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#### C-COM – Pioneer in Mobile VSAT

- C-COM is an Ottawa-based technology company focused on research, development and design of fully motorized, autodeploy, mobile satellite antenna products (iNetVu<sup>®</sup>).
- Established in 1997, C-COM is one of the largest Comm-On-The-Pause (COTP) mobile VSAT manufacturers in the world.
- Company is developing highly disruptive antenna technology (electronically steerable phased array).

Employees: Exchange: Stock closing price: Dividend yield: Market cap:

Note: As of July 19, 2022.

33 **TSXV: CMI** and **OTCQB: CYSNF** \$1.48 (Canadian) 3.4% \$62,266,570 (Canadian)





## C-COM by the Numbers

**10,000+:** iNetVu<sup>®</sup> commercial mobile VSAT systems sold

- **106:** Number of countries in which you will find iNetVu®
- **600+** Active dealer partners worldwide
  - 34: Models available of the iNetVu® auto-acquire, motorized antenna
  - **10:** Modem manufacturers PLUG & PLAY Integrated with iNetVu<sup>®</sup> (35 different modem models)
    - 8: Sizes of antenna available (75cm, 80cm, 98cm, 1.0m, 1.2m, 1.5m, 1.8m and 2.4m)
    - 4: Formats of antenna (Driveaway, Flyaway, Manpack, Fixed Motorized)
  - 4: Bands of antenna available (Ka, Ku, C & X band)
- **\$25,531,938:** Working Capital (as of May 31, 2022)
- **\$19,040,428:** Shareholder Dividends Paid (as of May 31, 2022)
  - **41:** Consecutive Quarterly Dividends
  - **\$0:** Debt







Note: As of May 31, 2022. All figures in \$CAD



#### **Commercial Markets Using Mobile SATCOM**

- Government
- Military
- Emergency Response
- Disaster Recovery
- Blue Light Vehicles
- Oil & Gas
- Telecom Companies
- Banks
- Broadcasters
- Hospitals
- Schools
- Mining
- Events

COM



Where terrestrial infrastructure is LIMITED DISRUPTED NON-EXISTENT Broadband Internet via Satellite is the ONLY option





#### Worldwide Deployment









## 98 cm Auto-Acquire Ka-band DriveAway (Hughes, ViaSat, Avanti & Gilat)



 G - Avanti Approved; Thor7 Type Approved; also compliant with Gilat (SkyEdge) Ka services

- V Exede by ViaSat / KA-SAT satellites using ViaSat Broadband Modems. Auto beam select is available on the KA-SAT Tooway service.
- H Hughes Ka-band modems. The Ka-98H is suitable to operate over the Yahsat Yahclick network, and will be adapted as more networks become available.
- H-JUP- Hughes Jupiter modems. The Ka-98HJup is suitable to operate with HNS Jupiter (NA)<sup>(1)</sup>, YAHSAT (MENA)<sup>(1)</sup> and Avanti<sup>(1)</sup>
- Pod option available

<sup>(1)</sup> Supported Radios: Spaceway or Jupiter. Please specify which radio being used when ordering. http://www.avantiplc.com/avanti-approved-compatibility



## New Generation 1.2 m Auto-Acquire Ku-band DriveAway

#### iNetVu<sup>®</sup> 1202



#### • Field Upgradable to Ka-Band

 Low Stow, high-precision antenna pointing, near zero backlash

Ka-band or Ku-band

- Excellent Cross-pol performance
- Based on Eutelsat approved Skyware 1.2m Antenna, Type 125
- Works on all Ku Supported Services
- Characterized with Eutelsat\* and Intelsat Compliant
- Patented sleek aerodynamic form (Patent # D696649 & D696650)
- Optimal high-precision antenna pointing
- Wind deflector pod (optional)
- 2-piece thermoset-molded reflector (optional)



www.c-comsat.com

by C-COM

NEW

#### 1.2 m Auto-Acquire FlyAway

#### iNetVu<sup>®</sup> FLY-1202



- 1.2m FlyAway Antenna Designed for Ku and X Band
- Low cost, high precision antenna pointing, near zero backlash
- Setup less than 15 minutes
- Tool less, Captive H/W fasteners
- Fits in 4 Transportable Cases, under 35kg ea.
- Based on Eutelsat approved
  1.2m Skyware antenna







#### iNetVu<sup>®</sup> ManPack

Manpack systems can be easily configured to provide quick access to satellite communications for any application that requires remote connectivity in a rugged environment.

Ideally suited for applications that require a quick, simple set-up; in vertical markets such as emergency response, disaster management, public safety, broadcast, media and more.







