SKYBUOY

WHITE PAPER

CONTENTS

Introduction	3
Headlines	4
Know How	5
Detecting Spin	6
Security, Speed and Dependability	7
Research Facility: Harwell Campus	8
Skybuoy Token Sale	10
Project Development	14
Key Equipment	15
Commercialisation	16
Civil Aviation Flight Data	17
In-Flight Communication	19
The Global Village	20
Global Communication Infrastructure	22
Levelling the Playing Field	24
Cellular phone Marketplace	25
Future Developments	27
The SKYBUOY People	29
The Math	31
Proofs	32

INTRODUCTION

The modern world is increasingly dependent on telecommunications, whether wired or wireless. This is especially seen in the growth of social media, and virtual distributed systems such as Internet gaming and cryptocurrency, to name but two. However, all current forms of communication have their issues with security, speed and dependability.

Hacking of all manner of communications is rife and costs the world billions in stolen funds, disruption of business and subsequent investment in security measures. The resultant leap-frogging as to who has the upper hand offers little comfort to the user.

Audio, video and digital data moves around the Earth at close to the speed of light, from hub to hub, and hub to client. Unfortunately, cables and relay equipment insert lags and bottlenecks in transit. This [latency] is often very noticeable.

Every year billions are spent on maintaining and repairing our communications infrastructure. At times repairs can take days, or even weeks to effect. This is particularly the case with subsea cables with costs running into the millions.

SKYBUOY offers a solution to all these problems by providing intrinsic built-in security, blistering high data speeds and 99.999% reliability. This is achieved by eliminating the long-standing reliance (circa 1837) on electro-magnetism for the relay of data over distance. The mechanisms employed are founded in an even older physics, made possible by recent innovations in microchip fabrication techniques.

HEADLINES

SKYBUOY will provide the benchmark for multi-media communications in the decades ahead. Ultra-low latency makes it ideal for live feed broadcasts. High levels of data handling will support video streaming over long distances, providing access to and from even the most remote locations and communities without expensive infrastructure. It is unaffected by extremes of weather or environment, requiring no towers, dishes or cables. This clearly has very positive implications for the cost and speed of implementation. All of which makes **SKY**BUOY an ideal solution for telecoms providers, international business, finance, energy development, travel, shipping, space science, and anywhere that people, organizations or systems want to talk to each other.

- Minimal ecological impact
- Minimal power requirement
- Low-cost deployment and minimal infrastructure
- Does not require line of site
- Does not require cable connection
- No degradation of signal fidelity
- Ultra-low latency
- Ultra-high data transmission
- Quantum encryption

KNOW HOW

The SKYBUOY concept is based on known and established technologies, and has been developed and refined since 2011. Underpinning the technology is the control of entangled sub-atomic particles. This science has been known for decades and was acknowledged by none other than Albert Einstein. Methods for achieving entanglement have become commonplace, and sees practical application in such spheres as quantum computing. By detecting the state of entangled particles, and by influencing that state, it is possible to achieve communication over distance.

DETECTING SPIN

Unlike political spin, it is not so easy to determine the spin of entangled particles. It has long been held that if one attempts to observe the state of a sub-atomic particle, then the state of that particle changes in the act of being observed. This is not disputed. However, our solution is more simple and elegant than one might think.

NOT Superluminal

Physical science shows that nothing can travel on a vector at faster than light. The speed of light in a vacuum is a universal constant. However, entangled pairs are one-and-the-same sub-atomic particle, simply observed in two places. Therefore, there is no distance. Speed is equal to distance over time, so if the distance is nil, time is irrelevant. This is part of what Einstein referred to as "Spooky Science". He did not personally like it, but he could not refute it.

If one imparts a force to the first perceived particle, that force is transferred to the second perceived particle. The resultant change in state induces current in a proximal conductor and this is what is detected.

SECURITY, SPEED AND DEPENDABILITY

Since there are no cables or electromagnetic emissions carrying the data between sender and receiver, there are no points of access. This intrinsic security is not hackable and **SKY**BUOY networks may be standalone if desired, without any need to connect to the Internet or other network.

The infrastructure and energy requirements for **SKY**BUOY are minimal. Practically all the bottlenecks or choke points have been eliminated. The initial offering predicts transfer speeds of 64Gbps, and near zero latency. It also means that the carbon footprint for **SKY**BUOY is less than existing legacy systems by an order of magnitude.

