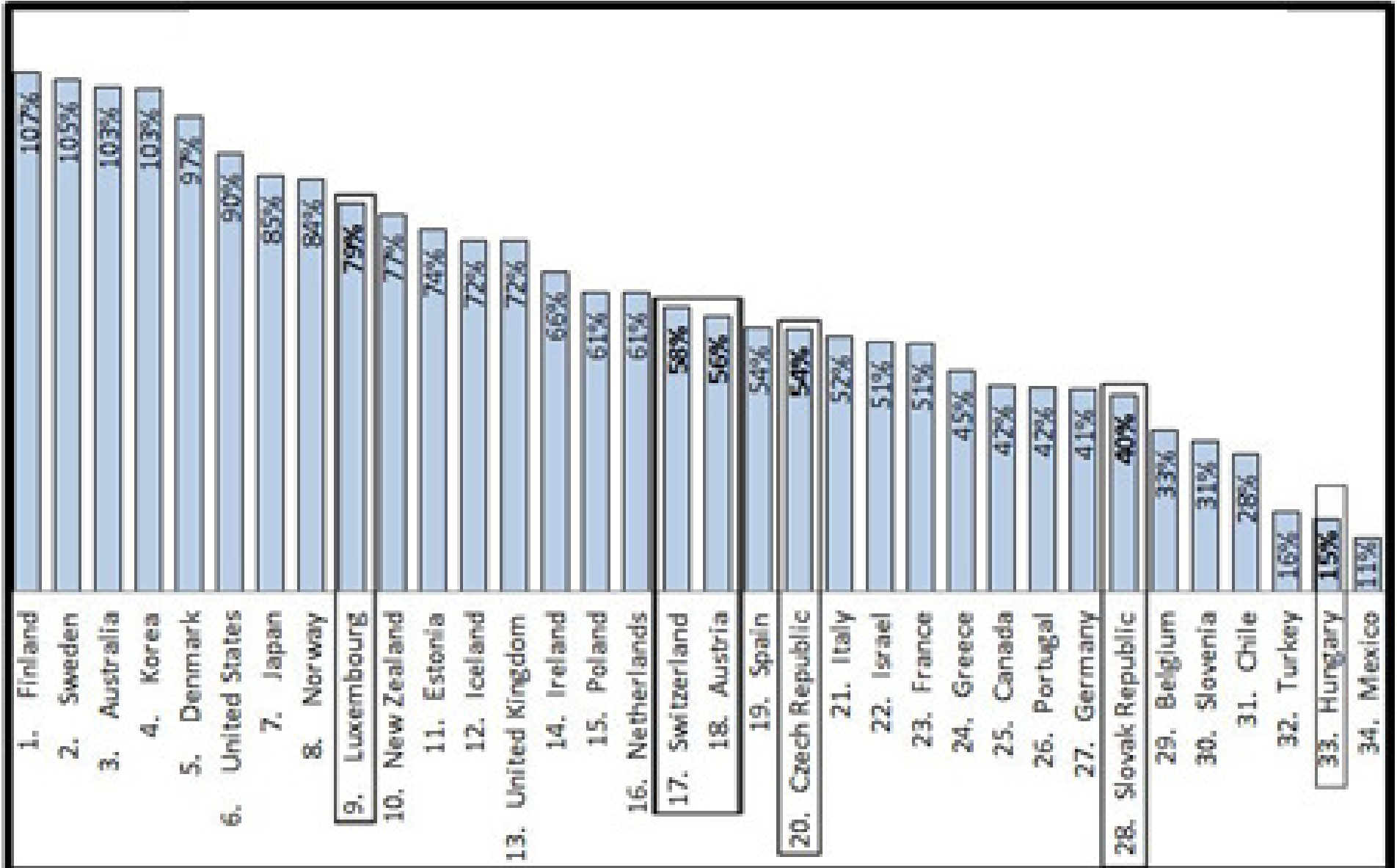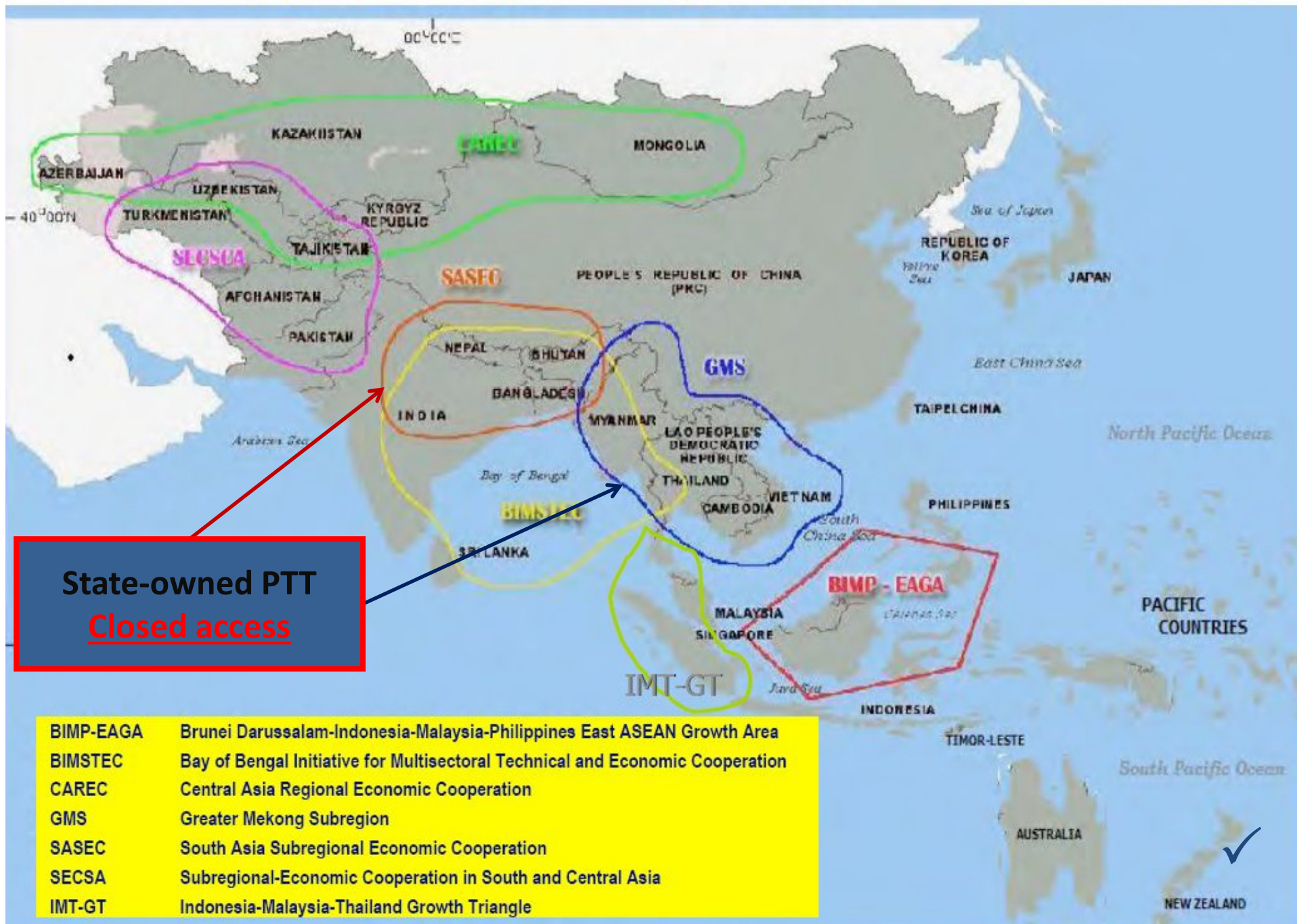
Asian Highway has connected:
Russia, India, China, Turkey, Central Asia, SAARC, ASEAN+2