#### Simple to Assemble and Easy to Use

#### Manpack



Auto-Pointing System Option Includes Onboard Controller

- Complete satellite acquisition in seconds
- Super quiet operation, no noise
- IP 66 Rating of whole system
- Assembly in 4-5 minutes without tools
- High precision reflector petal can be interchanged among one system and over multiple systems
- Multiple bands support: Ku, Ka, X
- Supports manual operation with handwheels and indicators





## Manpack Deployment in Japan following Typhoon 19

















FracTech – Texas, USA - 1200



ITC Global - Australia - FLY-1201



**Diverselt - Perth, Australia - 1200** 



**TC Communication - Australia 1200** 



Oil & Gas – Halliburton - 980



Libya - Hermes - 1200



Sinopec - China - 1200



BSC - Beijing - 1200







#### Satellite News Gathering



WebTVLive OTT by C2D.eu - RTC Belgium Broadcaster - Ka-75V



DDish TV - Mongolia - 1201



Spar Woman's Day Race – Grintek – Africa - Ka-98H



SNG - ViaSat - USA - Ka-75V



SNG - Newspotter - Eusatnet (SatSpeed) Germany - Ka-75V

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CCTV in China - Sichuan Earthquake - 1200



**SNG - ARY News - Pakistan - 1200** 



**Elections in Angola - Grintek - 1200** 







#### Emergency Response



Excelerate - UK - 1200



Landslide Disaster JSC Japan - 980

![](_page_15_Picture_7.jpeg)

Police Command Vehicle Altegrosky – Russia - 1200

![](_page_15_Picture_9.jpeg)

FireTruck - Xian - China - 1200

![](_page_15_Picture_11.jpeg)

Fire Department - Japan - 1201

![](_page_15_Picture_13.jpeg)

ER - Primetech - UK - Ka-75V

![](_page_15_Picture_15.jpeg)

**Disaster Recovery - Softbank - 980** 

![](_page_15_Picture_17.jpeg)

Indonesia - 1200

![](_page_15_Picture_19.jpeg)

![](_page_15_Picture_20.jpeg)

![](_page_16_Picture_0.jpeg)

## TeleHealth

![](_page_16_Picture_2.jpeg)

Telemedicine and Mobile Diagnostic Center Altegrosky - Russia - 1200

![](_page_16_Picture_4.jpeg)

Mobile Heath - Remote Comm LLC Midland, TX - 1200

![](_page_16_Picture_6.jpeg)

Mobile Surgical Satellite Service New Zealand - 1800

![](_page_16_Picture_8.jpeg)

Loma Linda University – USA - 1200

![](_page_16_Picture_10.jpeg)

Mobile COVID Vaccination Clinic – Hughes - US - 1200

![](_page_16_Picture_12.jpeg)

Mobile Health Care Services Siberia - 1200

![](_page_16_Picture_14.jpeg)

**Breast Screening - NZ - 980** 

![](_page_16_Picture_16.jpeg)

Transnet Phelophepa Health Train Grintek - South Africa - 1200

![](_page_16_Picture_18.jpeg)

![](_page_16_Picture_19.jpeg)

![](_page_17_Picture_0.jpeg)

![](_page_17_Picture_1.jpeg)

![](_page_17_Picture_2.jpeg)

Polish Military - TTCom - 1800

![](_page_17_Picture_4.jpeg)

Military – Russia – 120<u>0 & 980</u>

![](_page_17_Picture_6.jpeg)

Russian Military Communications - 1200

![](_page_17_Picture_8.jpeg)

Military - Russia - 1200

![](_page_17_Picture_10.jpeg)

Military - 1200 transported on a Russian IL-76 Cargo Plane

![](_page_17_Picture_12.jpeg)

**Russian Military - Fly-1201** 

![](_page_17_Picture_14.jpeg)

Military Forward Operations Base – USA FLY-1201 - Carolina Satellite

![](_page_17_Picture_16.jpeg)

Demo to President Putin Russia - 1200

![](_page_17_Picture_18.jpeg)

![](_page_17_Picture_19.jpeg)

![](_page_18_Picture_0.jpeg)

![](_page_18_Picture_1.jpeg)

![](_page_18_Picture_2.jpeg)

Telecom – TFL – Fiji – 1200

![](_page_18_Picture_4.jpeg)

Telecom – TFL – Fiji – 1200

![](_page_18_Picture_6.jpeg)

Telecom - Numix -Broadband on Wheels - Malaysia- 1200

![](_page_18_Picture_8.jpeg)

