BGAN M2M Presentation for Mackay/G1 Event

October 2013

What is BGAN?

Voice | Data | Streaming | SMS

BGAN SERVICES

BGAN Network | I4 Satellite | SAS
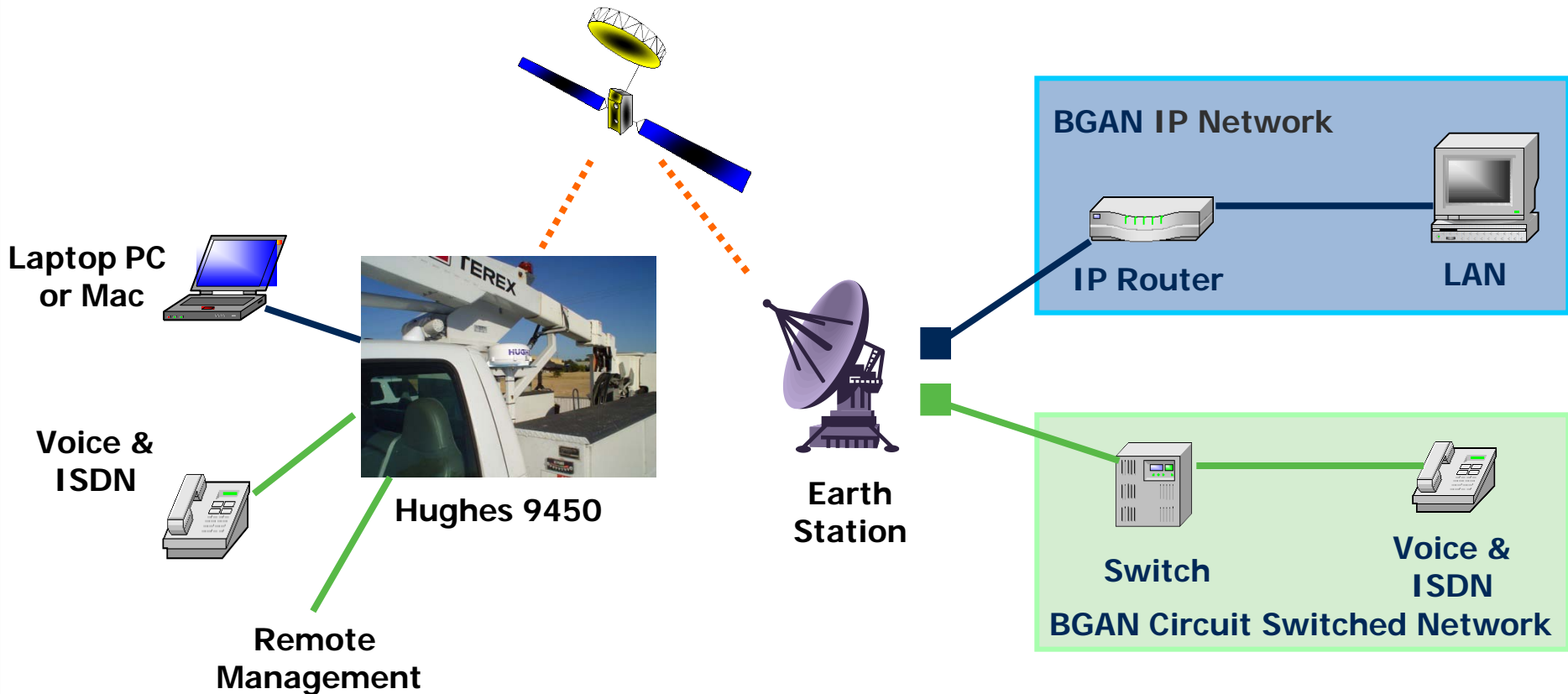
INFRASTRUCTURE

Satellite Terminals

BGAN DEVICE

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BGAN: one device, two networks

Laptop PC or Mac

Voice & ISDN

Hughes 9450

Remote Management

Earth Station

BGAN IP Network

IP Router

LAN

BGAN Circuit Switched Network

Switch

Voice & ISDN

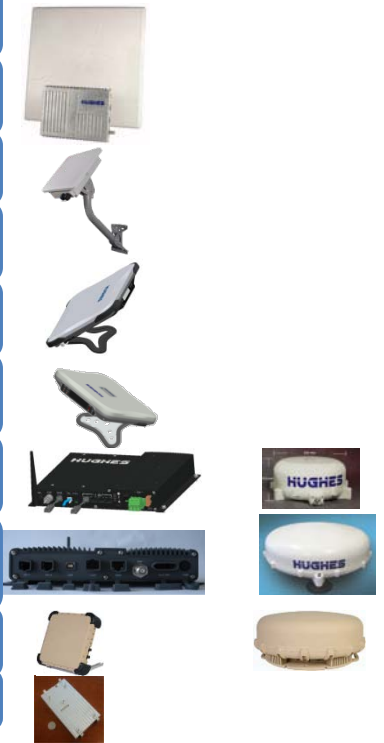HUGHES®

Hughes Product Portfolio

Hughes 9502 (2-piece)

