



# Infrastructure investment by online service providers (OSPs)



Richard Morgan

October 2019

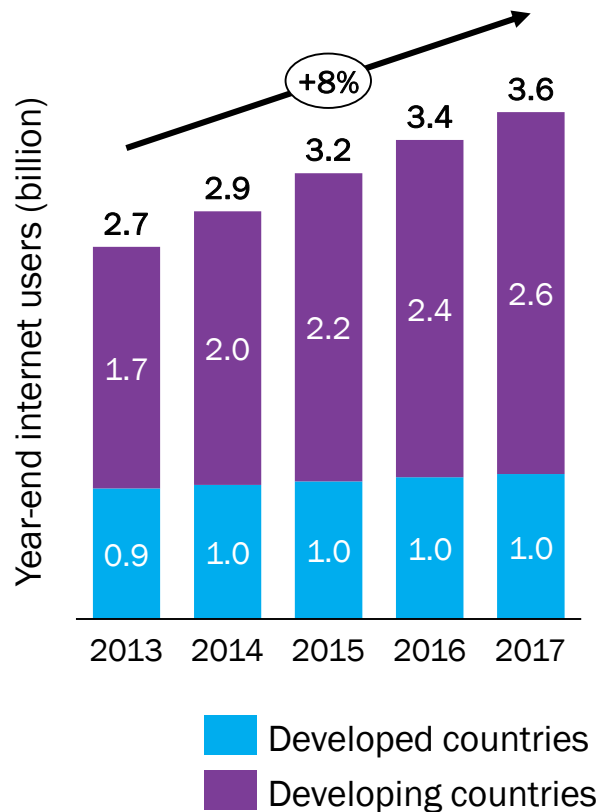


- Demand drivers and infrastructure investment**
- Hosting infrastructure
- Transport infrastructure
- Delivery infrastructure
- R&D
- Conclusion

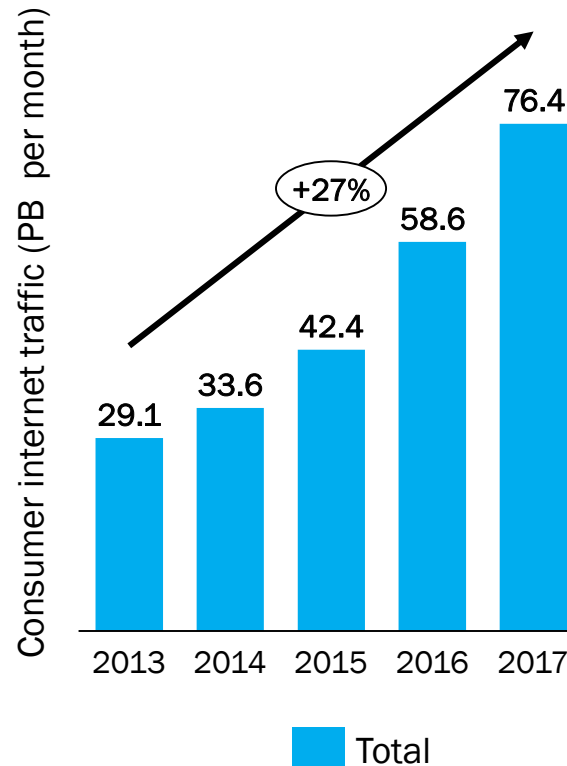
# Changing Internet usage is driving infrastructure requirements



