Ka-Band Broadband Satellite Technology & Capabilities

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Corporate Summary

- Broadband Solutions and Managed Network Services for Enterprises and Governments
- Full Range of ISP Services for Consumers and Small Businesses
- Global Technology and Market Leadership
- HughesNet® Service Businesses in North America, Europe, India, and Brazil
- Over 80 Hughes-Authorized Service Providers Globally
Hughes at a Glance

Premier Broadband Network Services and Equipment Provider

- Large Enterprise
- Consumer/SMB
- TELCO/Carrier

Mobile Satellite Networks Leader

- User Terminals
- Satellite Gateway

VSAT
2009 Revenue $895M

Telecom Systems
2009 Revenue $112M
Key Strategy

Task: Make this circle larger every year by the synergy between our services and manufacturing businesses.
Hughes is The Global Leader...

Global Market Share(1)

- Hughes: 50.2%
- Gilat: 25.2%
- ViaSat: 8.7%
- iDirect: 5.9%
- Others: 10%

2.2M Hughes VSATs Shipped

Russia/ CIS VSAT Market Share(2)

- Hughes: 51.5%
- Gilat: 29.5%
- ViaSat: 9.2%
- iDirect: 5.5%
- AdvantechSatNet: 2.2%
- STM Networks: 1.5%
- NDSatCom: 0.5%
- Shiron: 0.1%

28K Hughes VSATs Shipped

10th consecutive year of greater than 50% market share

(1) Based on cumulative terminals shipped according to COMSYS, 2009 Report.
(2) Based on data from Dubna Conference, 2009 and Hughes shipments
More than 2.2M Terminals Shipped Worldwide to Over 100 Countries

- NORTH AMERICA: 1.7M Terminals
- SOUTH AMERICA: 117k Terminals
- EUROPE: 135k Terminals
- RUSSIA/CIS: 29k Terminals
- ASIA/PACIFIC: 90k Terminals
- INDIA: 77k Terminals
- AME: 62k Terminals

Hughes Hub
Hughes Service
3rd Party Service using Hughes Platform
Market Sector: Consumer
HughesNet® Consumer/SMB Service: Dual Ku/Ka- Band Operation

2009 Network Stats
- >700K Sites; >500K Consumer
- Largest managed network services provider in USA
- Over 90 transponders across 13 satellites
- SPACEWAY® 3/Ka-band service commenced April 2008: 250k Subs (Q110)
Reaching the Consumer

High-Speed Internet by Satellite
Is Now Available Where You Live.
Make the switch to HughesNet!

View Pricing & Order
Closing the Digital Divide

UNITED STATES
- Unserved Market: 10M Households and 3.5M SMBs
- 500K HughesNet Residential/SMB Subs (Q409)
- High Speed: 1-5 Mbps

INDIA
- 11K HughesNet Kiosks: Distance-Learning, eGovernance, high-speed Internet
- Franchise increases profits via pay-as-you-go services

RUSSIA
- eRussia Initiative w/GlobalTeleport: 8K rural ISPs and schools on HN System

MEXICO
- Rural telephony: 30K lines HN system
- Rural broadband: 2K HN terminals

BRAZIL
- State of Amazonas (1.5M sq km): Hughes and PRODAM
- High-speed Internet and eGovernance at agencies/schools

AUSTRALIA
- ORION Satellite Systems
- Up to 200K subs in rural areas on HN System with DVB-S2/ACM
Market Sector:
Enterprise & Government
The Network as a Strategic Asset

Marketing Solutions
- Customer facing Communications
- Loyalty cards
- POS/interactive promotions
- Kiosks
- Leverage Data Network infrastructure

Human Resource Management
- Interactive Training
- Offline training/DVR
- Employee facing communications
- Training and learning solutions
- HR applications/Intranet

POS, Back Office
- Credit card verification
- PCI Compliance
- Critical application support
- Data exchange

Front Office
- Secure front office support
- Marketer and Jobber Solutions
- Secure 3rd part application support

IT Applications
- Software/Security distribution
- Intrusion detection
- Performance Management

Continuity of Operations
- Backup to terrestrial network
- Co-primary implementation
- Multicast support
Integrated Satellite and Terrestrial Networks

- Combined satellite and terrestrial (xDSL, EVDO, etc) technologies
- Maximize strengths of both: satellite ubiquitous coverage; terrestrial capacity
- Common router used for both satellite and terrestrial connections

Common Router For Hybrid Networks
- Network Management
- Acceleration Software
- Encryption and Security
Broadband for Police: Los Angeles

- Hughes/Helius solution for Los Angeles Police
  - 10 million residents
  - 18,000 deputies
  - 12,200 sq km
- Digital newspaper
  - Up-to-the-minute information for officers and administration
- On-demand training
  - Personal scheduling ensures mandatory compliance
- Inmate orientation
  - Training in rules and regulations
  - Medical care
  - Rehabilitation programs
Emerging Market Sector: Broadband Mobility Solutions
**Broadband On-The-Go**

- **Business achievements**
  - **Aeronautical**
    - Row44 - Southwest Airlines
  - **Maritime**
    - Global marine communications
    - Intelsat maritime service
  - **Trains**
    - Commuter train service in USA
**HX Based System**
*60cm Ku-Band Antennas*  
*Gulf of Mexico Service*

