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The Complementary Role of Satcom

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Agenda

- Broadband-for-All and its impact
- Current status for Broadband in India
- Satellite as Complementary Technology
- In Summary
- Plagiarism is the sincerest form of flattery

Key Indicators

Internet flattened the world – Thomas Friedman in “The World is Flat”

1.4%

Growth of a nation’s GDP, for every 10% increase in BB penetration

- World Bank / ADB
- McKinsey
- Booz and Co.

537 Bn

Contribution of BB to India’s GDP in 2020

- Between 16%-18% of the GDP
- Close to 50% through mobile apps

61.06

Total Internet Subscribers per 100 population

- 35% growth rate of BB penetration
- Cheapest data rates
- Data consumption per capita saw exponential growth

Economic Benefits and Digitization

Business

~630 Lakhs MSMEs

3 Lakh SMEs
5000 Medium Enterprises

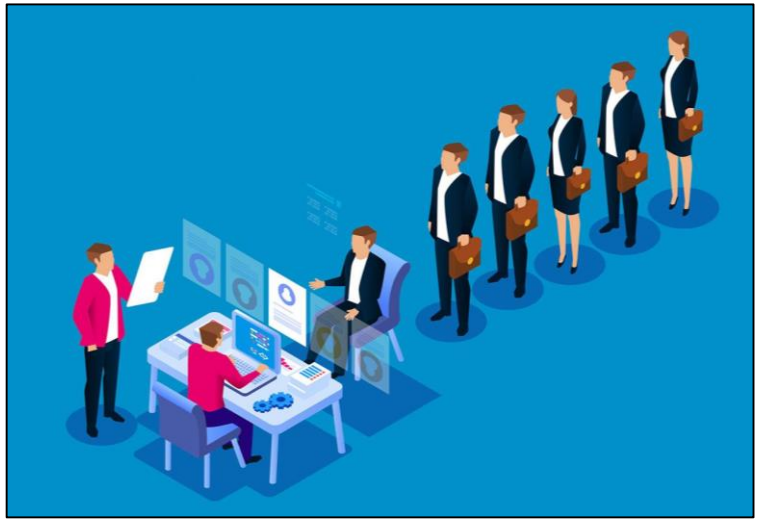
Startup Ecosystem

India has the 3rd largest startup ecosystem

~8K startups in 2018; up to ~9000 in 2019
YoY growth of 12%-15%
Upto 1.6-1.7 Lakh direct jobs generated