ASIAN HIGHWAY ROUTE MAP

A network of 141,000 km of standardized roadways crisscrossing 32 Asian countries connecting EU.
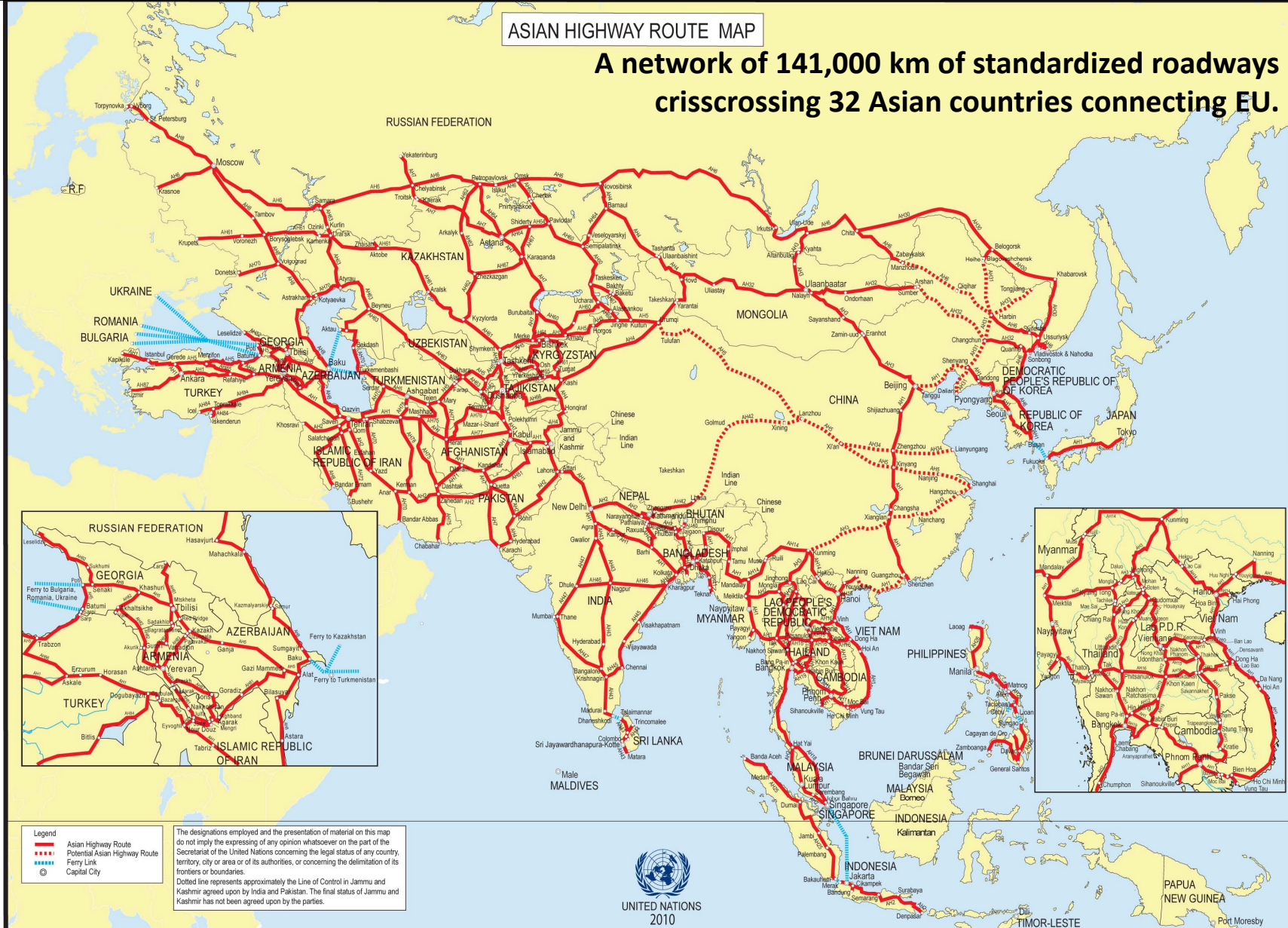
Each country's share in Asian Highway

Country	Length (km)	Country	Length (km)
1. Afghanistan*	4,247	17. Malaysia	1,595
2. Armenia	966	18. Mongolia*	4,286
3. Azerbaijan	1,462	19. Myanmar	3,003
4. Bangladesh	1,768	20. Nepal*	1,314
5. Bhutan*	167	21. Pakistan	5,377
6. Cambodia	1,335	22. Philippines	3,517
7. China	26,181	23. South Korea	907
8. DPR Korea	1,462	24. Russia	17,046
9. Georgia	1,101	25. Singapore	19
10. India	11,650	26. Sri Lanka	650
11. Indonesia	3,970	27. Tajikistan*	1,925
12. Iran	11,153	28. Thailand	5,110
13. Japan	1,111	29. Turkey	5,245
14. Kazakhstan*	12,856	30. Turkmenistan*	2,204
15. Kyrgyzstan*	1,695	31. Uzbekistan*	2,966
16. Lao PDR*	2,317	32. Viet Nam	2,631
Source: ESCAP		*Landlocked developing country (LLDC)	

