

Network Restoration Via Satellite In The Pacific

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INTELSAT.

Envision. Connect. Transform.



Diverse, Reliable, Global and Innovative

2016 Financials

Revenue 2.188 Billion USD

Backlog 8.7 Billion USD

EBITDA 75%

Number 1 satellite company

Revenue

Reach

50 Traditional Satellites

3 Epic^{NG} Satellites

Strong history

First commercial satellite
operator launching Early

Bird 1965

Feb 28th 2017 announced conditional
merger with OneWeb and Softbank to

inject 1.7 Billion to become 40%
shareholder

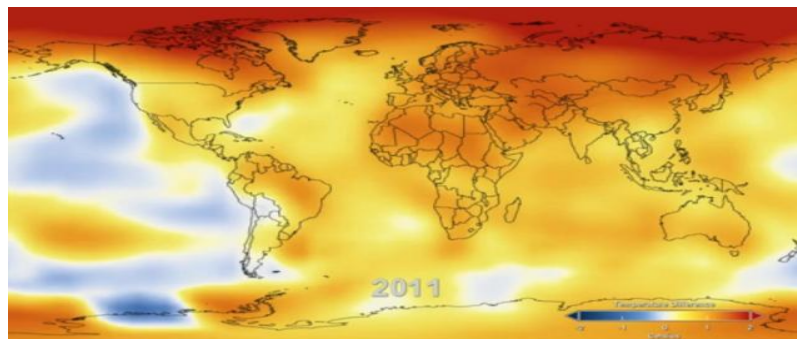


Natural Threats

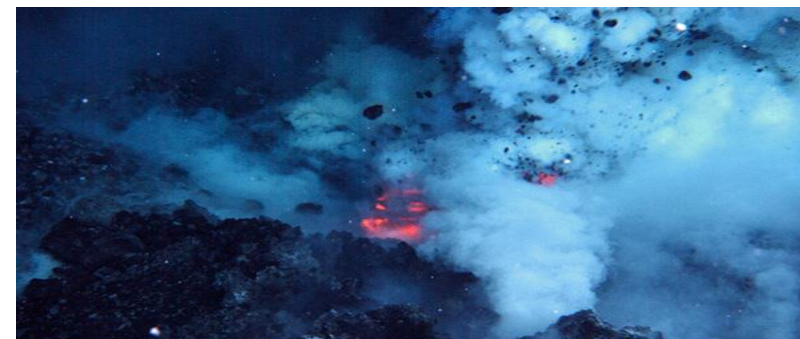
Submarine cables are exposed to natural hazards in all water depths but they dominate in water depths greater than 1000 m



Source : NOAA/Reuters.



Source : NASA.



Source : NOAA / NSF / WHOI.

The Pacific is no stranger to natural disasters like cyclones, undersea volcanoes, earthquakes and tsunamis.

When these natural disasters happen, they usually affect large areas and cause devastating damage, often to many undersea cables.

Man-made Threats

In depths to around 1000 m, around 90% of all hazards to submarine cables are man-made



Source : ISPC

Fishing

Trawling nets can snag and damage submarine cables



Source : ISPC

Anchorage

In 2012, a ship's anchor accidentally sliced an underwater internet cable as it entered a port in Kenya, cutting off access to six African countries.



Theft

In 2007, 43 km of cables went missing from two lines in Vietnamese waters. One ship was caught with over 50 tons of cable cut into 1.5-5m sections

Additional Risks and Interruptions



Source : US Pacific Fleet

Disruptions due to planned maintenance



Source : Wikipedia Creative Commons

Vulnerability of cable landing stations

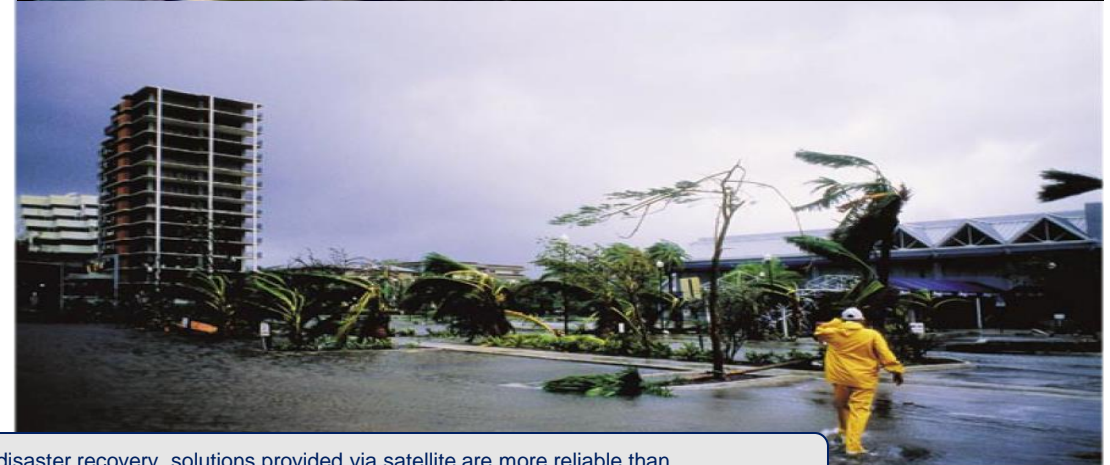


Scarcity and expense of cable repair ships

Thus, some form of diversity and disaster restoration is required to ensure continued flow of communications

Satellite - Ideal for Diversity & Restoration

- Highly **Survivable** (Physical survivability and robustness)
- **Independent** of terrestrial infrastructure
- Able to provide the load sharing and **Surge Capacity Solution** for Larger Sites
- Best for Redundancy: They add a layer of **Path Diversity** and **Link Availability** , especially **for single path fiber systems**
- Satellites are the best and most reliable platform for communications in natural disasters or terrorist attacks — fiber networks or even terrestrial wireless can be disrupted by tsunamis, earthquakes, or hurricanes. Satellites are **Instant Infrastructure**.
- Intelsat has been **quick to respond** in providing disaster recovery in the Pacific



In times of disaster recovery, solutions provided via satellite are more reliable than communications utilizing land-based connection