Employment

2.8Mn jobs in next 8-10 years from IOT and AI apps



Social Benefits and Digitization

Financial Inclusion

80+%

Indians with Bank Accounts
Versus
69% in South Africa and 93% in USA

Education

6.5 years

India's Average Schooling years
Versus
8.6 years average for the world

Healthcare

1 : 1456

Rural India's doctor to population ratio
Versus
WHO recommended ratio of 1:1000

Internet Penetration – current status

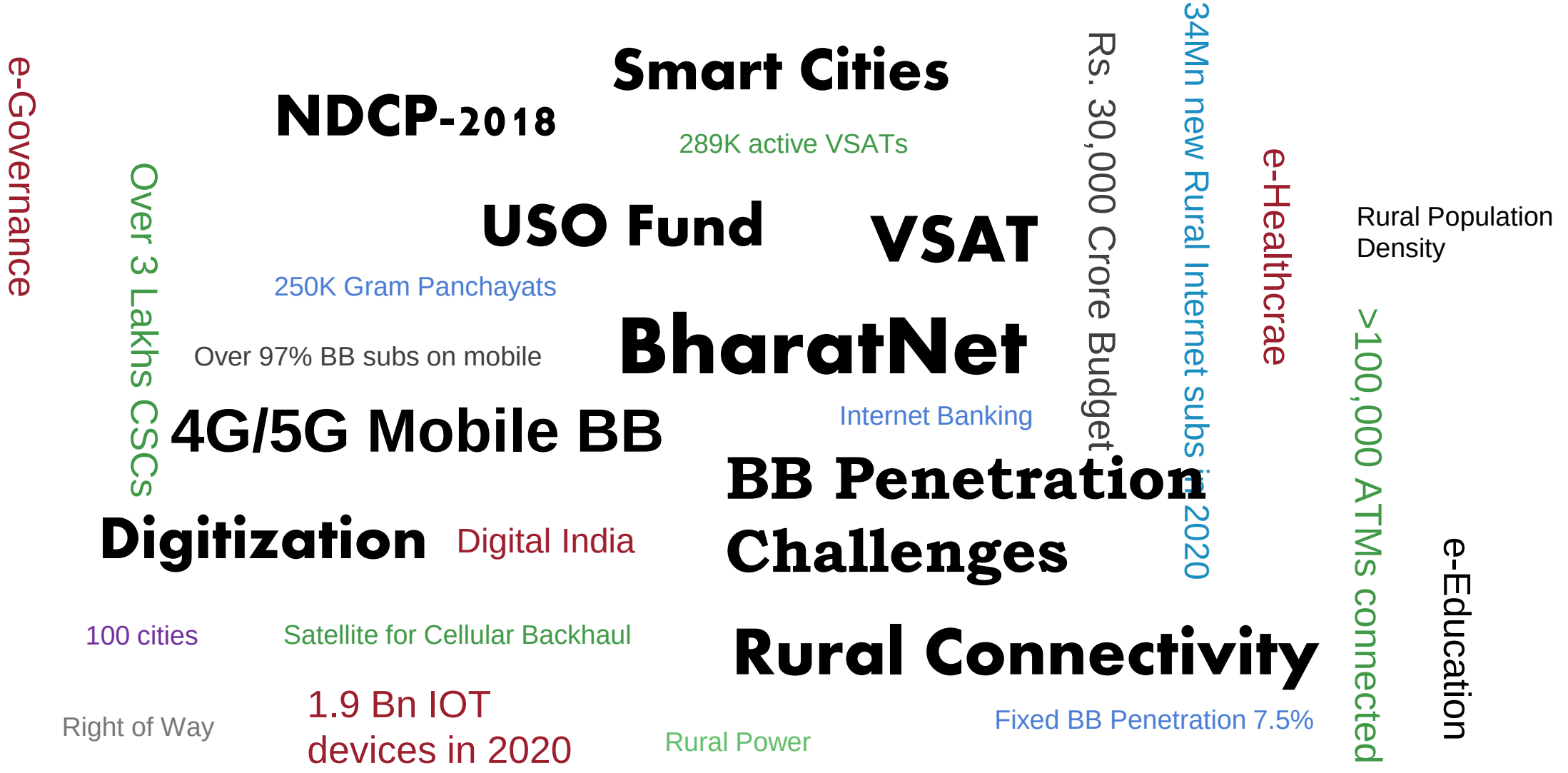
“The devil is in the details, but so is salvation.”

Internet Subs in India, last 4 Qtrs			
	Urban	**Rural**	**Total**
Sep-20	474.11	302.35	776.46
Dec-20	487.01	308.17	795.18
Mar-21	502.53	322.77	825.3
Jun-21	496.84	336.87	833.71

Internet Subs as % of Population			
	Urban	**Rural**	**Total**
Sep-20	101.74	33.99	57.29
Dec-20	103.98	34.60	58.51
Mar-21	107.34	36.24	60.73
Jun-21	105.06	37.74	61.06

- Total Internet penetration has grown about 35% annually over the last 3 years.
- Rural Internet subscribers have increased by 30Mn-35Mn new additions each year
- The stark reality is -
  - A Rural Population of roughly 890Mn
  - 63% of which is unconnected today (550+ Mn!!)
  - It would take about 15+ years at the current pace to connect the last citizen