The Cloud Readiness Index 2012

Cushman & Wakefield

	Data Privacy	International Connectivity	Data Sovereignty	Broadband Quality	Government online servives and ICT Prioritization	Power Grid and Green Policy	Intellectual Property Protection	Business Sophistication	Data Center Risk	Freedom of Information Access	Cloud Readiness Index	Rank	Change since 2011
Japan	9.0	10.0	5.6	7.6	7.9	7.8	7.6	8.4	6.0	8.9	78.8	1	⬡
Korea	9.0	8.0	6.2	9.0	9.1	7.1	5.9	6.9	7.4	7.7	76.3	2	⬆
Hong Kong	7.5	7.4	7.6	7.6	8.4	5.7	7.9	7.1	8.0	8.7	75.9	3	⬇
Singapore	4.5	9.2	8.1	6.3	9.5	5.7	8.7	7.3	6.4	7.1	72.8	4	⬇
Taiwan	7.0	7.5	5.9	6.1	8.8	7.1	7.1	7.5	6.5	8.9	72.4	5	⬡
New Zealand	9.0	1.3	8.1	5.4	7.8	8.3	8.3	6.6	7.1	8.9	70.8	6	⬡
Australia	7.5	2.7	7.3	6.0	8.2	7.5	7.6	6.7	5.6	8.6	67.7	7	⬇
Malaysia	7.5	4.6	5.6	3.7	8.2	6.2	7.0	7.1	6.2	6.9	63.0	8	⬇
India	6.0	8.4	4.7	2.4	6.3	3.3	5.0	6.1	3.1	7.6	52.7	9	⬡
China	4.0	5.0	3.5	3.5	6.6	4.5	5.7	6.2	5.1	7.1	51.2	10	⬇
Indonesia	6.0	4.8	2.1	2.2	5.7	4.9	5.1	6.0	3.1	7.2	47.1	11	⬡
Philippines	2.5	4.6	4.3	2.3	5.5	5.8	4.0	5.9	3.6	7.5	46.0	12	⬆
Thailand	3.0	2.8	1.5	5.9	5.5	4.8	4.4	6.0	3.6	7.4	44.9	13	⬇
Vietnam	5.0	3.2	3.9	2.2	5.9	3.8	3.6	5.3	5.4	6.6	44.9	13	⬇

Source: Asia Cloud Computing Association

Cushman & Wakefield Data Center Risk Index - 2013

			TIER 1 60%			TIER 2 35%							TIER 3 5%				
2013 RANK	INDEX SCORE 1ST = 100	COUNTRY	ENERGY COST	INT'L BANDWIDTH	EASE OF DOING BUSINESS	CORPO-RATION TAX	COST OF LABOUR	POLITICAL STABILITY	SUSTAIN-ABILITY	NATURAL DISASTER	EDUCA-TION	ENERGY SECU-RITY	GDP PER CAPITA	INFLA-TION	WATER AVAILABILTY	2012 RANK	POSI-TION CHANGE
1	100.00	US	3	1	3	30	18	20	20	29	1	17	8	10	11	1	0
2	89.53	UK	21	2	5	12	16	15	26	12	13	23	17	17	21	2	0
3	82.29	SWEDEN	15	10	10	11	26	3	4	3	9	15	6	4	9	8	5
4	81.29	GERMANY	19	4	15	25	25	8	15	9	16	20	15	10	24	3	-1
5	81.16	CANADA	4	11	13	19	20	2	10	23	2	1	7	5	2	5	0
6	79.63	HONG KONG	27	3	2	4	9	10	28	16	23	29	5	22	22	7	1
7	79.47	ICELAND	8	29	11	8	21	20	1	18	7	8	14	24	1	4	-3
8	79.45	NORWAY	13	19	4	19	30	1	3	15	12	6	2	3	3	12	4
9	78.74	FINLAND	11	22	8	13	24	3	7	1	15	30	12	20	7	9	0
10	78.37	QATAR	1	30	21	2	28	12	30	2	19	7	1	8	30	6	-4
11	77.11	SWITZERLAND	9	15	17	1	29	5	9	13	18	11	3	1	13	10	-1
12	76.26	NETHERLANDS	16	6	18	15	22	10	23	5	10	16	11	16	15	14	2
13	74.59	KOREA, REP.	6	21	6	13	13	19	12	20	8	26	19	12	19	13	0
14	73.98	FRANCE	17	5	19	27	23	20	17	10	20	18	16	12	18	11	-3
15	72.49	SINGAPORE	23	14	1	5	14	17	29	4	17	22	9	26	29	17	2
16	68.96	MALAYSIA	7	28	9	15	8	26	22	19	26	3	25	7	8	19	3
17	67.43	POLAND	18	16	24	6	10	13	18	7	21	24	22	21	25	22	5
18	67.09	IRELAND	24	26	12	3	19	15	24	14	6	21	13	6	10	16	-2
19	66.73	THAILAND	12	23	14	8	3	29	8	22	22	14	28	18	14	15	-4
20	65.55	SOUTH AFRICA	5	27	20	19	7	29	13	8	30	10	26	29	28	18	-2
21	65.15	SPAIN	22	11	22	22	15	24	14	11	10	25	18	14	20	21	0
22	64.14	CZECH REP.	20	19	25	6	12	7	19	6	24	12	20	19	27	25	3
23	62.70	AUSTRALIA	28	18	7	22	27	6	21	21	5	2	4	8	6	23	0
24	61.56	RUSSIA	2	9	27	8	6	26	27	24	4	5	21	27	5	24	0
25	58.91	CHINA	10	13	26	15	5	18	11	25	27	13	27	15	23	26	1
26	55.12	JAPAN	29	8	16	29	17	8	25	30	3	27	10	2	17	20	-6
27	52.01	MEXICO	26	24	23	22	2	25	16	27	14	9	24	22	16	27	0
28	46.37	INDONESIA	14	25	28	15	1	28	5	26	29	4	29	25	12	28	0
29	40.85	INDIA	25	16	30	28	4	13	6	28	28	28	30	30	26	29	0
30	35.15	BRAZIL	30	6	29	26	11	23	2	17	25	19	23	28	4	30	0

