Defence, Security and Resilience
- a commercial perspective

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31 May 2017

Changing context…

» <u>**Global Context**</u>

  › **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**

» <u>**Technology and Industry Context**</u>

  › **Commercial developments often outpace military**

  › **Consumer and enterprise markets offer equivalent or greater revenue**
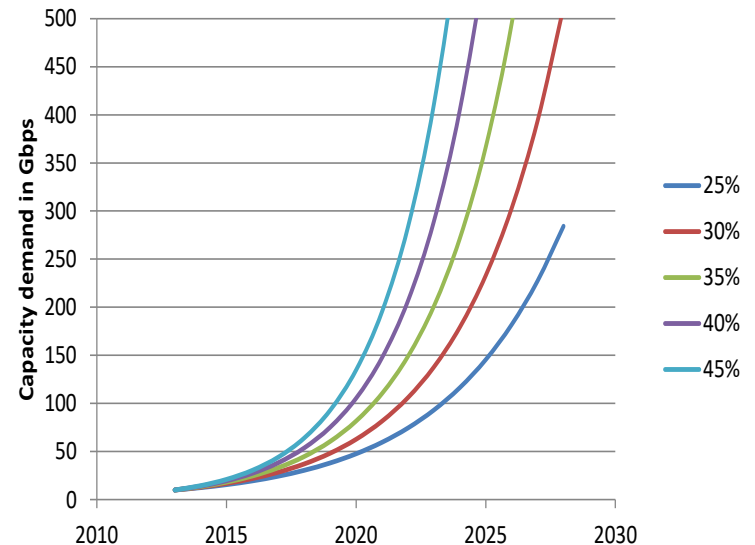
» <u>**Military Context**</u>

  › **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
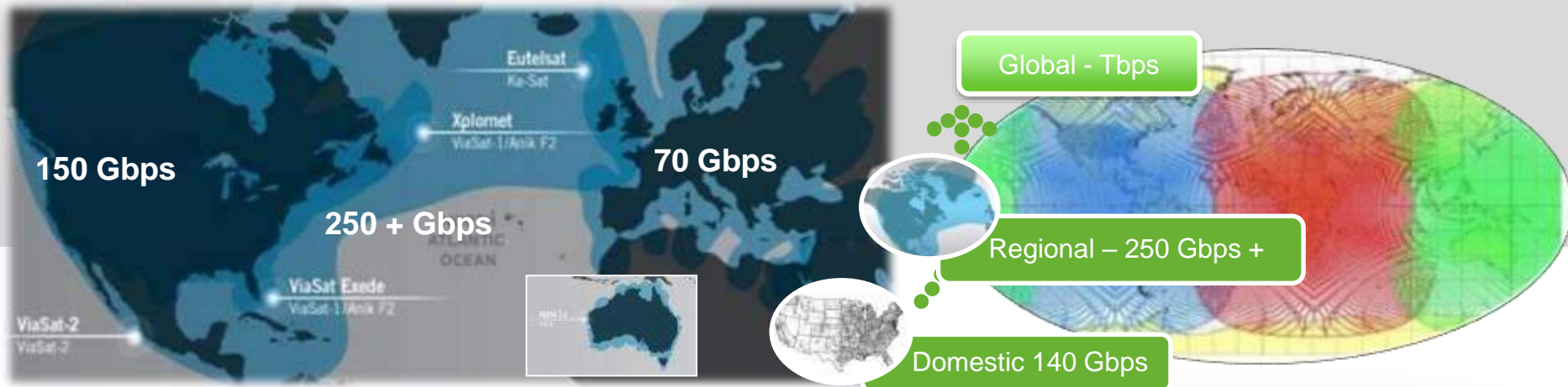 › increasingly contested, congested..
  › …and competitive!

