TeleGeography Workshop

PTC

January 20, 2019

Back to the Future

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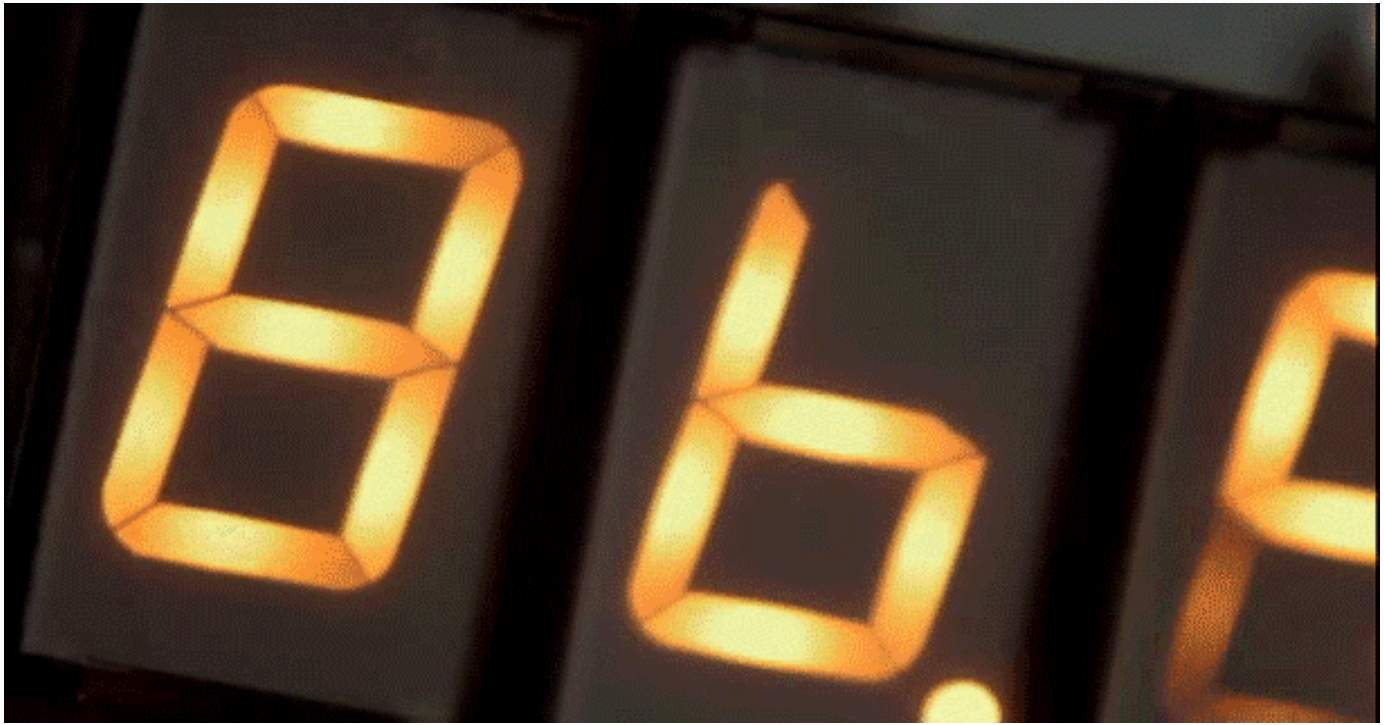
TeleGeography

Back to the Future and international networks

- Three time travel stops per topic - past, present, future:
  - Bandwidth demand drivers
  - Interregional routing changes
  - Shifting cable landings
  - Content providers & cable investment
  - Future cable requirements

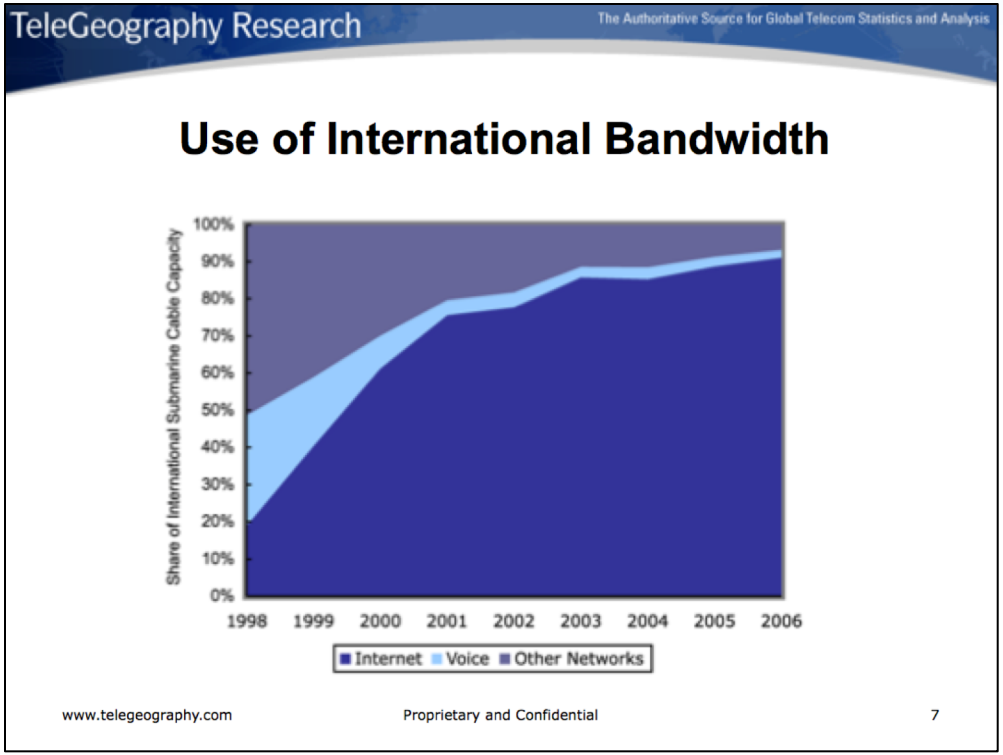
Time to hit 88 mph!