China goes to Europe via Russia

China Telecom Europe – Euro-Asia Network
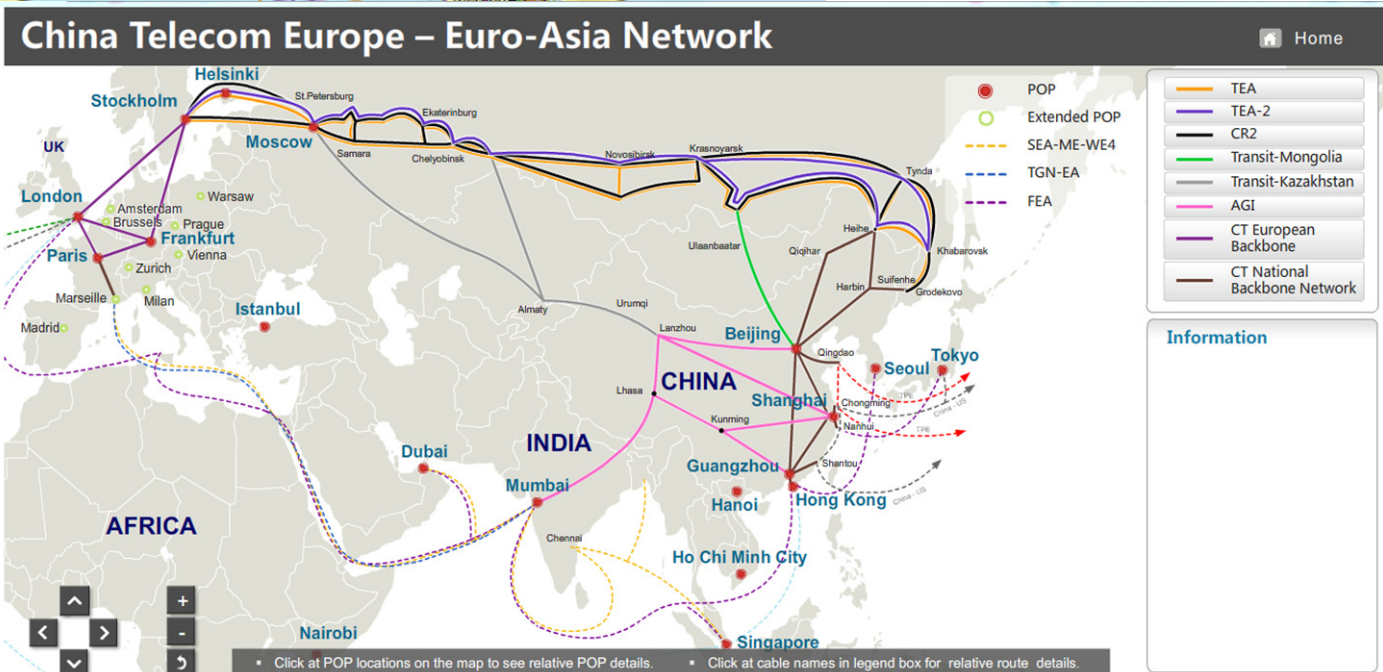
ME-Europe gets terrestrial

Jeddah-Amman-Damascus-Istanbul (JADI)

Regional Cable Network (RCN)

