Satellite Telecommunications (Satcoms)

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Space Moves!
September 2017
Satcoms is a niche of telecoms...

1. The global telecommunications industry is worth around $5 trillion per annum

2. The global satellite industry is worth about $260 million per annum – about 5% of the global telecommunications industry

3. Satcoms is a niche of telecoms but has several key advantages:
   - Ubiquitous service – the same level of service is available across the entire planet irrespective of local telecoms infrastructure
   - Rapid deployment – satellite services can be installed in days rather than waiting for a terrestrial infrastructure roll-out
Satcom value chain – key players

**Value Chain Steps**

- **Satellite Manufacturing**
  - Design and manufacture of space qualified satellites
  - Airbus
  - TAS
  - SSL
  - Boeing
  - CGWIC
  - Mitsubishi
  - etc

- **Satellite Launch Services**
  - Design and manufacture of space qualified launchers
  - Arianespace
  - SpaceX
  - ULA
  - ISRO
  - Mitsubishi
  - ILS
  - etc

- **Satellite Operators**
  - Regulatory
  - Systems engineering
  - Operations
  - SES
  - Intelsat
  - Eutelsat
  - Telesat
  - Hispasat
  - Telenor
  - etc

- **Service Provider**
  - Satellite service providers
  - Cellular service providers
  - Fibre service providers
  - Terrestrial radio
  - TV & radio
  - Banking/Finance
  - Government
  - Mining/Resources
  - Consumers
  - Prosumers
  - GSM Backhaul
  - Money to spend

- **End User**
  - Money to spend

**Competencies / Skills**

- Design and manufacture of space qualified satellites
- Regulatory
- Systems engineering
- Operations
- Installation, service and Maintenance
- Local Knowledge
- High Quality Personnel
- Access to Infrastructure
- TV & radio
- Banking/Finance
- Government
- Mining/Resources
- Consumers
- Prosumers
- GSM Backhaul
- Money to spend

**Key Participants**

- Airbus
- TAS
- SSL
- Boeing
- CGWIC
- Mitsubishi
- etc
- Arianespace
- SpaceX
- ULA
- ISRO
- Mitsubishi
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**Ground Terminal Equipment Supply**
Some lies

1. Satcoms is only viable beyond the reach of the terrestrial network

2. Satcoms is unreliable

3. Voice services are not possible

4. Terrestrial services are of superior quality

5. Satcoms cannot support the Internet Protocol
Some half truths

1. Satcoms is complicated (so are computers)

2. Satcoms is expensive (so is cellular data)

3. A voice circuit over a satellite is inferior to terrestrial links

4. Satellites are best used for television services
The truth

1. Satcoms offer ubiquitous, instant coverage that spans beyond national boundaries

2. Cost effectiveness relative to terrestrial services varies

3. Satellites offer a unifying technology solution

4. Satellites are generally more reliable than terrestrial lines which suffer from cable breaks, “elephant outages”, cable theft, etc
Cable theft prevalent in the UK...

Oldham cable theft attempt disrupts TV for 2.5m

Thieves trying to steal metal cable under a Greater Manchester street disrupted television services to 2.5m addresses, police have said.

The attempt was made after a manhole was forced open on Manchester Road in Oldham, on Wednesday night.

A spokesman said those responsible climbed down into a “complex cable system” and cut lines, but could not gather them and “left empty-handed”.

Engineers restored TV services within an hour of the damage being discovered.

The police spokesman added broadband and telephone services, which were also affected, had been restored within hours by the BT team, who had worked “around the clock”.

Supt Craig Thompson said Greater Manchester Police had been working with the telecommunications company for “some time and when the alarm was raised, our BT colleagues immediately put in place their full-scale response”.

“We are appealing for any witnesses who may have information to call us and assist our investigation,” he added.

More on This Story

Related Stories

Gang jailed for copper wiring theft 04 June 2013, LANCASHIRE
Some forthcoming developments in satcoms

1. High Throughput Satellites (HTS) and Very High Throughput Satellites (VHTS)
   - 100 times the data rate for twice the satellite + launch cost
   - Cheaper satcoms solutions
   - Available today and increasingly in the coming years

2. Megaconstellations
   - Very large constellations of hundreds or thousands of small, cheap mass-produced satellites
   - Much cheaper satcoms solutions
   - Available from 2020
Three generations of HTS systems

1st Generation
- AMC-15 (2004), AMC-16 (2004), etc
- Hybrid Ku/ Ka satellites pioneered Ka band
- Lower power and larger beams
- Gross throughput to \( \sim 2 \text{ Gbps} \) (125MHz per spot beam)

2nd Generation
- Pure Ka band satellites
- 63-125 MHz per downlink spot beam
- \( \sim 5-10 \text{ Gbps} \) gross throughput

3rd Generation
- Smaller, tighter spot beams provide more efficient frequency reuse
- 500-1000MHz per downlink spot beam
- \( \sim 100 \text{ Gbps} \) gross throughput

WildBlue / Viasat first to market and have become the benchmark for others
Fourth and fifth generation HTS and VHTS systems

Jupiter 2
- 220 Gbps
- Launched Q4 2016

ViaSat-2
- 300 Gbps
- Launched Q2 2017

ViaSat-3
- 1 Tbps per satellite
- 3-10 satellites
- First two satellites in production with Boeing as prime and ViaSat as payload provider
- Third satellite in negotiation
Megaconstellations
Some of today’s Megaconstellations projects

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<thead>
<tr>
<th>Operator</th>
<th>Orbit</th>
<th>Number of Satellites</th>
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<tbody>
<tr>
<td>SpaceX Q/V-band</td>
<td>LEO</td>
<td>11,943¹</td>
</tr>
<tr>
<td>SpaceX Ku-band</td>
<td>LEO</td>
<td>4,425²</td>
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<td>Boeing Q/V-band</td>
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<td>Boeing Ka-band</td>
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<tr>
<td>ViaSat Ka-band</td>
<td>MEO</td>
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</tbody>
</table>

Note 1: SpaceX Q/V-band 11,943 satellites x 386kg = 4,610 tonnes = 73 x Falcon Heavy or 231 x Ariane 5 launches
Note 2: SpaceX Ku-band 4,425 satellites x 386kg = 1,710 tonnes = 27 x Falcon Heavy or 86 x Ariane 5 launches
So satcoms prices really are going to fall...
Questions?

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