Each **SKY**BUOY connection is not dependent upon a single entangled pairing. There will be legion of pairs. This makes it much easier to detect a change of state, and there is huge built-in redundancy as a matter of course.

RESEARCH FACILITY: HARWELL CAMPUS

SKYBUOY will be developed at the world renowned Harwell Campus in Oxfordshire, UK. At 710 acres, it is more than 4 times the size of the MIT campus. Universities from around the world maintain a permanent presence onsite. Many leading multi-nationals have chosen to be located there also, because of the access it gives them to cutting-edge facilities in one place.

RAL Space

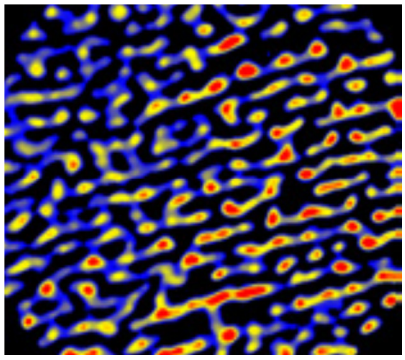
Part of the Science and Technology Council (STFC), RAL Space provides space test facilities, instrument and mission design, and studies of the science and technology requirements for new missions. The Integration and Testing Facility houses two 5m diameter vacuum chambers for testing instruments destined for use in space. It is the largest facility of its kind in the UK.

ISIS Neutron Source

The ISIS pulsed neutron and muon source at the Rutherford Appleton Laboratory is only one of three such facilities that are operating in the world today. ISIS allows scientists to study materials at the atomic level using a suite of instruments described as 'super-microscopes'. It is the most productive research centre of its type in the world.

Diamond Light Source: The UK's national synchrotron

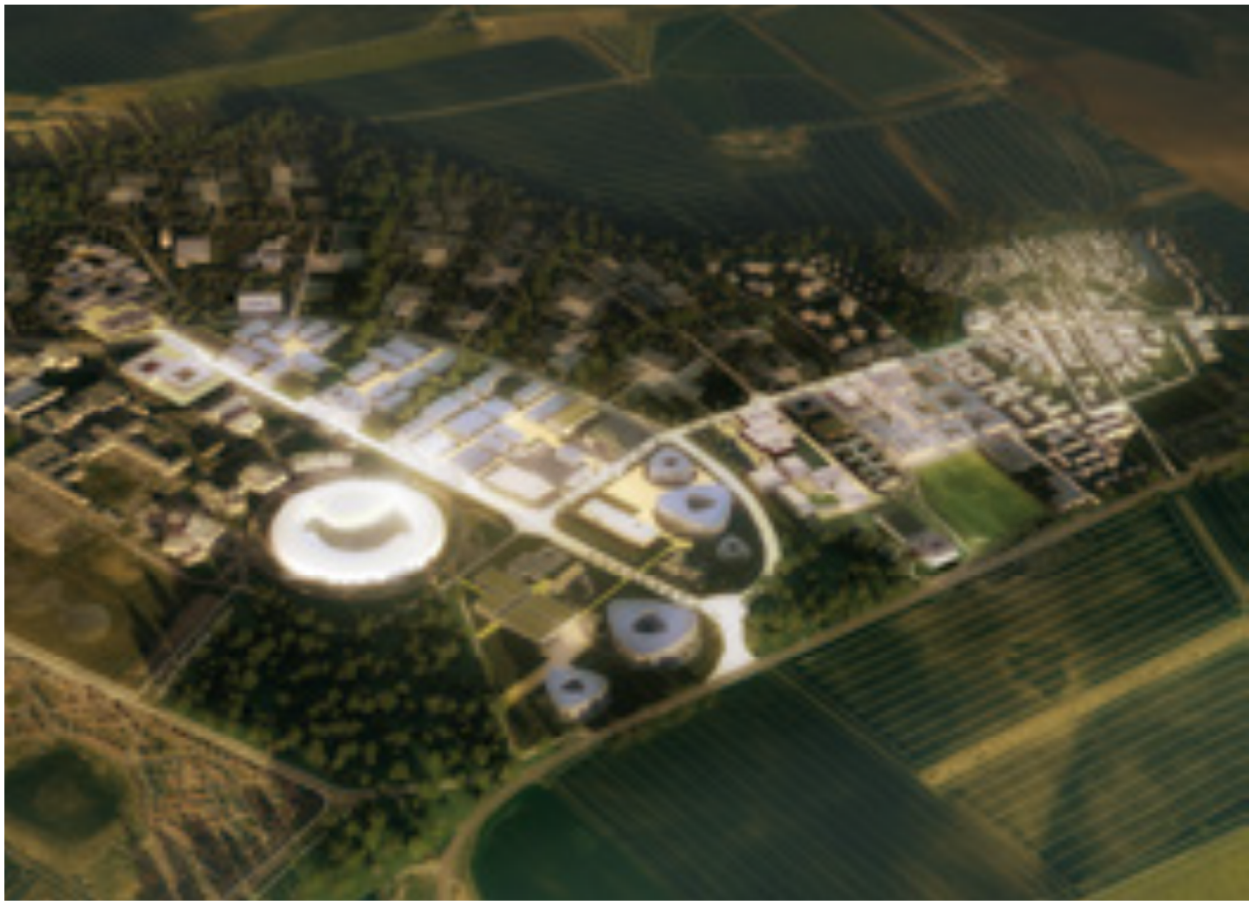
This third generation synchrotron is a world leading, medium energy X-ray-source. It is used to study materials at microscopic level and produces light that is 10 billion times brighter than the Sun. Its various beamlines have been used to study a vast range of subject matter, from fossils to jet engines, viruses to vaccines.



