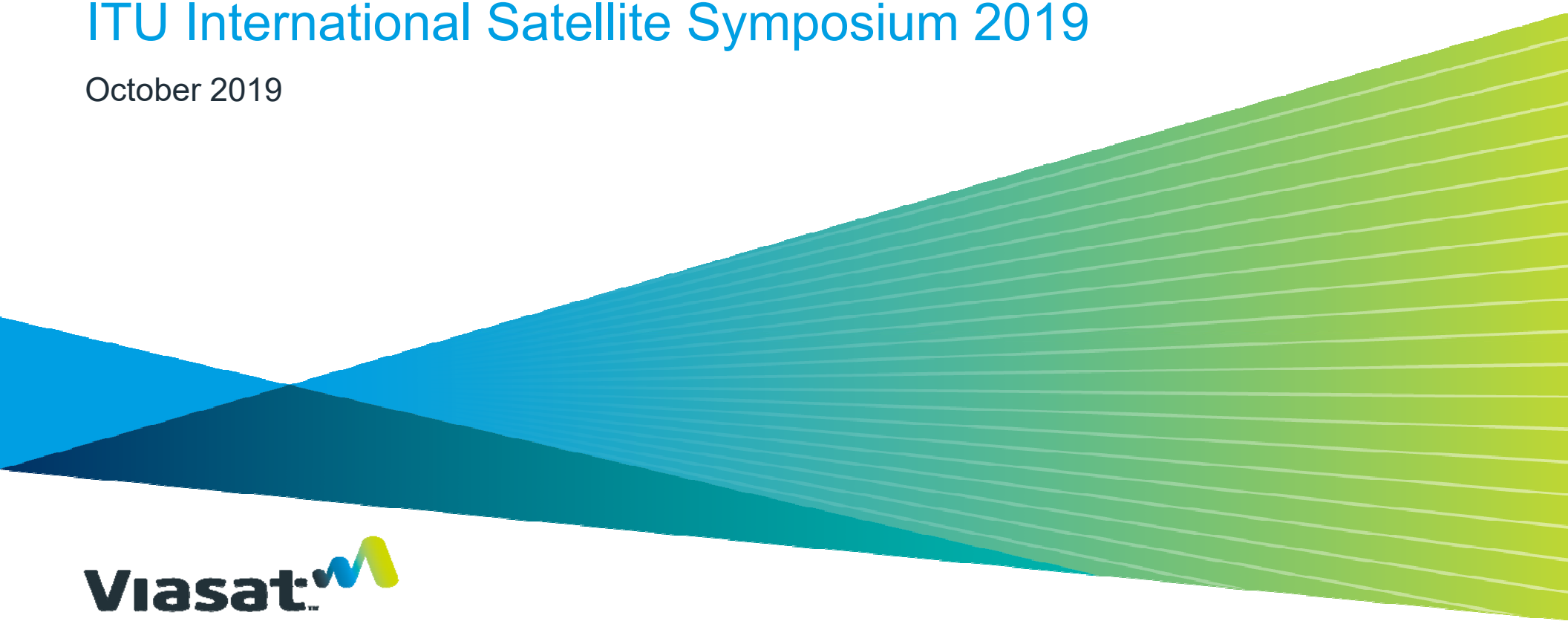
# Satellite Systems and the 5G Ecosystem