Hughes 9502 (2-piece) C1/D2

Hughes 9502 (1-piece)

New Hughes 9502 (1-piece) C1/D2

New Hughes 9211-HDR

Hughes 9202

Hughes 9450-C11

Hughes 9350-C10

Harris MIL-STD-810

Hughes Core Module - OEM

Hughes Product Portfolio

Core Module

BGAN Core Module Engine

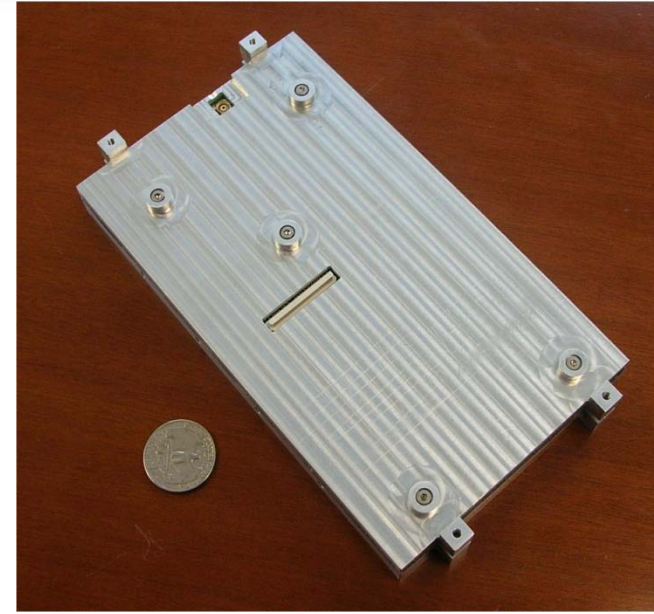|	
Size	171 mm x 96 mm (6.7" X 3.8")
Weight	.45 Kg (15.8 ounces)
Interfaces	100 pin board-to-board connector Single RF coax connector
Frequency	L-Band Tx 1626.5 - 1660.5 MHz Rx 1525.0 - 1559.0 MHz
Classes Supported	Classes 1,2,3,8,9,10 & 11
Additional Items Required	IF/power board, antenna and housing

BGAN Core Module

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Harris MIL-STD-810 Terminals

Interfaces	Ethernet, ISDN, & USB
Services	464 Kbps background rate
	Multiple streaming services
	ISDN 64 Kbps data service
	Efficient, high quality, cost effective voice
	Full ISDN Data
Target Markets	Government, Oil & Gas

Class 2 Portable Terminal

Class 10 Mobile Terminal

Hughes 9350-C10 Mobile BGAN

Interfaces — Ethernet, RJ-11 (2 ports), ISDN, USB, **Wi-Fi ENABLED**

Services — 464 Kbps background rate

*256 Kbps streaming service

ISDN 64 Kbps data service

Efficient, high quality, cost effective voice

Full ISDN Data

POTS – Voice & Fax

Target markets — Media, Government, Oil and Gas

* 256K streaming supported above 45 degree look angles

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Hughes 9450-C11 Mobile BGAN (Mobile M2M)

Interfaces   Ethernet (4 ports, PoE), **Wi-Fi ENABLED**, RJ-11 (2 ports), ISDN

Services   464+ Kbps background rate

128 Kbps streaming service

Supports 64 Kbps ISDN

Push-to-talk ready, using Wi-Fi

Third party data least cost routing

Ignition power management

Target Markets   Utility, Government & Energy fleets

Wi-Fi ENABLED

HUGHES®

Hughes 9202 Land Portable

Interfaces	Ethernet, POTS, full ISDN, **Wi-Fi ENABLED**
Services	464 Kbps background rate
	128 Kbps streaming service
	3.1KHz Audio and ISDN 64 Kbps data service
	POTS – Voice & fax
Features	Small, light weight, rugged design
	LCD user interface (UI) and web UI
Target markets	GAN replacement, Military, Gov't & Commercial

Hughes 9211 Land Portable High Data Rate (HDR)

Interfaces   Ethernet, POTS, external antenna port, **Wi-Fi** ENABLED

Services   492 Kbps background rate

650 Kbps asymmetric streaming service

POTS – Voice & fax

Features   Small, light weight, rugged design

LCD user interface (UI) and web UI

Target markets   Media, Military, Gov't & Commercial

HUGHES

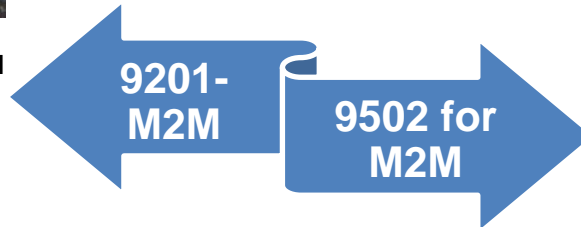# 9201-M2M Paved The Way To Co-Develop The 9502