The National Imaging Centre

Diamond Light Source provides a national centre for nanoscale imaging and physical sciences comprising the electron Bio-Imaging Centre, I14 Hard X-ray Nano-probe and electron Physical Sciences Imaging Centre.

Being located at Harwell Campus provides access to a highly skilled talent pool. Oxford is 20 minutes away, and London a mere hour. It is also a designated Government Enterprise Zone, giving reduced Business Rates and other benefits.



Possibly of greatest value, is the access it provides to potential business and commercial partners. In the space sector alone, there is a cluster of about 70 organisations at Harwell. The European Space Agency, RAL Space, The UK Space Agency, Airbus, Thales Alenia Space, Boeing, Lockheed Martin, and Deimos Space UK can all be found on the Campus. At a recent meeting with Estates Director, Duncan Rodgers, it was agreed that **SKY**BUOY will fit right in on the Harwell Campus.

SKYBUOY TOKEN SALE

Procedures and Specifications

Below is a short description of the Token Sale. For legal limitations, please refer to the Skybuoy Token Sale Terms and Conditions document.

1. Purpose and Use of Tokens

From a consumer perspective, Skybuoy Tokens ("SKYT") will be used as a means of paying for services on the Skybuoy Network Infrastructure at preferential rates. Possible Token uses are outlined below:

- Purchase the end user version of hardware products developed by the company, the price of which shall be determined in the future.
- Purchase a monthly or yearly subscription to the Skybuoy service.
- Purchase gift cards that subscribers can give to friends or family, and redeem on the network as subscription or other benefits.
- Send Tokens directly to other participants as a store of value.
- Sell, transfer and exchange SKYT at any time.

As products and services are developed, further Token usage options will be announced.

2. Creation of SKYT

The Company will create up to a maximum of 1,200 million SKYT through the Smart Contract System.

400 million SKYT ("Sale SKYT") will be available for purchase during the Sale Period and the minimum goal of the Token Sale is 80 million SKYT sold.

Once this minimum target is reached, and upon completion of the Sale Period, it will allow the mint and disbursement of all the SKYT sold.

A further pool of 400 million SKYT will be also created through the Smart Contract System, pre-allocated and directly released to the Company ("Company SKYT"). These will be time-locked, for uses as described in Section 6 of this chapter.

A third pool of 400 million SKYT will be allocated for marketing, promotion and network use incentives ("Incentive SKYT") and is to be utilised as described in Section 7 of this chapter.

All SKYT will be of equal value and functionality.

3. Commencement and Duration of Token Sale

Skybuoy will conduct a public sale of Tokens beginning at 12:00 pm UTC on 1st of August 2017 (the "Launch Date"); and ending 12:00 pm UTC on 1st of September 2017 (the "Token Sale End Date"); or when 400 million SKYT has been sold, whichever is earlier.

In the event that the minimum goal of tokens sold is not reached by the Token Sale End Date, the Company will refund all payments received during the Sale Period.

4. Price of SKYT

The price per Token is 0.0005 Ethereum ("ETH" or "Ether"), and 1 ETH will buy 2,000 SKYT. All Token purchase transactions must be made in Ether as the "Payment Currency".

Sale SKYT, Company SKYT and Incentive SKYT have the same fungibility.