Bypass Egypt
Dodge the pirates

Iran and Oman also detour

Europe Persia Express Gateway

"EPEG is now the Internet's fastest path between the Gulf and Europe, shaving at least ten percent off the best submarine cable round trip time from Dubai to Frankfurt." Jim Cowie, Renesys. 26 Sep, 2013.
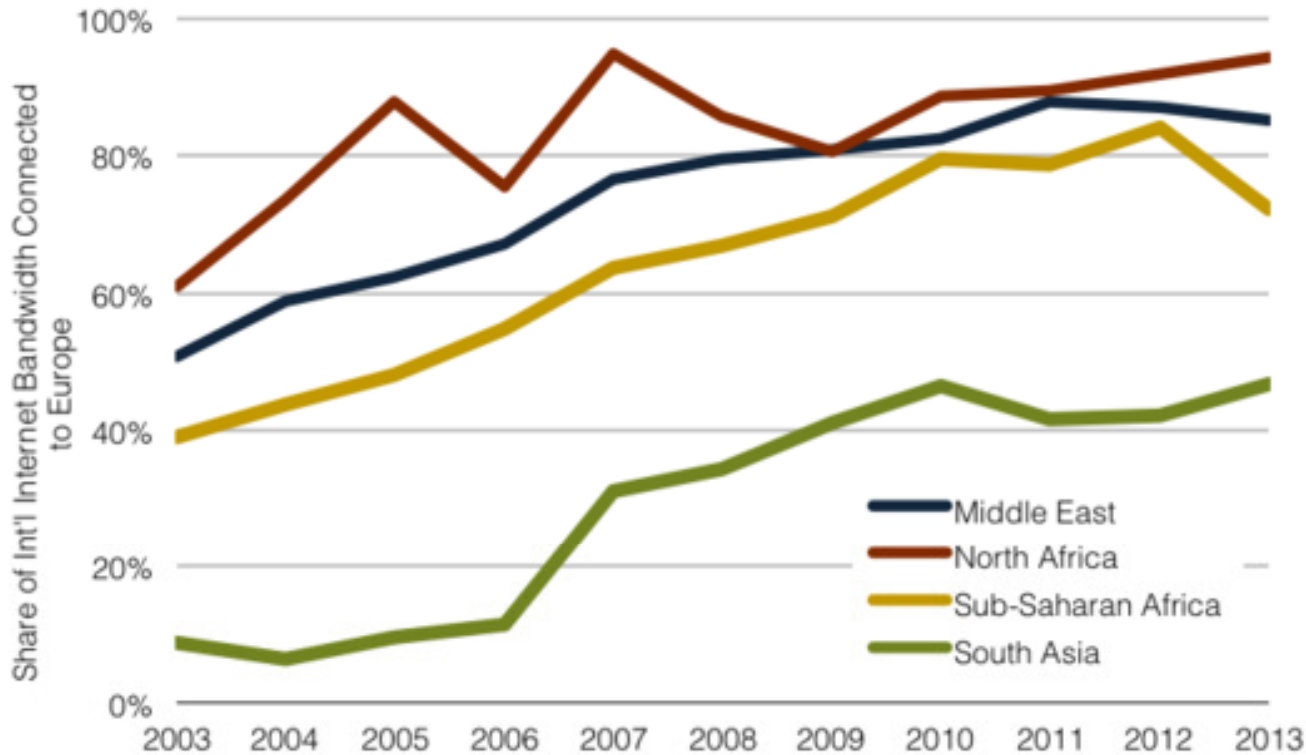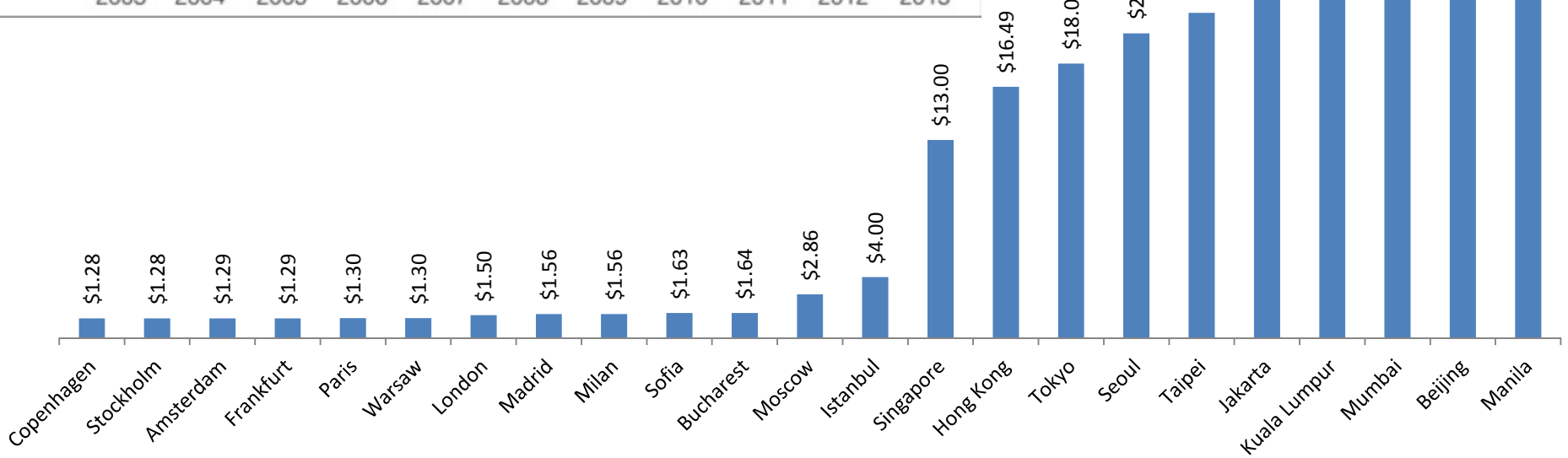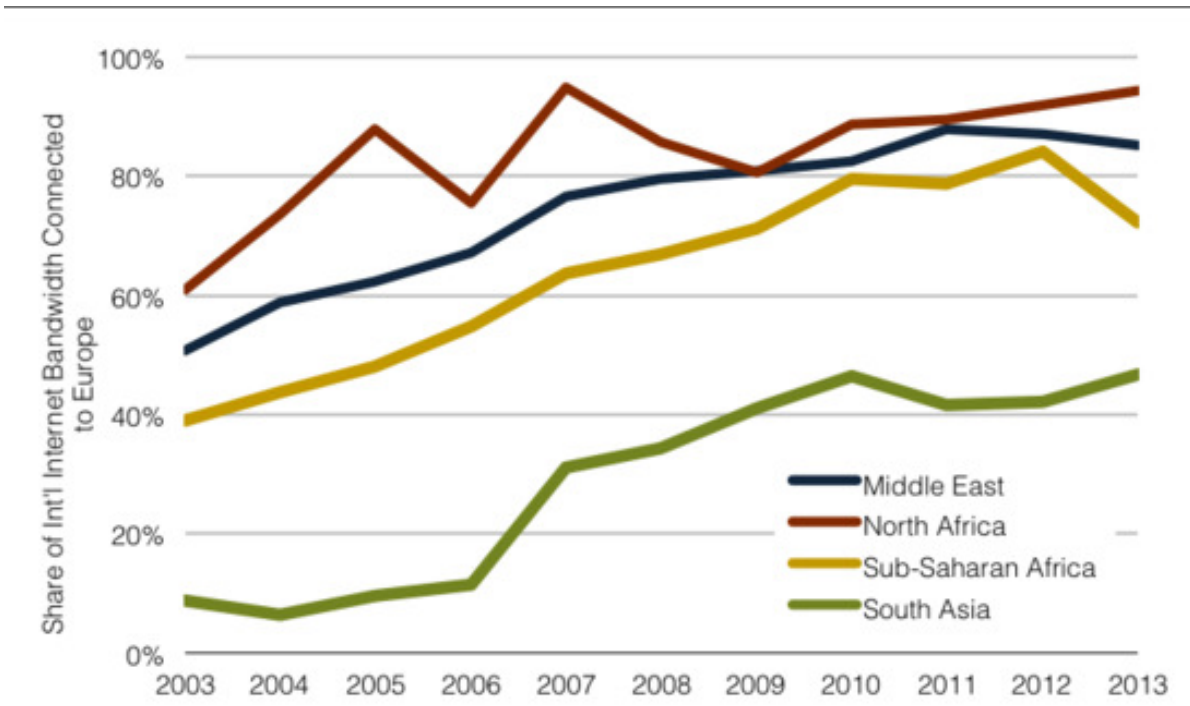
APAC to Europe via Middle East?