Telecom Malaysia Mobile Store Numix - 980

![](_page_18_Picture_10.jpeg)

AT&T - UK - 1800

![](_page_18_Picture_12.jpeg)

**Telecom – China - 980** 

![](_page_18_Picture_14.jpeg)

**Telecom Malaysia - Numix - 1200** 

![](_page_18_Picture_16.jpeg)

Telecom Malaysia - Numix -980

![](_page_18_Picture_18.jpeg)

![](_page_18_Picture_20.jpeg)

![](_page_19_Picture_0.jpeg)

![](_page_19_Picture_1.jpeg)

![](_page_19_Picture_2.jpeg)

Gov. pension programme Vox Telecom – South Africa – Ka-98H

![](_page_19_Picture_4.jpeg)

Peru – FLY-981

![](_page_19_Picture_6.jpeg)

Telespazio – Demo – Germany- 981

![](_page_19_Picture_8.jpeg)

Government - Mobile ID Vehicles Argentina - Telespazio - 1200

![](_page_19_Picture_10.jpeg)

Mobile Sight Services - UK Primetech - 750

COM

![](_page_19_Picture_12.jpeg)

Mobile Office - Eskom South Africa - 980

![](_page_19_Picture_14.jpeg)

Mobile Tax Office - Grintek South Africa - 980 - SARS

![](_page_19_Picture_16.jpeg)

Youth Services - UK – Primetech -Ka-75V

![](_page_19_Picture_18.jpeg)

![](_page_20_Picture_0.jpeg)

#### Mobile Banking

![](_page_20_Picture_2.jpeg)

NTI Soluciones – Spain - 1200

![](_page_20_Picture_4.jpeg)

South Africa Grintek - 980

![](_page_20_Picture_6.jpeg)

UK - Primetech - Ka-75V

![](_page_20_Picture_8.jpeg)

Numix - Malaysia 981

![](_page_20_Picture_10.jpeg)

Transportable ATM Container New Zealand - Bay City - 980

![](_page_20_Picture_12.jpeg)

**Coris Bank International - 980** 

![](_page_20_Picture_14.jpeg)

Germany - 1200

![](_page_20_Picture_16.jpeg)

![](_page_20_Picture_17.jpeg)

![](_page_20_Picture_19.jpeg)

![](_page_21_Picture_0.jpeg)

The Satellite business is a \$46B market. Flat Panel Satellite Antennas represent a \$17B opportunity over the next decade.

Many big players, with very ambitious projects, are now getting involved:

![](_page_21_Picture_3.jpeg)

OneWeb

(UK+Bharti-

India) 648 Satellites

![](_page_21_Picture_4.jpeg)

Musk (SpaceX) 4408 microsats

![](_page_21_Picture_6.jpeg)

Bezos (Amazon-Kuiper) 3,236 satellite constellation

![](_page_21_Picture_8.jpeg)

![](_page_21_Picture_9.jpeg)

![](_page_21_Picture_10.jpeg)

Telesat Lightspeed 188 Boeing 132

Gates funding Kymeta

![](_page_21_Picture_14.jpeg)

# Entering the GOLDEN AGE OF the SATELLITE BUSINESS?

O3B, SpaceX, Amazon, Inmarsat, Telesat, Viasat, Intelsat, Hughes, Kepler, Boeing and others have large-scale goals. All of these grand schemes require antenna design expertise. All require reliable & high precision ground station antennas. Can they be cost effective?

![](_page_21_Picture_17.jpeg)

![](_page_22_Picture_0.jpeg)

## Low Cost Phased Array Antenna System for Ka-band Mobile SOTM

- C-COM Satellite Systems, in partnership with the University of Waterloo, is creating its first Phased Array Antenna (PAA).
- C-COM tested its Ka-band Phased Array modules using the company's patented phase shifter technology in 2020.
- The proof-of-concept prototype has been successfully concluded by satellite tests in 2021.
- The concept is based on modules that are small, but contain everything the antenna, plus the electronic circuit, parts of the control circuitry, and local memory.

![](_page_22_Picture_6.jpeg)

![](_page_22_Picture_7.jpeg)

16x64 RX 4x4 Modules (1024 Elements)

![](_page_22_Picture_9.jpeg)

![](_page_22_Picture_10.jpeg)

![](_page_22_Picture_11.jpeg)

CIARS

## Advantages of Proposed Technology

#### **INTELLIGENT CHIP BASED TECHNOLOGY**

- System can have full control over each module
- Can perform electronic beam steering
- Can optimize the beam
- Can electronically scan 360 degrees
- Scalable
  - Gain can be increased by adding multiple modules
  - Allows for small building blocks which can be used
  - to make any size of antenna;
- Conformal
  - Bends to fit various shaped surfaces

![](_page_23_Picture_12.jpeg)

#### Dramatic cost reduction

- One antenna consists of several thousands chips, a few hundred antennas could reach a volume of millions of chips.
- It will be easy to reach "economies of scale", leading to significant cost savings.

