Battle of the Satellite Services

The Future of Global Xpress, Intelsat Epic<sup>NG</sup>, O3b and Viasat in Maritime, Oil and Gas and Aviation Markets

With:

September 26<sup>th</sup> 2013

Gottlieb International Group Inc.
www.Gottliebinternationalgroup.com
About Gottlieb International Group

- Over ten years consulting to the Satellite Industry;
- Seven Years in Maritime and Mobility Applications;
- Clients include Satellite Operators, Equipment and Service Vendors, Major Telcos, Private Equity Firms
- Extensive list of published works in major trade publications including SatNews, Digital Ship, Riviera Marine Maritime Communications and Electronics;
- Numerous speaking engagements around the world including Digital Ship, Aci Conferences, Offshore Communications, Washington Satellite Show.
- Founded and Manage Four major Groups on LinkedIn including Maritime Satellite and VSAT – Independent Opinions, Aviation Satellite and VSAT – Independent Opinions, Satellite, Telecom Investors and Global Xpress reaching nearly 4,000 members.
What we do...

- Market Research, Analysis and Business Plan Development w/Unique Focus on Satellite Mobility Markets: Maritime, Aviation and Oil and Gas Upstream;
- Specialized Advertising: Including use of Webinars, Blogging, Writing and placement of articles to promote clients products and services.
- Sales Training;
- Customer Training;
- Market Consultation/Analysis for Investor Community (Custom and Webinars);
- Litigation Support.
Our Clients
The Agenda:

- Gottlieb International Group Introduction: 5 Minutes
- Aviation: David Bruner with Panasonic Aviation: 30 Minutes + 10 Minutes Q and A;
- Oil and Gas Upstream: Andrew Lucas with Harris Caprock; 30 Minutes + 10 Minutes Q and A;
- Maritime: Michel Verbist: 30 Minutes + 10 Minutes Q and A;
- Comparing Satellite Services – Quick Summary – Several Slides of Interest – Alan Gottlieb 10 Minutes;
- For questions: you will find a button on your display where you can type in your questions;
- A recording of the Webinar in MP4 will be available to registrants. If you would like a copy, please e-mail us.
David Bruner – Vice President, Panasonic Avionics

Aviation

Global Xpress, Intelsat Epic NG
Our Panelist – David Bruner

Vice President, Panasonic Avionics Corporation

David is Vice President, Global Communication Services for Panasonic Avionics Corporation. He is responsible for implementing Panasonic’s new connected aircraft strategy. David has been with Panasonic for 6 years.

Previously David was the Director of Business Development for General Dynamics Airborne Electronic Systems, President of Inflightonline – a web media company focused on the inflight market and Senior Vice President of AT&T Aviation. In total David has over 25 years in the aerospace industry including 5 years at American Airline’s SABRE group. Prior to IFE David was an IT professional.
Also – Chris McLain

Principal Satellite Network Engineer – Panasonic Avionics

Chris and his team are responsible for acquiring satellite capacity and developing Panasonic’s high throughput satellite strategy. Prior to joining Panasonic, Chris worked on mobile satellite projects at LinQuest, Lockheed and Boeing, primarily in the area of performance modeling and system analysis. While at Boeing, Chris helped develop the first Ku-band aeronautical mobile satellite system, Connexion by Boeing, and worked with ITU to get Ku-band allocated for aeronautical use. He is a graduate of MIT and University of Washington.
Discussion Questions:

- Could you give us a quick background on Panasonic Avionics?
- I understand that Panasonic through investigated GX before deciding to go to Intelsat EpicNG. Could you explain how you reached that decision? How do these services compare in terms of capacity and coverage, and which systems allow for backup in case of failure etc.? What are the costs involved in switching infrastructure?
- Numerous Phased Array type antennas are in development for the aviation market. Given the fact that such an antennas do not perform well in high latitudes (such as on the Great Circle Routes) if mounted on the top of an aircraft, would not some sort of mounting infrastructure be required to allow mounting of antenna panels on the sides of the fuselage? Is this practical? Could they secure approvals for mounting antennas on the side of the aircraft and, if so, how would the need to mount antenna tiles on top and the sides of the aircraft affect installation cost?
Discussion Questions (Continued)

- Viasat has made major strides in the U.S. with Ka-Band technology with JetBlue. Viasat 2 will be launched in 2015 and will cover the North Atlantic and roam onto Ka-Sat. How do you see its potential has compared to Global Xpress to EpicNG?

- In addition to Inflight entertainment and passenger connectivity, what other uses to you see for Inflight Broadband?

- In sum, which services do you believe will enjoy the widest acceptance in the commercial airline market?
eXConnect Current Coverage
eXConnect Future Coverage
Andrew Lucas – Harris Caprock

Oil and Gas Upstream

Global Xpress, Intelsat Epic\textsuperscript{NG} and o3b
Our Panelist – Andrew Lucas

Global Operations Officer, Harris Caprock, Andrew Lucas is responsible for overseeing the operation and deployment of the business’ global satellite and terrestrial network infrastructure. He plays a key role in leading Harris CapRock’s global network operations, customer support centers, field services, and regional operations internationally.