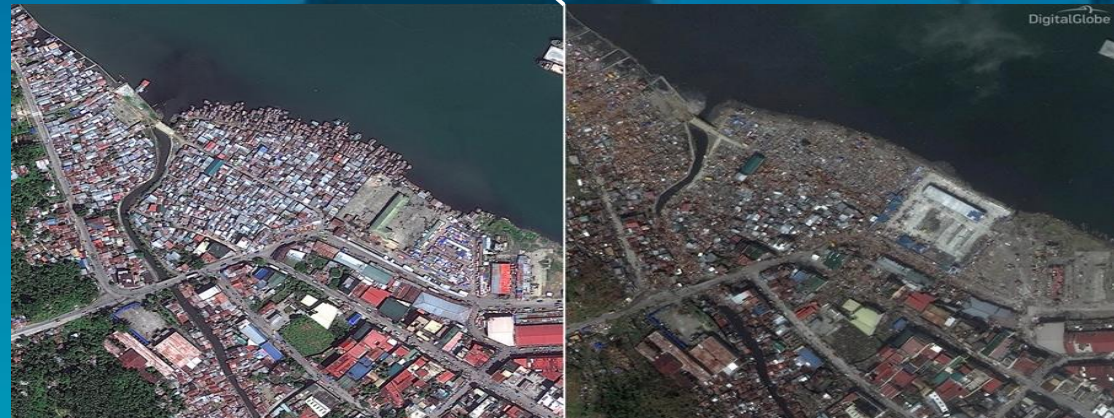
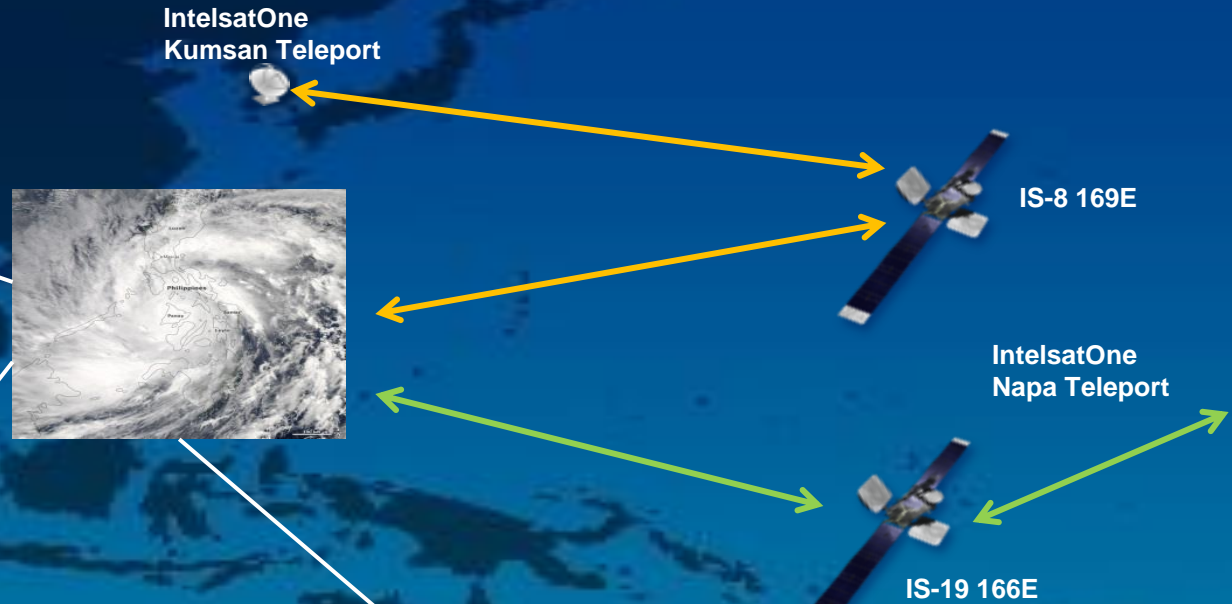
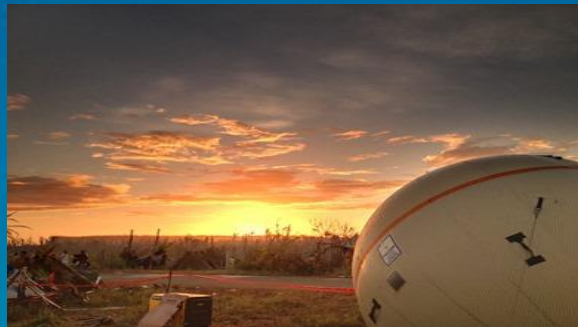
Intelsat – Assisting in Disaster Recovery

Philippines – Typhoon Haiyan 2013

IS-8 supporting the American Red Cross International Emergency Response unit



IS-19 supporting the Global Disaster Immediate Response Team



An ounce of prevention is worth a pound of cure – Benjamin Franklin

- Proper preparation can do much to mitigate financial and service impacts due to planned or unplanned disruptions
 - ❖ Don't wait until it's TOO LATE!
- To help customers prepare for worst case scenarios, Intelsat is offering 2 types of satellite backup options that cater to different needs.

Dedicated Backup Capacity

- Dedicated Access
- Potential Revenue Generation
- Full Control
- Instant Activation