Earthquake Monitoring

Tsunami Monitoring

Distribution Automation

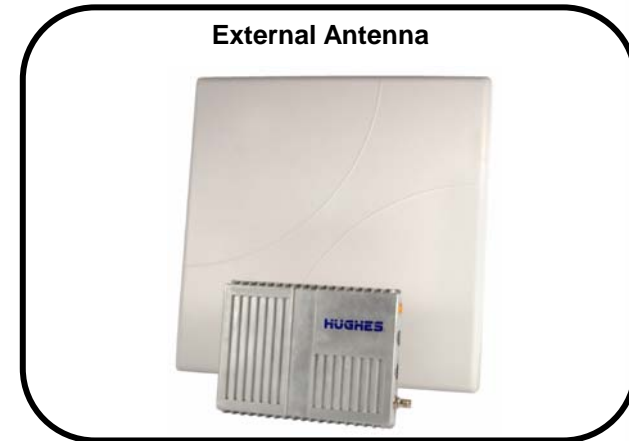Smart Meter Backhaul

Well site

9201-M2M ← → **9502 for M2M**

Both Integrated and External Antenna Units have very low power Consumption Ideally Suited For Solar/Battery Powered Sites

Integrated Antenna

External Antenna

Hughes Roadmap for BGAN M2M

Hughes 9201-M2M

BGAN

Hughes 9502-2
External Antenna
P/N 3500509-0001

Q1 2012

NEW!

Hughes 9502-1
Integrated Antenna
P/N 3500753-0021

Q1 2013

NEW!

Now Approved for C1/D2
Hazardous Locations
P/N 3500509-0004

Now being approved for C1/D2
Hazardous Locations
ETC 3Q2013
P/N 3500753-0022

NEW!

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Hughes 9502-2 Two Piece

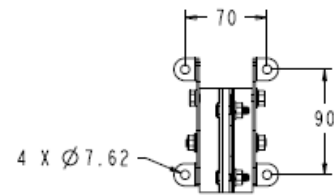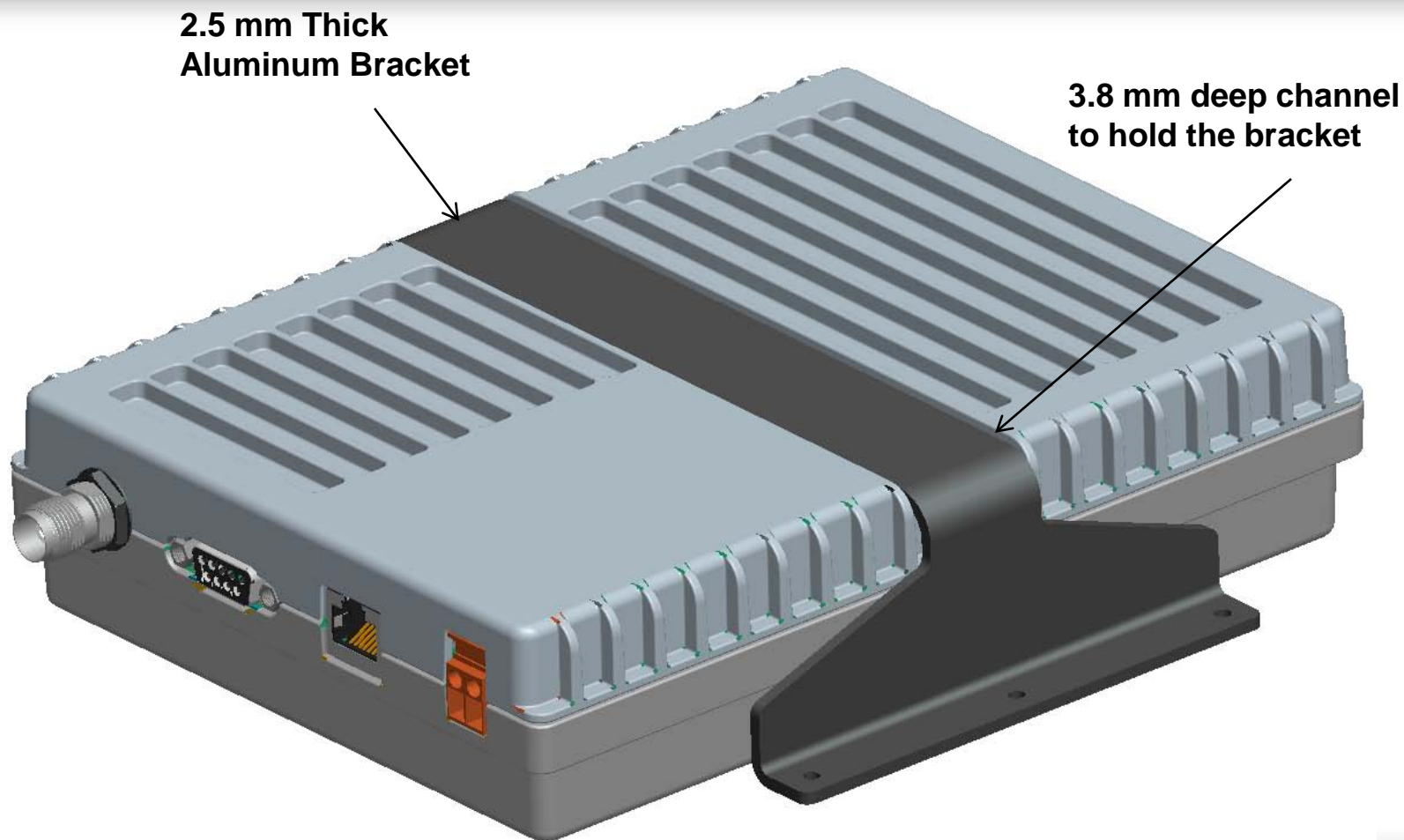|	
Communications interface	Ethernet
Services	Class 2 - Up to 400+ Kbps background rate
	Plus SMS
What's inside the box	Modem, antenna, 10M RF Cable w/adapter
Features	Low power consumption <1W
	Always ON and IP Watchdog
	Automatic Context Activation
	Secure Remote Management
Approvals	Hazardous locations certified, Inmarsat type approved, FCC, c-UL, CE, RoHS-2