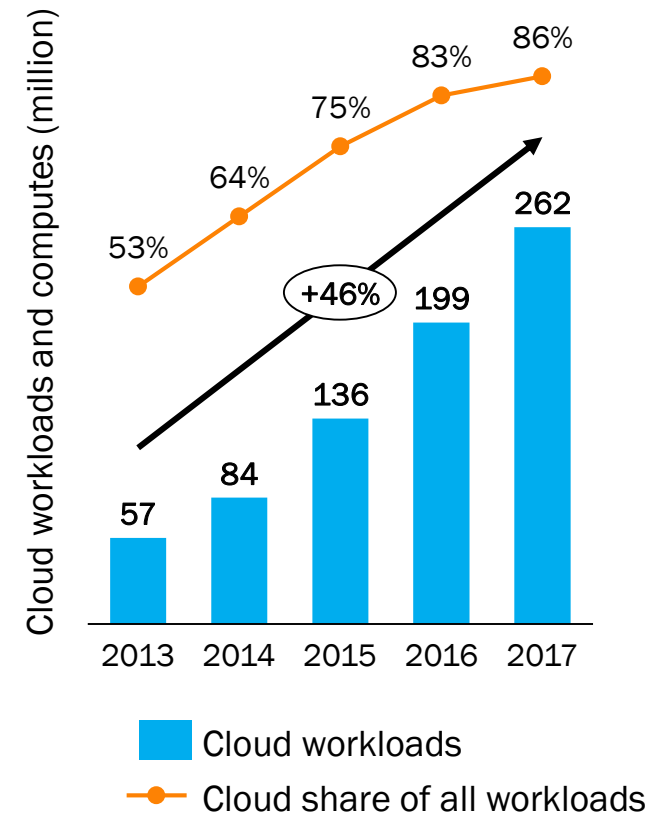
**ONLINE  
USERS**



**RICH  
CONTENT**

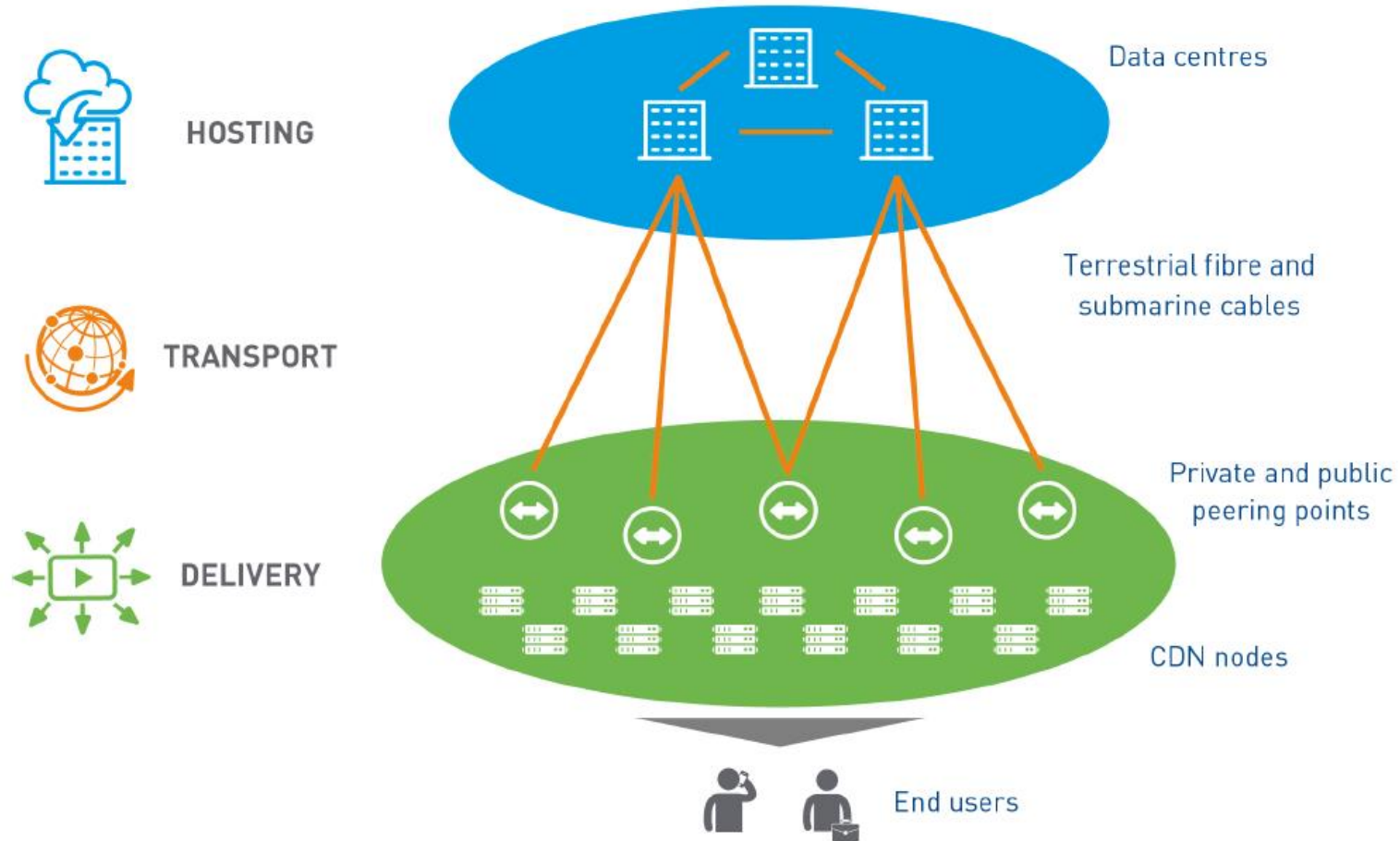