Can conform to various shapes

 Applicable to many vertical markets

![](_page_23_Picture_17.jpeg)

![](_page_23_Picture_18.jpeg)

![](_page_23_Picture_19.jpeg)

![](_page_23_Picture_20.jpeg)

## Scalable Architecture: 4x4 to 16x16 to 80x80 Antenna Sub-Arrays

![](_page_24_Figure_1.jpeg)

![](_page_25_Picture_0.jpeg)

#### **Novel Dielectric-Based Patented**

#### **Phase Shifter**

- Operating Principle:
- Based on coplanar waveguide (CPW) combined with a dielectric slab (BLT ceramic) and High Resistivity Silicon (HRS);
- Phase shift is tuned by reconfiguring the phase shifter components via physical actuation;
- Distances can be changed using piezoelectric transducers or micro-electromechanical systems (MEMS) actuators

![](_page_25_Picture_7.jpeg)

![](_page_25_Picture_8.jpeg)

![](_page_25_Picture_9.jpeg)

![](_page_25_Picture_10.jpeg)

#### Flat Panel Antenna vs Parabolic Under Test

![](_page_26_Picture_1.jpeg)

![](_page_26_Picture_2.jpeg)

![](_page_26_Picture_3.jpeg)

#### ESA Antenna

Supports GEO, LEO, MEO Constellations Ka-band Frequency: Transmit: 27.5-30.0 GHz Receive: 17.7-20.2GHz Electronic Beam Steering and Tracking Elevation Angles: 20-90 deg; (70deg from Boresight) with scan loss up to 5dB Azimuth Angles: 360 deg Continuous Polarization: Software switchable,

Linear (H/V) or CP (RH/LH)

![](_page_27_Figure_3.jpeg)

![](_page_27_Picture_4.jpeg)

![](_page_27_Picture_5.jpeg)

![](_page_28_Picture_0.jpeg)

#### Cars with ESA Antennas

![](_page_28_Picture_2.jpeg)

![](_page_28_Picture_3.jpeg)

![](_page_28_Picture_4.jpeg)

## High-Speed Trains with Phased Array Antennas

![](_page_29_Picture_1.jpeg)

![](_page_29_Picture_2.jpeg)

![](_page_29_Picture_3.jpeg)

#### Simulation of Aircraft with Phased Array Antennas

![](_page_30_Picture_1.jpeg)

![](_page_30_Picture_2.jpeg)

![](_page_30_Picture_3.jpeg)

## Phased Array System for High Efficiency Millimeter Wave Wireless Communications of 37-48GHz

![](_page_31_Figure_1.jpeg)

![](_page_31_Picture_2.jpeg)

![](_page_31_Picture_3.jpeg)

Canada

NAC CNAC

#### Phased Array System for High Efficiency Millimeter Wave Wireless Communications of 37-48GHz

![](_page_32_Picture_1.jpeg)

#### PARTNERS

C-COM Satellite Systems Inc. Skyworks Solutions Canada Inc. University of Waterloo Eindhoven University of Technology NXP Semiconductors Netherlands BV Semiconductor Ideas to the Market (ItoM) BV

COUNTRIES INVOLVED Canada Netherlands

![](_page_32_Picture_5.jpeg)

![](_page_32_Picture_6.jpeg)

## Phased Array System for High Efficiency Millimeter Wave Wireless Communications of 37-48GHz

![](_page_33_Picture_1.jpeg)

- 5G services currently being rolled out in Europe and elsewhere are based on updated 4G systems.
- A host of Low-Earth Orbit Satellite constellations are now in deployment that will leverage ubiquitous coverage between the north and south poles.
- The biggest gains will come from the introduction of new mmWave technologies, which use radio waves of much higher frequencies and shorter wavelengths.
- These technologies are the key to improved network capacity, faster downloads (anywhere from 10 to 100 times) and reductions of up to 10-fold in 'latency' (i.e. the time to respond to an instruction or a command).
- Softbank HAPS Mobile Mission Concept: <u>https://www.hapsmobile.com/en/media/</u>

![](_page_33_Picture_7.jpeg)

![](_page_33_Picture_8.jpeg)

![](_page_34_Picture_0.jpeg)