Capacity demand vs time for various annual growth rates

Y-axis: Capacity demand in Gbps (0 to 500)
X-axis: 2010, 2015, 2020, 2025, 2030

Legend:
— 25%
— 30%
— 35%
— 40%
— 45%

So what does that mean to ViaSat…

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…

150 Gbps

250 + Gbps

70 Gbps

Eutelsat Ka-Sat

Xplornet ViaSat-1/Anik F2

ViaSat Exede ViaSat-1/Anik F2

ViaSat-2 ViaSat-2

Global - Tbps

Regional – 250 Gbps +

Domestic 140 Gbps

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

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

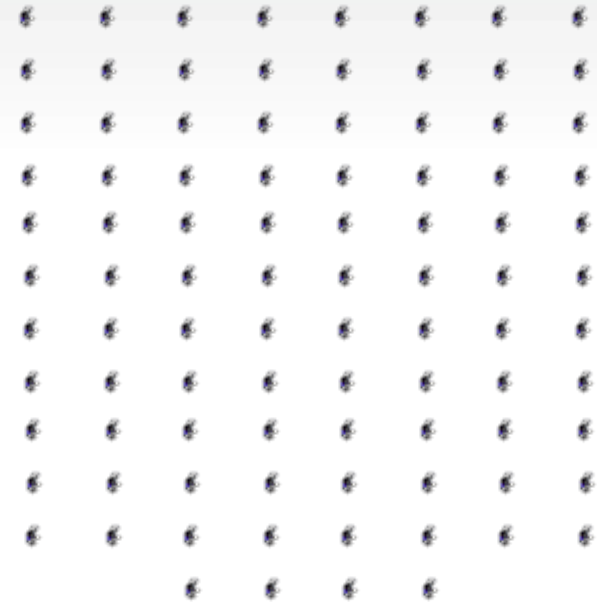» Satellite Design, Ground Segment Design, Operational Experience

» and more to follow….
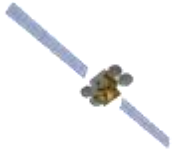
High Capacity Satellites redefine SATCOM Possibilities

At launch, ViaSat-1 had more capacity (140 Gbps) than the combined fleets of Intelsat and SES: *over 100 traditional satellites*
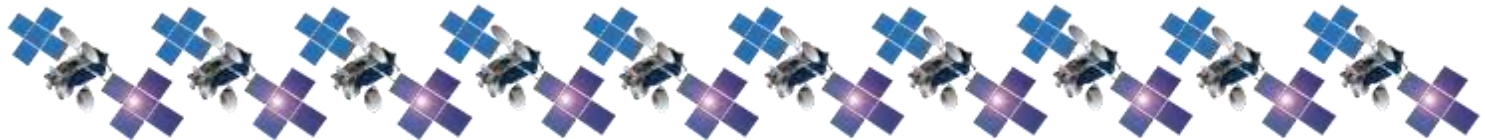
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ViaSat-3 will once again redefine satellite communications…