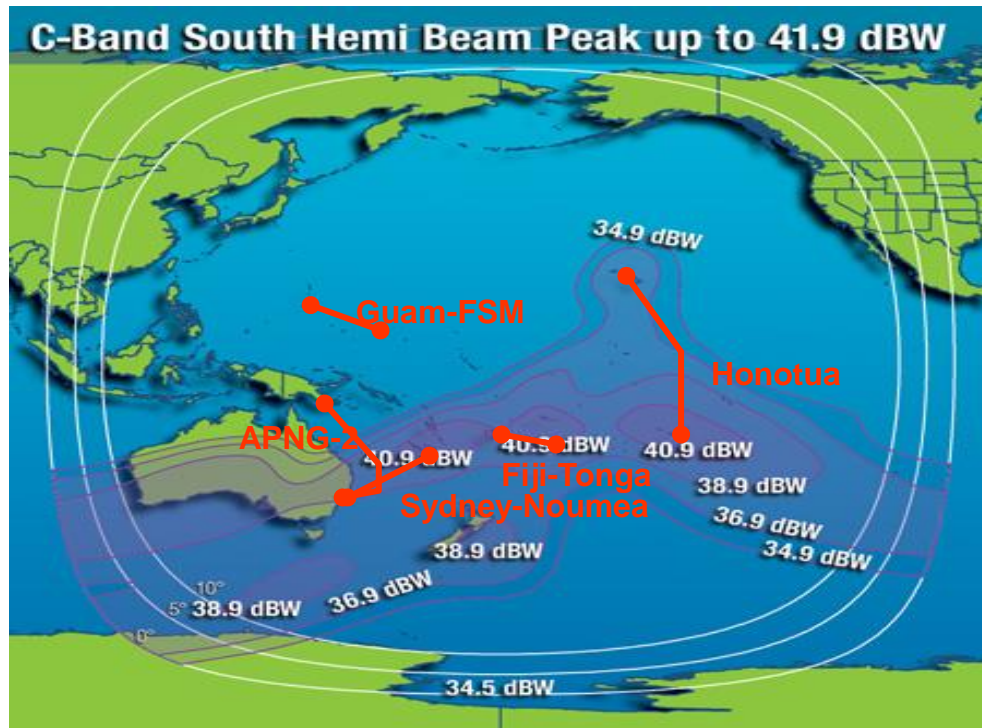
Shared Backup Capacity

- Shared Access
- Subscription-based
- Affordable
- Pay-As-You-Use

Dedicated Backup Capacity Options

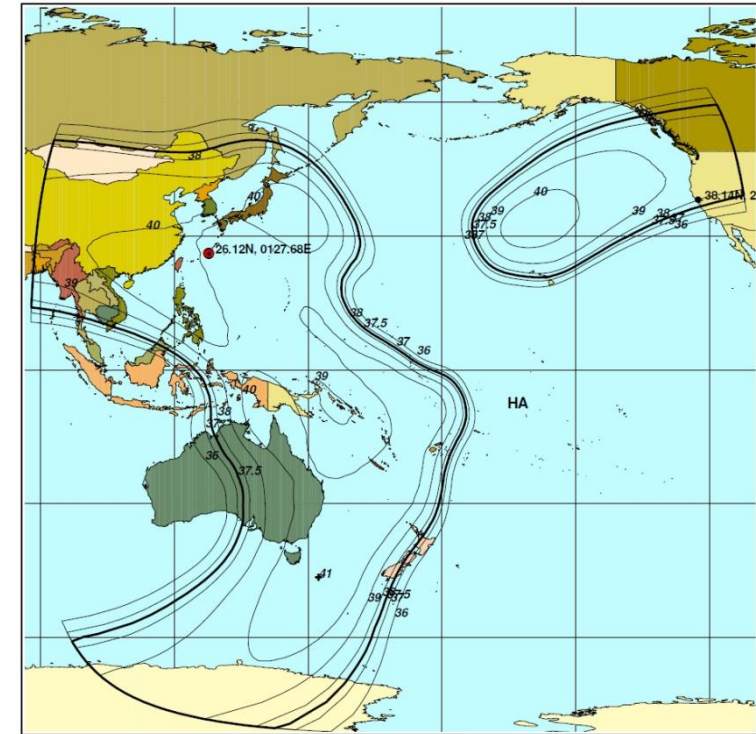
Full-time satellite diversity

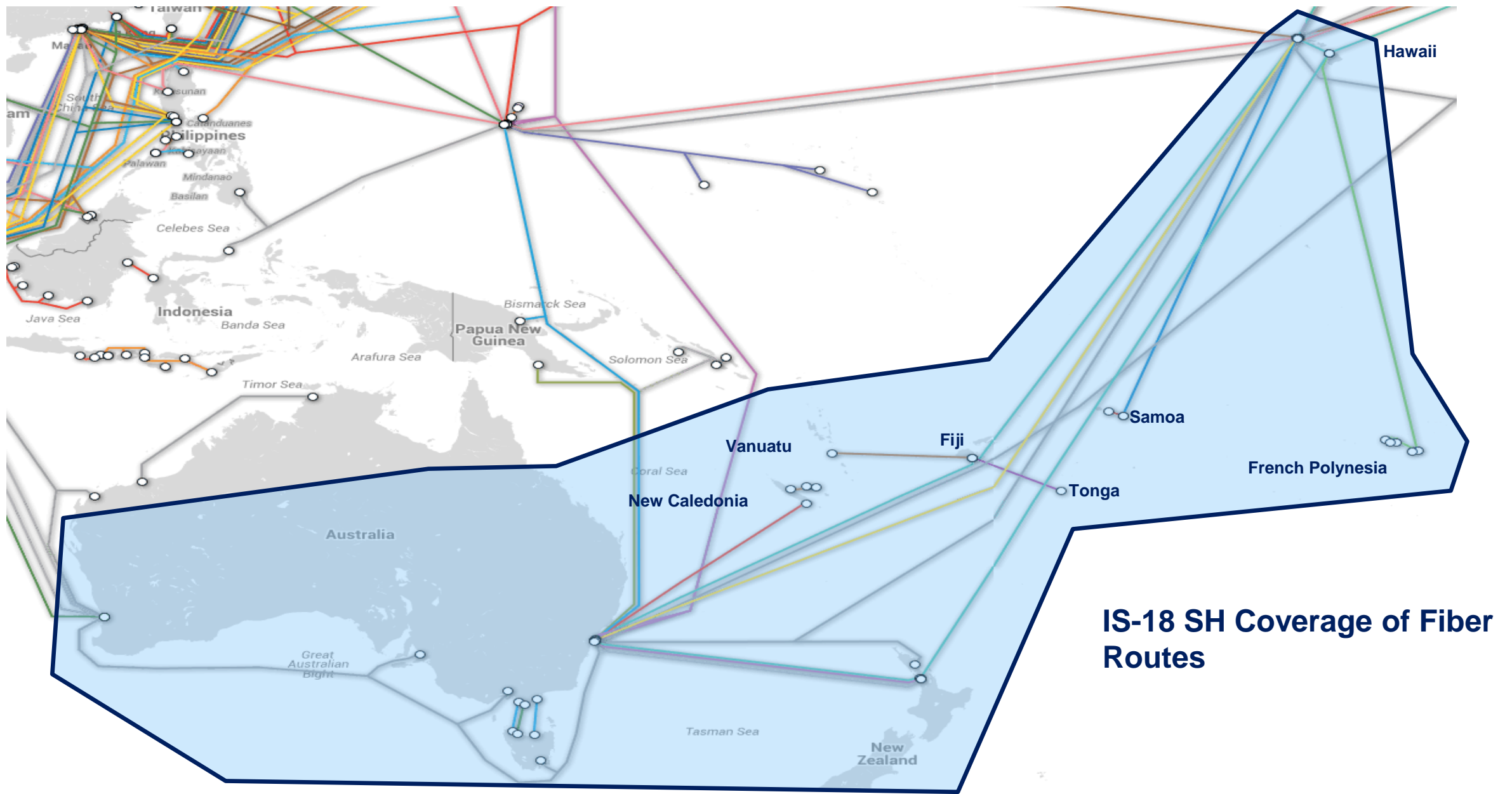
- IS-18 SH/SH @180°E
- Straight lease of capacity
- Full control and access



Eclipse pre-emptible satellite diversity

- IS-805 @169°E
- Lower cost
- Inclined orbit with one hour outage per day for up to 90 days a year
- Suited for Northern and Mid-Pacific Islands.

