ITU International Satellite Symposium 2017

The Role of Satellites in Driving Digital Economies – O3b in the Pacific

SES
beyond frontiers

PRESENTED BY
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PRESENTED ON
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Outline of Presentation

1 Introduction

2 Role of Satellites in Promoting Digital Economies

- O3b satellite constellation
- Who does O3b help connect to the internet?

3 Satellite's Role in the 5G Ecosystem

- Support Key Usage Scenarios
- Satellite Sweetspots in 5G

4 The O3b Experience: Transforming Connectivity Options in the Pacific

- Applications

5 Conclusion

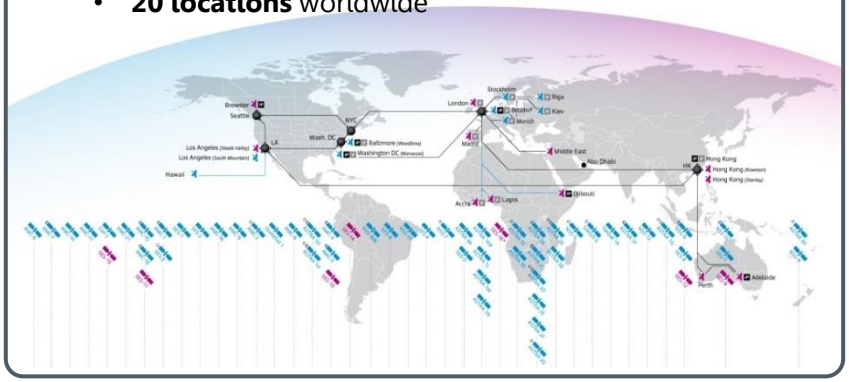
Introduction

SES & O3b
Who we are

SES O3b Networks worldwide

World-leading satellite operator and dynamic market leader

- Global satellite fleet operator and parent company of O3b Networks
  - **Over 50 satellites in GEO** covering 99% of the globe
  - **12 O3b satellites in MEO**
- Partner of choice for major global broadcasters, telcos, enterprises, governments and institutions
  - Technical **reach of 325 million households** in 2016
- Global reach, regional support
  - Over **2,000 employees** around the globe
  - **20 locations** worldwide



SES O3b Networks in the Pacific

A strong base of quality data customer in the region

Digicel — Expect More. Get More.