## ITU International Satellite Symposium 2019

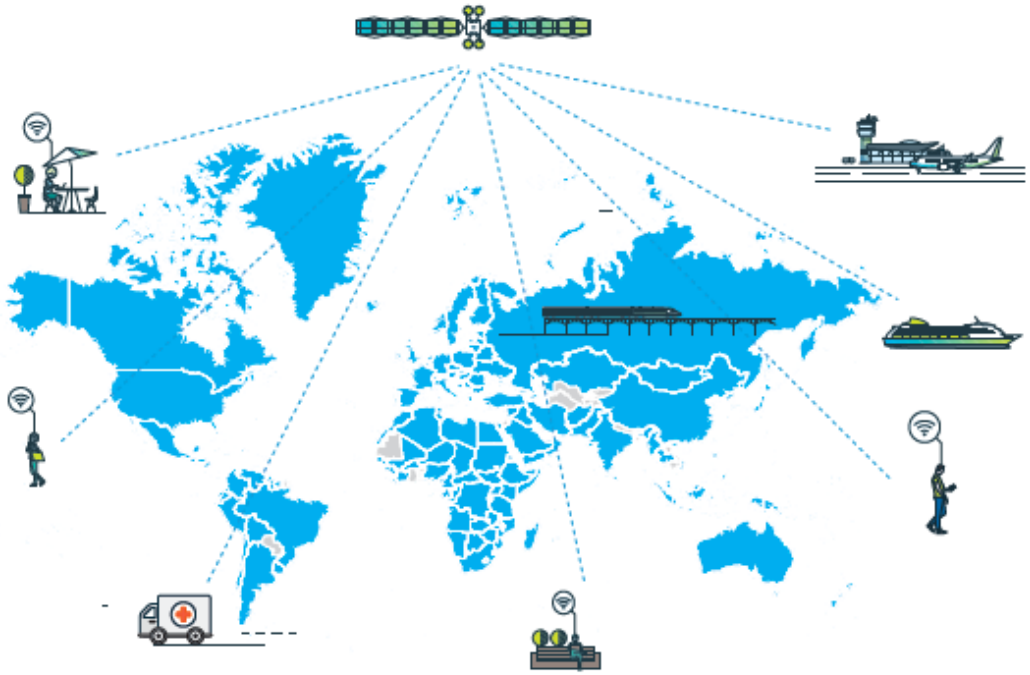
October 2019



Viasat

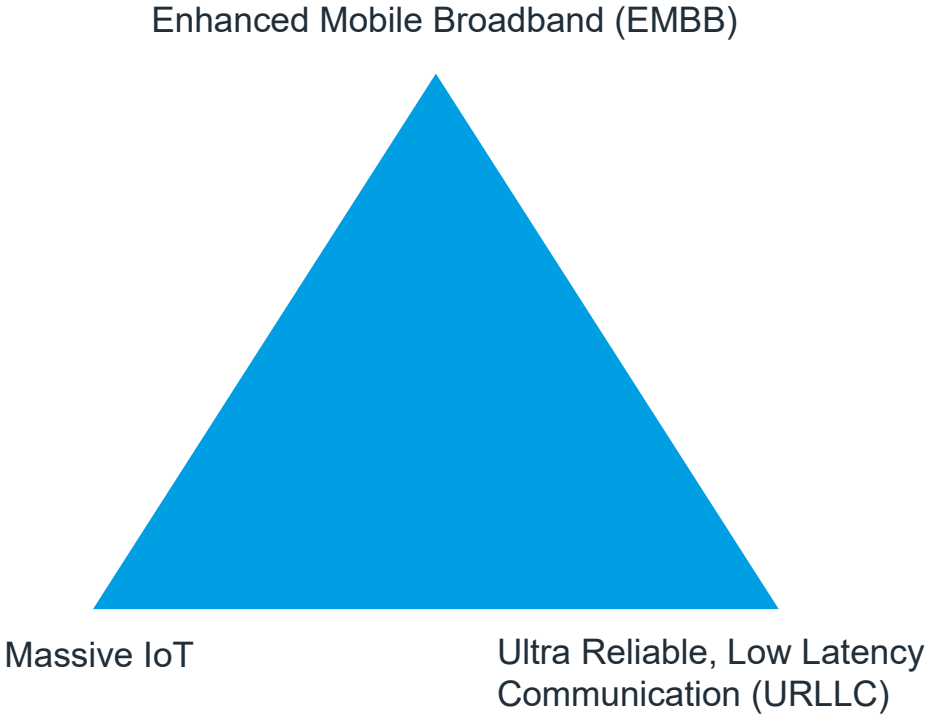
# The Role of Satellite in the 5G Ecosystem

- Advances in satellite technology are driving a new revolution in efficiency in a satellite core band, the 28/18 GHz band
- Only satellite is truly ubiquitous and can reach all the unconnected
- Modern satellites serve a variety of roles in the 5G ecosystem, across various use cases
- **Satellite 5G is *the* leapfrog technology the next 3 billion needs.**