Prior to this, he served as Business Manager for Schlumberger Global Connectivity Services (GCS) until its acquisition by Harris Corporation in 2011. While with GCS, Mr. Lucas was instrumental in driving the business forward, delivering increased revenue, profitability and service quality through focus on business efficiency, method and structure. Mr. Lucas has also held multiple positions with Data Marine Systems. Mr. Lucas has over 20 years experience in the satellite communications industry with significant focus on technical and operational capabilities.
Discussion Questions

- Could you give us a quick summary of what Harris/Caprock is doing in Upstream Oil and Gas Satellite markets?
- In Oil and Gas Upstream there are many different applications including: 1) Telemetry; 2) Crew Welfare; 3) Portable Communication on Rigs (for Service Providers); 4) Transmission of Seismic Data and/or Wireline Data; 5) Use with Latency Sensitive Applications such as SAP; 6) Video for ROVs; 7) Dive Support; 8) Fiber Backup. For each of these applications, which are most likely use Ka-Band HTS satellites (Global Xpress, Viasat, O3b) and which are likely to continue to use Ku-Band HTS-Ku Band or conventional Ku or C-Band?
Discussion Questions (Continued)

- Regarding the latency issue associated with the use of GEO satellites, do you believe O3b MEO service will be widely adopted for use with latency sensitive programs assuming it maintains its latency advantage across the network? I am especially interested in three areas that might pose obstacles to acceptance of O3b. Do you believe 1) Rain Fade; 2) the jitter associated with connectivity to a MEO satellite; 3) the requirement for two 2.2 Meter tracking antennas on an offshore Rig are significant obstacles to adoption or do you believe that the low latency associated with O3b will “trump” the other issues?

- Regarding the use of HTS satellites and, in particular, O3b, for transmission of Seismic Data, does it make economic sense? Is there really an advantage of getting the data back in real time vs. waiting several days for the tapes to be transferred by courier?

- In sum, how will the use of satellite services change in the next five years? Will Ka-Band be widely accepted or will it only be used in niche applications where reliability is not a major factor i.e. Crew Welfare.
True End-to-End Communications
Putting It All Together Into a Managed Network

Technology agnostic → Employ the best solution for the client
Develop solutions that enable clients to maximize the value of their networks
Rig Of The Future Will Provide
- Improved Situational Awareness
- Faster Decision Making
- Real-time Remote Control
- Increased Automation
- Lower Operating Costs
- Safer Work Environment

Success Depends On
- 100 Times Bandwidth of Today
- Every Device IP Connected
- Multi-path Communications
- Applications Aware Network

Ultra Broadband 100Mbps+ Network
Video Surveillance Above & Below Decks
Crew Infotainment & Training
Spill Detection & Prevention Sensors
Down-hole Drilling Information
Subsea Fiber Networks
Remote Control
Wireless Rig-Area-Networks™
Remotely Operated Vehicles

Energy Trends
Emergence of the Digital Oil Field

Rig Headquarters
Teleport
Energy Headquarters
Subsea Fiber Networks
Teleport
Shallow Water Production Platform
Support Vessel
Shallow Water Drilling Rig
Deep Water Offshore Drilling Rig

4,000 METERS WATER DEPTH
Maritime
Global Xpress, Intelsat Epic\textsuperscript{NG} and o3b
Our Panelist- Michel Verbist

Michel has 20 years proven experience initiating direct sales in new international and domestic telecommunication markets and establishing international distribution networks; since 2008 he has focused on satellite markets for serving customers within Orange Business Services, a (formerly France Telecom) subsidiary focusing on corporate and multinational customers.

He has played a key role to put satellite services as strategic services and the company is heavily investing in new resources and additional value added satellite services. Since July 2011, Michel has headed the International Business Development in Orange Satellite Business Unit. Despite the steep growth, Orange Satellite Services has achieved over the past 5 years, Orange expects to further grow the revenue ten per-cent or more year on year for the next 5 years.
Please give us a brief background of France Telecom’s activity in the maritime VSAT sector;

With the increased throughput potential of HTS satellites, both Crew Welfare and ships operations will benefit. Beyond Crew Welfare usage, how will ship owners utilize connectivity to increase operational efficiency and lower operating costs?

Orange has sold VSAT services to several fleets of Offshore Service Vessels. Are OSV’s a major market for HTS satellite services? If so, what specific onboard applications would benefit most?