5. Use of proceeds from the Token Sale

The funds that the Company receives for SKYT, will be used to compensate engineers, staff and contractors, cover operating costs and manufacturing expenses, and to address other administrative costs in the period after the Token Sale End Date. During which time the Company will develop a working prototype; and go on to produce and deploy one or more production models for various market application verticals, as outlined in the chapter on Commercialisation below.

The following is a list of budget items, which the Company reserves the right to modify in its sole and absolute discretion:

Equipment, technical development and staffing costs – This budget item will support the Company's team of engineers who are developing the product and technology, (i.e., payroll, laboratory and equipment purchases).

Manufacturing related expenses – This budget item will focus on third-party engineering, legacy systems integration, quality control, testing and nanotechnology fabrication commissioning.

Administration – This budget item will cover legal, accounting and other professional services fees, physical infrastructure, security costs and administrative costs.

Contingency – This budget item is intended as a reserve to address unforeseen costs.

Legal and regulatory costs – This budget item is intended to cover costs related to conducting the Skybuoy Token Sale, patenting and IP protection.

6. Use of Time-Locked Company SKYT

All the Company SKYT will be used for compensating employees and contractors, and for other internal purposes in connection with the development and deployment of the Products, and the Technology IP.

These tokens will be deposited into a time-locked account that will release funds over the course of three calendar years in three equal parts, beginning at the end of the first year.

Once unlocked, the funds will be available for the Company to use for any purpose at its sole discretion.

7. Use of Incentive SKYT

The Tokens available in the incentive fund will be used to cover expenses related to the following items:

A portion of the Tokens will be allocated to a Reward Fund that will be used to encourage adoption and use of the Product and Technology. Tokens from the Reward Fund will be given to early adopters at a rate to be specified.

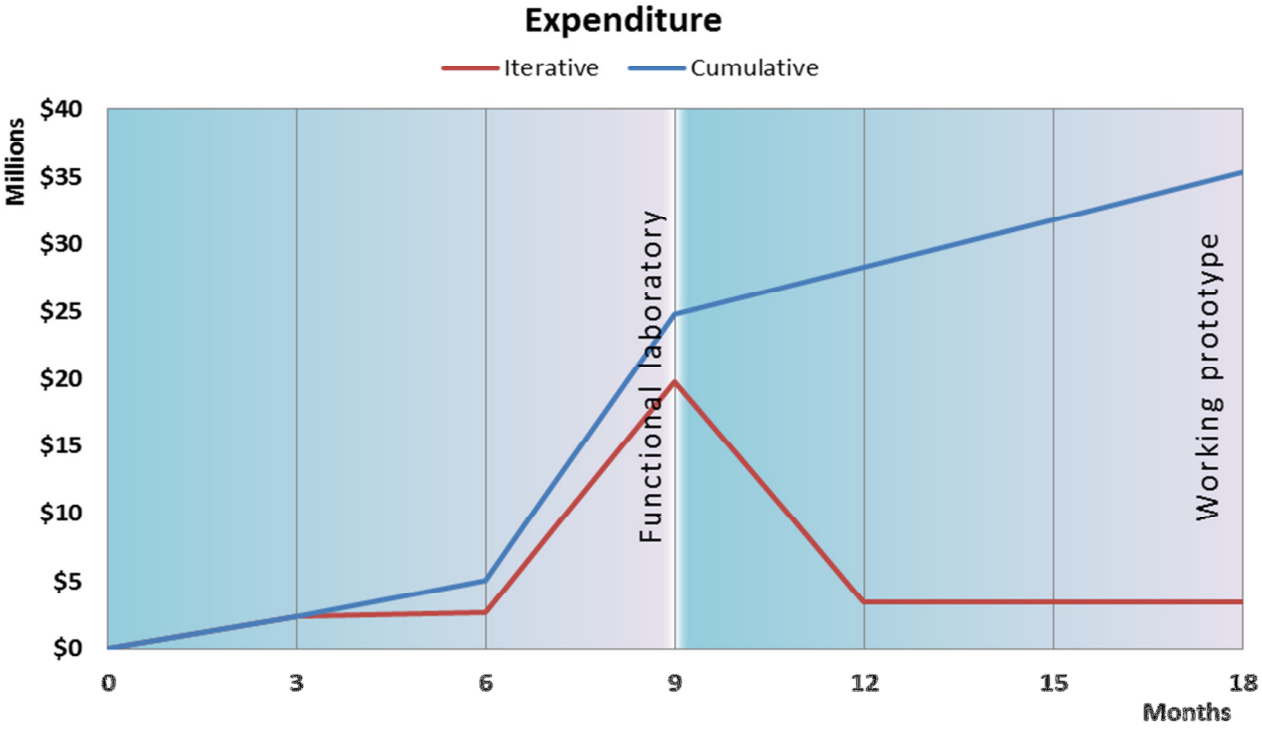
A portion will be used to cover travel costs, negotiation and collaboration with existing Tier 1 infrastructure providers, telecommunications companies, airlines, satellite manufacturers, space agencies and other parties.