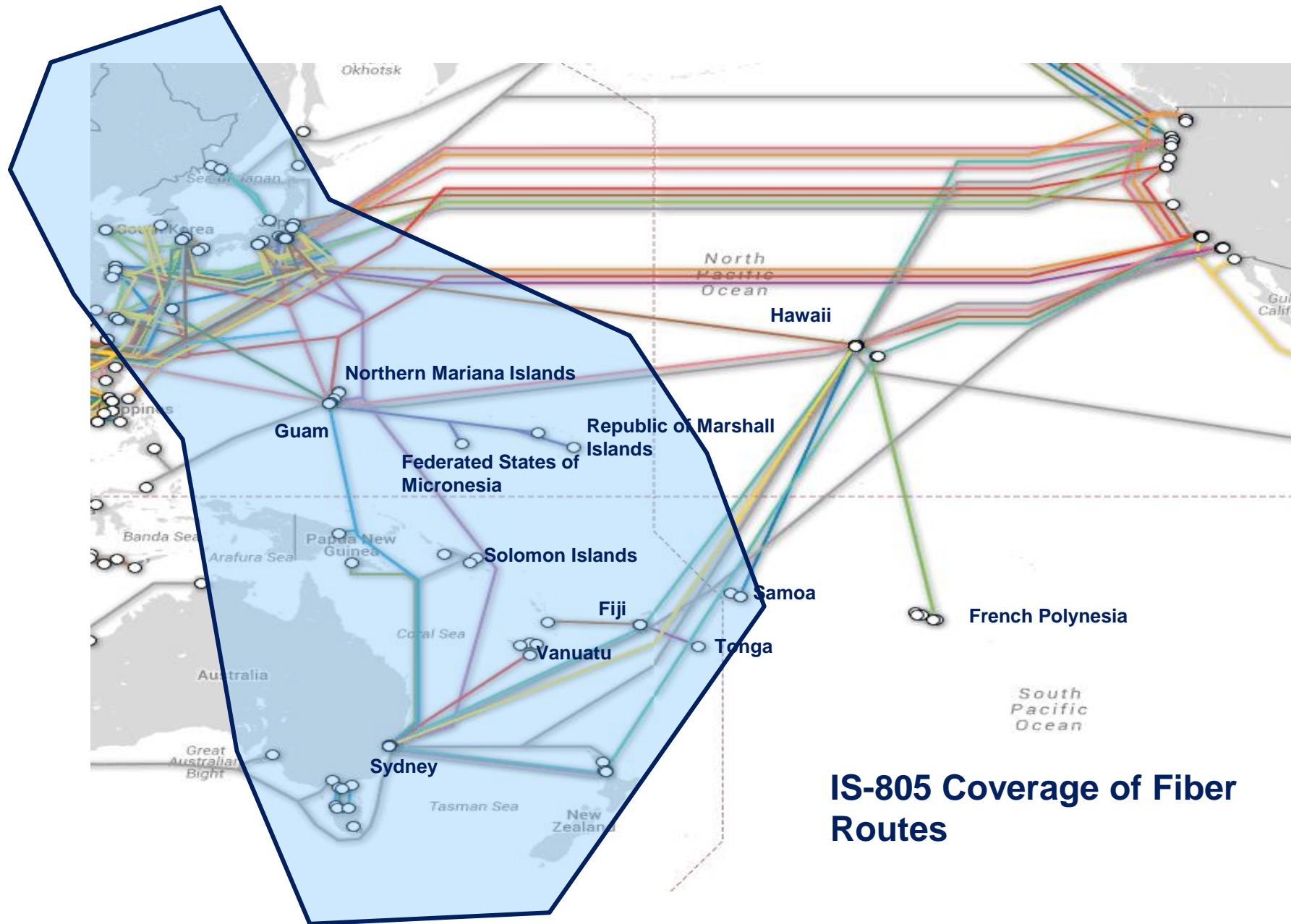




IS-18 SH Coverage of Fiber Routes

Source: www.submarinecablemap.com

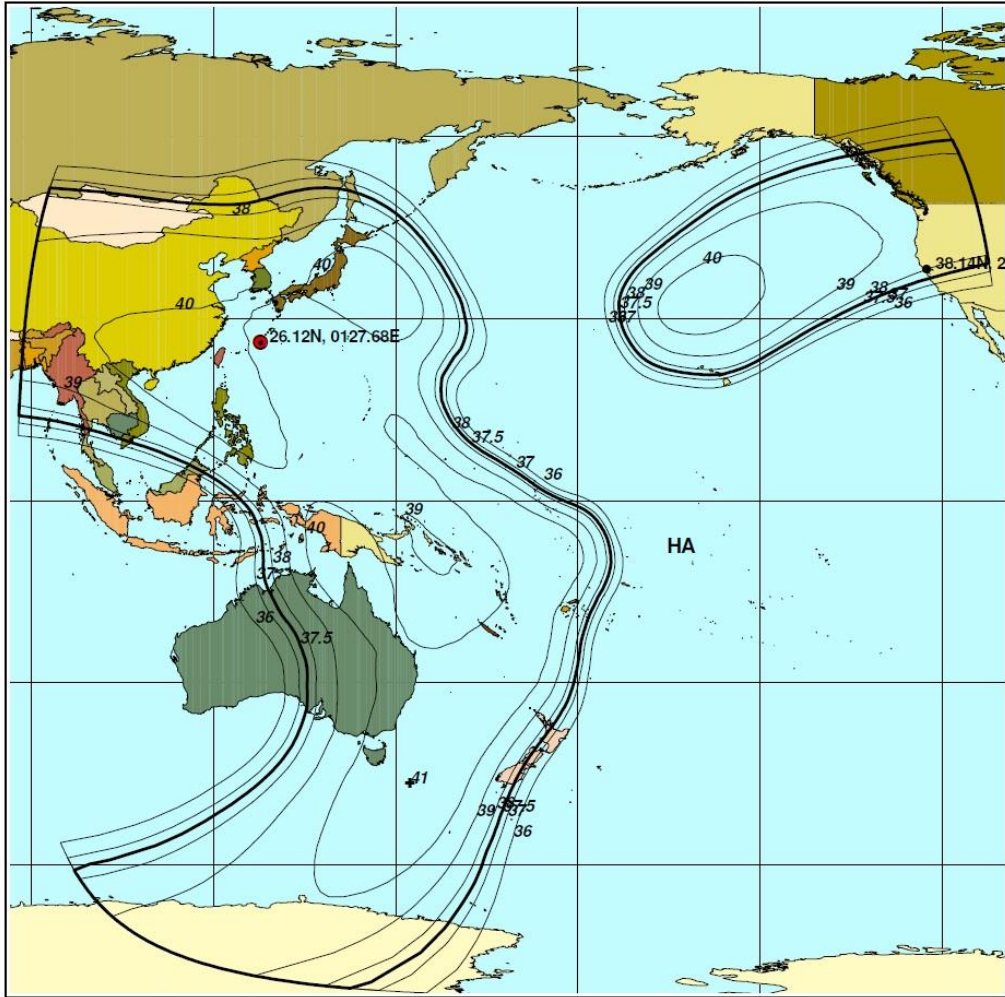




IS-805 Coverage of Fiber Routes

Source: www.submarinecablemap.com

Shared Backup Capacity Option



- Customers can buy into a shared capacity pool on IS-805 C-Band Hemi beam
- Monthly reservation fee for access to this shared capacity
- Use of shared capacity can be scheduled in advance e.g. cable maintenance; or activated in times of emergency e.g. natural disaster
- Customer pays a pre-determined rate for the usage of the capacity when required
- Pre-assigned transmission plans & test periods provided to allow for fast activation of services

In Summary

- ❑ By providing different network restoration options to cater to different customer needs and budgets, Intelsat makes it easier than ever for
 - Service providers to maintain services and safeguard revenue
 - Companies to have business continuity
 - Government organizations to have access to critical communication services in times of disaster

- ❑ The options are:
 - Full-time satellite diversity – IS-18 SH/SH
 - Eclipse pre-emptible satellite diversity – IS-805 inclined orbit
 - Shared satellite capacity pool – IS-805 C-Band Hemi shared pool
 - Available through Intelsat Distributors.

Next Generation Epic^{NG}

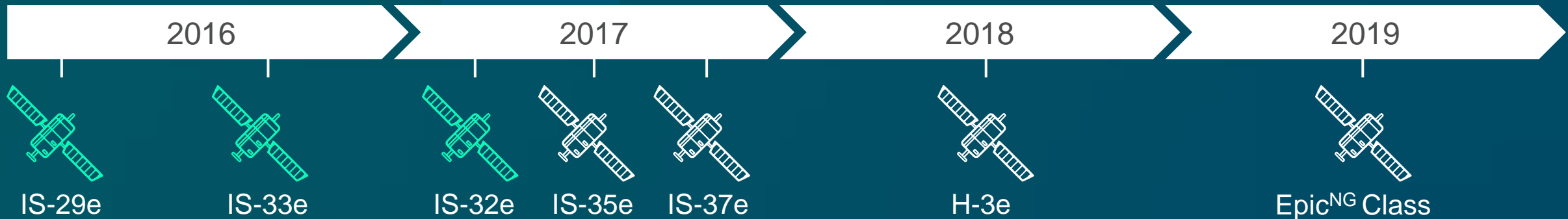
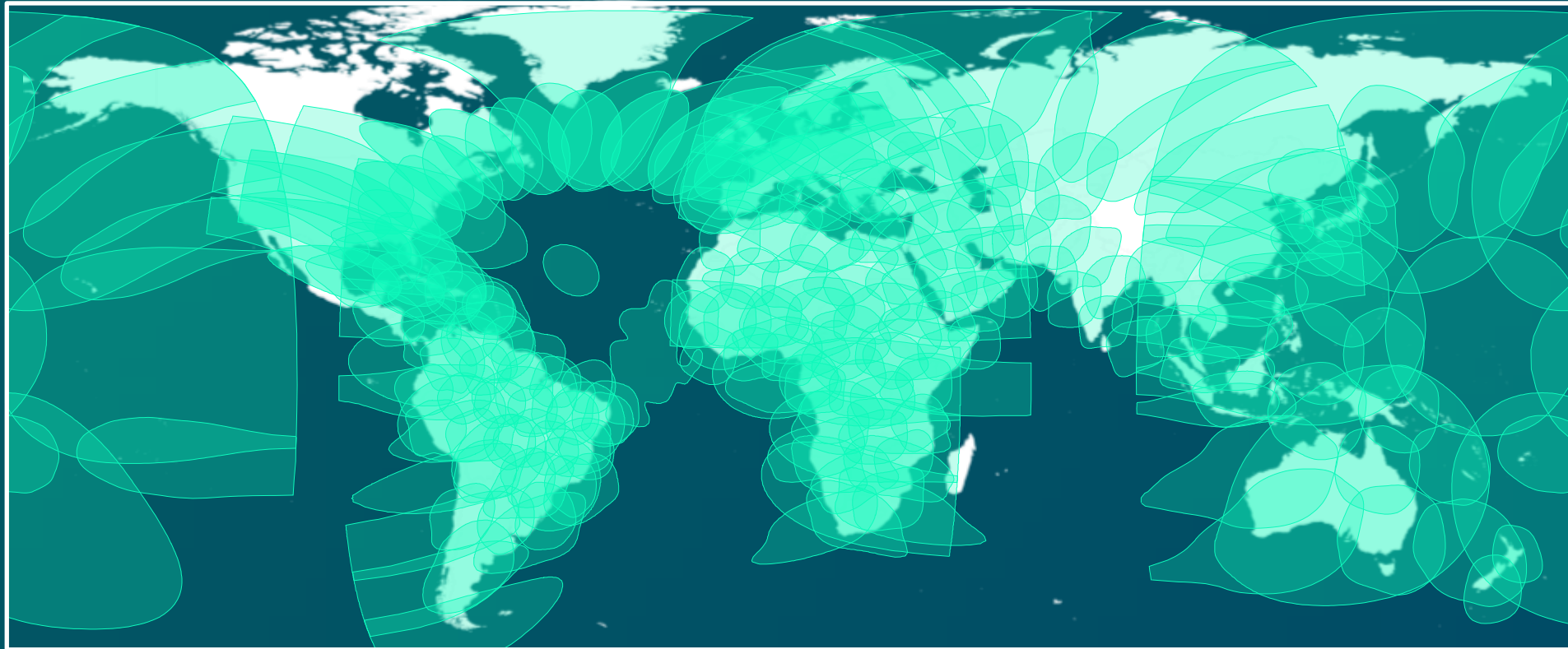
Just around the corner