…EACH ViaSat-3 Has Roughly <u>10 Times</u> the Capacity of ViaSat-1

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

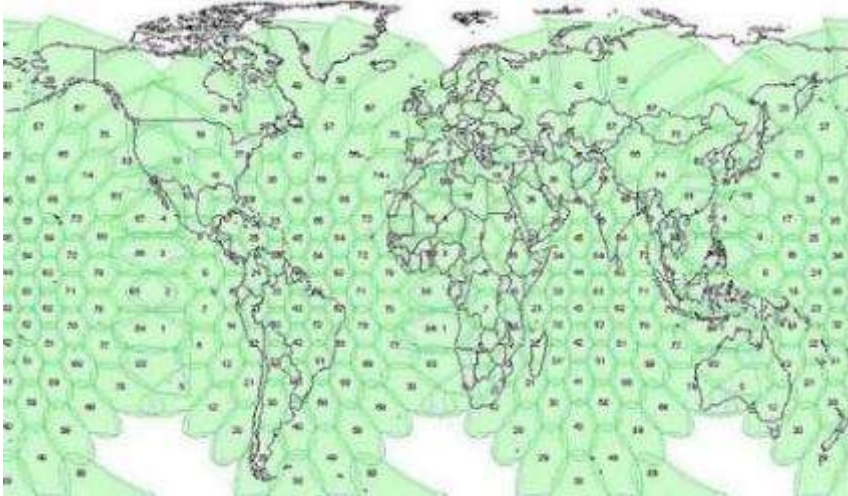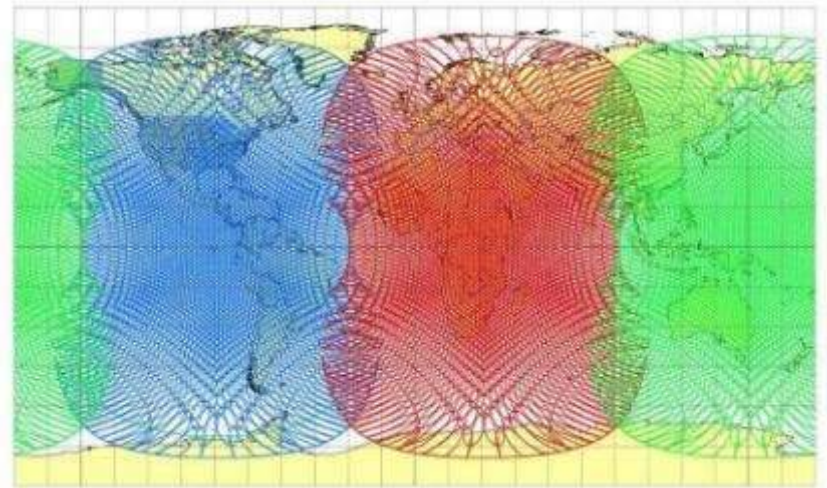# Capacity is Driven By Beam Size and Frequency Re-Use
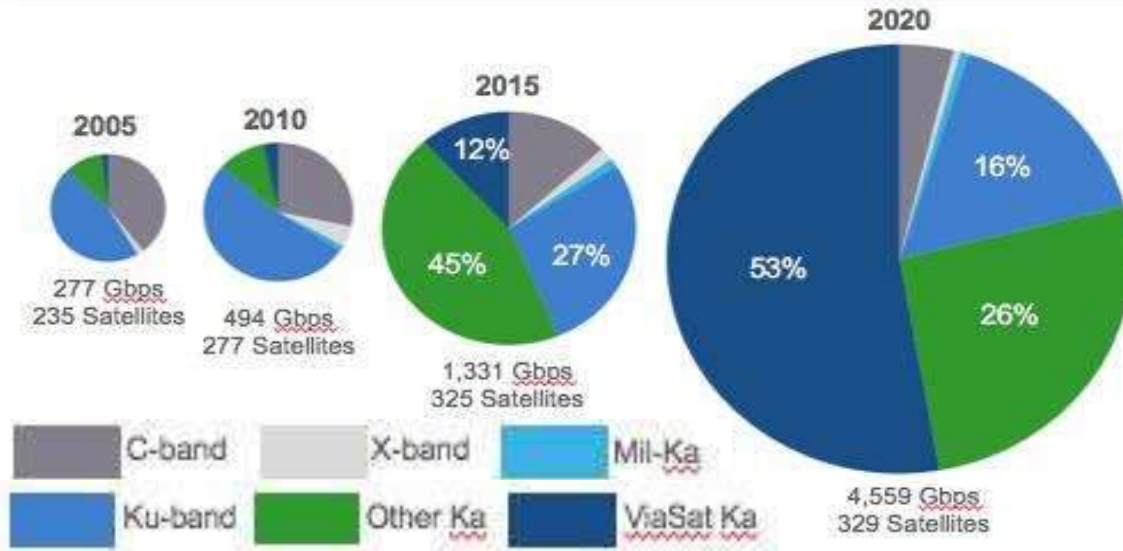
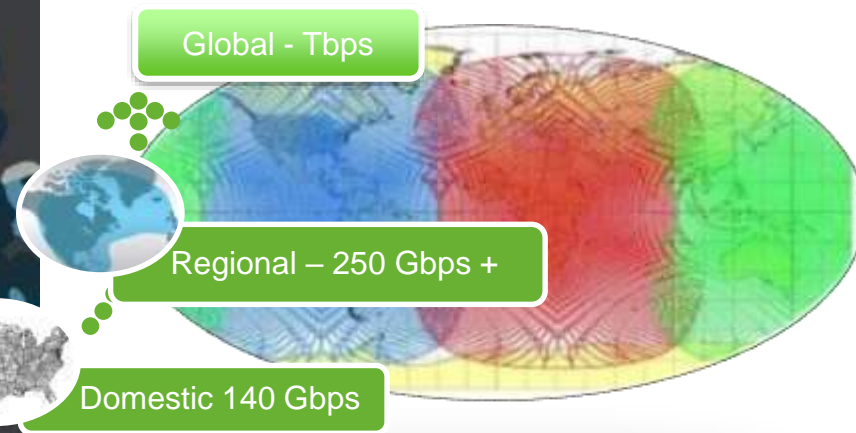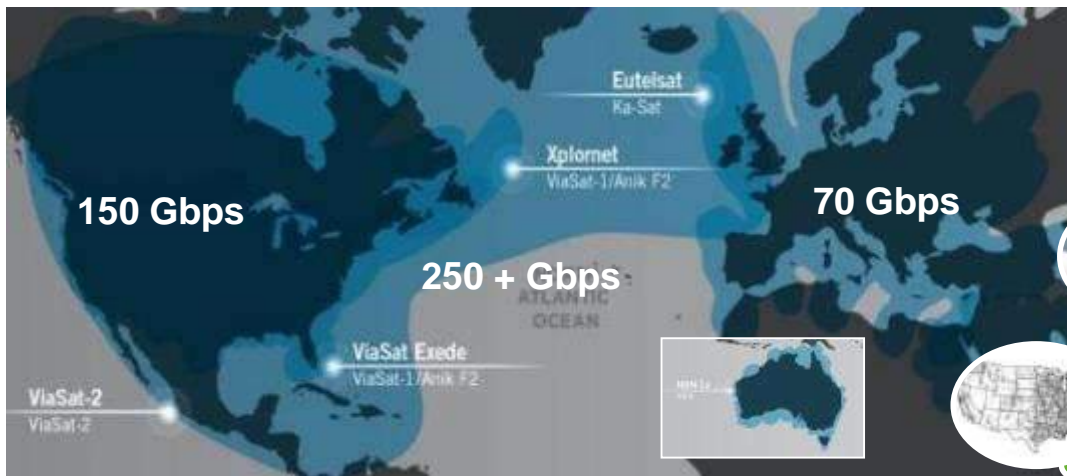Intelsat 32e (EPIC NG)