**DVB-S2/ACM and AIS**
*for return enables continuous link optimization*

- PLMN
- PSTN
- Internet
- HX Gateway
- Corporate Data Center
- Intranet
- HX200

**HX200**
PRODAM BRAZIL – WiMax Trunking

- WiMax service to rural remote cities in the Brazilian state of Amazonas
- So rural that no terrestrial connections are available
- HX System used to offer SCPC like services
The Market Leader in MobileSat

TERMINALS

Thuraya Voice
Inmarsat R-BGAN
MSV
Inmarsat BGAN
Thuraya IP
ICO MIM
Terrestar Core Platform

BGAN-X 9250
FB250
Harris Falcon III BGAN

Technology Platforms
Dual Ku/Ka-Band Service Runs On HN Technology Platform

- Powerful HN NOCnx in a single rack;
  - High capacity return channel
    - up to 96 Mbps of return channel throughput
    - Over 100 return channels
  - High capacity forward channel
    - Up to 45 Msps
  - High capacity IP Processing
    - Up to 180 Mbps IP processing
    - Advanced IP features
    - HTTP Acceleration AND HTTP object prefetch
  - Full OSS functionality
    - Automatic provisioning
    - Automatic commissioning
    - Standard APIs to 3rd party BSS packages

Powerful Family Of Terminals

- HN7740S Integrated VoIP
- HN7700S High End Enterprise
- HN7000S Internet Access
Evolution of Terminal Platform

- Incorporation of HN System features and functionality
  - Leverage extensive experience
- Development focused on
  - Reduction of components
  - Leverage “COTS” products
  - “Lights out” Gateway systems
SPACEWAY® 3
The World’s First Switch-in-the-Sky

- 10 Gbps gross throughput
- Multiple spot beams with flexible capacity allocation and on-board routing
- Single hop, full-mesh, small-dish connectivity
- Enterprise, Consumer, SMB and Gov’t Applications
- Ka-band technology
- April 2008: Commercial Service; >250K Subscribers (Q1 10)
Ka-Band Broadband Architecture

Ground System
High Level Architecture

Network Control Center

Ka-Band Satellite

Forward Carriers

Return Carriers

High downlink power, high downlink data rates are optimum for small terminals

Region Spot Beams

User Terminals Within A Spot Beam

INTERNET
Hughes To Supply Avanti (UK) Ka-Band HN Technology

- Multi-Year Supply Agreement
- HYLAS Ka-Band Satellite
- 8 Gateway stations & 50k HN Terminals
- European Consumer & Enterprise Services Commence in 2010
Adaptive TDMA LDPC Coding

- Hughes introduces the VSAT industries most powerful and efficient TDMA access scheme;
  - LDPC coding of the TDMA bursts, together with
  - Adaptive coding of the bursts

- LDPC is the most power-efficient coding technology for TDMA channels in the market today
  - Compared to typical TurboCodes the Hughes LDPC enables up to 33% gain in the TDMA channel satellite efficiency
    - 20% gain is typical

- Adaptive coding
  - Enables remote stations to typically operate at the next higher FEC rate than TurboCode
  - Enables 20-50% throughput gain in the same occupied bandwidth
    - 20% gain is typical
New HN9400 High-Throughput Dual KU/Ka Band Router

Key Features

- All Features of Existing HN Product Line
- Adaptive LDPC or Turbocode Inroutes
  - Up to 30% Improved Throughput with LDPC
  - Additional Performance With Adaptive FEC
- Increased Performance
  - Higher Processor Speed
  - Twice the Memory of Current HN Modems
- Has Two LAN Ports
  - 10/100 Based T
  - Separate LAN Subnets Supported on Each LAN
- Supports Ku-band and Ka-band
- New Smaller Footprint Chassis
- Expected Ship Q3

First VSAT to Support Adaptive LDPC TDMA Coding

- 60 Mbps Multicast
- 20 Mbps UDP
- 15 Mbps TCP
Next Generation High-Throughput, Ka-Band Satellite

- New spacecraft technology
- NewSystem technology
- High Speed forward and return channels
- Key QoS and acceleration features
- Enhanced user experience

- 100 Gbps capacity
  - (~100 times the capacity of a typical Ku band satellite)
- In service 2012
  - Supplied by Space Systems Loral
- Optimized for broadband access
- Multiple Ka spot beams
- Advanced high order modulation rates
- More speed:
  - 5 – 25 Mbps downloads
- More bandwidth:
  - Increased download limits
Research & Development: Keys to Continued Success

High-Level Drivers

- Increased Operating Efficiency
- Enhanced Functionality and Features
- Superior Performance

Focus Areas

- Reduction of Space Segment
- Compression of IP Traffic
- Higher Throughput
- Expansion of IP Router Functionality
- Enhanced Network Management
- Security
- Application Performance

Continuous System, Software, and Platform Advancement
Hughes Differentiators

- Hughes Operates the World’s Largest Broadband Satellite Network
- Hughes Leads in Ku-Ka Band Next Generation High-Throughput Satellite Systems

Product Features Driven by Our Experience as Service Provider on Five Continents

Products Designed to Support Enterprise, Government and Consumer Services

- North America: SPACEWAY 3 Ka-Band Technology Serves Over 250k Subs
- Europe: AVANTI Ka-Band HN System & Terminals in 2010
- Dual Band Ku/Ka Systems & Routers
- JUPITER, 100Gbps Ka-Band Satellite in 2012