OPT

TELIKOM PNG

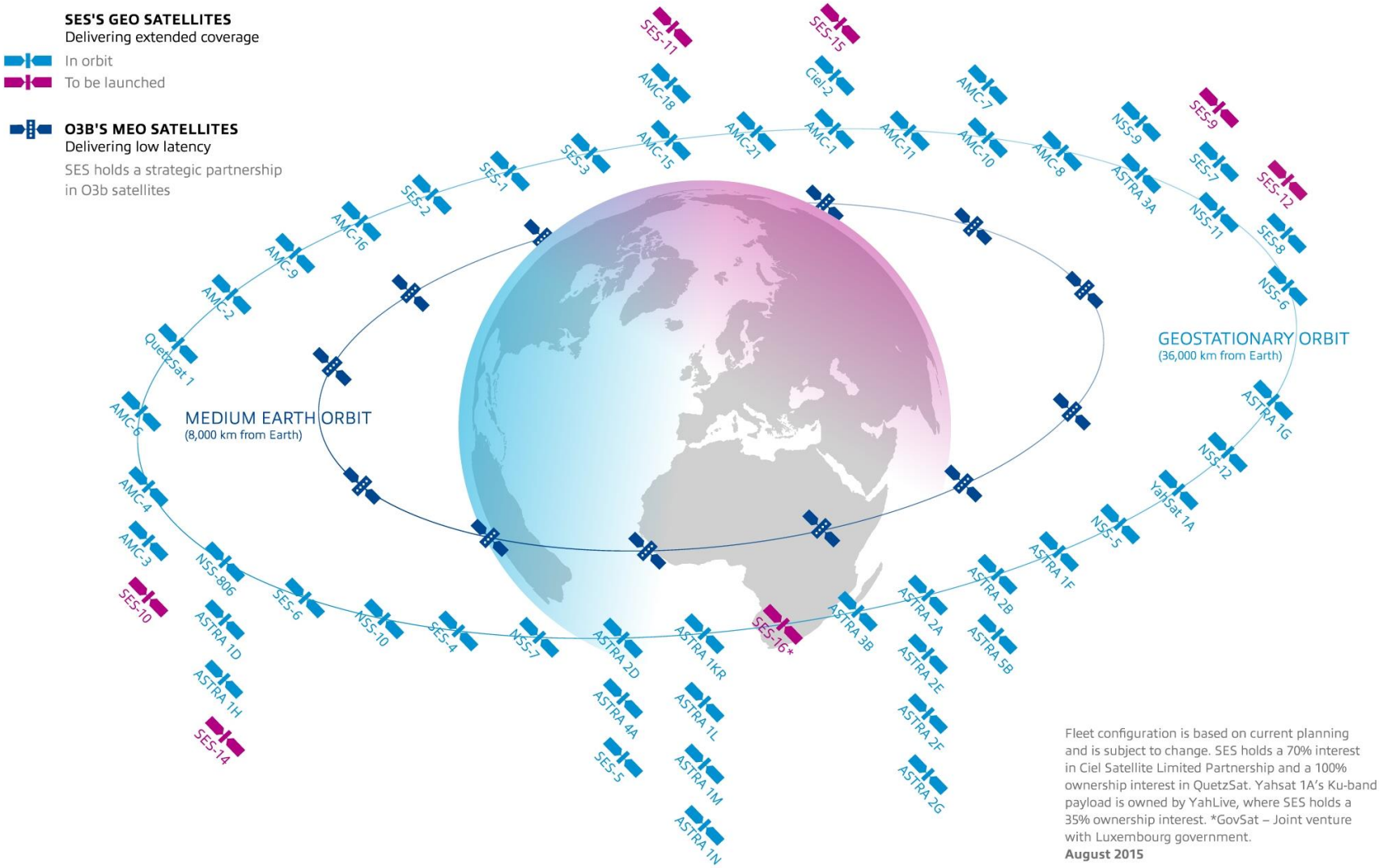
Our Telekom

SpeedCast

ASTCA

PALAU TELECOMS

SES & O3b
Combined Fleet Map



Fleet configuration is based on current planning and is subject to change. SES holds a 70% interest in Ciel Satellite Limited Partnership and a 100% ownership interest in QuetzSat. Yahsat 1A's Ku-band payload is owned by YahLive, where SES holds a 35% ownership interest. *GovSat – Joint venture with Luxembourg government.
August 2015

Coverage
Millions will still not enjoy the internet 5 years from now…

- Pacific Island penetration in 2020 might be no more than HALF that of the rest of the Pacific region:

  42% for Pacific islands, vs 74% for the Pacific Region as a whole.

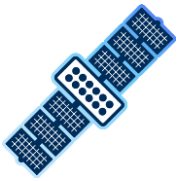
  (GSMA 2016)

- But using multiple technologies (satellite AND fiber) can help with penetration and Universal Access

- Even if business case for 2G → 3G / LTE uncertain using fixed (terrestrial) infrastructure, newest satellite connectivity options can provide instant coverage