Bandwidth demand drivers

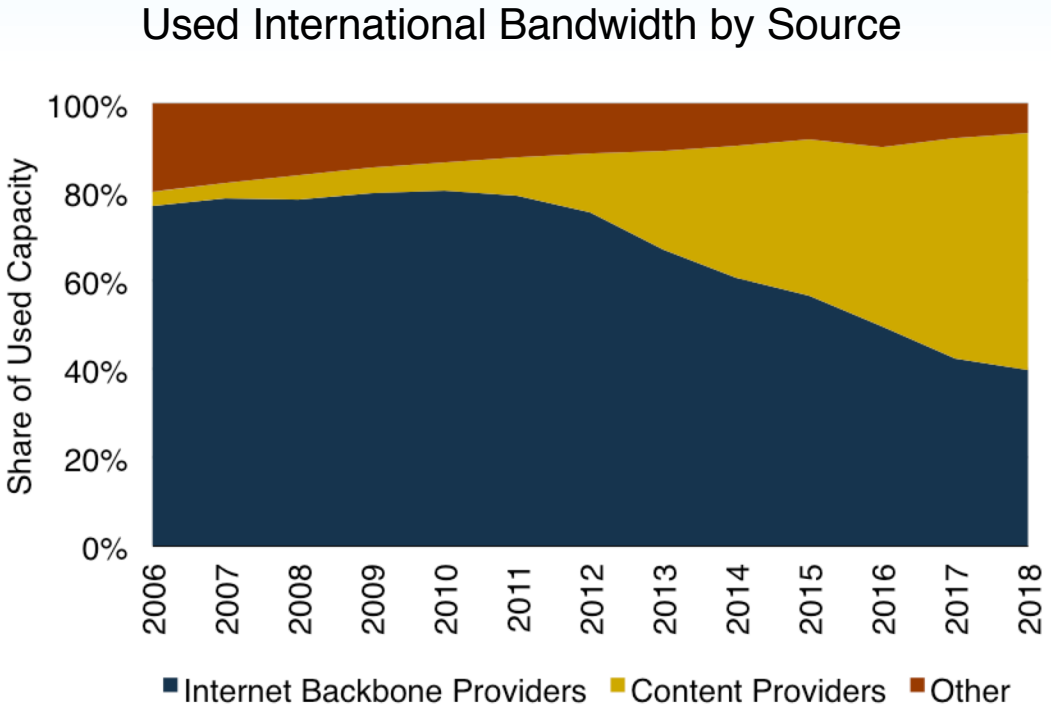
Doc Brown: Then tell me, future boy, who's President of the United States in 1985?
Marty McFly: Ronald Reagan.
Doc Brown: Ronald Reagan? The actor?

2006



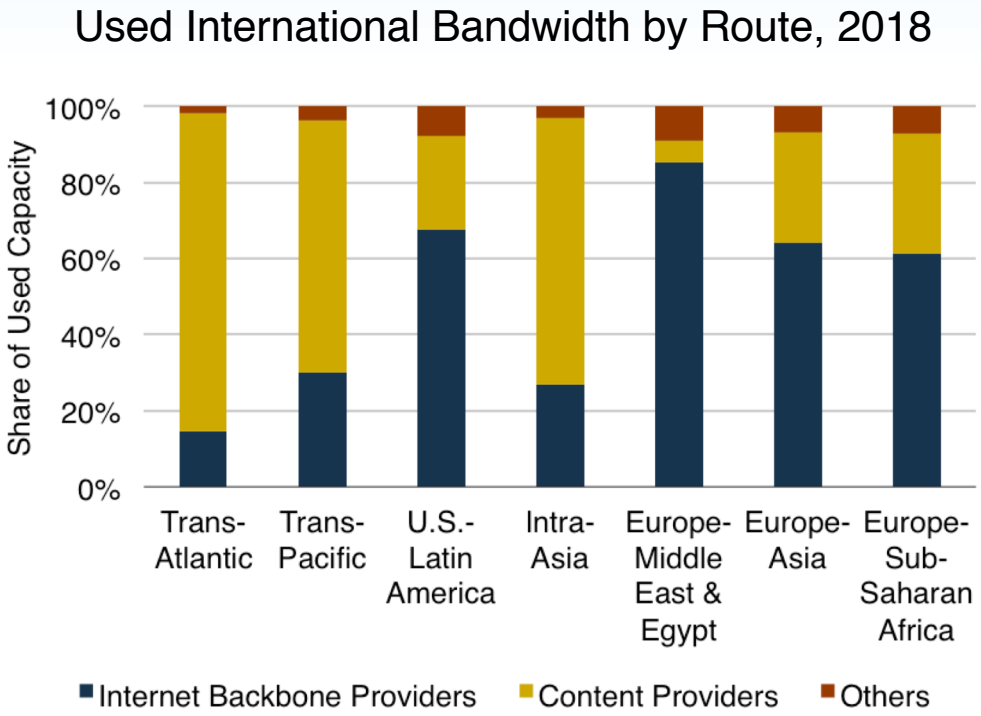
- Internet backbone providers' dominance was clearly established, share was over 80%

2018



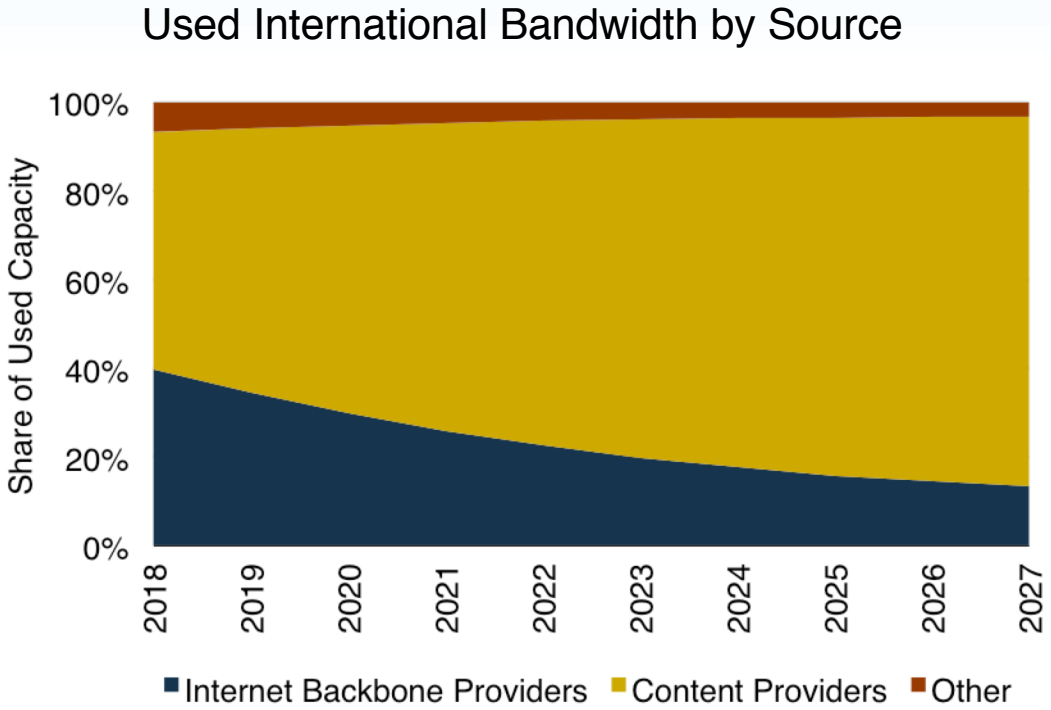
- Internet backbone providers' dominance has diminished since 2010
- Content providers (including Google, Facebook, Microsoft, Amazon) accounted for 54 percent globally in 2018

