

Defence, Security and Resilience - a commercial perspective



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Changing context...

» Global Context

- › Emerging players/non-state actors using “commercial services” to outpace traditional military systems – internet, smartphones, commercially available security and jammers
- › We operate in a 24/7 media and consumer environment which Govts / Military often less able to benefit from (have to be factual and build consensus, non-state actors don’t seem to have that constraint...)
- › Changing landscape of state actors

» Technology and Industry Context

- › Commercial developments often outpace military
- › Consumer and enterprise markets offer equivalent or greater revenue

» Military Context

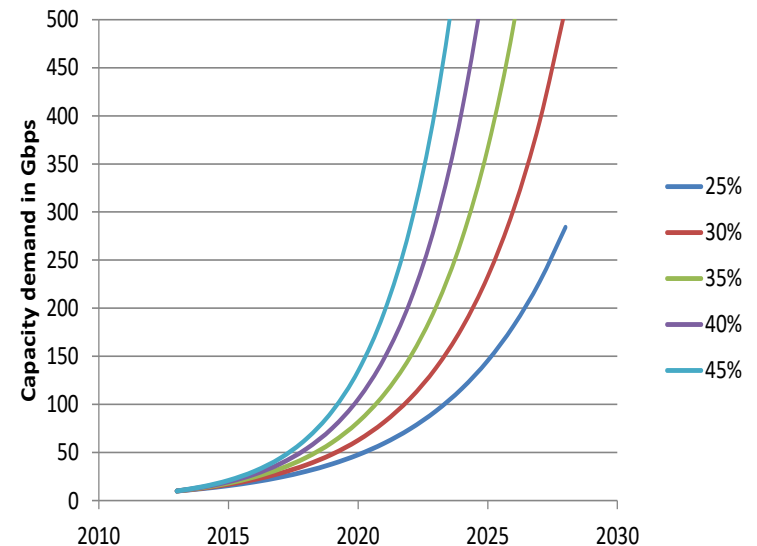
- › Finances taut and force levels reducing, reliance on “information dominance” and smarter platforms (eg UAV/RPAS, soldier as a sensor...)
- › Reluctance to commit “boots on ground” post Iraq and Afghanistan?
- › Expectations from recent operational experience and “consumer” services
- › All lead to more widely dispersed, information producing and consuming forces that need to be connected....

Demand drives the market...

- » Demand continues to grow at around 30% (commercial and government)
- » For consumers:
 - › always on, NETFLIX and social media, HD TV, augmented reality
 - › whilst half the worlds populations lives on 1% of the earth, there are more and more of them!
 - › ...and they travel
- » For defence:
 - › Intelligence, Surveillance and Reconnaissance (ISR)
 - › full motion video, medical, welfare, new platforms, connected soldier
- » Space offers major opportunities
 - › increasingly contested, congested..
 - › ...and competitive!



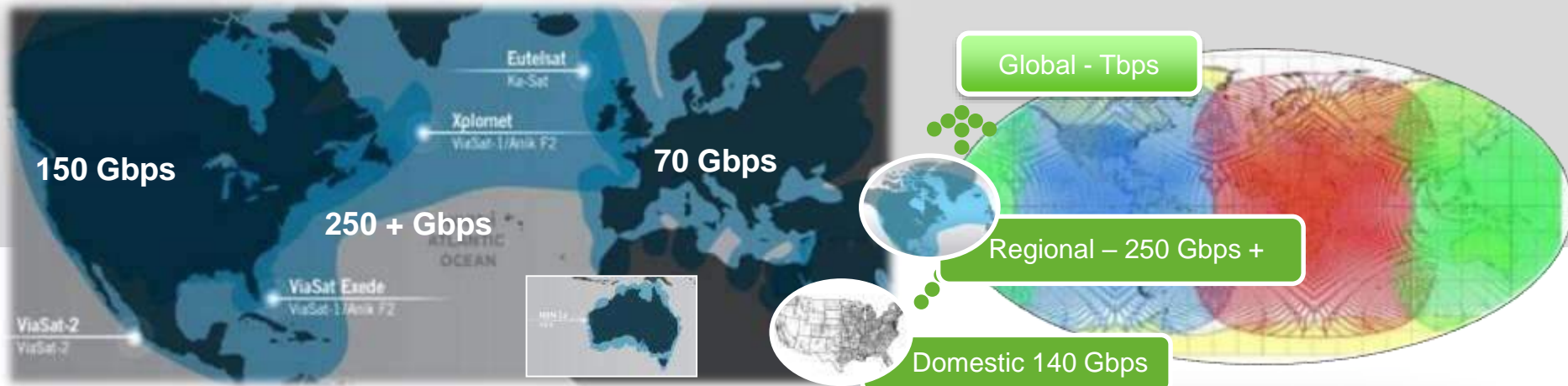
Capacity demand vs time for various annual growth rates



So what does that mean to ViaSat...