**CLOUD  
SERVICES**



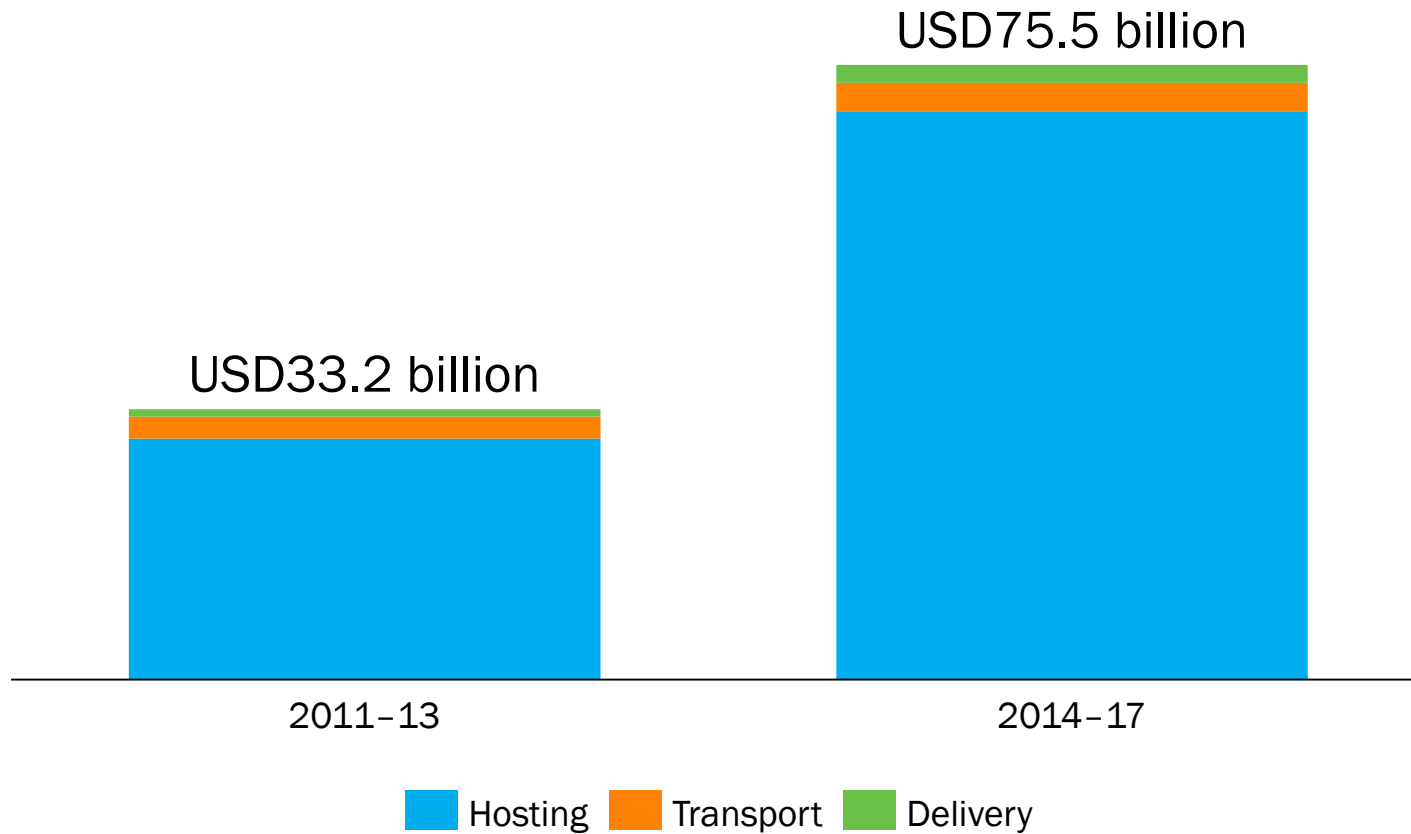
# OSPs are investing in hosting, transport, and delivery infrastructure