2018



- Content providers' share on some routes is even higher:
  - 83% trans-Atlantic
  - 66% trans-Pacific
  - 70% intra-Asia

2027



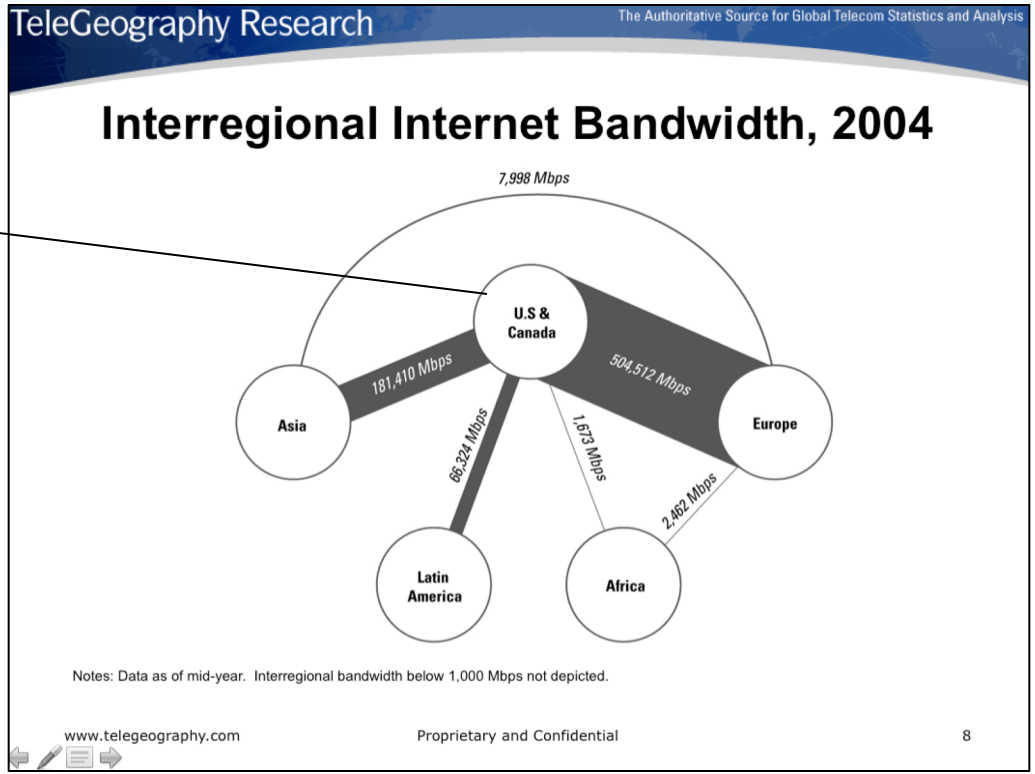
- Content providers' share globally could be up to 83 percent by 2027.
- The location of data centers will play large role in determining the degree of their dominance by route
- But will new consumers emerge that don't even exist today?

Interregional routing changes

Doc Brown: Things have certainly changed around here. I remember when this was all farmland as far the eye could see.

2004

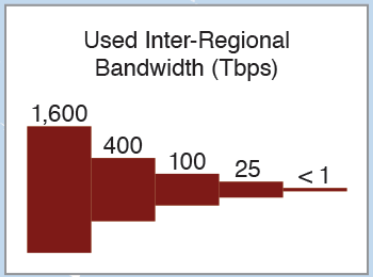
U.S. & Canada's share of all interregional capacity was 97%