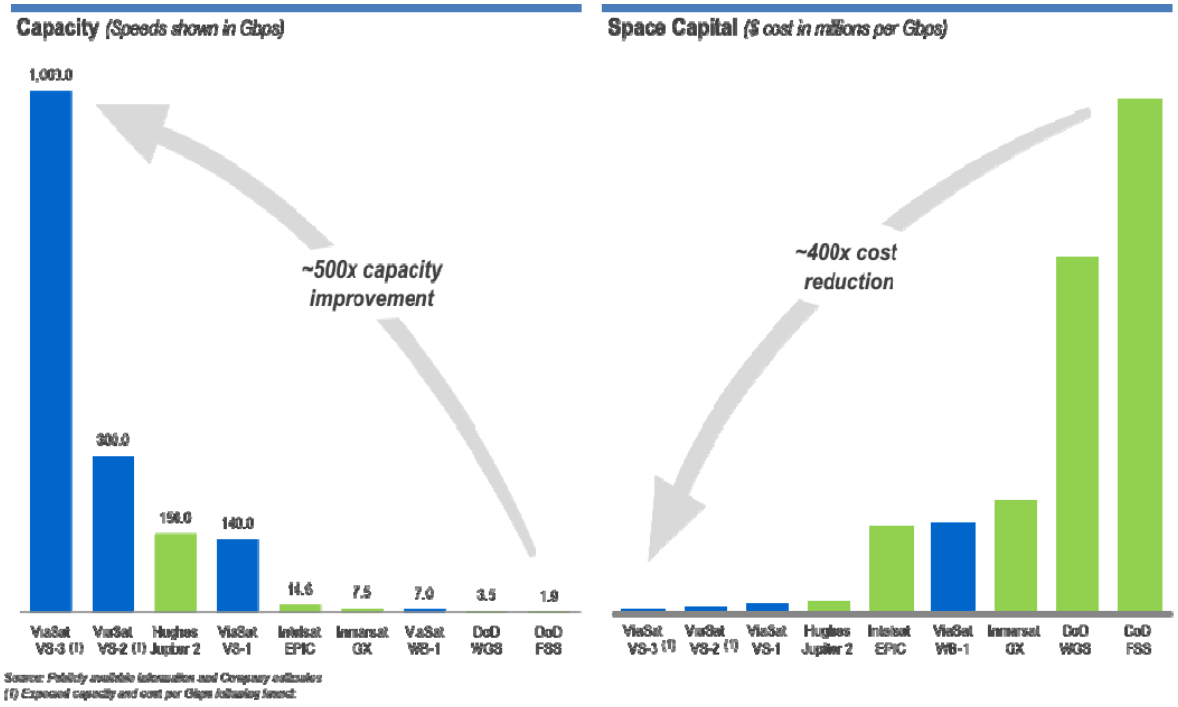
# The Role of Satellite in the 5G Ecosystem

- Satellite, like IMT, is an important component of the "Network of Networks" that 5G represents.
- 5G fundamentally is about network core architecture moving to all-IP routing. Most advances are made in this transition.
- Satellite is fulfilling the promise of 5G today:
  - EMBB = HDFSS with 100 Mbit/s speeds for *everyone*
    - *Now priced competitively with 4G*
  - Massive IoT = connecting devices *anywhere*
    - *Enabling the 4th Industrial Revolution*
  - *URLLC = Hybrid and NGSO networks*
    - *Only ~5% of traffic is latency sensitive*



# Changing the economics of satellite broadband

- Lowering the cost-per-bit allows other service models based on economies of scale
  - Democratizing connectivity
  - New services
  - Closing digital divides
- Today: Cost and speed competitive with 4G services in many countries.
- Tomorrow: ViaSat-3 can connect hundreds of millions of new users at affordable prices.




Source: Publicly available information and Company estimates
(1) Expected capacity and cost per Gbps following launch

# 5G for all – inclusive connectivity requires satellite!

- Telemedicine – making the right to healthcare a logistical reality
- Financial Inclusion – providing connectivity for banking and social programs
- National Security/Borders – giving law enforcement agencies access to broadband in the field
- Farming – precision agriculture raises incomes, creates opportunities.
- Education – extending educational opportunities to all students in a country
- SMEs – connecting businesses to global markets, enabling local e-commerce
- Disaster Recovery – resilient links, rapid deployment