## Overview of clusters of infrastructure investment



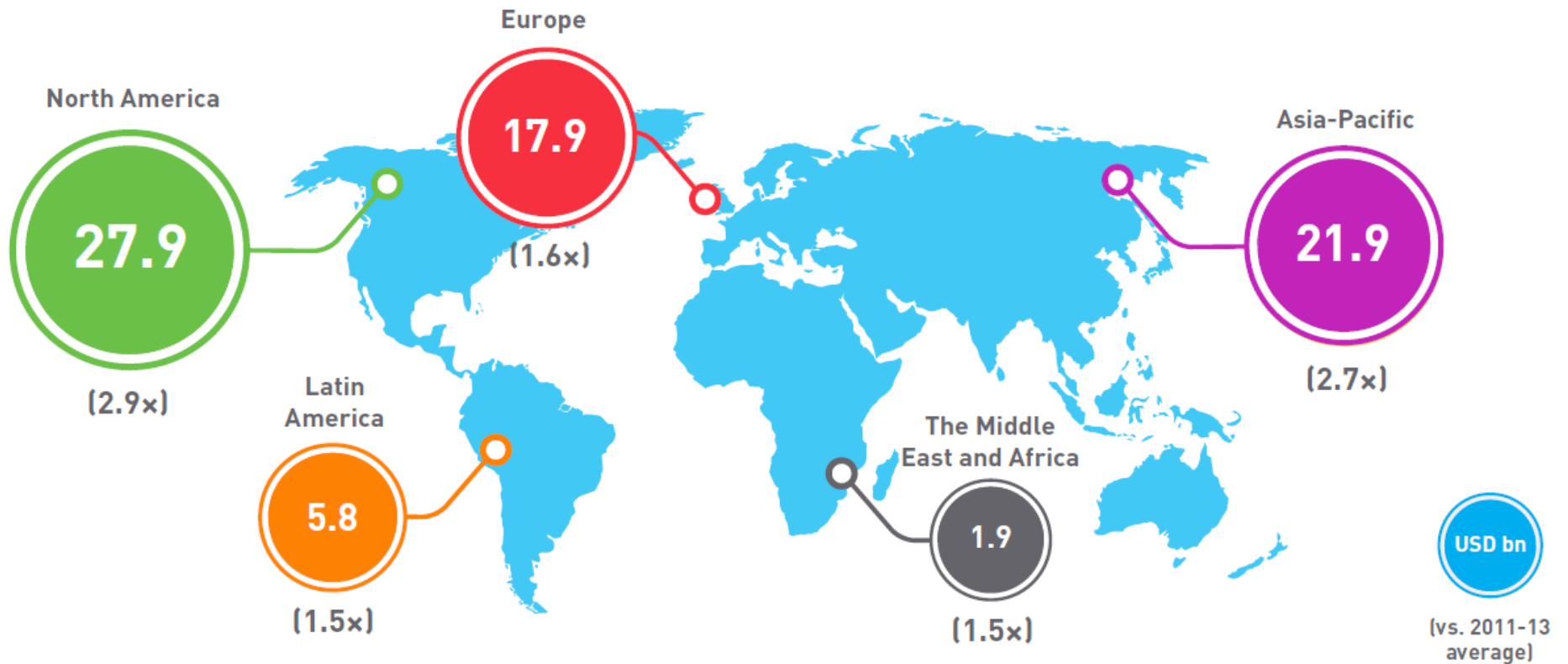
# OSP investment has grown to over USD75 billion a year

Average annual OSP investment



# Investment is growing across all regions of the world

Average annual total investment by region (USD billion, 2014-17)