1) 2008: Reliance and **China Mobile** terrestrial link.

2) 2009: Tata and **China Mobile** terrestrial link.

3) 2010: Bharti and **China Mobile** terrestrial link.

Why rush to Europe?

- **Middle East's internet connectivity with Europe has sharply grown from 51% to 85% during 2003~2013.**

- **Europe now accounts for 94% of international Internet bandwidth connected to North Africa, up from 61% ten years ago.**

- **Sub-Saharan Africa's 72% bandwidth to Europe, up from 39% a decade ago.**

- **Less than 6% of South Asian capacity was connected to Europe in 2003 while it is over 46% today.**

The embedded chart shows "Share of Int'l Internet Bandwidth Connected to Europe" (y-axis, 0%–100%) over years 2003–2013, with series: Middle East, North Africa, Sub-Saharan Africa, South Asia.

The bar chart shows monthly median IP transit prices by city:

| City	Price
Copenhagen	$1.28
Stockholm	$1.28
Amsterdam	$1.29
Frankfurt	$1.29
Paris	$1.30
Warsaw	$1.30
London	$1.50
Madrid	$1.56
Milan	$1.56
Sofia	$1.63
Bucharest	$1.64
Moscow	$2.86
Istanbul	$4.00
Singapore	$13.00
Hong Kong	$16.49
Tokyo	$18.00
Seoul	$20.00
Taipei	$21.34
Jakarta	$22.40
Kuala Lumpur	$26.85
Mumbai	$32.50
Beijing	$40.00
Manila	$49.98