# Telemedicine: making the right to healthcare a logistical reality

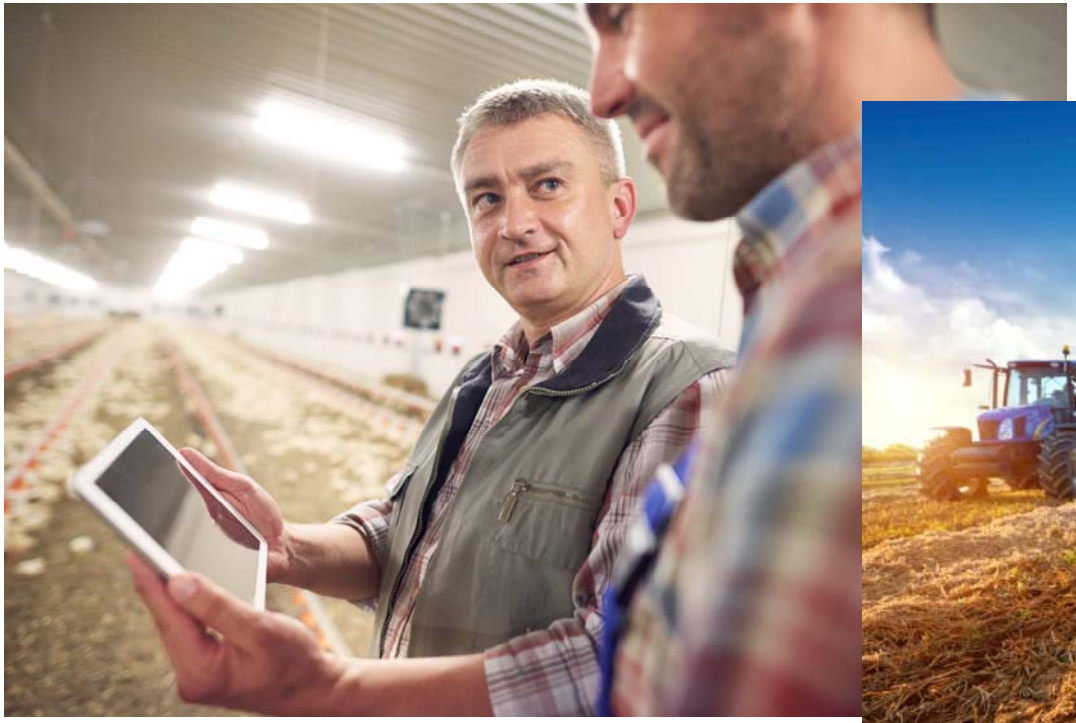

Community Wi-fi empowers community health centers

# Financial Inclusion: providing connectivity for banking and social programs



# National Security: giving law enforcement agencies access to broadband in the field

# Farming: precision agriculture raises incomes, creates opportunities



# Education: extending educational opportunities to all students in a country

# SMEs – connecting businesses to global markets, enabling local e-commerce

# Disaster Recovery – resilient links, rapid deployment

- Detect Disasters – Massive IoT
- Restore Critical Comms Quickly
- Improve 5G Service Resiliency
- Stable connectivity during rebuilding


To fulfill its role in 5G, satellite needs stable access to satellite spectrum.

Satellite is making massive investments that requires stability of the spectrum – where there is stability, there is investment!

Significant amounts of spectrum is available for terrestrial 5G/IMT, and more will be made available at WRC-19; there is no economic or business operation need to study new bands

Analysis to date indicates that proposed terrestrial **5G/IMT is designed to be incompatible with existing FSS** in segments like the 28 and 18 GHz bands.

# Future 5G bands need not endanger connectivity for all

- 28 GHz was originally allocated to satellites because the existing bands were inadequate. Per the FCC: to address the demand for satellite-based services that could not be "fully and economically accommodated in the only frequency bands [then] available"
- Access to the Ka band was then critical (and remains so today) for the development of commercial satellite broadband systems because other frequency bands were already heavily used and did not offer the 2.5 GHz of spectrum available in the Ka band.
- WRC-15 recognized and reaffirmed the satellite use/need that has developed when, in the ITU's words, "WRC-15 excluded the 28GHz band from the scope of study toward the international harmonization of millimetric bands for IMT by WRC-19."

# In fact, FSS in Ka-Band is being considered for expansion (AI 1.5, ESIMs)

- WRC-15 directed that 28 and 18 GHz be considered for expanded global satellite connectivity to moving platforms via Res 158, recognizing:
  - "that there is a need for mobile communications, including global broadband satellite services, and that some of this need can be met by allowing earth stations in motion to communicate with space stations of the FSS operating in the frequency bands 17.7-19.7 GHz (space-to-Earth) and 27.5-29.5 GHz (Earth-to-space)" and
  - "that a consistent approach to deployment of these earth stations in motion will support these important and growing global communication requirements"

# A holistic approach to 5G users' access needs is critical

- 5G Solutions must ensure global digital inclusion
- A global spectrum strategy (that preserves critical Ka Band spectrum for satellite) is essential for advancing digital opportunities.
- Avoid false choices between 5G/IMT and Satellite – having both is readily achievable
- Ensuring satellite access to the 28/18 GHz bands is essential to prevent fragmentation of digital opportunities

# Thank you