Demand drivers and infrastructure investment

**Hosting infrastructure**

Transport infrastructure

Delivery infrastructure

R&D

Conclusion



# Large OSPs are investing in their own data centres



HOSTING

Tencent data centre under construction in Guizhou





# OSPs also invest significantly in hardware and cooling



HOSTING

## Racks in Facebook's Prineville Data Centre





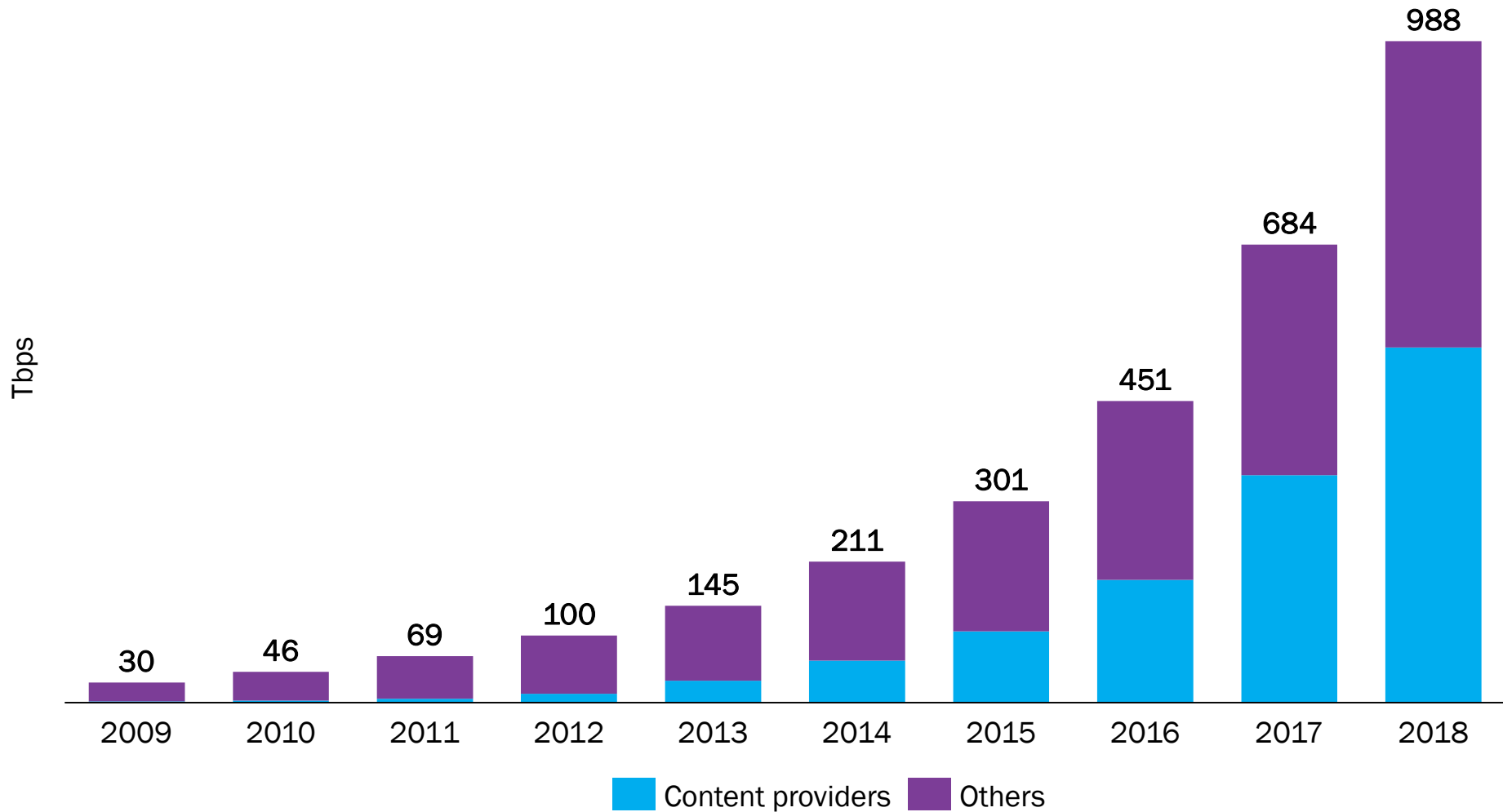
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# OSPs account for a growing share of international bandwidth use