- Mobile and Fixed connectivity needs should not be viewed independently

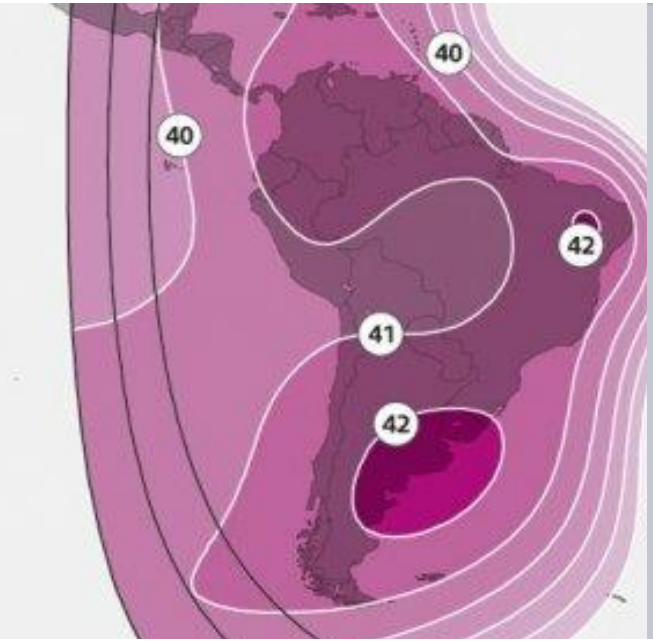


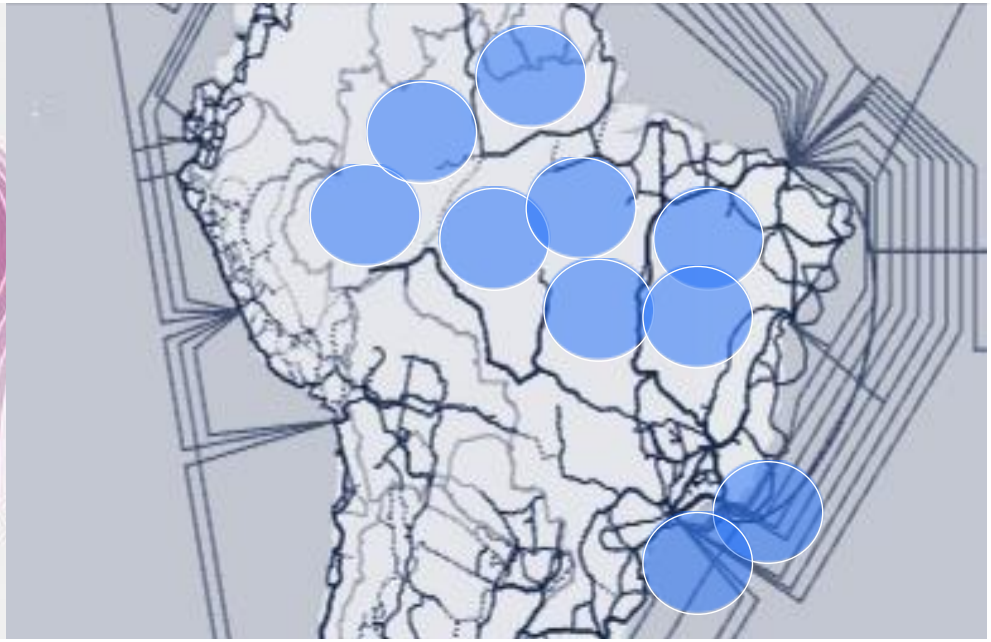
Actual prediction: Nearly 4B will not be connected in 2020 (3.6 billion).
Source: Cisco's Visual Networking Forecast, June 2016

Complementary Solutions

GEO Coverage



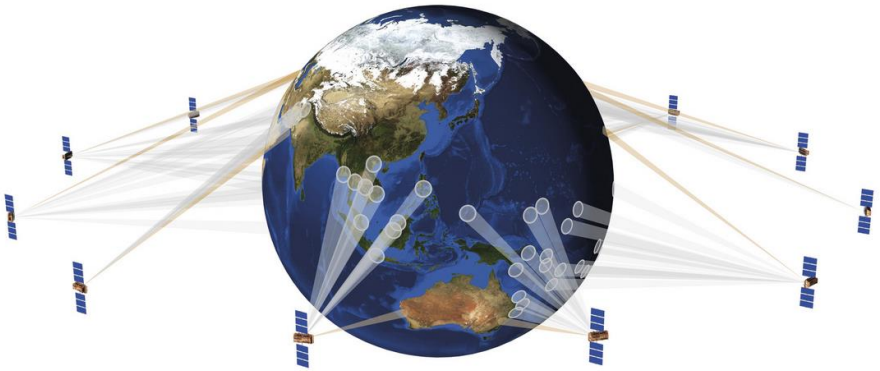
O3b MEO and Fiber



Role of Satellites in Promoting Digital Economies

O3b's Non-GSO Satellite Constellation – Fiber without the Cable

- Circular equatorial orbit at 8062 km altitude (MEO)