Given that both Ku-Band and Ka-Band satellites are much more advanced in their ability to resist rain, is Ka-Band now a realistic choice for transoceanic vessels and, in particular, those that sail through tropical regions?
Overall, how do you think the market split will be between Ku-Band and Ka-Band services? Do you believe that Ka-Band services such as Global Xpress and Viasat will dominate a large share of the market or do you believe most of the markets will remain with conventional Ku-Band and the new Intelsat EpicNG Ku-Band HTS service?
the largest international MPLS backbone in the world

over 1,500 PoPS in 166 countries
integrating satellite technology within converged IP enterprise networks to serve sites:
- in regions with poor or non-existent communication infrastructure
- in developed countries as MPLS back-up

Orange VSAT capabilities: our value-added business proposition

- Dedicated satellite: SCPC, iSCPC
- Shared satellite
- Maritime & Offshore satellite
- Integrated satellite L Band Services
Orange Solution
secure, private network, multiple access and private cloud connectivity

end-to-end ownership

one provider one point of contact one SLA
transforming your business with Orange VSAT

Remote PC and Bridge System Maintenance

Improved Crew Welfare
Minimizes Attrition

Fuel Optimization Saves Fuel

Unlimited O & M Data Base Sync
Enhances Operational Efficiency

Centralized Document
Reduces Errors and Saves Time

Low Cost Voice Calling

$VSAT as enabler for savings$

Telematics: Lowers Maintenance Costs

Unlimited O & M Data Base Sync
Enhances Operational Efficiency

Real Time Distribution of Software and Virus Updates
Reduces PC Problems

Low Cost Voice Calling

Reduction of Personnel at Sea
Through consolidation of Administrative Tasks Onshore

Improved Crew Welfare
Minimizes Attrition

Centralized Document
Reduces Errors and Saves Time

Telematics: Lowers Maintenance Costs

Real Time Distribution of Software and Virus Updates
Reduces PC Problems

$VSAT as enabler for savings$
Orange office@sea

- convergence of terrestrial and satellite capabilities
  - access to corporate network and terrestrial LAN
  - VPN data applications
- crew welfare
  - Web browsing, email
  - cellular service and VoIP
  - streaming video and entertainment
  - online training
  - telemedicine
- improving efficiency/reducing TCO/building business intelligence with real time coms
  - reduced vendor base
  - remote management
  - low cost voice
  - value-added services
  - converged simplified technology landscape
  - voyage decision support
  - cloud solutions
- global coverage
  - global IP VPN network
  - teleports covering all continents
Summary: GX vs. EpicNG vs. O3b vs. Viasat
Rain Fade: Global Xpress Ka vs. Ku-Band

Link margins required for 99.6% availability

Global Xpress Ka-Band
30 GHz

Ku-Band
14 GHz

180W (180E)  50W (310E)  60E  180W (180E)

Legend:
- Light blue: 0 to 2 dB
- Light blue-green: 2 to 4 dB
- Green: 4 to 6 dB
- Dark green: 6 to 8 dB
- Red: 10 to 12 dB
- Yellow: 12 to 14 dB
- Orange: 14 to 16 dB
- Dark red: 16 to 18 dB
- Purple: > 18 dB

180W (180E)
Ku-Band vs. GX Coverage Comparison

- GX has 89 Beams, 72 of which can be lit simultaneously;
- Bandwidth can be doubled to 84 Mbps in 8 “Spots” but to do this 8 other “Spots” Beams must go “dark;”
- Each Satellite has 6 steerable beams 1.2 degrees in diameter, if not pre-empted for military use. However, “Spots” are smaller than the 2.0 degree “Spots.” So little additional coverage is added;
- The Net Result is Global Xpress is not really “Global” but covers about the same area as conventional Ku-Band Networks.
Global Xpress 64 Spot Beams Lit
GX Backup - The Reality: Contended Bandwidth

Global Xpress
1 Mbps

Fleet Broadband
384 Kbps – Shared!

Minimal Connectivity = Critical Applications Disrupted
World Ku Band Coverage
GX With 64 Beams Lit
Intelsat Epic HTS Sat Coverage
## GX vs. Epic vs. O3b vs. Viasat 2

<table>
<thead>
<tr>
<th></th>
<th>Global Xpress</th>
<th>EpicNG</th>
<th>O3b</th>
<th>Viasat 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Network</strong></td>
<td>Proprietary- No Backup, No Spare</td>
<td>Open – Backup with any Ku Sat</td>
<td>Proprietary but has spares</td>
<td>Open</td>
</tr>
<tr>
<td><strong>Pricing</strong></td>
<td>Monopoly</td>
<td>Competitive w/ other Sat Networks</td>
<td>Proprietary - Monopoly</td>
<td>TBD</td>
</tr>
<tr>
<td><strong>Coverage</strong></td>
<td>Near Global</td>
<td>Near Global</td>
<td>+45 to -45, Localized Spot Beams Only</td>
<td>North America, North Atlantic Caribbean, Europe, ME w/Ka-Roaming</td>
</tr>
<tr>
<td><strong>Satellite Throughput</strong></td>
<td>12 Gbps</td>
<td>25-60 Gbps</td>
<td>10.5 Gbps w/ 4.5 M Antenna</td>
<td>140 + Gbps</td>
</tr>
<tr>
<td><strong>Rain Fade</strong></td>
<td>Severe</td>
<td>Light to Moderate</td>
<td>Severe</td>
<td>Severe</td>
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<tr>
<td><strong>Availability</strong></td>
<td>Q 4 2014</td>
<td>2014-16 (1st 2 satellites) Others TBA</td>
<td>Q4 2013Late</td>
<td>2015 (Projected)</td>
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</tbody>
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Thank You
Additional Questions?