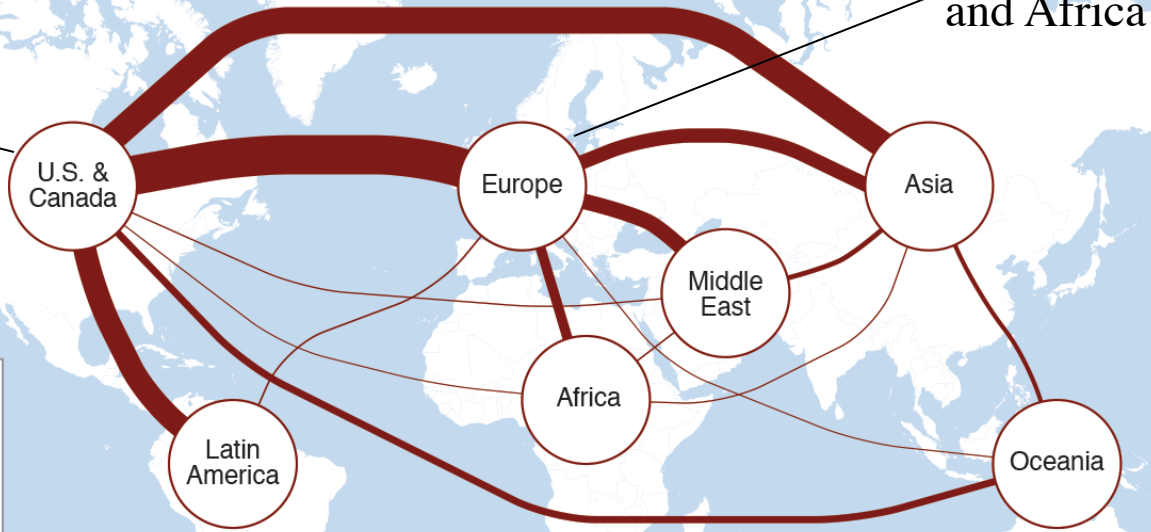


2018

U.S. & Canada's share of interregional capacity is down to 83%

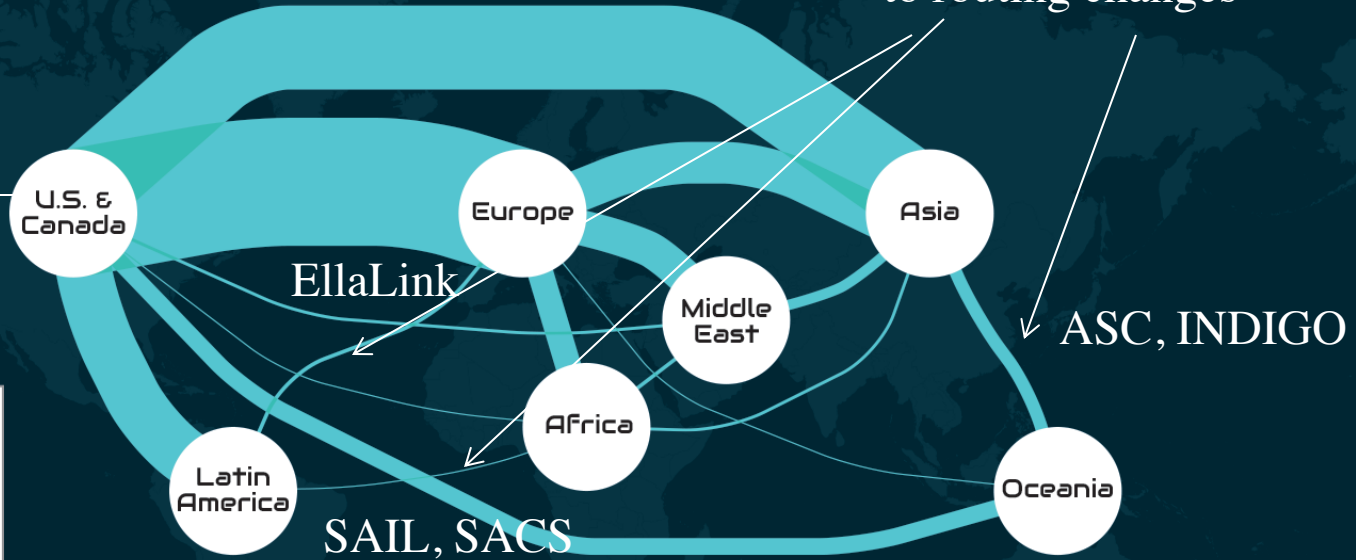
Europe is the primary hub for the Middle East and Africa

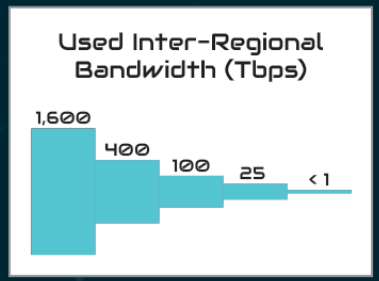




2024

U.S. & Canada's share still over 80%



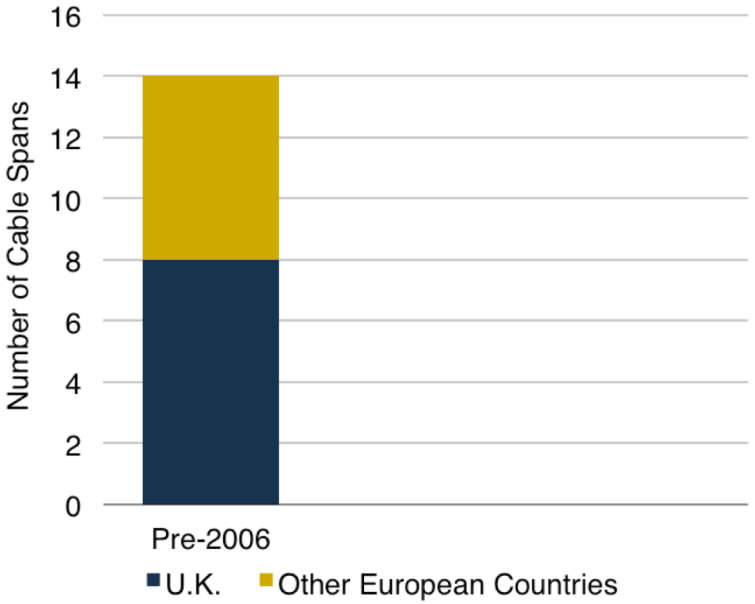


Shifting cable landings

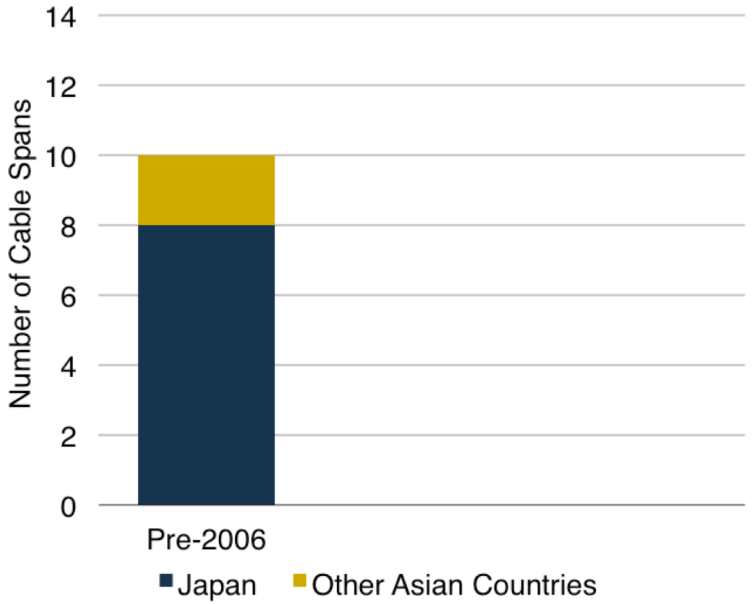
Marty McFly: Whoa, this is heavy.
Doc Brown: There's that word again: 'heavy.' Why are things so heavy in the future? Is there a problem with the Earth's gravitational pull?