- » ViaSat 1 - 2011 - 140 Gbps - approx 750K subscribers, 100s of aircraft, government users (KaSat in Europe approx 170K subscribers)...
- » ViaSat 2 - 2017 - 300 Gbps, 7 x coverage...
- » ViaSat 3 series - 2020 - Tbps satellites, global coverage - affordable 100 Mbps broadband for millions, 1000s of aircraft...
- » Same networks support consumer and airline broadband, defence customers and VIPs (including the President)...
- » Architecture / beam size / cyber protection / situational awareness...



What the commercial sector delivers

- » Commercial developments often outpacing the military - eg broadband and earth observation
- » Commercial scale - millions of consumers, thousands of aircraft - growing consumer and enterprise global demand
- » Research and development that can be leveraged
- » Commercial “Space Ops” a growing field
- » Skynet 5 PFI - a commercial delivery of military capability - UK first to do that. Key cultural step
- » Earth observation, weather data, Satellite navigation and Position Navigation & Timing - EU programmes
- » UK smallsat industry and spaceport agenda - could be leveraged for hybrid architectures
- » Horsepower behind national industrial strategies
- » Talent pool



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ViaSat



UKSPACE
THE SPACE TRADE ASSOCIATION

ViaSat 1

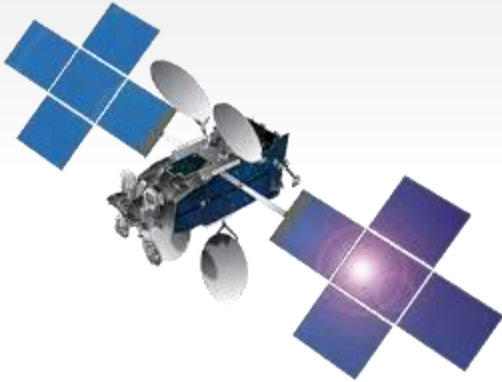
- » Launched October 2011
- » 140 Gbps – Highest Capacity Satellite in orbit
- » Service Open for 1 Million Subscribers
- » Unprecedented Speed and Internet Media Performance
- » 72 Spot Beams, 17 Gateways
- » Changing the capacity economics
- » Satellite Design, Ground Segment Design, Operational Experience
- » and more to follow....



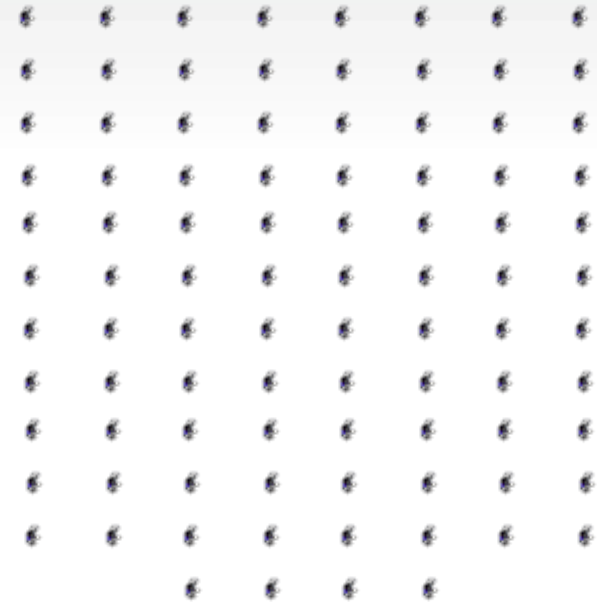
High Capacity Satellites redefine SATCOM Possibilities



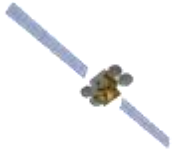
At launch, ViaSat-1 had more capacity (140 Gbps) than the combined fleets of Intelsat and SES: **over 100 traditional satellites**



