OneWeb is a new global communications company powered by satellite, with new ambitions and new values.

Our vision: Internet access everywhere for everyone.
Connectivity at Sea

- **Global coverage including the Arctic**
  - = safer routes
  - + regulatory compliance
  - + environmental monitoring

- **Very capable connectivity service**
  - Multiple network slices
  - & Multiple QoS
  - as available terrestrially

- **True Value**
  - Low capex investment,
  - terrestrial-like latency and
  - throughput more closely matching demand

- **Beyond traditional**
  - Not bound by
  - pre-existing constraints
  - including high capex cost
  - for HW, long contract
  - periods, inflexible terms

- **User Experience**
  - Comparable to terrestrial
  - connectivity
  - Connect to Cloud
  - application and use
  - connectivity as if on shore
Additional market requirements

- Global connectivity service requirement with flexibility to start/stop/amend
- Increasing use of cloud apps and real time video that require lower latency
- Leasing of shipboard antennas to minimize capex
- Network speeds > 1 Mbps and routinely 5x/10x
- Realtime vs stored messages
- Effective cost per MB and per Mbps decreasing
- IoT seems to be gaining attention

- But significant variation in demand (1) from one vessel type to another, (2) across geographies, (3) over time
- And significant growth in data demand with little growth in monthly revenue
Orbits and their impacts

Offers Lower Latency

- Decreasing altitude generally increases the number of satellites required.
- Orbits may be non-circular, offering some compromises in coverage and performance.
- Lowest Latency: < 50 milliseconds.
- Average global look angles to the satellites rise with decreasing altitude.

Latency comparison:
- LEO: ~ 50ms
- MEO: > 135ms
- GEO: > 560ms

Performance improves as one moves closer to Earth.
GEO coverage – a sample
Non GEO coverage – another sample
Satellite Network Operators – a sample

GEO
- inmarsat
- SES
- eutelsat
- INTELSAT
- THURAYA
- Viasat
- telenor
- Globalstar

MEO
- SES
- ORBCOMM
- 66+
- 588+
- ~40
- ~800-4000

LEO
- Iridium
- OneWeb
- Telesat
- LEOStar
- ~17
- ~66
- ~588
- ~300
- ~80-110
Satellites, constellations and coverage

• Constellations
  - No. satellites
  - No. planes
  - Orbit type

• Coverage
  - Coastal
  - Regional
  - Sea routes
  - High latitudes
  - Polar

• Satellites
  - Size & weight
  - Power
  - Useful life
  - Inter-satellite links
  - Steerable beams
  - Frequency reuse
  - Frequencies to vessels
Vessel onboard equipment

• **Shipboard antenna**
  - Blockage, redundancy & symmetry determines configurations/numbers
  - Size decreasing with innovation
  - Cost decreasing with volumes
  - Dual and tri-band versions access more satellites
  - Parabolic technologies are sound but electrically scanning innovations could accelerate change
  - 4G/LTE directional antennas used for nearshore operations

• **Onboard networks**
  - Hybrid ‘multi-network’ solutions w/ multiple operators incl. 4G/LTE, L-band and other networks
  - Universal requirement - routers/switches to efficiently manage access to multiple satellite and terrestrial networks
  - Out of band management standard requirement
  - Priorities and policies management essential to ensure efficient and appropriate use of network resources
  - Wi-fi enabled smart phones
  - IOT
Satellite service providers

- **Service provision**
  - SNOs may sell direct but typically sell via channel
  - Capacity may be sold as power/bandwidth or managed service
  - Service providers typically offer multiple competing solutions to customers
  - Service providers sell, install, maintain and support antennas
  - Contracts often extended to cover antenna leasing as a service
  - Data service is offered at guaranteed or as best effort speeds or as data plans

- Typically redundancy and fall back service is implemented depending upon the vessel’s itinerary
Discussion
OneWeb Summary

$3.4 BILLION
FUNDING TO DATE

650+ satellites
Built by OneWeb Satellites

22 firm launches
Successful First Launch on February 27, 2019
Monthly launches of 30+ satellites begin Q4 2019

Largest Satellite Constellation in the World
Global Coverage

Premium Spectrum
6.0 GHz of Priority Ku- and Ka-band Rights

Lowest Latency
< 50 milliseconds

Look Angle Advantages
Broad applications in Northern latitudes

LEO <50ms
MEO >150ms
GEO >500ms