Monthly median IP Transit prices per Mbps, Q2 2013

**Asian Highway has already linked the borders.
A fully meshed terrestrial telecom network is waiting.**

Target: Open-access
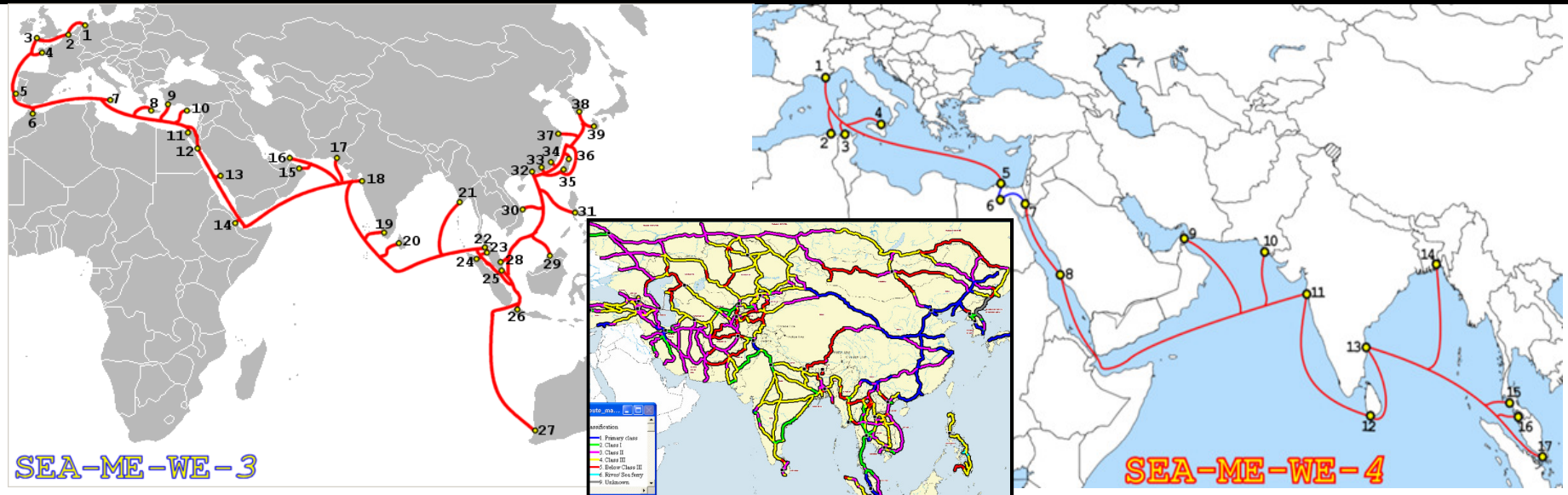
SEA-ME-WE-3

SEA-ME-WE-4

1) **Diversity and Redundancy to all submarine cables linking Asia with Europe and the USA via Japan through a Terrestrial Consortium.**

2) **Migrate SEA-ME-WE (3 & 4) from offshore to on-shore.**
   - ❏ **Also let all private carriers to migrate.**

3) **No regulatory disruption. Only the licensed carriers will access the Asian Information Highway.**

Advantages

- **Presumed 'unfriendly' countries are already interlinked.**
  - Submarine : [SEA-ME-WE 3 and SEA-ME-WE 4.](#)
  - Terrestrial: Sino-Russian link (TEA) and Sino-Indian link (Reliance/Tata/Bharti + China Mobile).

- **Highly resilient due to being meshed.**
  - Rerouting the traffic means 'zero' downtime.
  - Installation and maintenance crew/materials available everywhere.

- **Creates more opportunities for submarine cables.**
  - Investments in transpacific rather than intra-Asia.
  - <u>Lower</u> latency and <u>higher</u> SLA at <u>lesser</u> cost for intl' bandwidth.

Open access guaranteed

Impacts

- **Internet in Asia will be <u>similar to</u> or <u>cheaper than</u> the EU.**
  - **Mobile broadband (HSPA/LTE) will grow like 2G voice.**
    - **Smart devices and Wi-Fi offload will accelerate the data growth.**
  - **Investments in broadband will increase.**
  - **There will be higher ROI in FTTx.**

- **More international and domestic PoPs/access nodes will emerge.**
  - ✓ **Landlocked countries will have bandwidth at equal cost.**
    - ❑ **<u>Sub-regional telecoms initiatives have not delivered that.</u>**
  - ✓ **Pacific islands will enjoy reduced bandwidth cost in the mainland.**

- **International Gateway (IGW) reforms will be accelerated.**
  - **Usage of submarine cables' purchased capacity will be maximized.**
  - **Carriers will commit longer contracts.**

National broadband <u>backbones</u> will require lesser subsidies.

Next: Inclusive engagement