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Layered Epic^{NG} Capacity Rolled Out Over Time



Horizons 3e will Complete the Global Epic^{NG} Footprint

IS-29e – 310°E
IS-33e – 60°E
IS-32e – 317°E
IS-35e – 325.5°E
IS-37e – TBD

Horizons 3e

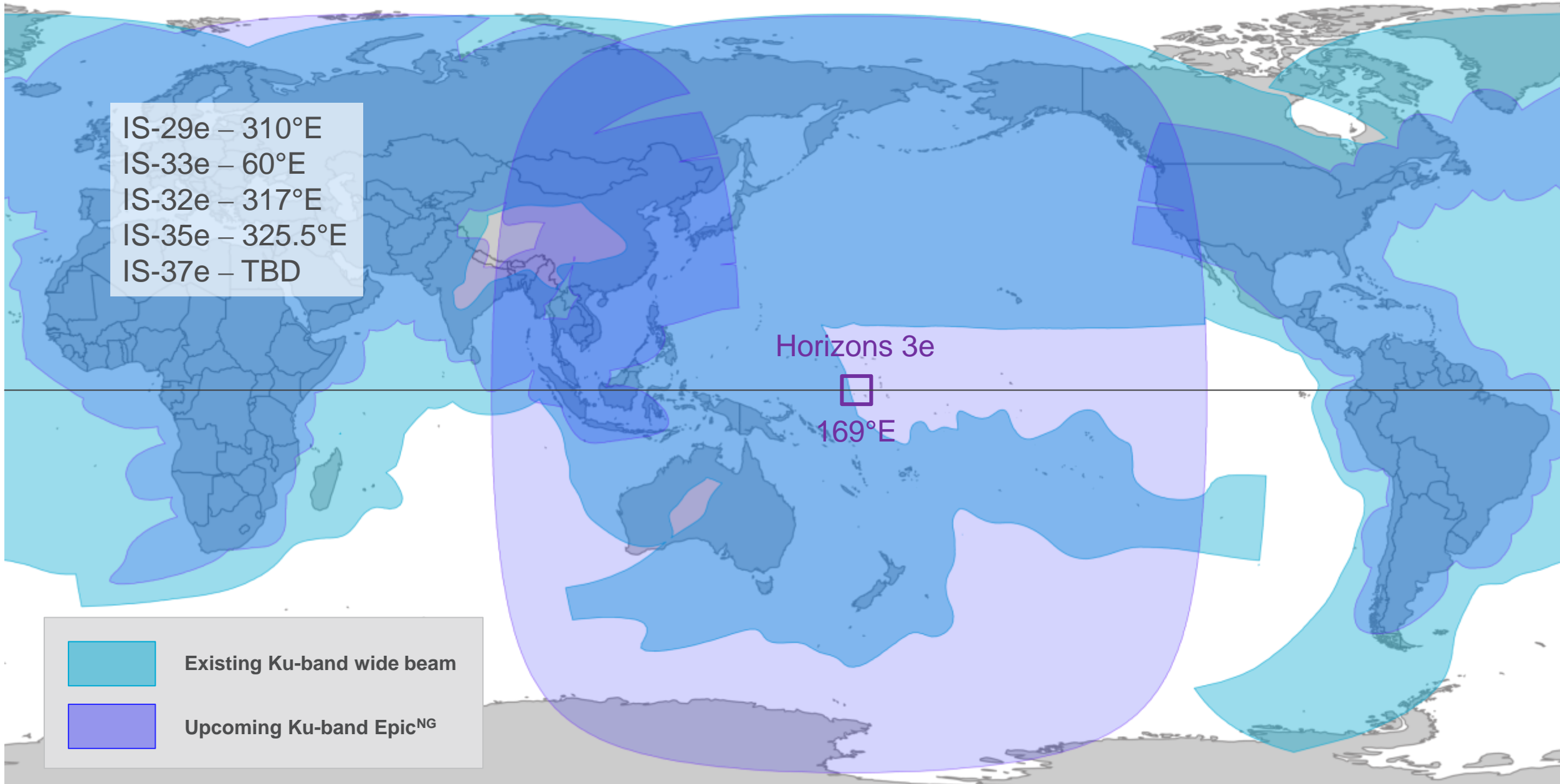
169°E



Existing Ku-band wide beam



Upcoming Ku-band Epic^{NG}



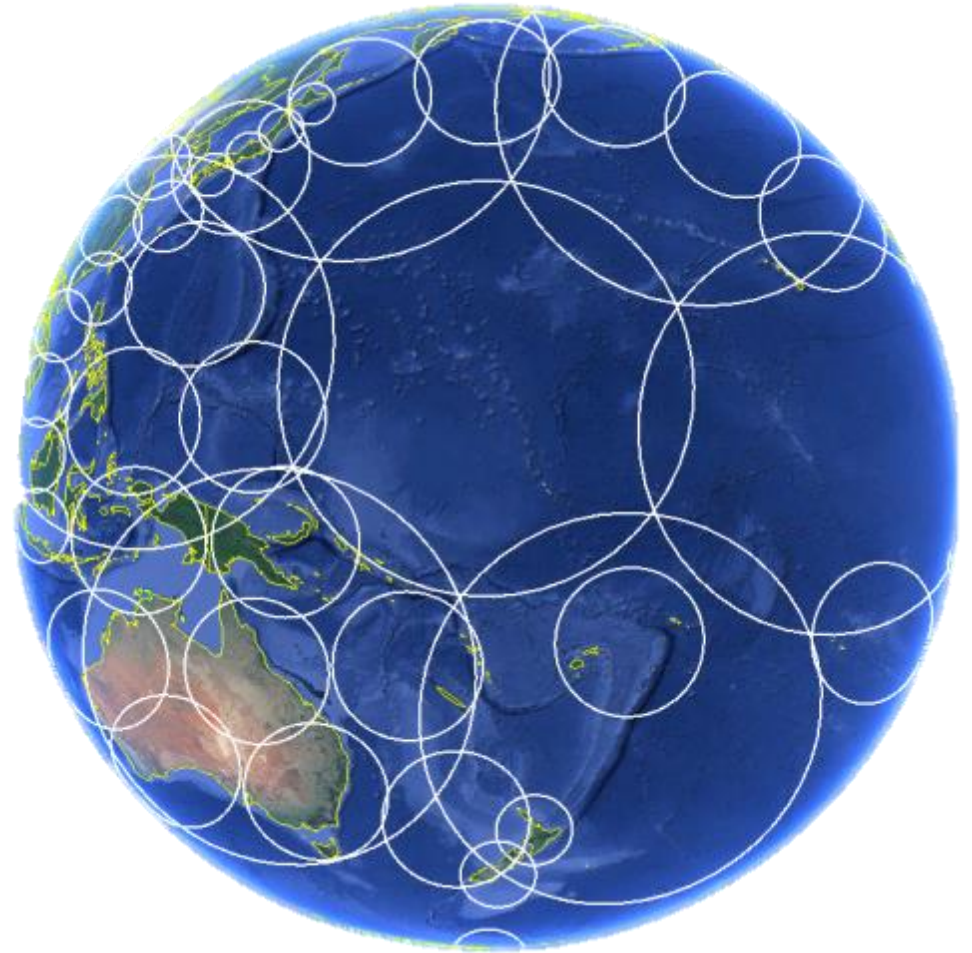
H-3e Enables the First Global Ku-band HTS Coverage