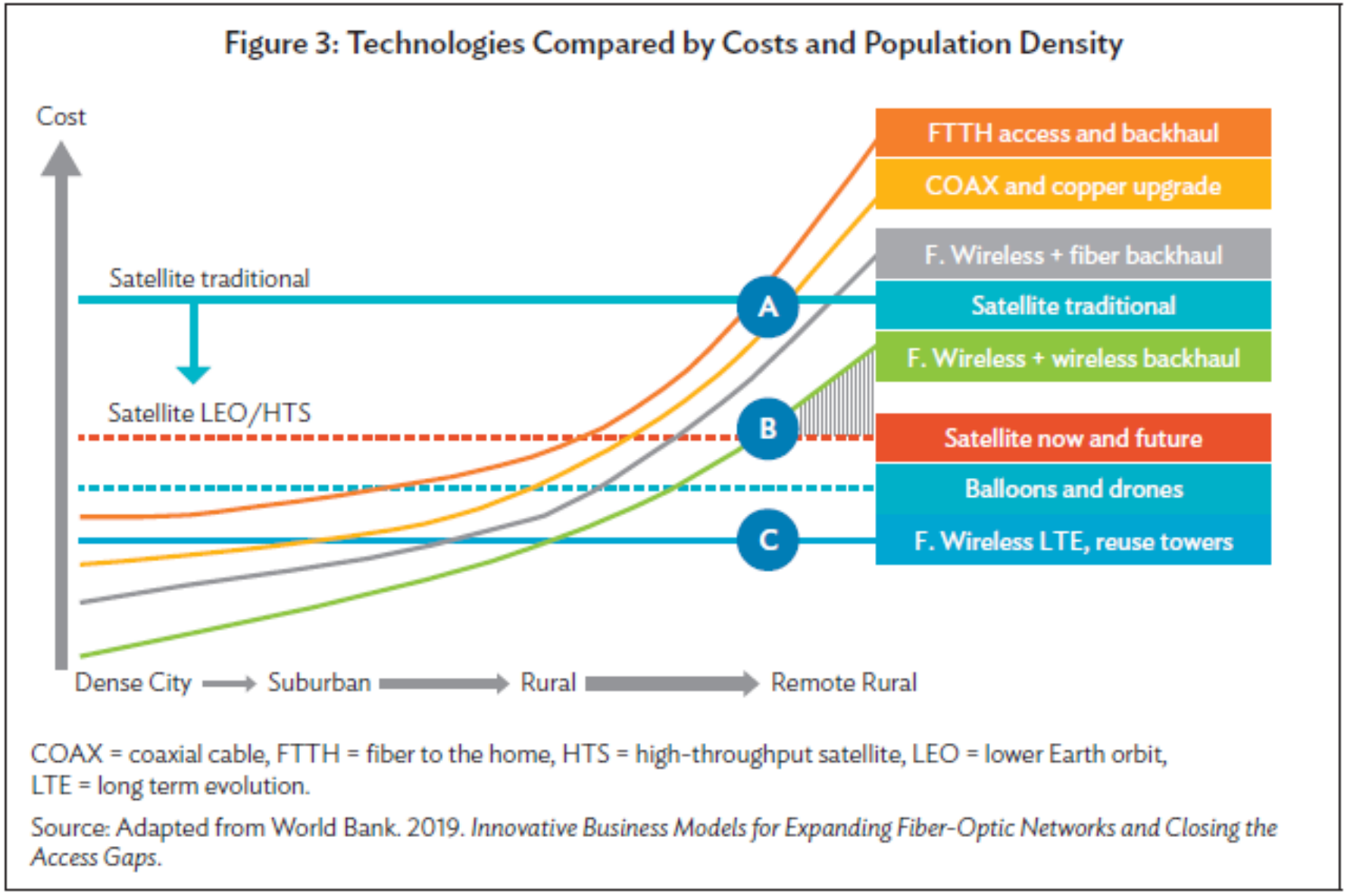
Trending: What, Why, When, Where



Satellite as Complementary Technology

	Satellite Communications	Terrestrial Technologies
Population Density	Satellite is ideal for those in sparsely populated regions	Better suited for densely populated areas
Disaster Relief	Well-suited for emergency communications during disasters recovery efforts	Terrestrial infrastructure suffers during such disasters and is not easy to replace
Cell Backhauls for 4G/5G	Satellite based Cellular backhauls require only electrical power and a clear line of sight	Terrestrial infrastructure for Cellular Backhauls has challenges such as rights-of-way, permits, civil works etc.
Faster Deployment	Satellite connectivity can have a swift deployment of the site and end-services	Terrestrial infrastructure deployment needs planning and has long-lead time to implement
Geographical Consideration	Satellite service could become a default solution for remote areas that are far-flung	Terrestrial services could focus on improving access in their current coverage areas
Resiliency and Backup	Satellites offer very high uptimes. Hence, used for network redundancy, and for backup in core and backhaul networks	Not the same resiliency