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Azimuth/Elevation bracket -1.5"
P/N 1022994-0022

70

90

4 X Ø7.62

MOUNTING HOLES FOR TERMINAL
AZIMUTH CANISTER/INCLINE BRACKET ASSY

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2.5 mm Thick Aluminum Bracket

3.8 mm deep channel to hold the bracket

IDU Top View with Strap

200 mm

M3.5 or 6-32 size bolt

150 mm
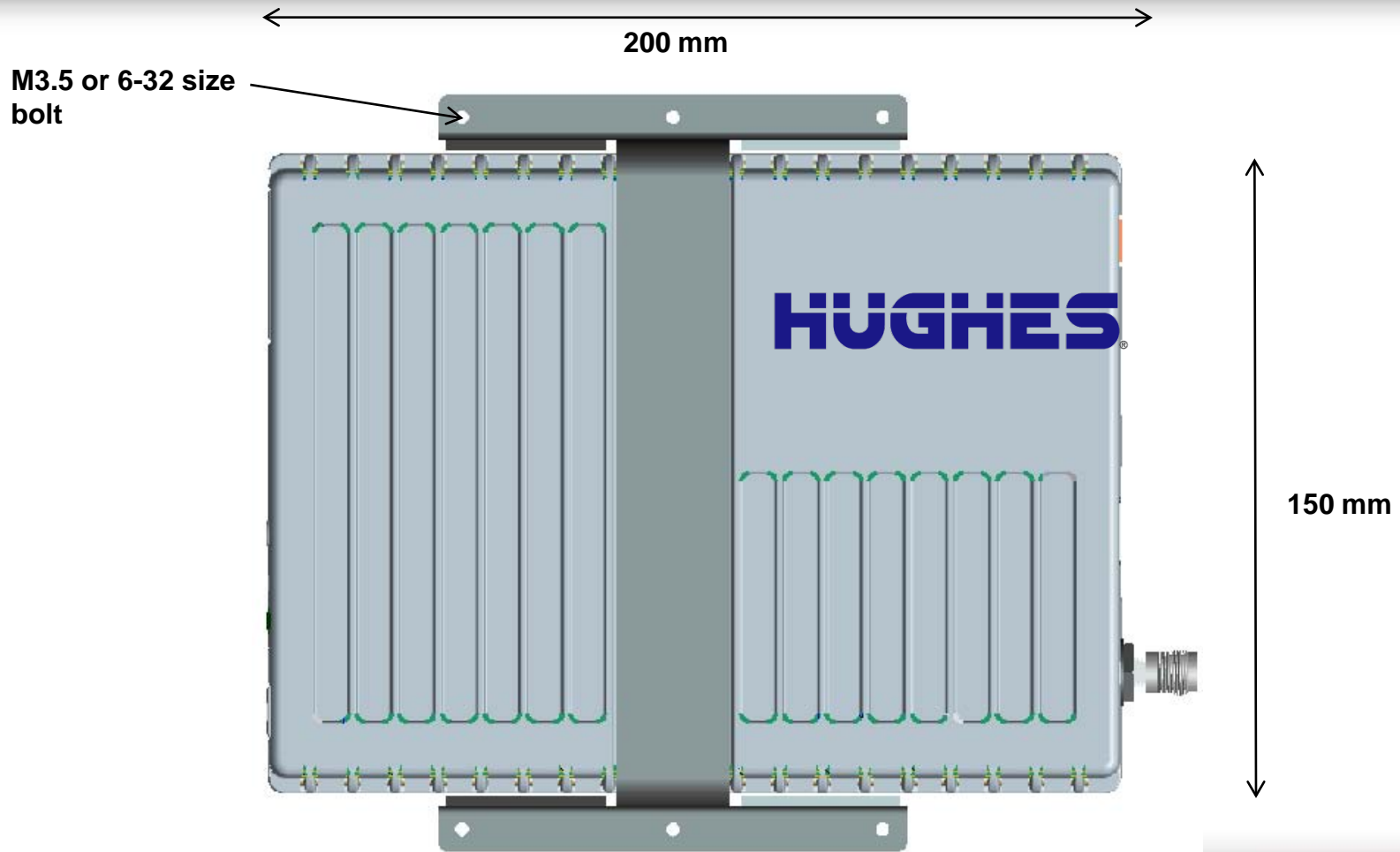
9502-2 Accessories

IDU Strap
P/N 3500617-0001

Azimuth/Elevation bracket – 2.0"
P/N 1022994-0024
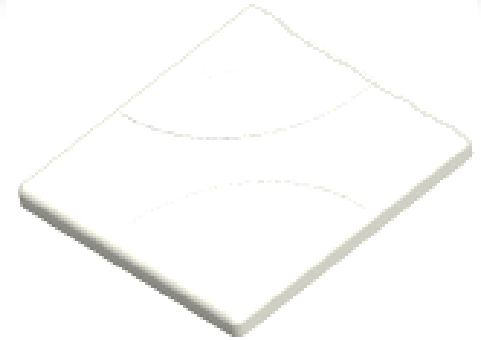
Antenna
P/N 3500564-0001

Azimuth/Elevation bracket – 1.5"
P/N 1022994-0022

RF Cable – 10 m
P/N 3500634-0001
Note: Other 50 ohm cable lengths (Must be 1.8dB +/-.5dB loss from end to end when measured at 1600MHz)

Basic Fixed Mount kit
P/N 3004066-0002

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Hughes 9502-1 One Piece Terminal

New

Communications interface	Ethernet (can run 100 meters)
Services	Class 2 - Up to 400+ Kbps background rate
	Plus SMS
What's inside the box	The terminal, locking bar, mounting screws
Features	IP-66 Ingress Protection
	Low power consumption <1W
	Always ON and IP watchdog
	Automatic Context Activation (ACA)
	Smaller 27.5 cm square antenna
	Secure remote management
Approvals	Hazardous locations accredited* Inmarsat type approved, FCC, c-UL, CE, RoHS-2

*Now being approved for C1/D2 Hazardous Locations ETC 3Q2013

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Hughes 9502-1 One-piece Kit – PN 3500753-0021

- Hughes 9502 Kit contents:
  - Integrated Antenna Terminal

- Optional Accessories:
  - Basic Fix Mount Kit – P/N 3004066-0002
  - Azimuth elevation bracket – P/N 10220994-0022 & 1022994-0024