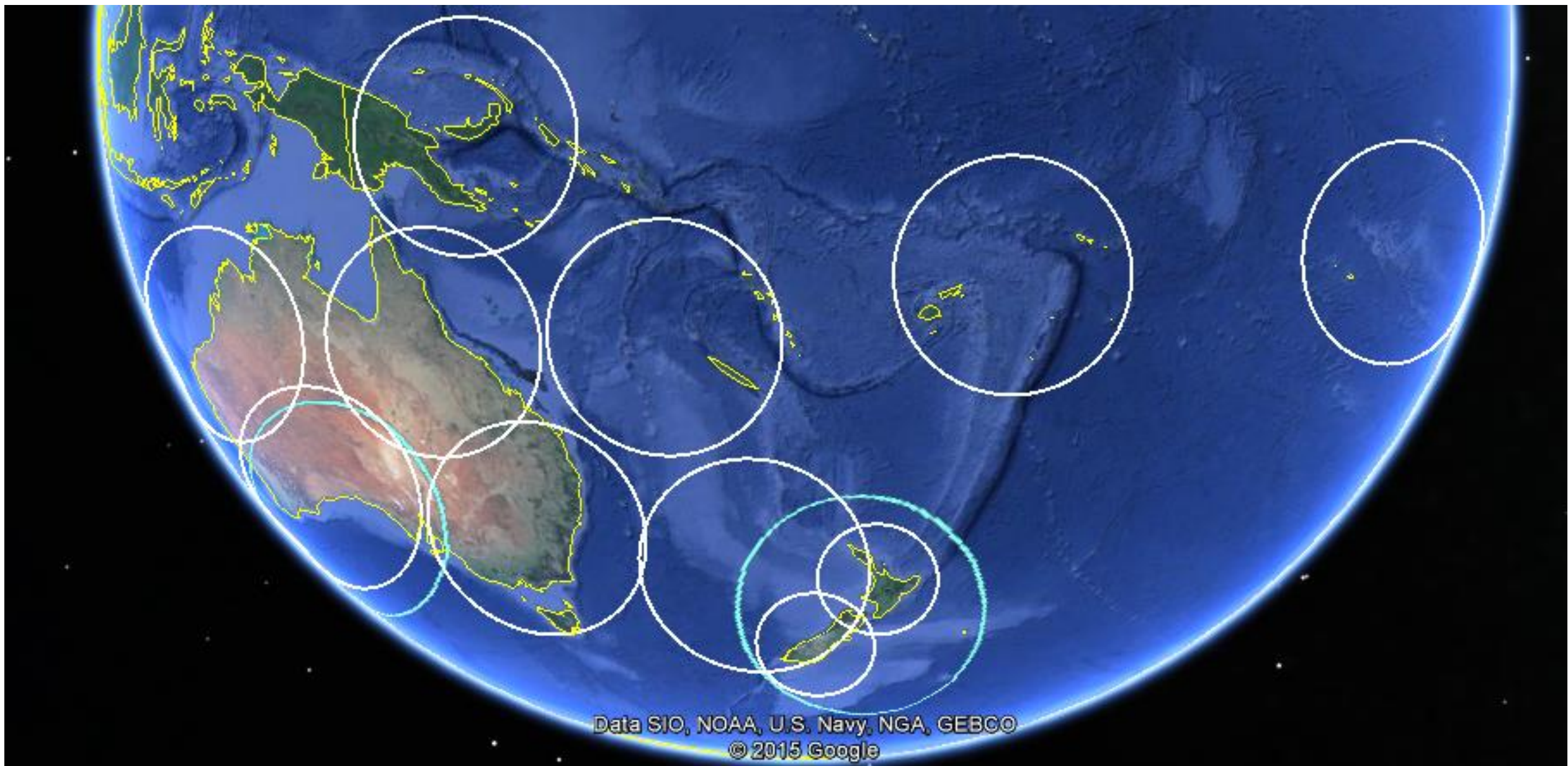
Expanding the Ku-band mobility capacity and coverage of IS-19 and IS-18 in the Pacific

Featuring multiple user spots optimized to serve densely-used Asian and trans-Pacific flight paths and maritime routes

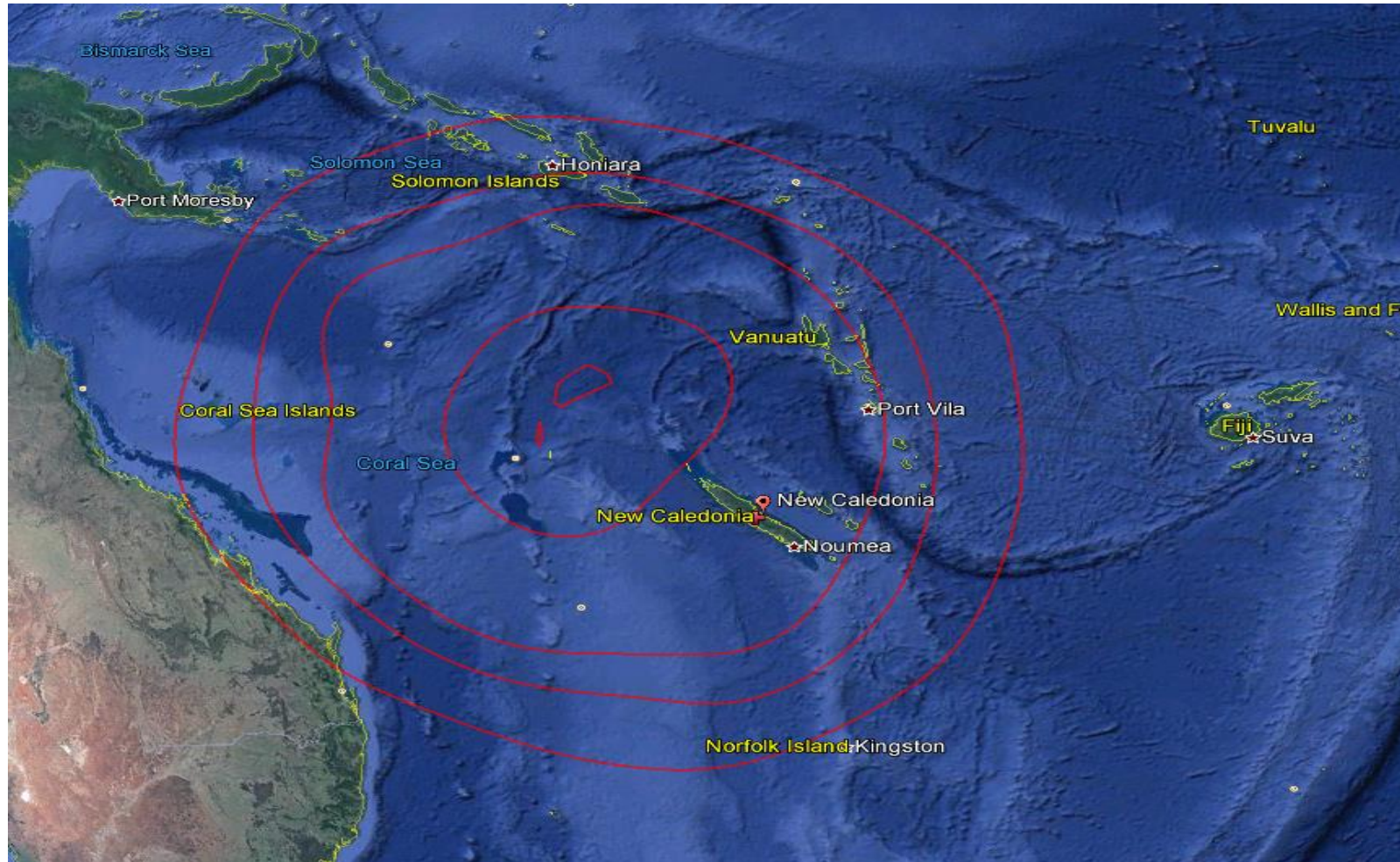
Overlap of the H-3e and IS-33e coverages in Southeast Asia provides more capacity and look angle diversity