2006

Trans-Atlantic

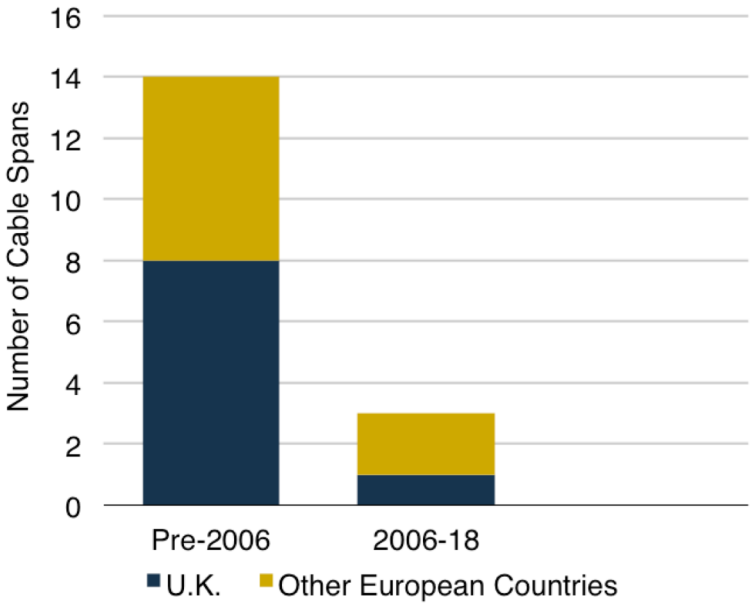


Trans-Pacific

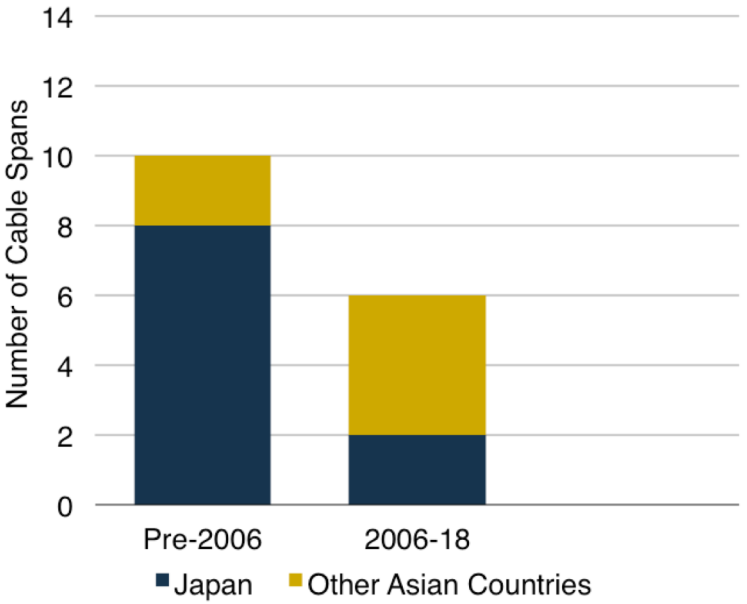


2018

Trans-Atlantic

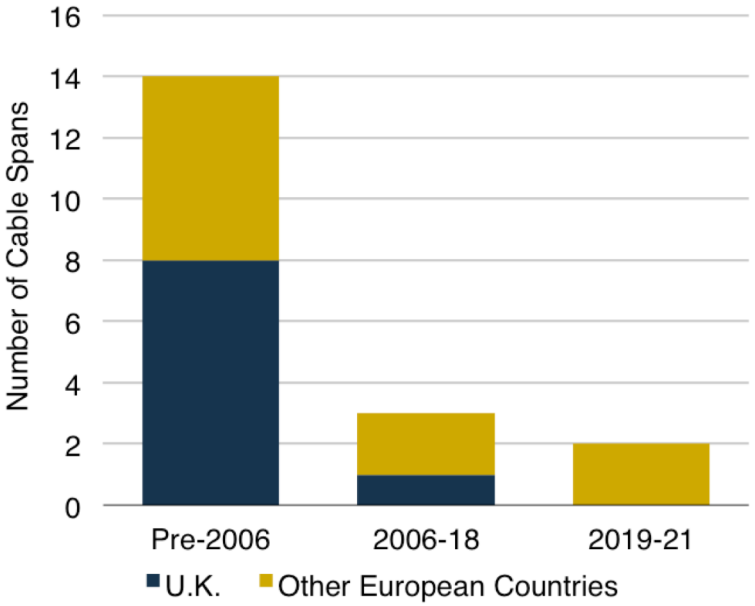


Trans-Pacific

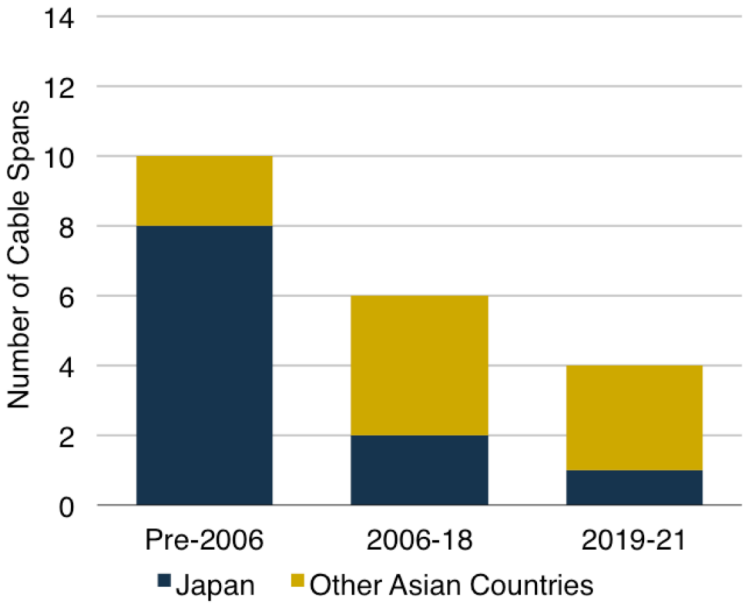


2021

Trans-Atlantic



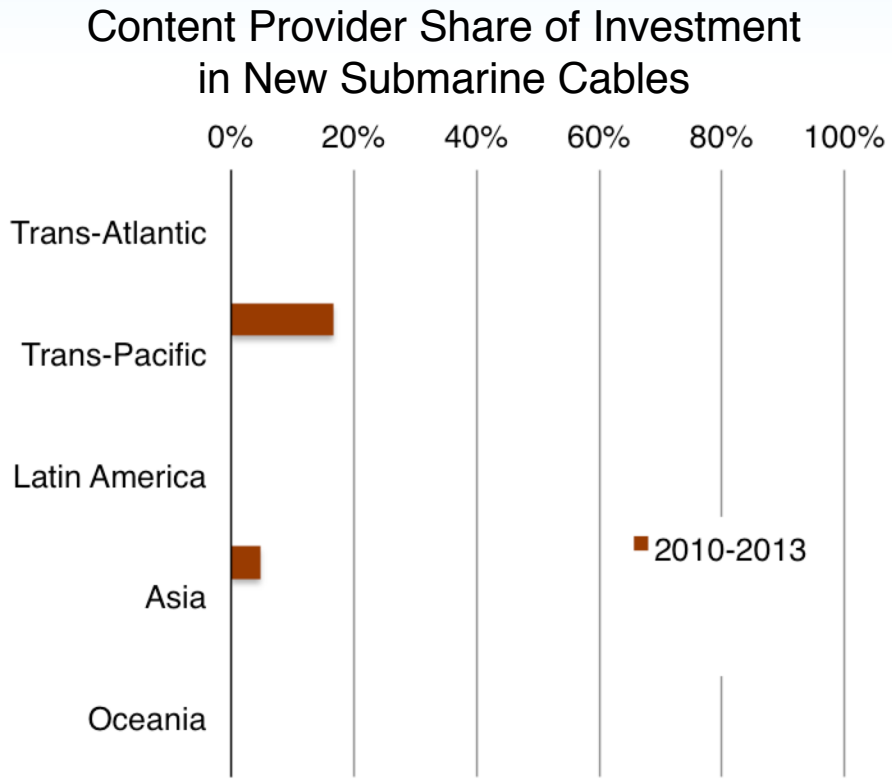
Trans-Pacific



Content providers and cable investment

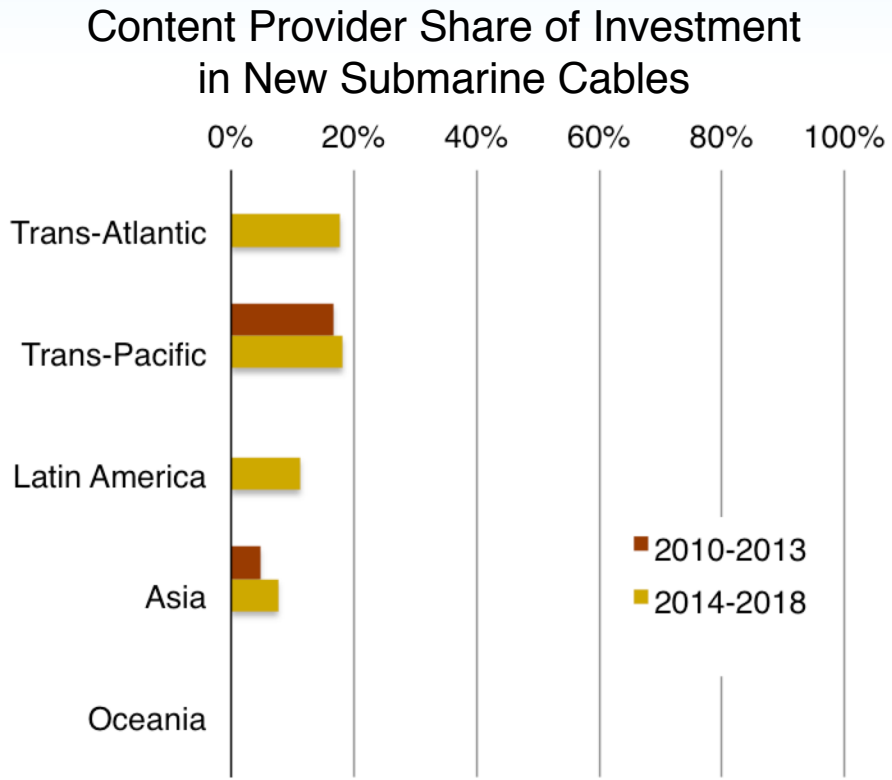