- C1/D2 or ATEX certified terminal part number is 3500753-0022
  - Certification will be granted in mid-Oct and terminals will be available for shipment in late Oct.

9502-1 One-piece Terminal Accessories

Azimuth/Elevation bracket – 2.0"
P/N 1022994-0024

Basic Fixed Mount kit
P/N 3004066-0002

Azimuth/Elevation bracket – 1.5"
P/N 1022994-0022

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Hughes 9502 Common Features

- Common Features :
  - IP packet data transfer via the BGAN satellite network
  - Remote Management
    - Web UI interface
    - SMS Control
    - AT Command Control
    - Log file upload
    - Terminal configuration
    - Remote firmware upgrade
  - IP Watchdog
  - Always On
  - Automatic Context Activation
  - XL-band compatible
  - Compliant for hazardous locations

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Hughes 9502 Common Features Cont'd

- Common Features :
    - Relay Mode
    - LED Off (stealth mode)
    - Auto Power ON when power is applied
    - Automatic PDP Context Activation (Static or DHCP)
    - Dedicated M2M webUI
    - Security
        - Ethernet MAC Filtering
        - Administration Password
        - SMS Control password
        - White List for SMS control
        - AT Command password lock
        - SIM Personalization
            - Phone-to-SIM
            - DP SIM Lock
            - SP SIM Lock

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Hughes 9502 Interfaces

- Interfaces :

  - Ethernet connection (RJ45)

  - USB 1.1 connection (USB Type-B) for PC to configure terminal

  - RF connector on IDU and external antenna

  - Integrated GPS receiver and antenna

  - RS232 serial interface (DB9) to external NMEA 0183 based GNSS device (e.g., GLONASS receiver)