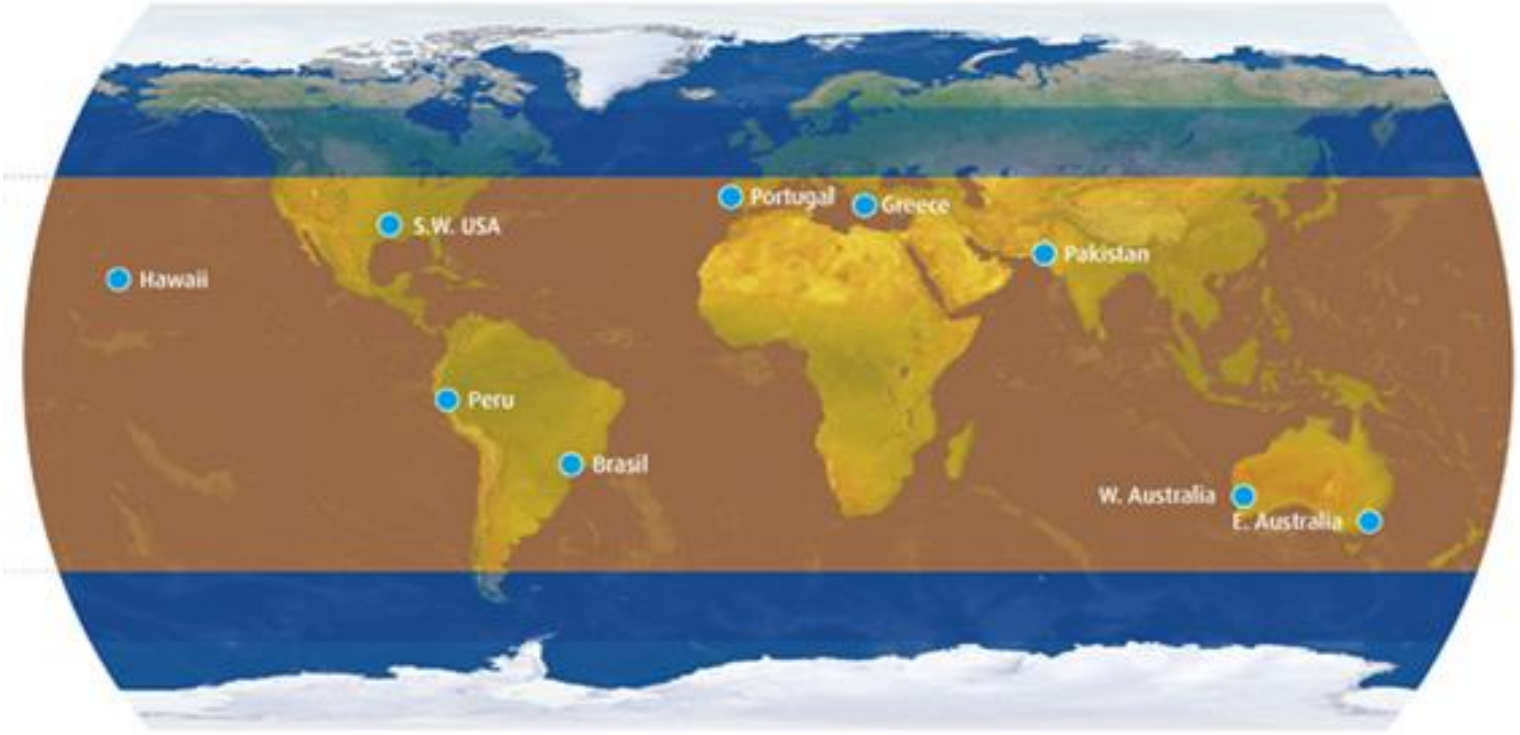
- O3b's global spectrum use today:
  - Uplink: 27.6-28.4; 28.6-29.1 GHz
  - Downlink: 17.8-18.6 ; 18.8-19.3 GHz

- 12 satellites in non-geostationary orbit at 8062 kilometers

- Beam size: ~700 km diameter on the ground

O3b Delivers “Fiber Speed, Satellite Reach”

Global reach 45 degrees North and South



9 gateways connect customers to the internet

Fiber-like latency and capacity:
- Under 150 ms roundtrip
- 2 Gbps per beam

Who does O3b help connect to the Internet?