Biff Tannen: Hello? Hello? Anybody home? Huh? Think, McFly. Think!

2013



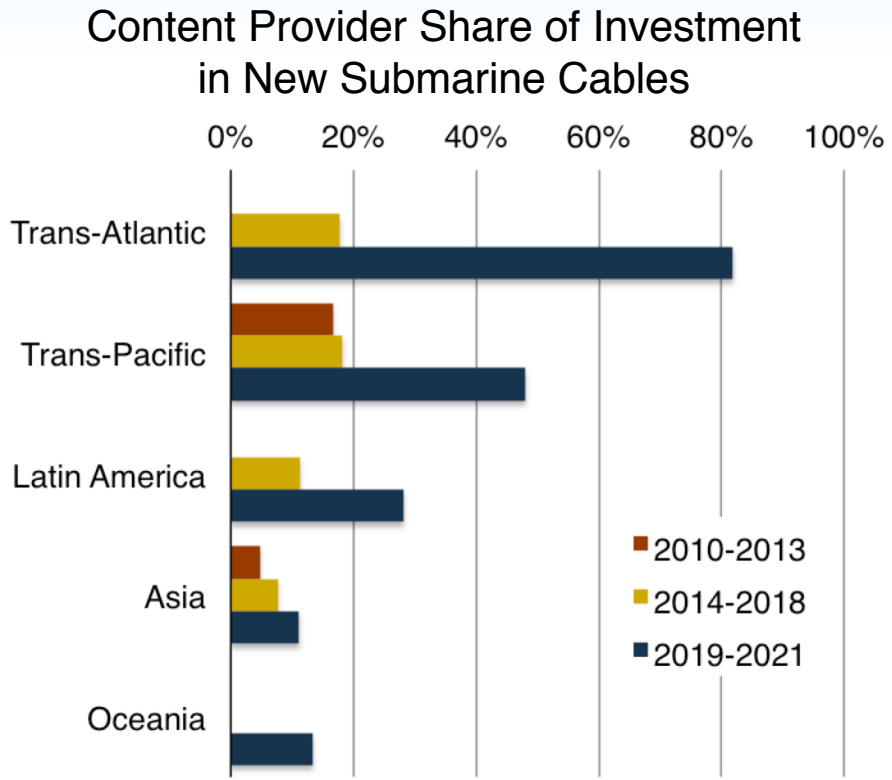
- Content provider investment in new cables was negligible 2010-2013
- Unity and SJC were the only notable investments

2018



- Content provider investment became widespread from 2014-2018 on several routes
- Content providers still accounted for only a minor share of overall investment