  - 3 LED status display and a single function button

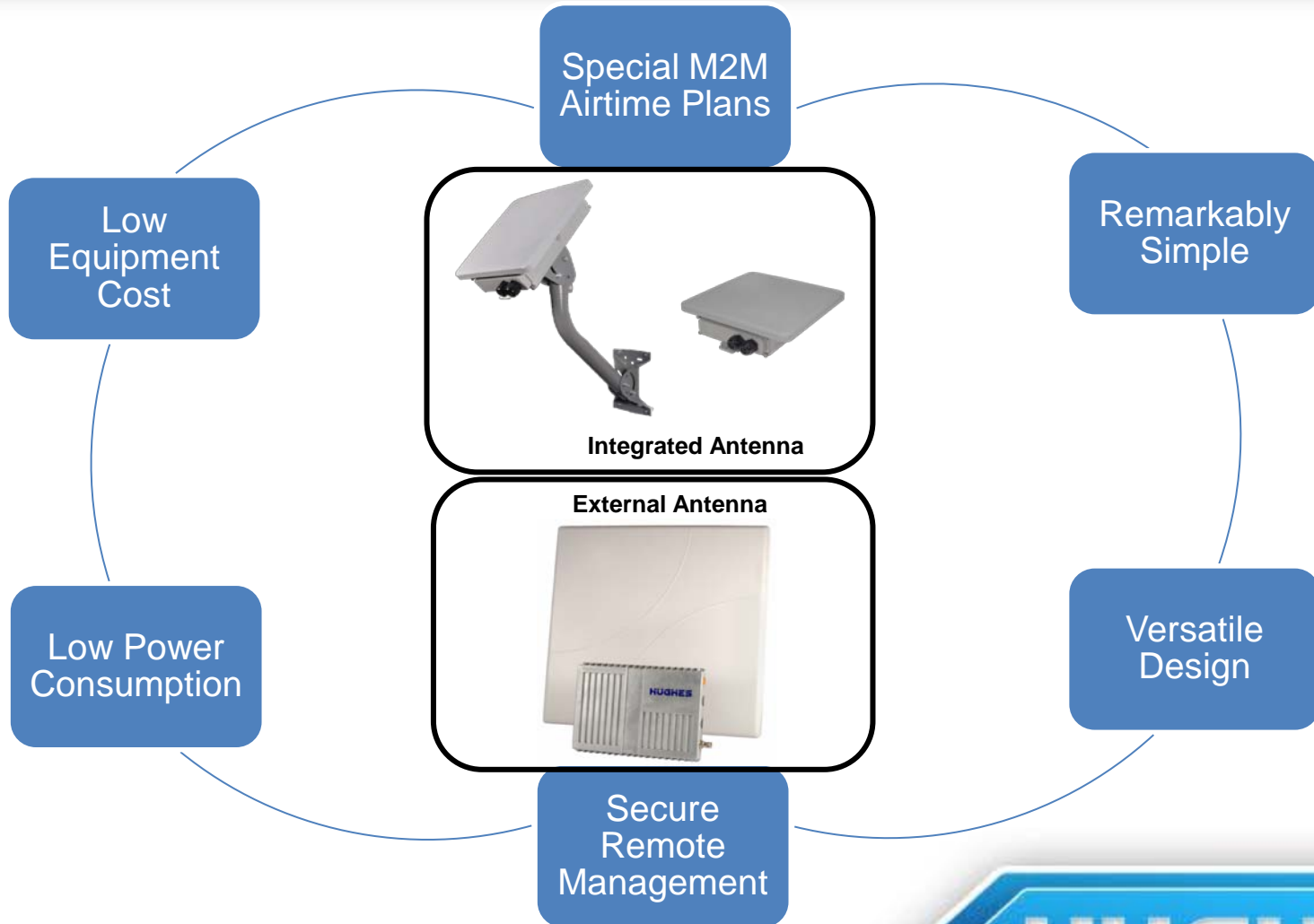 - 3.5 mm audio jack for audio tone or voltage level to assist in antenna pointing

  - USIM card slot

Front

Back

HUGHES

The Hughes 9502 Decision Drivers

Special M2M Airtime Plans

Low Equipment Cost

Remarkably Simple

Low Power Consumption

Versatile Design

Secure Remote Management

Integrated Antenna

External Antenna

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Hughes 9502 Power Consumption

- Power Consumption:

  The Hughes 9502 has four different states for power consumption:

  1. When the 9502 is transmitting/receiving at full power, the power consumption is < 20W

  2. When in a Narrow Beam w/o transmitting (90 seconds) the terminal will draw ~ 3W

  3. When in idle mode on the network, the Hughes 9502 will consume <1W. Idle mode is defined as having an active PDP context but the UE has already transitioned back to the regional beam due to 90 seconds of data inactivity. In idle mode the UE is still accessible via IP traffic from the network.