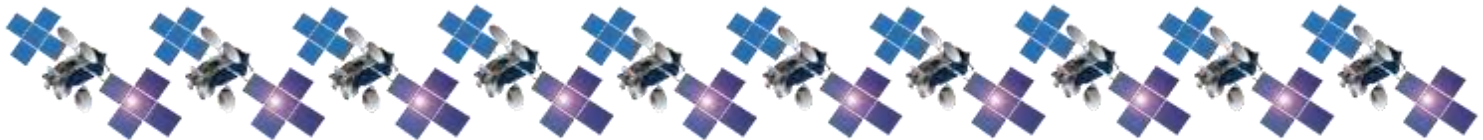
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ViaSat-3 will once again redefine satellite communications...



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...EACH ViaSat-3 Has Roughly 10 Times the Capacity of ViaSat-1

1000x Capacity Increase Changes Everything about How Satellite Fits in the Communications Market

Capacity is Driven By Beam Size and Frequency Re-Use

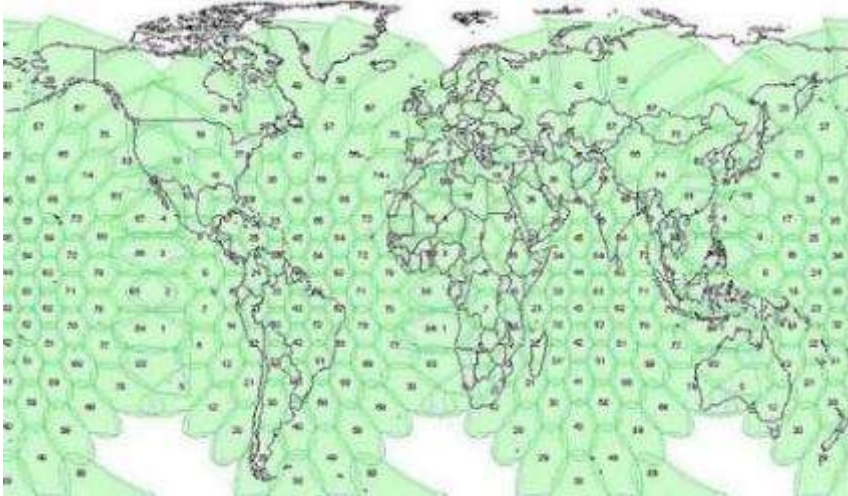
Intelsat 32e (EPIC NG)