O3b provides the "middle mile" to connect local operators to the internet via one of our 9 world-wide gateways

O3b Networks is the Fastest Growing Satellite Operator in History

Islands and Remote Cities

- ISPs , Telcos and Governmental Demands
- Universities

Fiber Redundancy

- Resiliency Option for Larger City ISP and MNO

Corporate (private networks)

- Resorts, Remote Factories & Datacenters
- Big Events

Oil, Gas, Mining

- Latency is Key in the Digital Oilfield and remote operations

Satellite's Role in the 5G Ecosystem

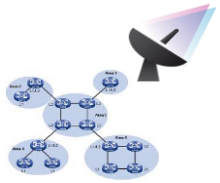
Satellites Can Support the Key Usage Scenarios for 5G

- Satellites can support **multi-gigabit per second** data rates for **enhanced mobile broadband**
  - Satellites routinely carry high bandwidth HD and UHD content
  - Satellites already support 2G/3G mobile backhaul in many parts of the world, and high-throughput satellites (HTS) in GEO, MEO and LEO will support 4G and 5G mobile networks

- Satellites can support **ultra-reliable communications**
  - Our customers – international broadcasters, MNOs, governments – depend on us every day to ensure ultra-reliable communications
  - GEO latency of 250ms (500ms round-trip) is acceptable for many 5G applications, and new MEO and LEO networks will be able to support even more latency-sensitive applications
  - Satellites can even play a role in helping 5G networks meet their sub-1ms latency requirements by delivering commonly accessed content to mobile base stations

- Satellites can support **massive machine-to-machine communications**
  - Satellites already support SCADA and other global asset tracking applications today, and can scale to support future machine-to-machine (Internet-of-Things) communications
  - Investments in new ground segment technologies, such as smaller, lower cost, electronically steerable, and/or phased-array satellite tranceivers are making ubiquitous deployment for IoT feasible

Four Satellite “Sweet Spots” in the 5G Ecosystem



Trunking and Head-End Feed

Satellites provide a very high speed direct connectivity option to remote / hard-to-reach locations

Backhauling and Tower Feed

Satellites provide a high speed connectivity complement (incl. multicast content) to wireless towers, access points and the cloud

Comms on the move

Satellites provide a direct and/or complementary connection for users on the move (e.g. on planes, trains, automobiles and ships)

Hybrid Multiplay

Satellites deliver content complementing terrestrial broadband (as well as direct broadband connectivity in some cases)

- Four main use cases can be identified for the integration of satellite-based solutions into 5G (IMT-2020):
  1. Trunking and Head-end Feed
  2. Backhauling and Tower Feed
  3. Communications on the Move
  4. Hybrid Multiplay