TRANSPORT

Total used international bandwidth

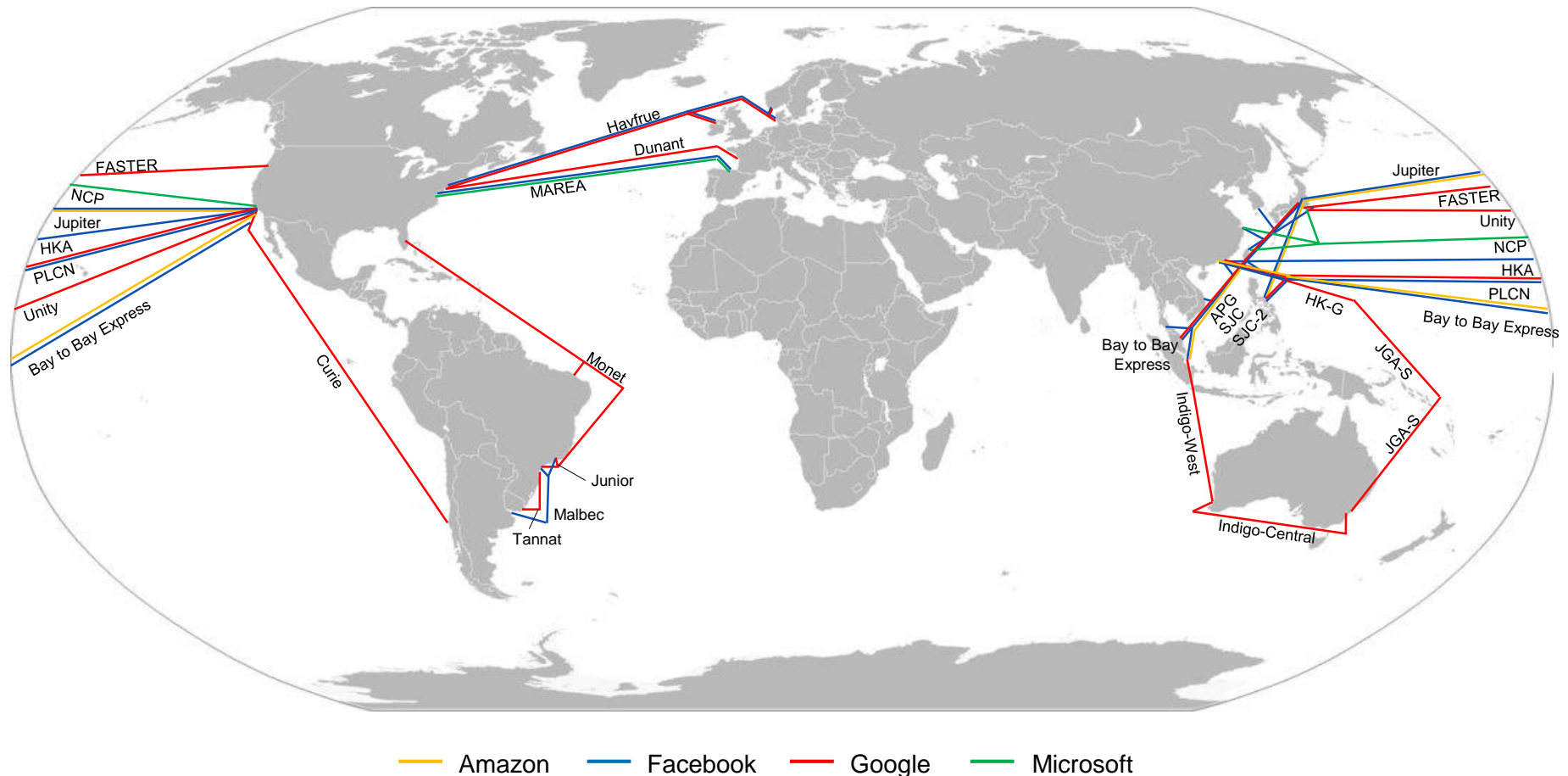


# OSPs are leasing international capacity, but also investing directly in submarine cables



TRANSPORT