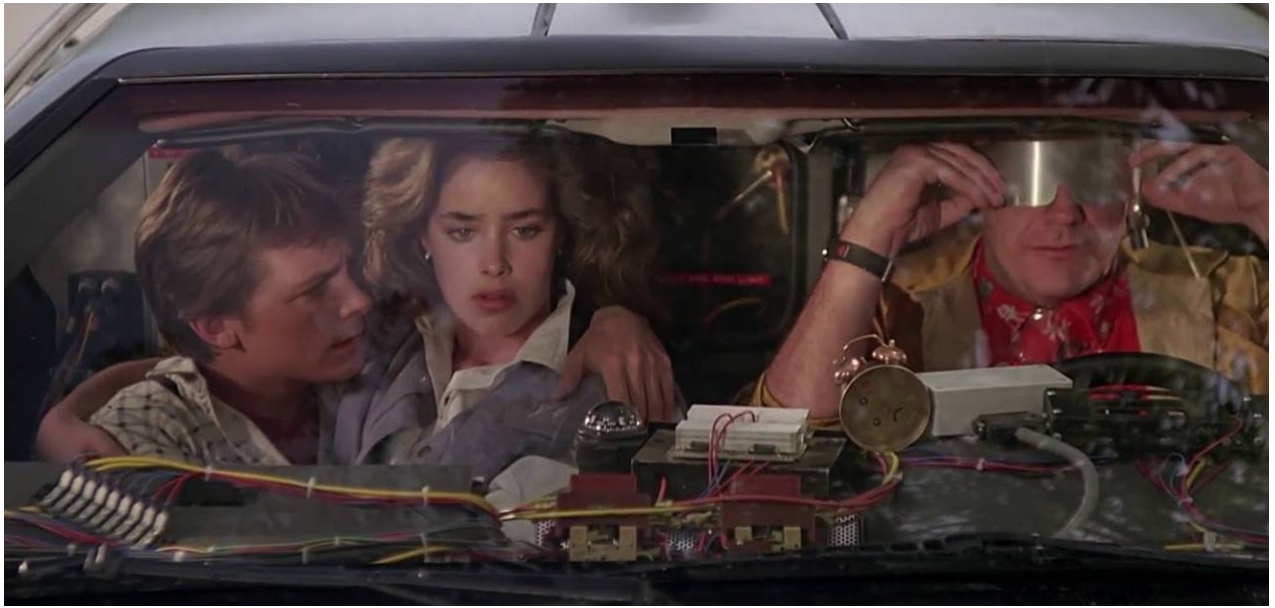
2021



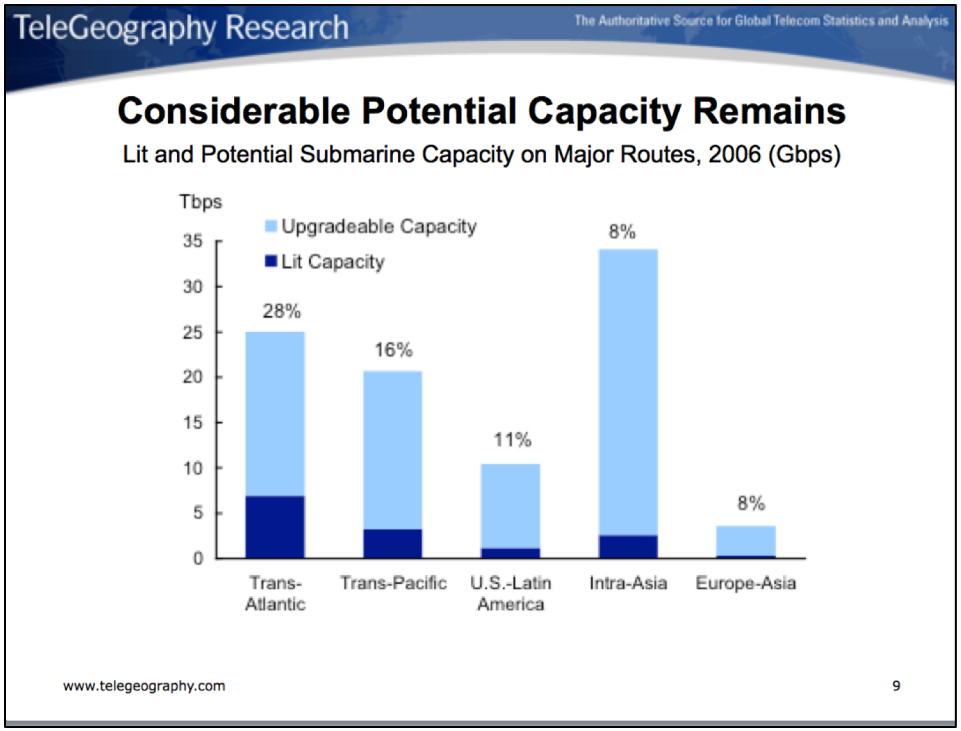
- Content providers' share surging on many routes
  - Only a majority on the Atlantic
- Substantial investment by new carriers' carriers:
  - Aqua Comms, Hawaiki, RTI, Seaborn Networks, PLDC
- Additional investment on new routes is planned

Future cable requirements

Doc Brown: Roads? Where we're going we don't need...roads!