Capacity will be incorporated in the IntelsatOne® Flex platform



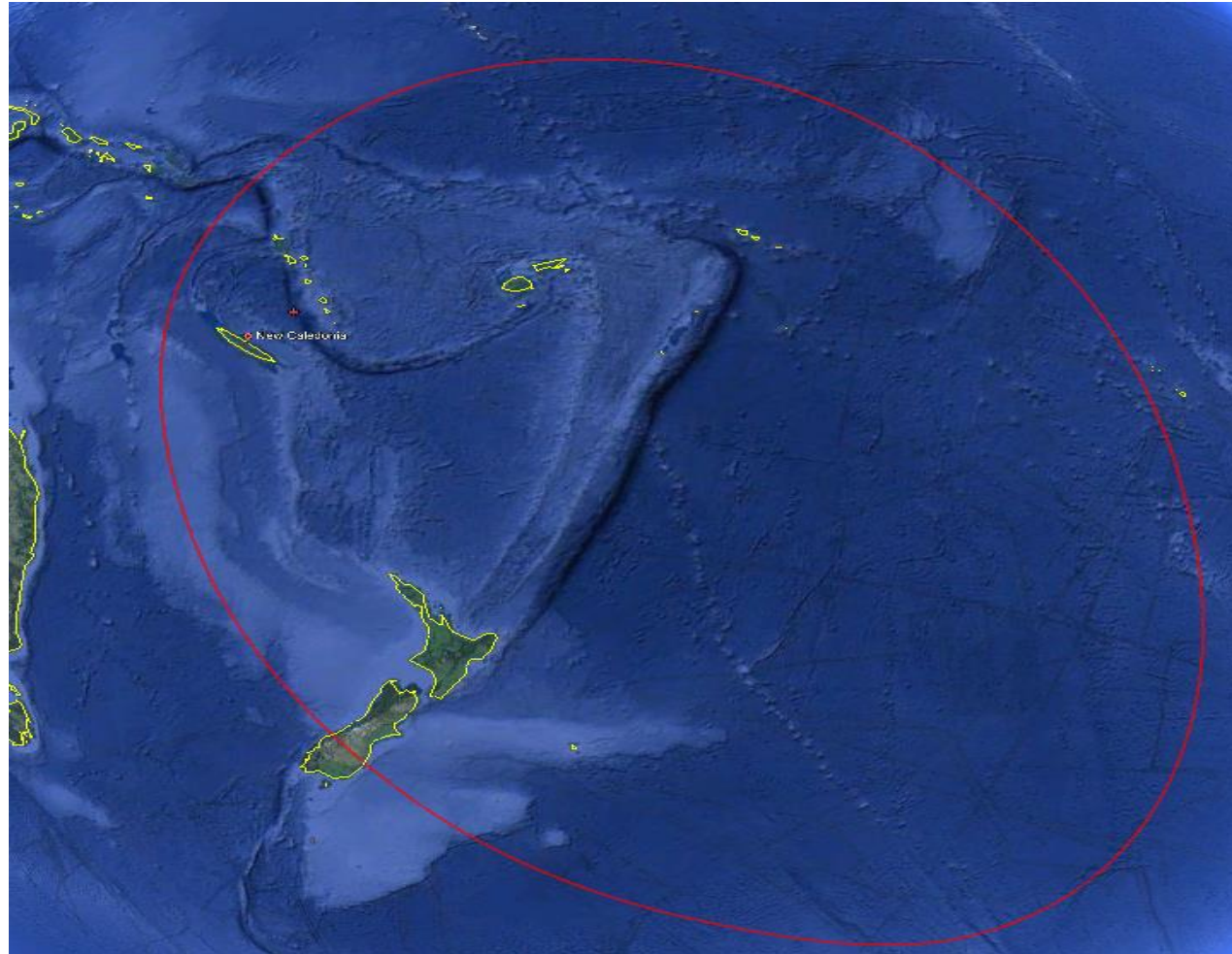


H-3e U17 Beam

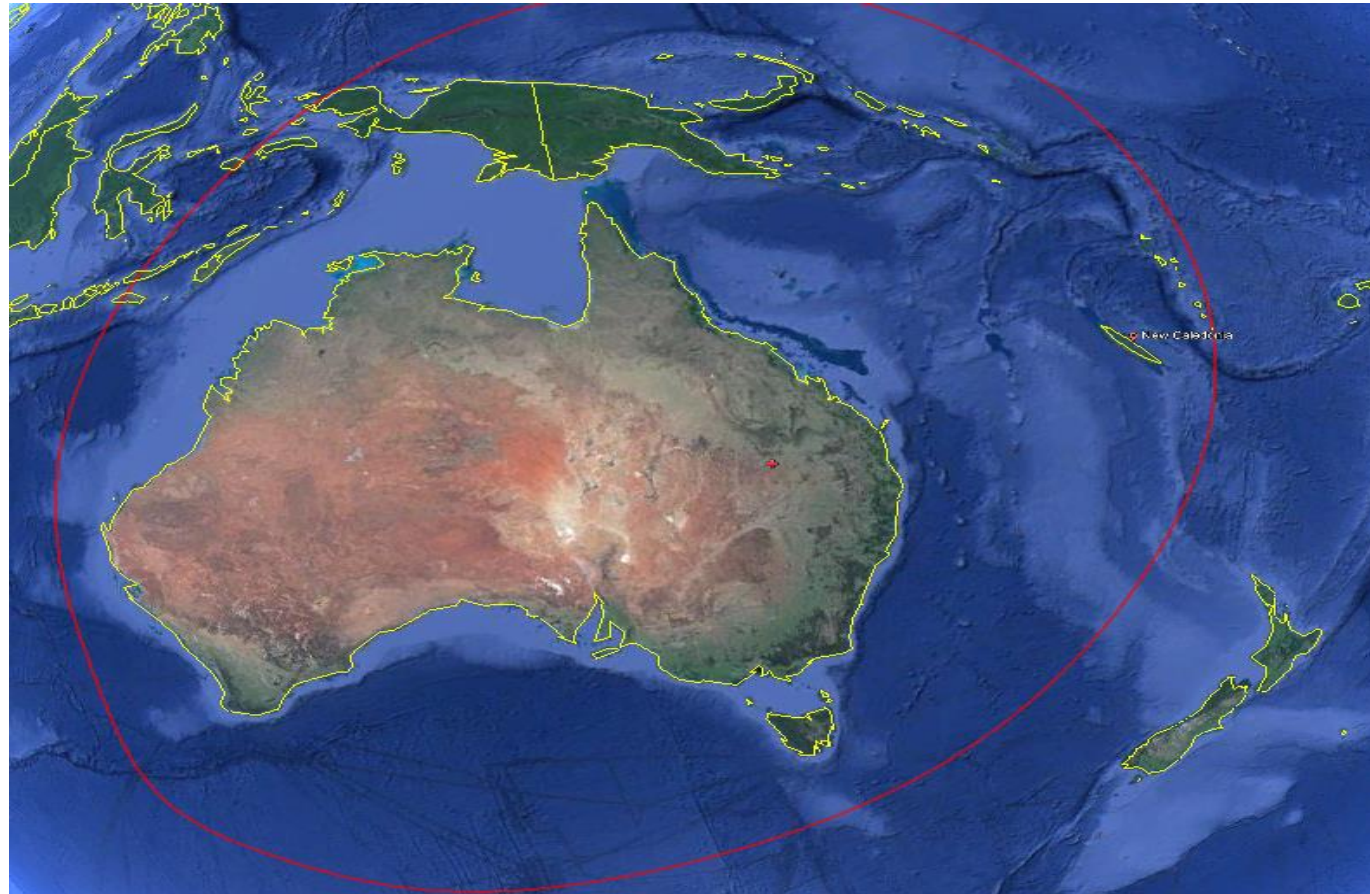


U17 configured with cross strapped to another beam will give us 109.4MHz for downlink and 94.3MHz in the uplink. If it is configured for loopback then we only have 94.3MHz available

H-3e P1 Beam



H-3e P2 Beam



OneWeb



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OneWeb

First and only fully global, pole-to-pole high throughput satellite system

- › Complements Intelsat's geostationary orbit ("GEO") satellite services
- › Enables coverage over the Earth's poles and in urban canyons
- › Provide global Ku-band high throughput coverage over certain great circle routes, such as via the North Pole
- › Will benefit to long haul flights, such as US West Coast to Europe