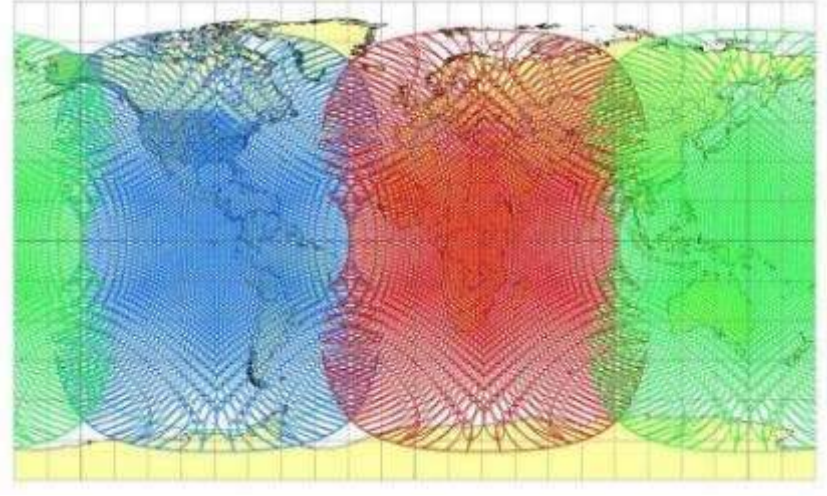
ViaSat-1



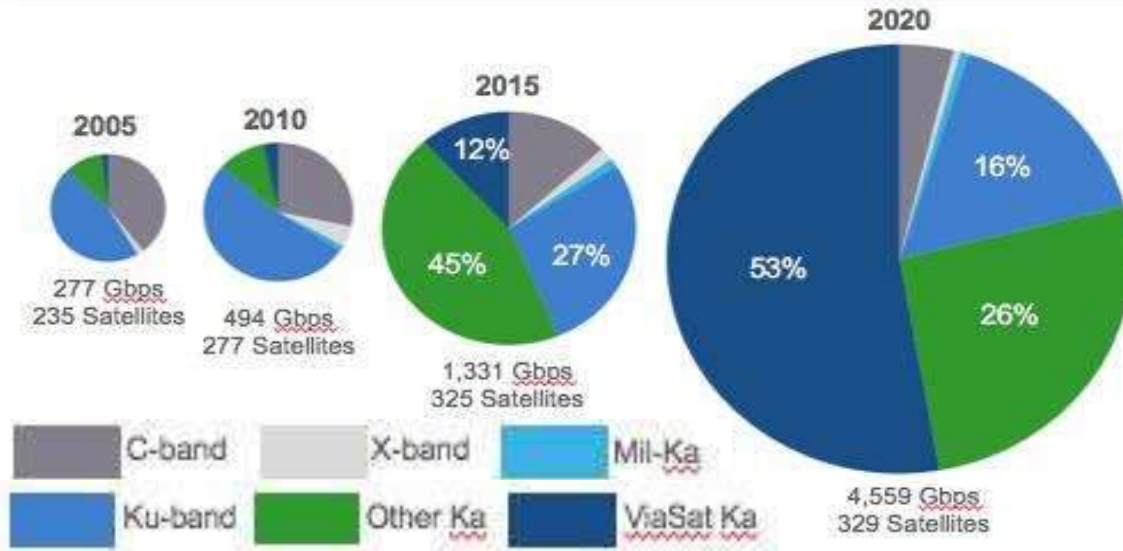
Inmarsat Global Express



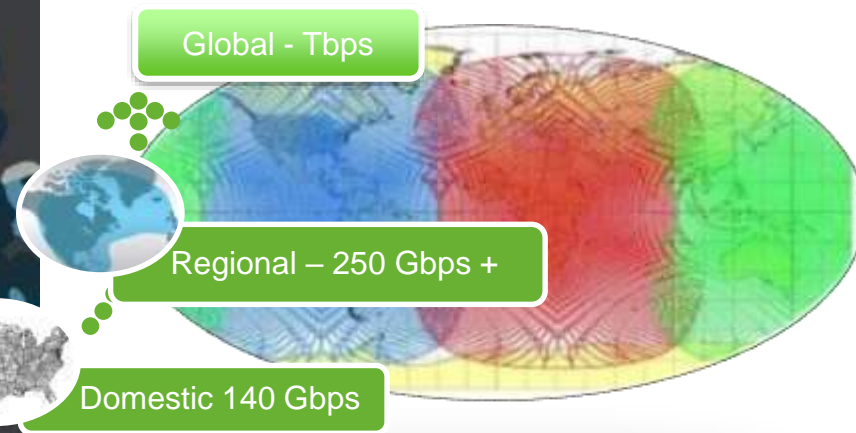
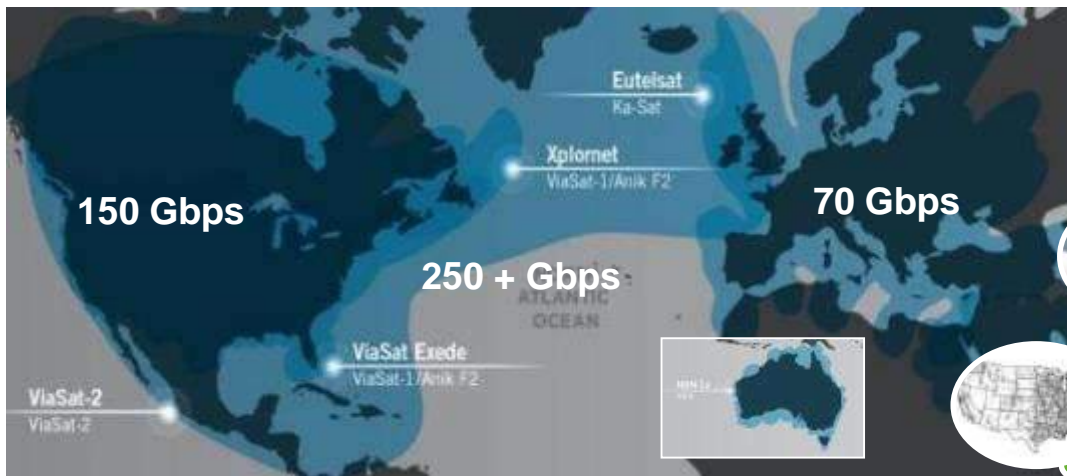
ViaSat-3