  4. There are two ways to put the UE into an "Off" state for even more power savings:

     A. The RTU can apply >2.2V @ 1 MΩ to the discrete input Pin#9 on the DB-9 connector to turn the UE Off (Pin#9 is positive and Pin#5 is ground) . When the RTU removes the 2.2V, the UE will start back up.

     B. Via a local AT command, a remote SMS command or a configurable timeout from inactivity on the LAN connection, you can turn the UE "Off", but the Ethernet connection will maintain the active pulses and wake up when any LAN packet is sent to the UE. In this state, the 9502 will draw less than 50mW of power using a 24V system or less than 10mW using a 12V system

Power Consumption Comparison

Hughes 9502

- Tx/Rx full power <20W
- Narrow beam w/o Tx (90 sec) ~3W
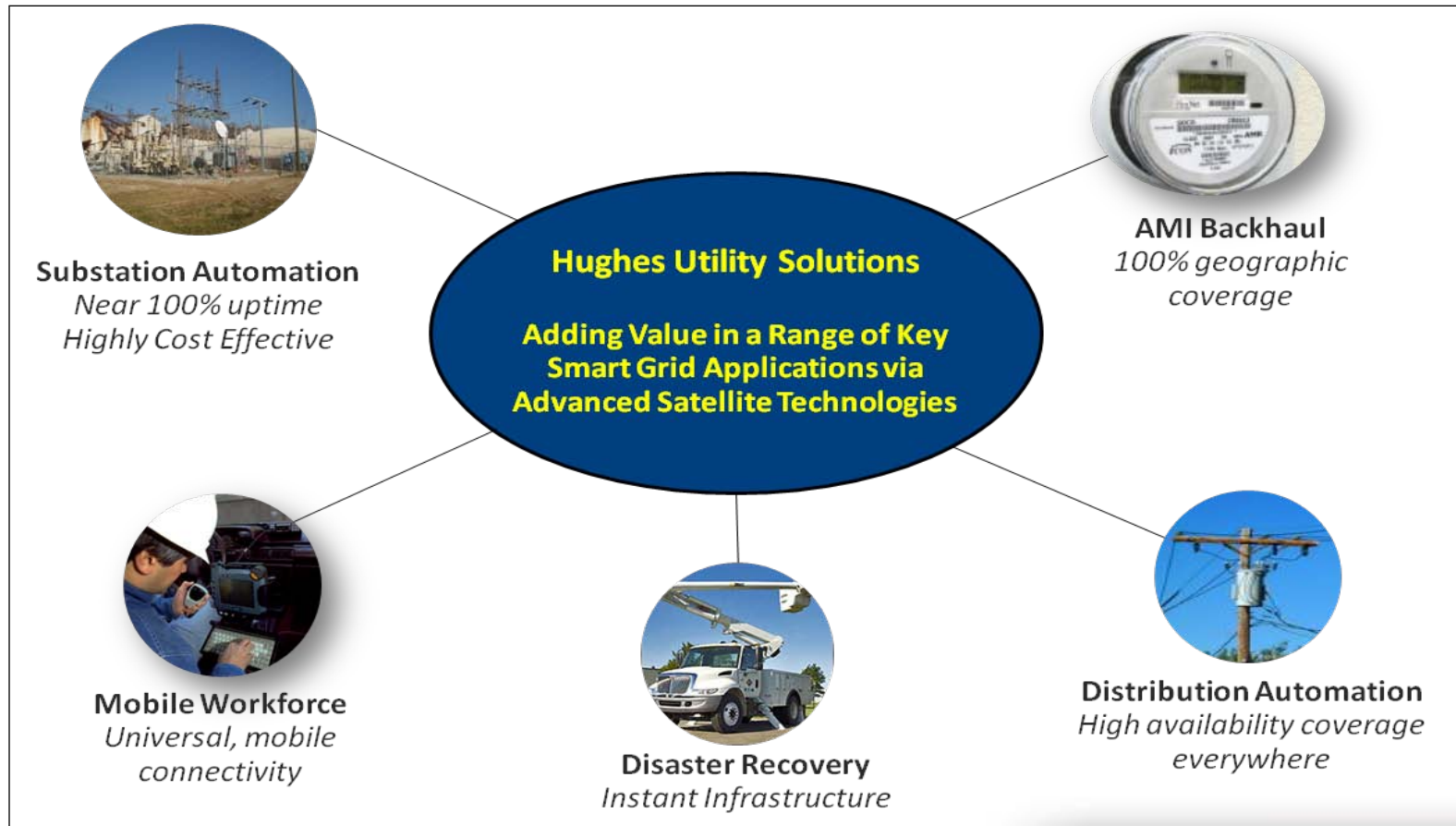- Idle Mode (Regional beam) <1W

Hughes 9201-M2M

- Tx/Rx full power <24W
- Narrow beam w/o Tx (90 sec) = 5W
- Idle Mode (Regional beam) = 3.7W