OneWeb

First and only fully global, pole-to-pole high throughput satellite system

- › The OneWeb satellite constellation
- › 700 satellites (Constellation – 18 planes of 36 satellites)
- › Low latency (<50ms round trip delay)
- › Look angles > 57°

Total Throughput of the system:


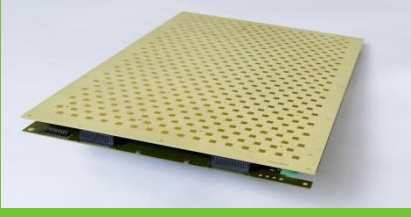
5 terabits per second

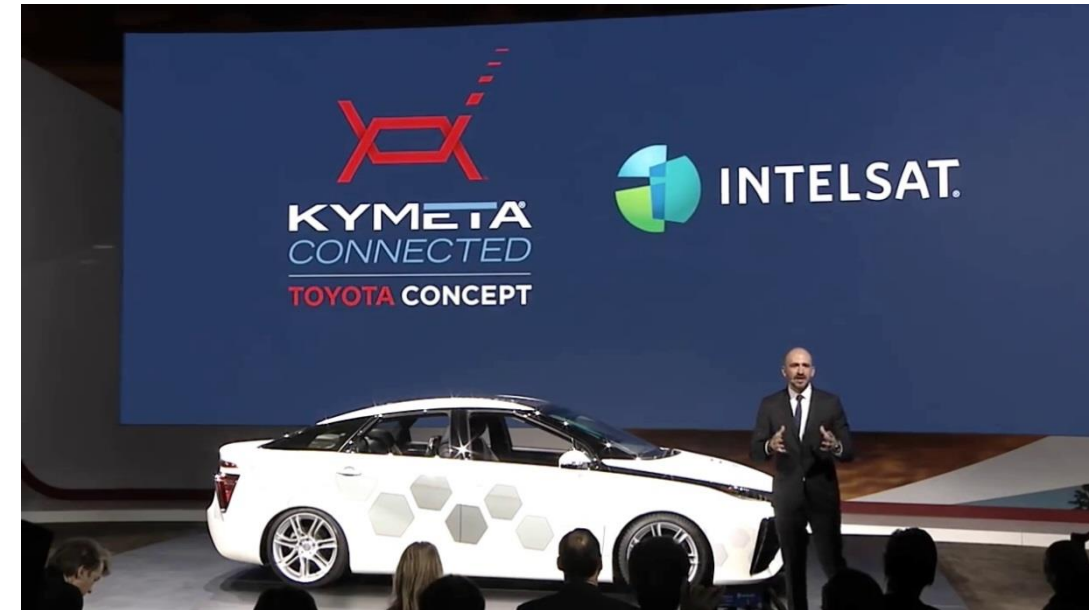


Credit: Airbus Defence and Space

Innovative Antenna Technology

-

Vendor	Kymeta	Phasor
Key strengths of the technology	 <p>Low cost Low profile and elegant Electronic tracking Passive array</p>	 <p>Ultrathin active phased array Electronic tracking Can conform to fuselage shape</p>
Main applications	<p>Connected cars Low end Maritime Broadband to Yachts Leo constellations Internet of Things</p>	<p>Business jets Aero mobility</p>



Thank you



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Intelsat – Assisting in Disaster Recovery Indonesia Tsunami 2004

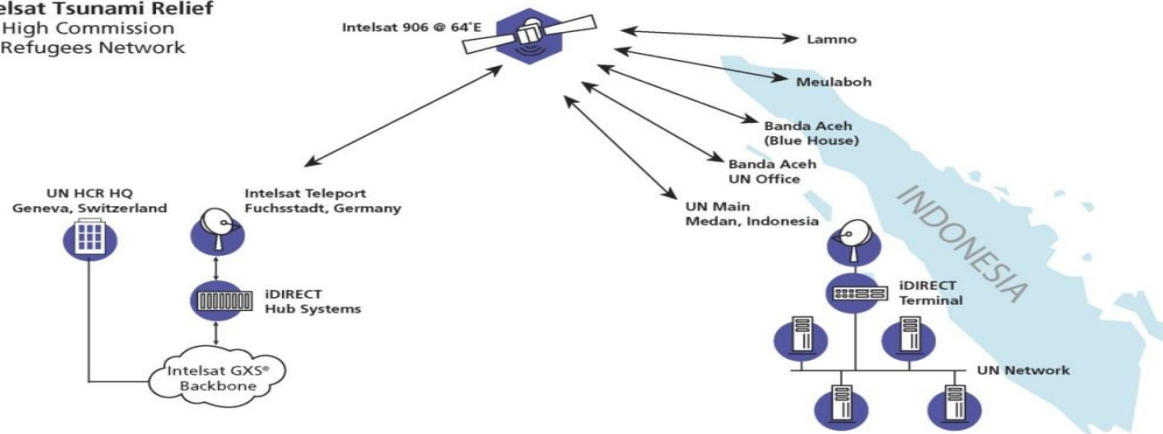
UN HQ
Geneva via
Fuchsstadt

IS-906

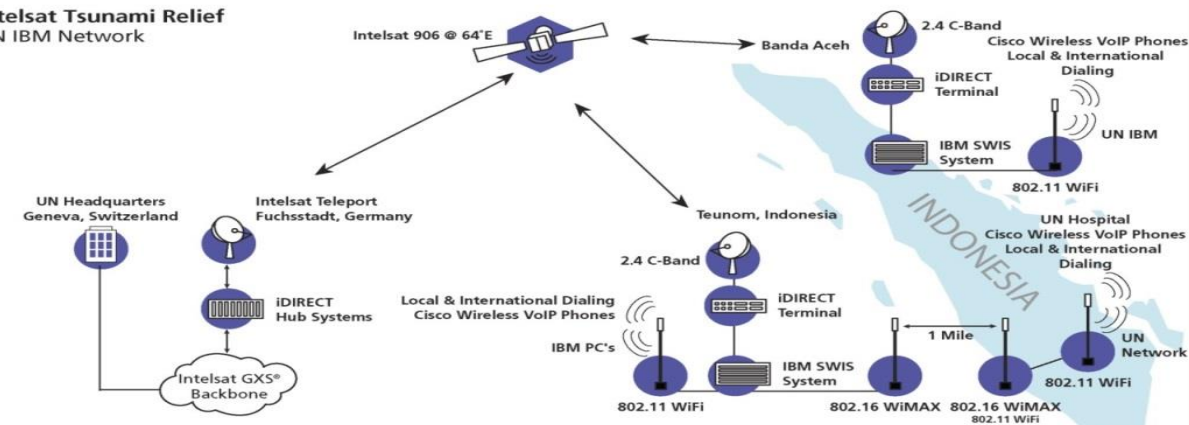
Banda Aceh



Intelsat Tsunami Relief UN High Commission for Refugees Network



Intelsat Tsunami Relief UN IBM Network



Economic Impact of Cable Disruptions

The economic impact on Pacific island states due to undersea cable disruptions will be severe because:

- Island states rely almost entirely on undersea cable for internet traffic.
- Almost all of the undersea cable connections are single path systems. There is no path diversity and no overland alternatives
- A very high proportion of internet traffic is international.
- For example, it is estimated that 95% of the total internet traffic in Papua New Guinea is international and the resulting damage from a cable disruption can amount up to 9% of GDP!

*



Check your connection

You don't seem to have an active internet connection.
Please check your connection and try again.

Close

H-3e Satellite Performance

Coverage	Region	Beam	Channel	Uplink					
				Configurable	Reserved	Flex	Available	Pipeline	Contention
Sea/South Pacific	Sea/South Pacific	P1	K51	36	18.2	17.8	0	0	-
S.E. Asia	Australia	P2	K52	27	0	26	1	0	-
South Pacific	New Caledonia	U17	K47	162	49.5	18.2	94.3	0	-

Downlink					
Configurable	Reserved	Flex	Available	Pipeline	Contention
54	33.9	18.2	1.9	0	-
54	0	54	0	0	-
224	96.4	18.2	109.4	0	-