Satellite Broadband – Ka Growth



- » ViaSat-2 Launch Jun 17
- » 2x capacity economics, 7x the coverage of ViaSat-1
- » Unprecedented combination of capacity and coverage
- » ViaSat-3 planned 2020 onwards
- » 2 on contract
- » 1 Tbps each, 100 Mbps service enabling 4K streaming
- » Affordable broadband for millions
- » 1 Gbps for enterprise, maritime...



Technology

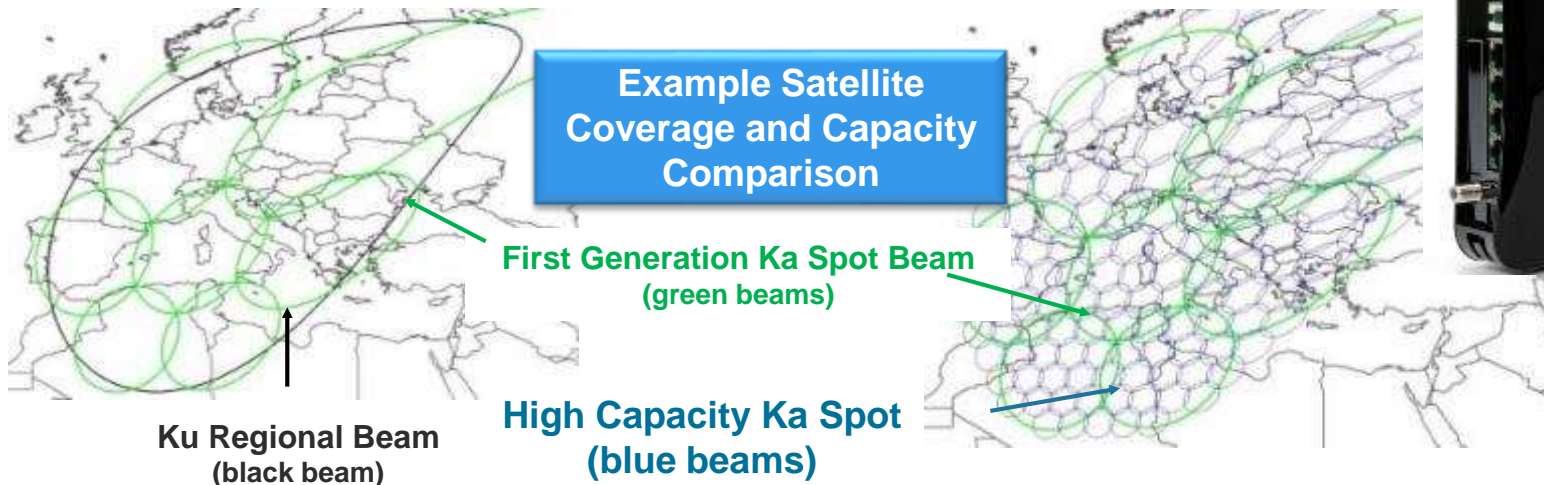
» Revolution in Technology and Throughput

- › Integrated system fully optimized for data delivery
- › Spot beam architecture enables more bandwidth per transponder and more total BW with frequency reuse
- › Enables smaller, lower cost terminals, greater speeds

» Continuing to evolve

- › ViaSat 2 generation “twice capacity economics” 2016/17
- › New Modem 100 Mbps capable
- › Subsequent satellite generation in design

| Effective Bandwidth | |
|---------------------|-----------|
| Ku Regional | 1-2 Gbps |
| Ka First Generation | 5-10 Gbps |
| Ka High Capacity | 100+ Gbps |
| Ka Next Generation | 3x? 10x? |



exede
INTERNET

Population



With so much land available on Earth you would think people are spread out evenly throughout the world, well think again. An entrepreneur used data from Nasa to understand where most of the world's population resides and found half of us are crammed into just one percent of the world

Your Expectations Drive Our Innovation

Commanders and staff need easier access to more data



Easy Access with Global Reach and Regional High Capacity