HUGHES®

Hughes SCAD/M2M Solutions

Hughes Utility Solutions

Substation Automation
Near 100% uptime
Highly Cost Effective

AMI Backhaul
100% geographic coverage

Hughes Utility Solutions

Adding Value in a Range of Key Smart Grid Applications via Advanced Satellite Technologies

Mobile Workforce
Universal, mobile connectivity

Disaster Recovery
Instant Infrastructure

Distribution Automation
High availability coverage everywhere

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M2M Target Market Applications

Utility
- SmartMeter backhaul
- Distribution Automation
- Hydro (dams, lakes, rivers)

Remote Surveillance
- Ideal for Battery/Solar

Oil & Gas
- Well Sites
- Pipelines
- Compressors
- Hazardous Locations

Remote Banking
- ATM
- Point of Sale

Environmental
- Weather
- Tsunami
- Earthquake

Gov't / Back up to VSAT
- For high availability sites
- Out of band management

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Initial Information gathering for M2M/SCADA Applications

- About the customer's system

    - Illustrate how the Hughes M2M equipment is expected to interface and communicate to their equipment & network.

    - Ask them about the RTU/controller that they use, including URL links to the make and model of the RTU

    - Can the RTU be configured for static or DHCP IP addresses?

    - Is there a power source at the remote end? DC or AC?

    - Is the one-piece or the two-piece 9502 better suited for their application?

    - If the two-piece is needed, is there current equipment at the customer site that could house the 9502 IDU?

- Security requirements

    - Public internet transmission acceptable?

    - VPN over Internet?

    - MPLS network to terminate to data center?

    - Static Global IP address desirable or essential? (pull data)

    - Dynamic Global IP address satisfactory? (push data)

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Initial Information gathering for M2M/SCADA Applications (cont'd)

❖ Additional Questions

- Have them describe what software or applications they will use at the remote and host end?

- Will the data connections originate at the remote site or from the host side (is data pushed, pulled or both)?

- What is the frequency of data being pushed/pulled per day, week or month?

- How many kilobytes or megabytes of data will be transmitted per day/per month/per site?

- Will the Hughes equipment be used for primary or backup communications?

- In what countries will the Hughes equipment be used?

- To determine IP subnet assignments, how many sites are to be installed and when?

- Are there any environmental or safety requirements?

- Describe any non-standard mounting requirements which would be necessary

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9502 WebUI Overview

Hughes 9502 WebUI

❖ **New look and feel for the 9502 WebUI**

❖ **Home page gives installer all the information required for pointing and getting the terminal connected to the network**

❖ **Easy access to retrieve system, event and packet log files from terminal for troubleshooting**

Hughes 9502 Status Bar

❖ **The status bar is included on the home page and other pages that do not have a navigation bar.**

❖ **It includes a field with the elevation angle and compass direction towards the visible satellite(s).**

❖ **The table below shows the possible status text that can be seen in the Connection section.**

Display	Comments	Corresponding LED display
Initializing	Initial start up (~15-20 secs)	Various
Pointing	UT in pointing mode	All three LEDs flash 1Hz
Registering	Attempting to register - pointing mode exited or bypassed	PWR on, GPS on or flashing, NET off
Registered	Registered and attached, no context	PWR on, GPS on and NET flashing
Connected	PDP context active	All three on (or off after 1 minute timeout)

STATUS

Connection

🔗 Connected

Beam: REGIONAL 13
Signal Strength: 56

GPS

🌐 3D GPS Fix

Location: 32.89573° N
117.20222° W
Last Fix: 28-Nov-2011,
15:51 UTC

Satellite Info

I-4 Americas
🧭 147.3°   📐 46.5°

❖ **The signal strength bar shows the quality of the received signal.**

❖ **The same scale is used for all beam types and so during pointing, only the left part of the bar is used.**

❖ **The signal strength in the Global Beam should be 46 to 52dB when it is pointed correctly (the higher the better).**

❖ **The signal strength increases in value as you transition to the Regional Beam and again when you get a PDP context and transition to the Narrow Beam.**

❖ **The GPS status area shows the status of the GPS fix and the possible text results are shown in the following table:**

Display	Comments
Acquiring	Trying to acquire a GPS fix
Stored	UT is using a Stored GPS fix
Blocked	Terminal has not registered with the network and gone through the Network GPS policy
2D GPS Fix	The UT has acquired a @D GPS fix and can continue Registration with the network
3D GPS Fix	The UT has acquired a 3D Fix
Location	Shows Latitude and Longitude coordinates if allowed by network GPS Policy
Last Fix	Shows date and UTC time of last GPS fix

STATUS
Connection

🔗   Connected

Beam: REGIONAL 13
Signal Strength: 56
40 ▓▓▓▓▓▓

GPS

🌐   3D GPS Fix

Location: 32.89573° N
117.20222° W
Last Fix: 28-Nov-2011,
15:51 UTC

Satellite Info

I-4 Americas
147.3°   △ 46.5°

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