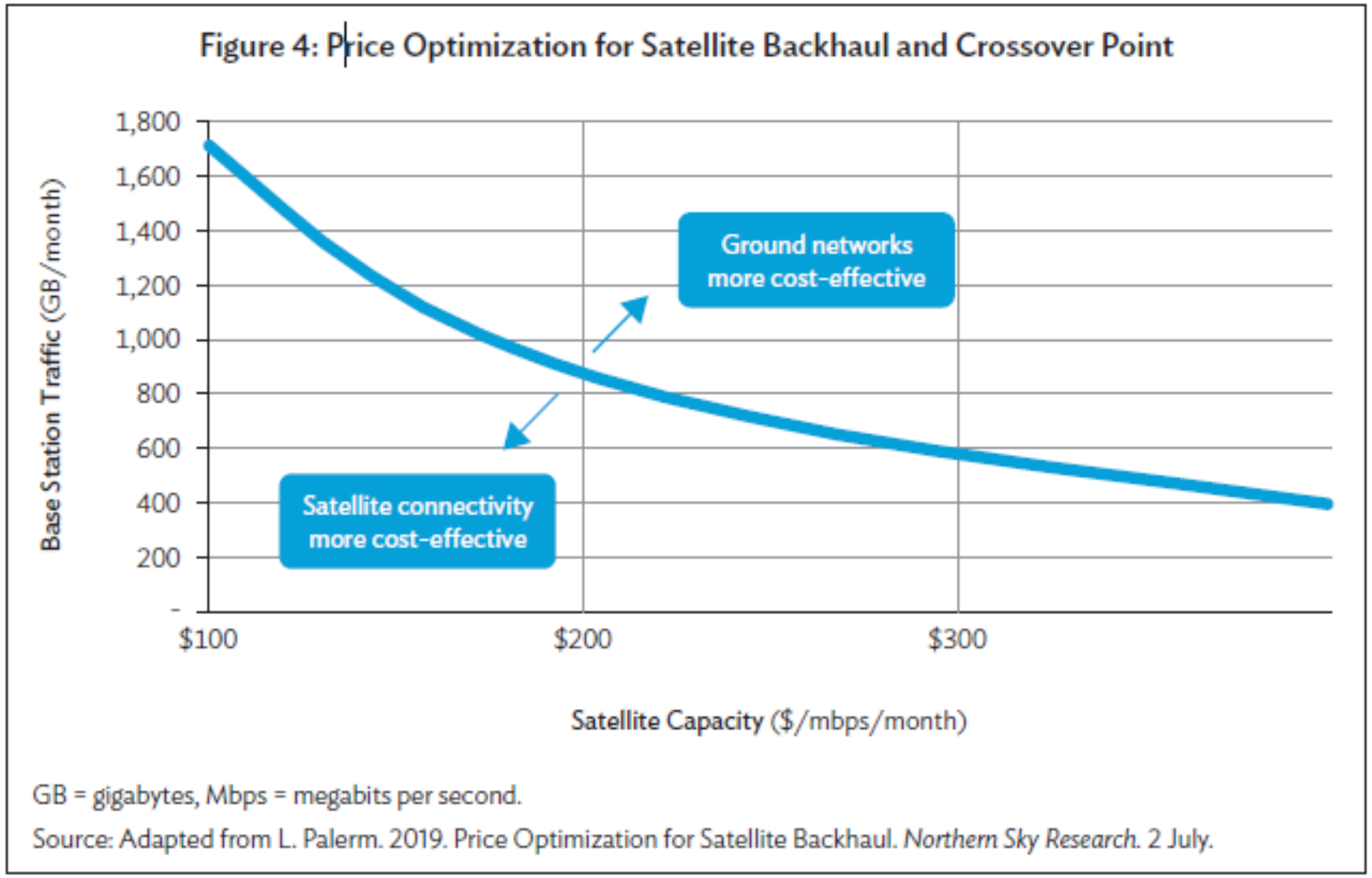
Relative Technology Costs



- All Satellite Capacity supply in 2020 was ~3 Tbps
- As compared total fibre globally was ~ 2000 Tbps
- 99% of global international traffic is on fibre
- Fibre prices are
  a) Range of $1-$3 per Mbps at fibre landing stations
  b) In the middle mile @ $10-$50 per Mbps

Optimum Cell Backhaul Technology

- At higher data rates terrestrial ground networks are more competitive
- Cross over point beyond which Satellite is better off
- Cross over point reflects:
  a) Total Traffic demand - *which is a function of population density and disposable incomes*
  b) Satellite prices – *a function of supply*



In Summary

- Satellite has strengths that complement terrestrial technologies
- Satcom exists today, as a significant component in delivery of broadband internet connectivity
- Satellite based broadband is poised to become more relevant for addressing the growing digital divide as technologies advance
- Advent of NGSO satellite constellations would bring in huge supply of capacity that would improve overall economics
- Newer models and technologies, are going to take Broadband-over-satellite solutions directly to homes

Thank You

Data sources:

- *TRAI Performance Indicators*
- *Broadband for inclusive development… Nov 2020; Deloitte*
- *Digital Connectivity… Apr 2021; ADB Report*
- *Abhishek Sikdar, Economic Times*

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