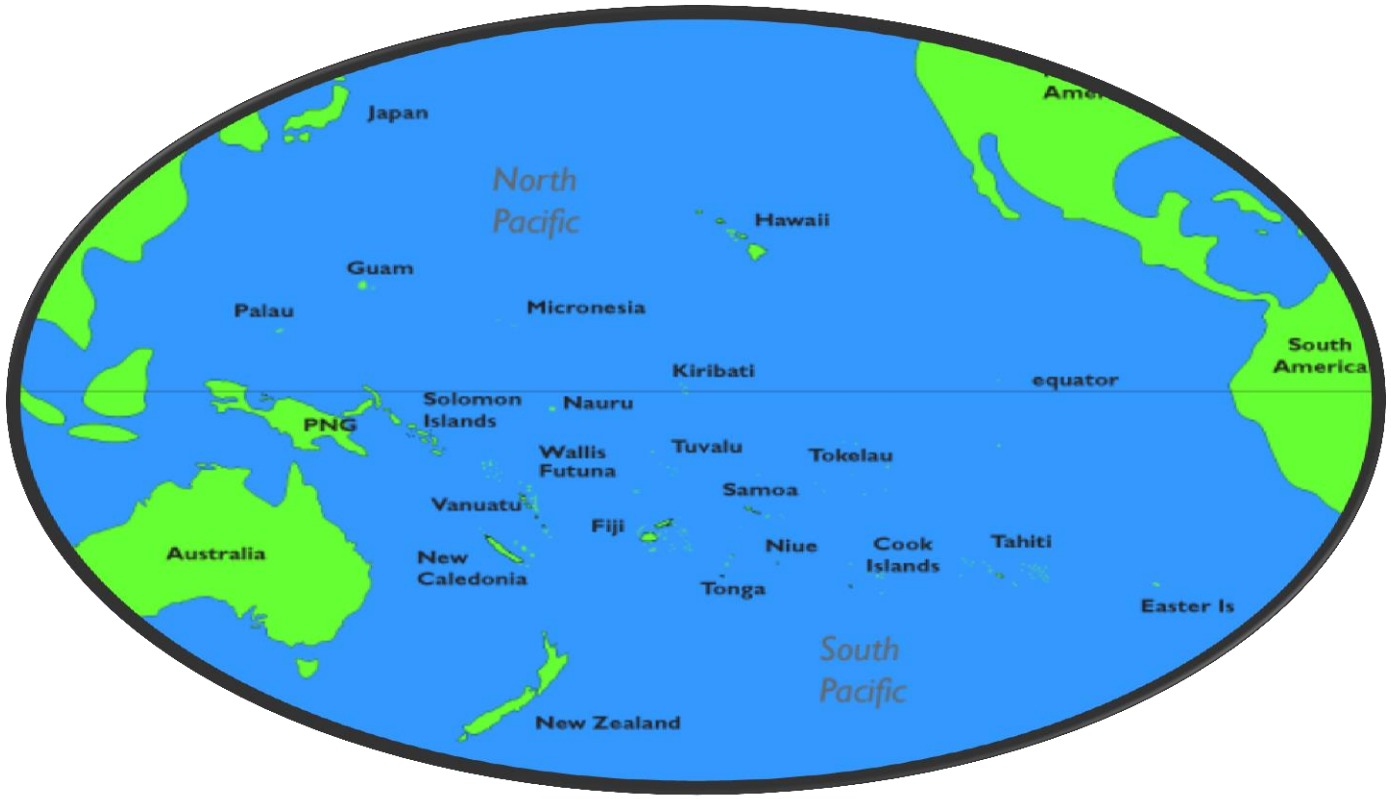
- These four “sweet spots” leverage the advantages of satellites – **high bandwidth** and **ubiquitous coverage** – to enable and extend terrestrial 5G networks

The O3b Experience: Transforming Connectivity Options in the Pacific

O3b connects islands

Most of the South Pacific Island nations now use an O3b beam:

American Samoa
FSM - Yap
Cook Islands
Christmas Island
East Timor
Kirbati
Nauru
Norfolk Island
Palau
Papua New Guinea
Samoa
Solomon Islands
Vanuatu



The Galapagos and Easter Island both have O3b coverage, also.