Map of expected submarine cables with OSP investment by 2020





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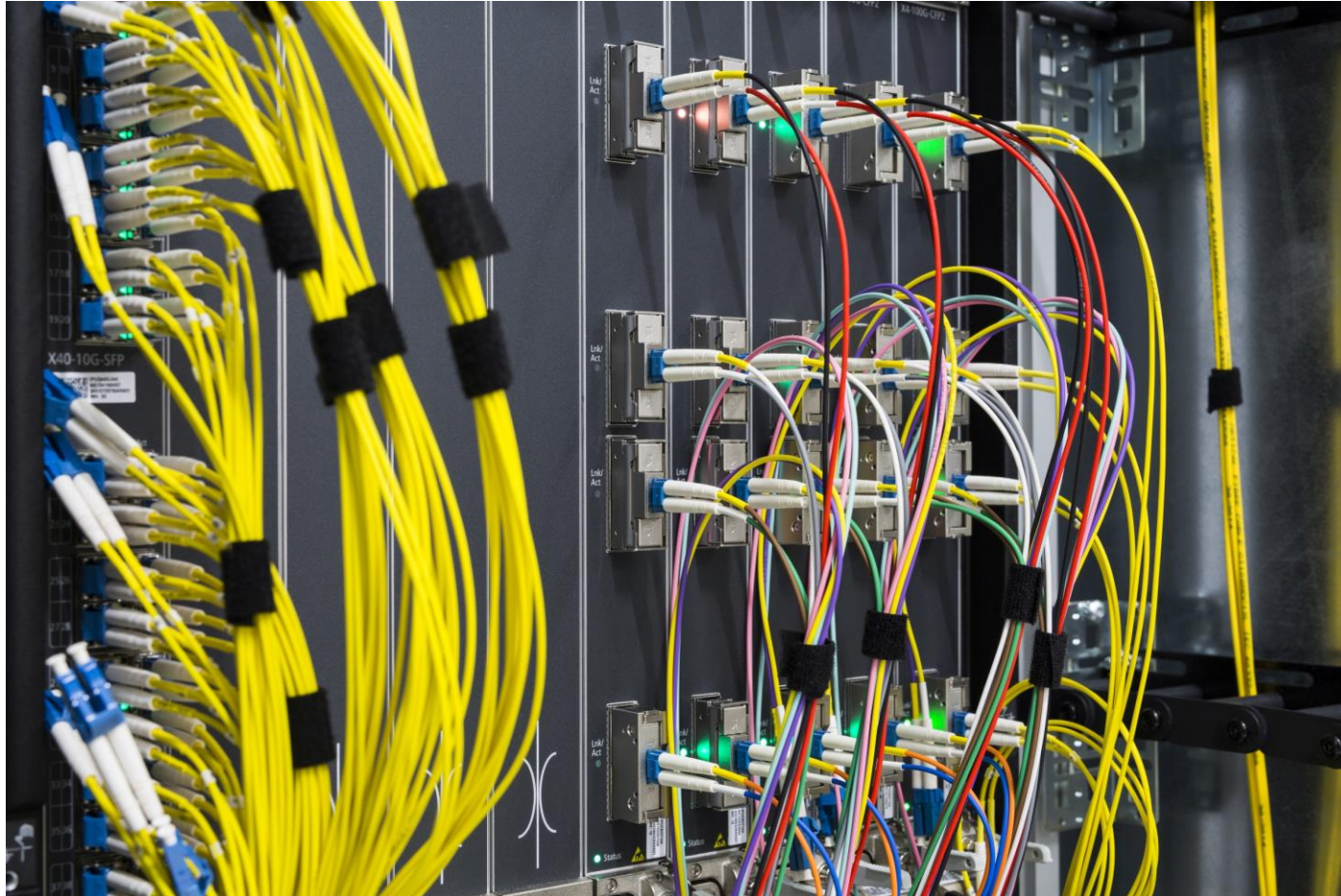