ViaSat-1

Inmarsat Global Express

ViaSat-3

Satellite Broadband – Ka Growth

2005 — 277 Gbps, 235 Satellites

2010 — 494 Gbps, 277 Satellites

2015 — 1,331 Gbps, 325 Satellites
- 12%
- 45%
- 27%

2020 — 4,559 Gbps, 329 Satellites
- 53%
- 16%
- 26%

Legend:
- C-band
- X-band
- Mil-Ka
- Ku-band
- Other Ka
- ViaSat Ka

» 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…

Eutelsat Ka-Sat

Xplornet ViaSat-1/Anik F2

150 Gbps

70 Gbps

250 + Gbps

ATLANTIC OCEAN

ViaSat Exede ViaSat-1/Anik F2

ViaSat-2 ViaSat-2

Global - Tbps

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Technology

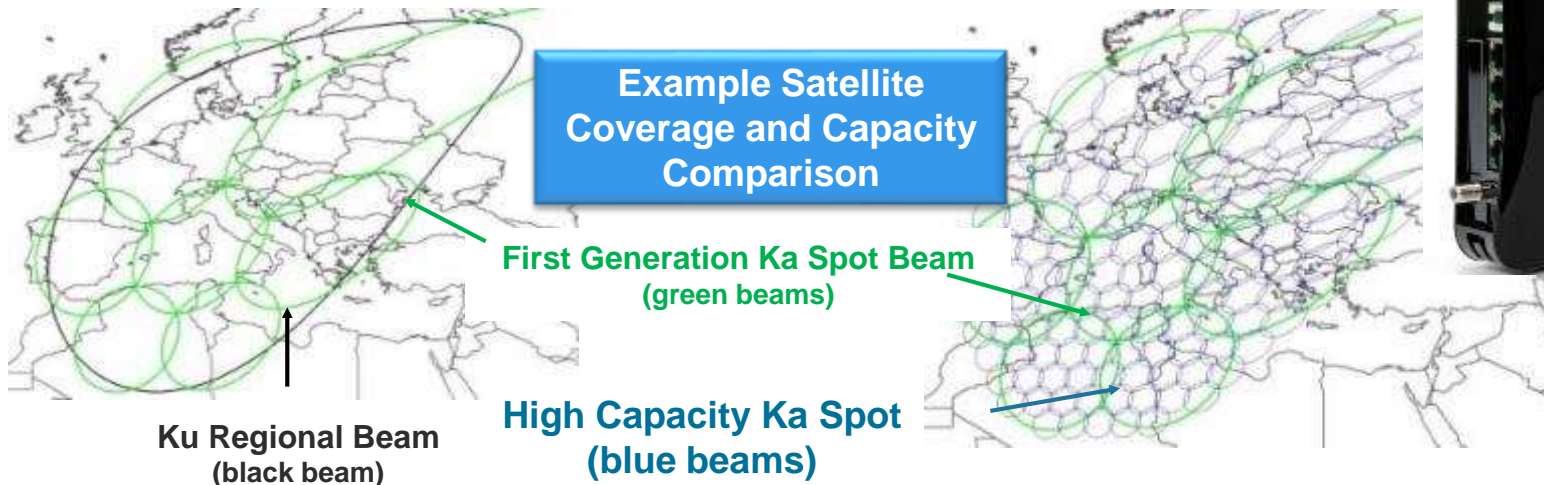» ## Revolution in Technology and Throughput

› 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?**

Example Satellite Coverage and Capacity Comparison

First Generation Ka Spot Beam
(green beams)

High Capacity Ka Spot
(blue beams)

Ku Regional Beam
(black beam)

exede
INTERNET

Your Expectations Drive Our Innovation

Commanders and staff need easier access to more data

ISR Hard Drive

SD Video BLOS

HD Video BLOS

Easy Access with Global Reach and Regional High Capacity

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