A Revolution in Backhaul

Digicel, Papua New Guinea

Oi/Timor Telecom, East Timor

Telecom Cook Islands, Cook Islands

PNCC, Palau

ASTCA, American Samoa

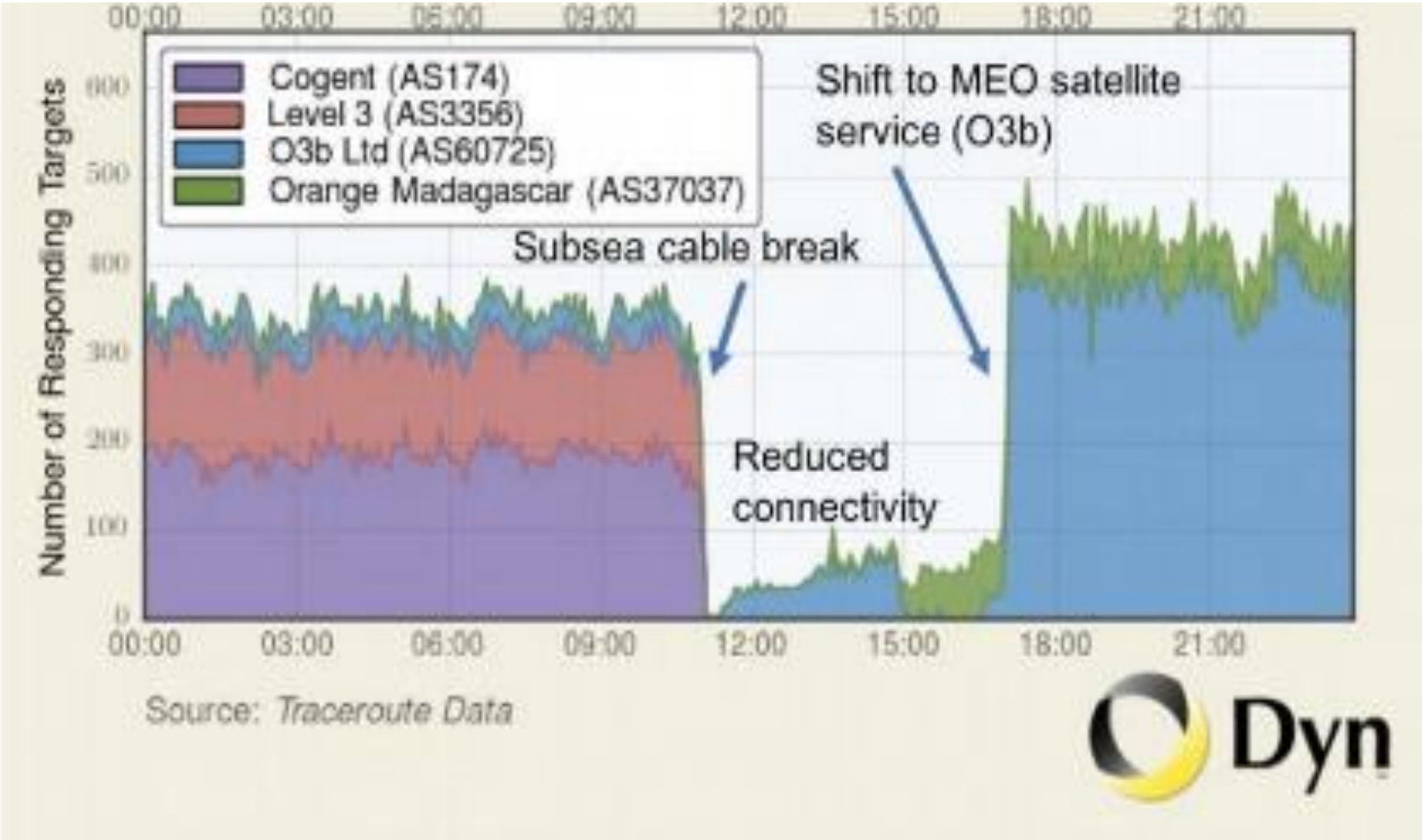
Improved QoE

Improved Reliability

Increased ARPU

Reduced Churn

O3b restores services when fiber goes down



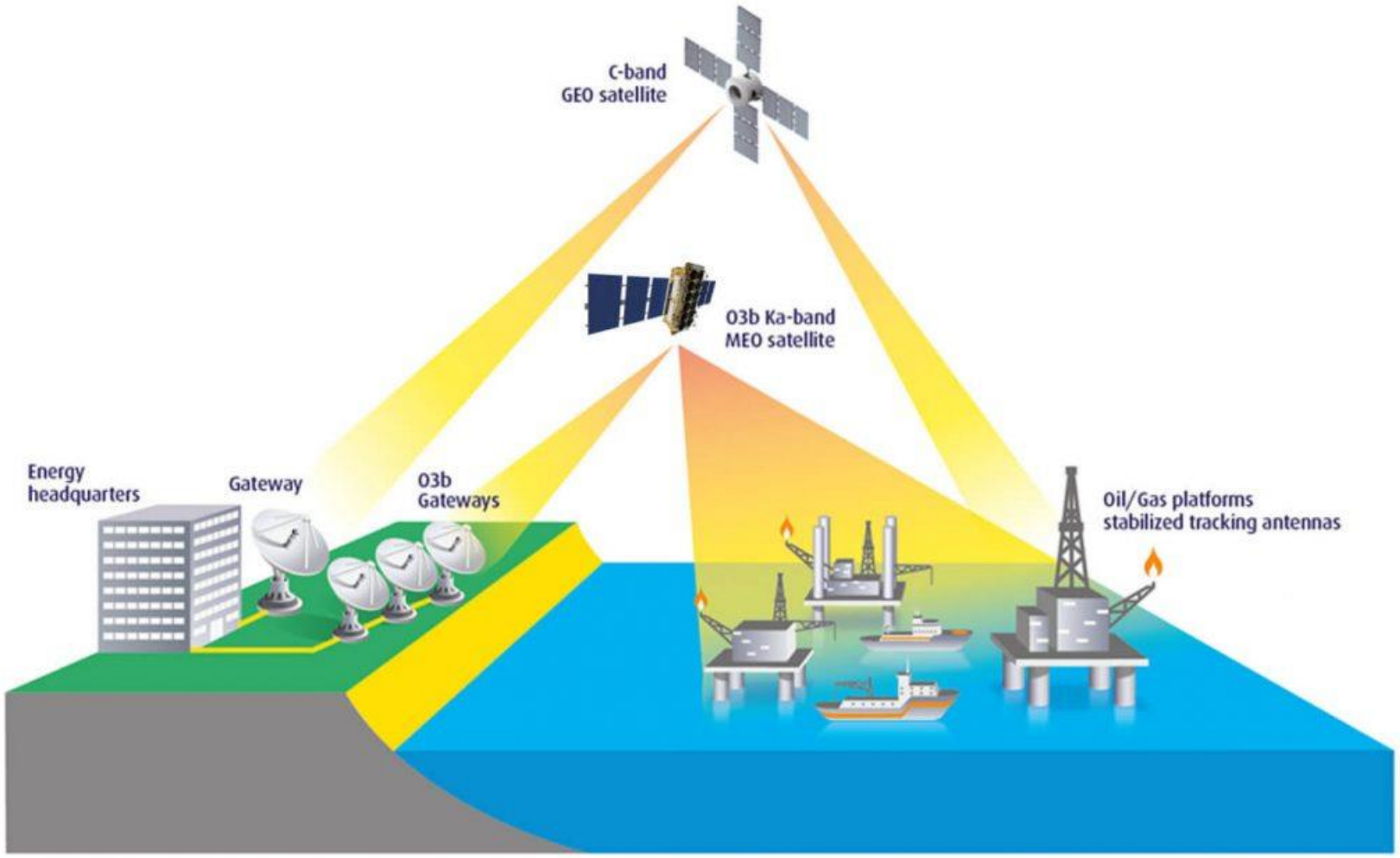
25 Jan 2017

O3b connects vessels

O3b currently serves Royal Caribbean Cruise Lines (RCCL) which operates Asian and South Pacific cruises

Other cruise lines are considering using O3b & SES capacity on their fleets

O3b connects oil & gas platforms



Conclusion

Conclusion

- Satellites are here to stay: we play a vital role in bridging the digital divide
- In the 5G ecosystem, satellites can enable and extend the outreach of 5G networks
  - Scalable infrastructure, dynamic offering, enabling revenues
- Regulatory and technical decisions should enable and not preclude satellites from playing a role in the 5G ecosystem
  - Satellites will play a particularly important role in extending 5G networks to hard-to-serve, underserved and unserved areas of the world
- SES and others in the satellite industry are actively engaged in technical standards bodies (e.g. 3GPP) and international forums (e.g. ITU, CEPT, 5G PPP) in order help make 5G a truly inclusive reality