# OSPs are investing in private peering, as well as being major customers of Internet exchange points



DELIVERY

Peering infrastructure at an Internet exchange point

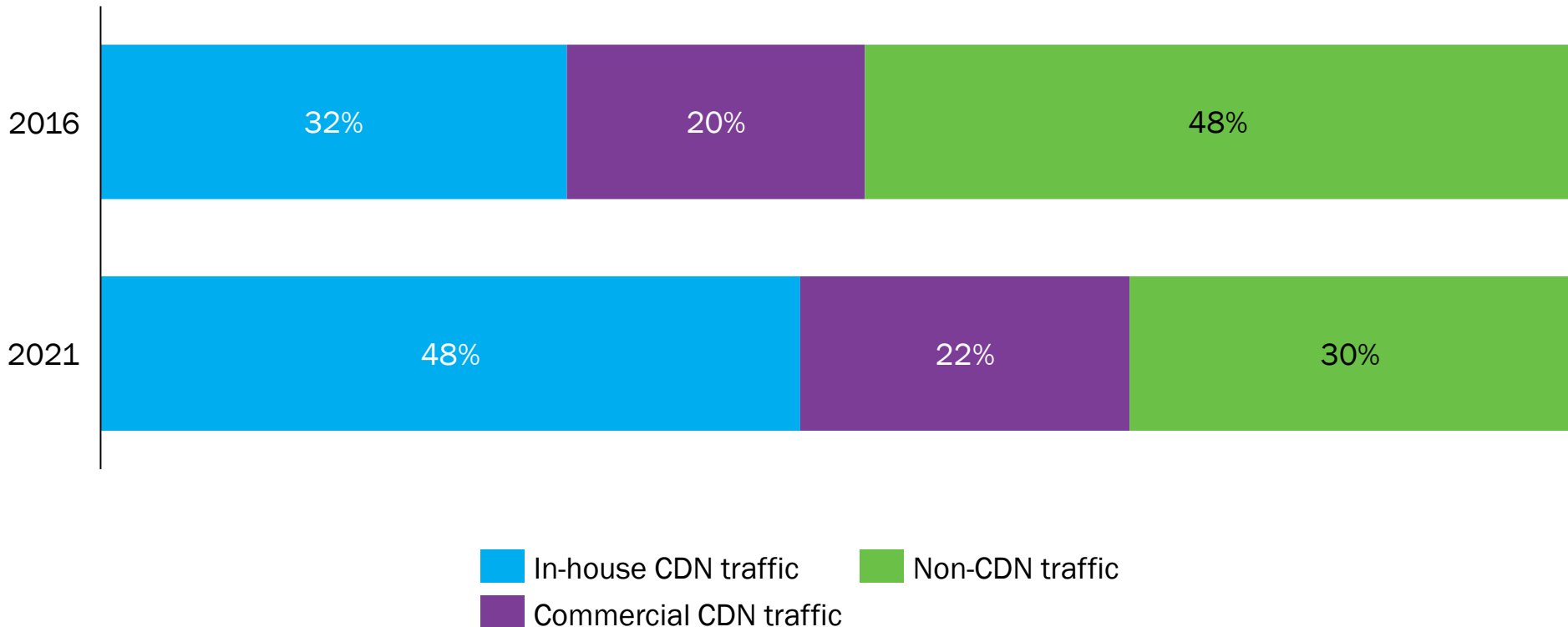


# OSPs are building in-house CDNs to optimise content and cloud services



DELIVERY

Internet traffic by CDN use







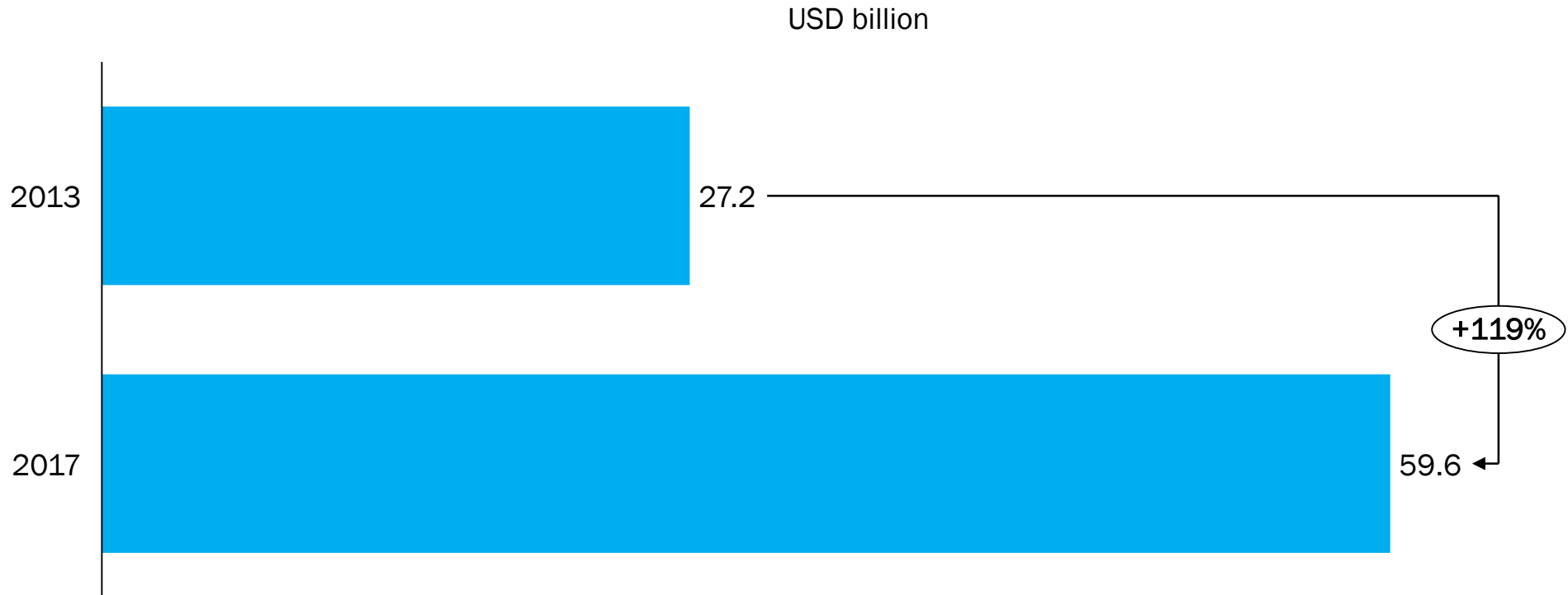
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# R&D spending is at comparable levels to investment in infrastructure

Annualised R&D spend for nine main OSPs in 2013 and 2017



Note: OSPs for which R&D was tracked include Google, Microsoft, Apple, Facebook, Alibaba, Tencent, Baidu, eBay, and Netflix. Facebook, Microsoft, Tencent, Alibaba, Baidu, eBay, Netflix, and Apple. Amazon has been excluded as the company does not report R&D separately from total "technology and content" opex

Source: Company financials, Analysys Mason, 2018

# This R&D is driving innovation and new approaches to infrastructure

Microsoft Project Natick data centre being prepared for deployment





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Supports investments by others in the ecosystem

Benefits to technology sector, labour market, and all Internet users

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