MEO Satellite Applications to Support Mobility

Colloquium on Satellite Services for Global Mobility
14 October, 2013

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O3b – A revolutionary solution

- A different kind of satellite:
  - The Medium Earth Orbit reduces delay by 75% compared with GEO
  - Lower cost to build and launch compared with GEO

- O3b is the first satellite constellation built with IP and mobile networks in mind
  - O3b’s cost advantage enables the business case for sites that are not possible with GEO
  - O3b’s low latency dramatically improves the quality of voice and data services
Satellite Overview

• Each satellite has 12 steerable antennas
  • 10 antennas used for customer beams
  • 2 antennas used for Gateway connectivity
  • Each beam is independently steerable to any location within +/- 45° latitude
  • Beams can be stacked at the same location to provide additional capacity
  • Circular polarization is used RHCP and LHCP

• Each Gateway beam is connected to five customer beams
  • A single satellite supports two groups of this 1:5 configuration
  • Loopback beams can also be configured to provide localized connectivity up and down in the same beam

• Each customer beam is configured with
  • a 216 MHz Ka-band transponder in the forward direction
  • a 216 MHz Ka-band transponder in the return direction
8 Satellite Regional Layout Example

Note: Each coverage area allows up to 5 beam placements.
Beam Coverage

- Inner coverage is defined as 0.2° off-boresight. This inner antenna coverage (approximately 50 km in diameter) provides optimal antenna gain for premier Tier 1 services.
- Outer coverage is defined as 2.5° off-boresight. This antenna coverage (approximately 700 km in diameter) provides coverage area for customer services, while also providing sufficient antenna gain.
O3b Value Proposition

High Throughput

Low Cost Capacity

Low Latency
O3b Approach – Expanding Markets with New Services

If I had access to a large amount of affordable, low latency bandwidth, how would this change the way I do business?

- What **new applications** could be enabled?
- Which new **value propositions** can I develop?
- What **new customer segments** could I serve?
- What **new business cases** could I close?
Royal Caribbean Case Study

- O3b satellite beams will follow ship tracks on ship’s normal route
  - Cruise operator provides O3b with normal ship course
  - **350Mbps** CIR to each Ship

- Beam tracking updates in real-time if the ship has to change course.
  - O3b will maintain ship within beam centre
  - Ship provides lat/lon updates on 2 hour intervals via in-band or out-of-band channel
Cruise Line Connectivity Benefits

- Attract and retain quality staff through improved Crew Welfare
- Attract new and more affluent passengers who need better connectivity
- Enable additional revenue streams from bandwidth services by selling Daily and Weekly Internet access packages to passengers
- Better leverage Social Networking as an advertising channel
- Add new services to the Passenger Experience

Improve Customer Satisfaction
Roaming Approach

- 2-3000 Passengers/Ship
- 50-100 Mbps per Ship
- Beam to Beam Roaming
Current Problems in Seismic Survey Activity

- 500 Gbytes – 3 Tbytes of data per day
- Data tapes flown to shore by helicopter
- Need for real-time information to make quick decisions
- Expensive
- Scientific staff onboard
- Processing equipment and data servers onboard
The RIGHT solution for Seismic data transfer

**Elegant and Cost-effective**

- Very high bandwidth link to transmit real-time 3D/4D imaging data
- Scientific staff, storage & processing equipment remain onshore

Data Packages of 500MB to 1TB per Day

Onshore Corporate office, Staff and Data Center Servers
Government Mobility Applications
Maritime Mobility Solutions

- O3b offers the ability to provision between 300-500 Mbps to a vessel or group of vessels as they manoeuvre.
- Option to either track vessels or to move beams based upon predetermined courses or routes.
- O3b has developed a dedicated maritime terminal solution used in the recently announced deal with Royal Caribbean.
- Throughputs available on O3b offers the potential to revolutionise Navy capability and communication.
O3b Maritime Emergency Response Example

- Hospital ships may be deployed to provide medical facilities to support emergency response.
- Radio communications with land based personnel is often difficult due to line-of-sight and other issues.
- Shipboard O3b stabilized platforms can provide high speed connectivity to shore based teams via the O3b gateway.
- Provides access to medical experts where not physically possible
- Improves triage
- Aids in logistics of supplies, ground and air transport
The capabilities of manned and unmanned aerial systems continue to grow and often outpaces the satellite systems designed to capture and relay the information from UAV / UAS.

Ultra wideband transponders and steerable beams ensure that O3b can offer ‘WGS’ like performance through dedicated Ka-Band beams.

Throughputs of >200 Mbps from the moving platform are achievable making O3b a preferred option for bandwidth hungry platforms.

Focus on terminal development and relationships with UAV / UAS providers and integrators.
O3b Terminal Equipment
OrBand™ 300 2.2m Maritime Stabilized VSAT System

- OrBand™ 300 is the evolution of Orbit’s OrBand™ portfolio into Ka-band.
- Revolutionarily compact maritime VSAT system that offers industry-standard RF performance equivalent to a 2.4m/95” dish in just a 2.7m/106” footprint.
- Takes up 40% less deck space than industry-standard 2.4m/95” and 3.8m/150” systems, and is more than 30% lighter than competitive solutions.
- Enables the most demanding maritime vessels and platforms to enjoy fiber-like broadband communication for high-speed internet services.
- Small enough to be shipped as a single, fully assembled and tested unit in a standard 20-foot container, the OrBand™ 300 is designed for quick and simple single-day installation.
- This means that OrBand™ 300 can be installed while ships are on routine port calls, substantially driving down operational costs and eliminating the need for vessels to await dry dock.
OrSat™ 400 1.2m Maritime Stabilized VSAT System

- OrSat™ 400 is the evolution of Orbit’s OrSat™ portfolio into Ka-band.

- 1.2m (46") Ka-Band antenna within a 1.55m (61") radome

- OrSat™ 400 features outstanding RF performance, system availability and dynamic response under virtually any sea conditions, and complies with the most stringent environmental standards for shocks, bumps and vibrations.

- Support a wide range of configurations with different RF packages and BUC power levels

- Can be easily upgraded in the field, without the need for balancing, to support all available configurations.
Antenna placement drives handover solution

- O3b Tracking Antennas placed in symmetrical locations on the starboard and port side.

- Two antennas sufficient to provide seamless handover between O3b satellites at end of pass and handle blockage by ship structure.

- All antenna vendors have software solutions to handle mid-pass handovers between antennas due to blockage by ship funnels.

- Two antenna solution designed for 99.9% availability.
Why O3b?

O3b’s Advantages

Supporting Data Rates unachievable with conventional solutions

Affordability that makes budgets go farther

Low latency delivering communications at sea which are equal to the ‘at home’ experience

High-speed, low latency connectivity facilitating remote operations

Enabling new operating models which bring unprecedented value to our customers.