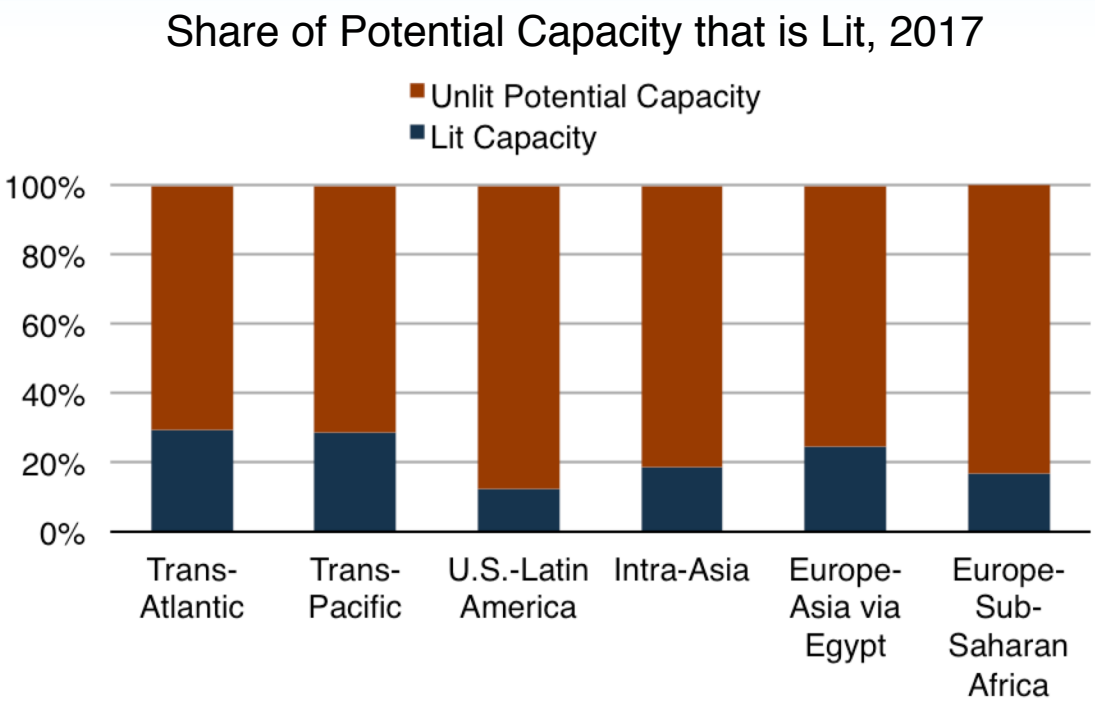


2006



- Even before the introduction of 100G technology, substantial unlit capacity existed on major routes.

2017



- 100G technology has extended the economic lives of many older cables
- New cables added to all major routes since 2006
- Low % lit, disguises the lack of available fiber pairs on some routes

2027 – Let's build a crude model

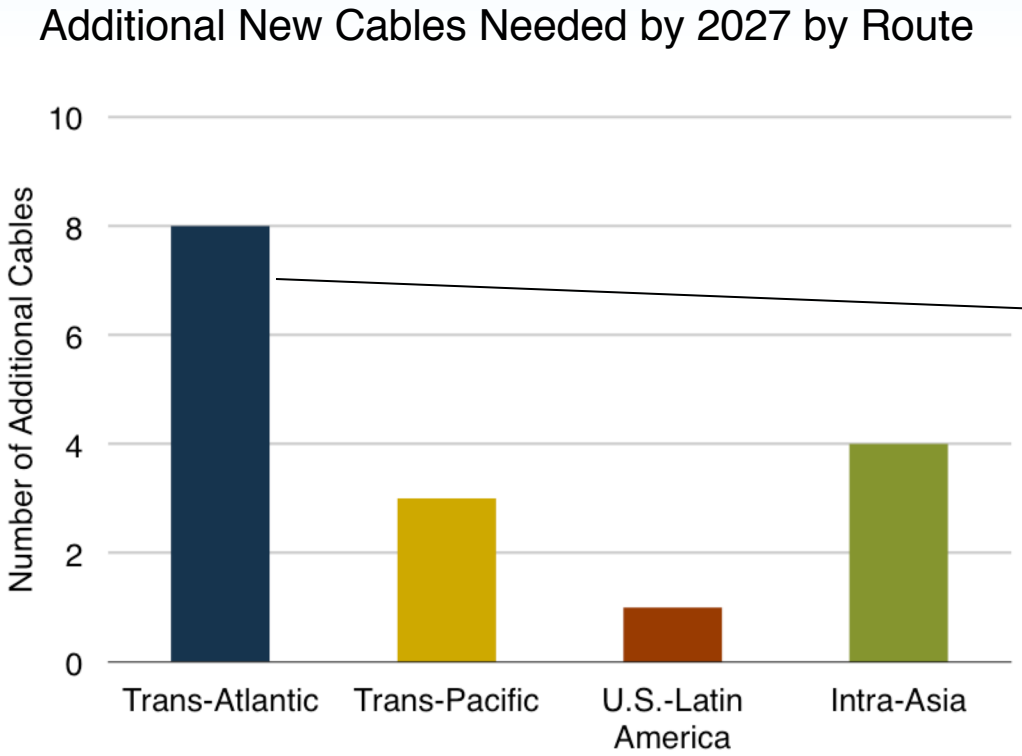
Doc Brown: Please excuse the crudity of this model. I didn't have time to build it to scale or paint it.

2027 – Let's build a crude model

Assumptions:

- Demand rises at "Moore's Law"-ish 40% CAGR 2018-2027 on major submarine cable routes
- Cables installed pre-2015 remain in service and have no further improvement in their potential capacity
- Cables installed after 2015 and all publicly announced planned cables will experience a 20% improvement in potential capacity in coming years
- New cables will have 12 fiber pairs with 30 Tbps per fiber pair
- So how many new cables would be needed on major routes?

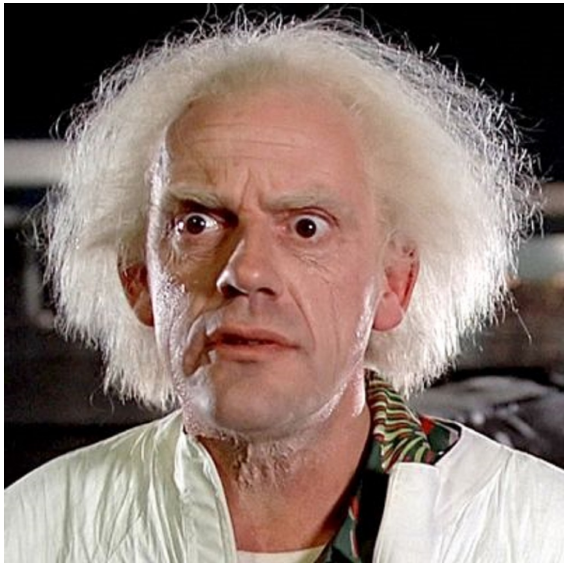
2027



Doc Brown:
Great Scott!

2027

Doc Brown: ..having information about the future can be extremely dangerous. Even if your intentions are good, it can backfire drastically!



2027

Caveats:

- New cables are built for *many* reasons, not just dwindling supply (ownership economics, lack of fiber pairs for sale, route diversity)
- Many older cables will be retired before 2027, and most will never reach their maximum capacities
- Future cables may have higher fiber pair counts and capacity per fiber pair than used in this model
- Pace of demand growth a decade from now is very uncertain!

The future

Doc Brown: Your future hasn't been written yet. No one's has. Your future is whatever you make it. So make it a good one.

Thank You

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