A portion will be used to cover the expense of marketing, PR and advertising campaigns aimed at expanding the awareness and adoption of the technology among users, prospective resellers and partner corporations.

The Company reserves the right to modify the distribution and timing related to liquidation and use of funds available from the Incentive SKYT account, dependent upon market demand, in its sole and absolute discretion.

PROJECT DEVELOPMENT

Working in unison with a number of scientists and engineers, the **SKY**BUOY team has developed the technical concepts, hardware design, and application feasibility for the technology. The funds raised during the Token Sale will allow immediate development of a working prototype. This is projected to take 18 months. During the period while the laboratory is being setup, the team will be expanded and capital equipment purchased. One of the major tasks will be to produce the computer models that will drive the electron beam lithographic printing.



The chart above shows the projected spend during the first eighteen months. With a nod to our fiduciary responsibility and with the development taking place at Harwell, the UK Treasury allow for those undertaking research and development (R&D) to offset costs against income and loss to a value of 230%, making it better than risk free. This includes a company subcontracting any of its R&D activities.

The prospect exists for **SKY**BUOY to go on and establish its own production facility. However, it is probable that strategic partnerships will be formed with one or more technology company. This will reduce overheads and speed up the time to market considerably. **SKY**BUOY is a disruptive technology. We want to work *with* existing players, rather than battle *against* them.

KEY EQUIPMENT

Nanofabrication methods and equipment are critical for the engineering of the **SKY**BUOY apparatus. Some of the major capital equipment required for the project is listed below.

(£1.00 GBP : $1.30 USD)	Unit price £	Unit price $	Qty.
Atomic force microscope	300,000	390,000	x 2
Electron beam lithography	800,000	1,040,000	x 5
Electron beam evaporator	240,000	312,000	x 2
Helium cryostat stinger	90,000	117,000	x 3
Semiconductor chemical vapour deposition	500,000	650,000	x 2
Graphene chemical vapour deposition	60,000	78,000	x 1
Spin coater	2,500	3,250	x 1
Hi-vacuum chamber	250,000	325,000	x 2

Being located on the Harwell Campus, gives us access to specialised resources not necessarily available elsewhere. This can include hi-vacuum chambers, and pulsed neutron/muon source, allowing inspection of materials at the atomic level. This may allow deferment of certain capital expenditure until later in the development programme. It will depend in part on availability and how time critical the specific resource is.

COMMERCIALISATION

The total communications market in all aspects is vast, and the value of which is worth literally trillions. In order to provide this project with scope and direction, focus for commercialisation is initially aimed at three market verticals: -

1. The company will develop a “black box” mirror system for the world’s aircraft. This application was the inspiration from which the “**SKY**BUOY” system takes its name.

2. Tier 1 communication infrastructure –
   Because of the ability to deploy quickly with minimal infrastructure, **SKY**BUOY can reach out to the currently 3 billion unserved of the population to connect to the Internet – Far more readily than say, launching 4,000+ satellites into orbit.

3. The cellular phone marketplace

There are significant advantages to this approach. The first two of these application areas offer a speedy route to market of between two - three years. With a revenue stream in place, additional development will be self-funded and further markets opened up.

The global mobile phone sector offers a significant and lucrative opportunity. A phased development to miniaturise **SKY**BUOY Communications and develop targeted applications will follow.

CIVIL AVIATION FLIGHT DATA

Approximately 2,000 new commercial aircraft, supplied by Boeing and Airbus, enter service annually. Taken with the circa 22,000 in service, there are two revenue models to consider –

SKYBUOY provides a leap in safety, such that airlines actively seek to deploy the system in their fleets. With a market penetration of 5%, this would yield sales of 1,100 units annually. If $15,000 each and data subscriptions of $1,000 per unit per year, first year revenue would be $17.6m, with significant growth in following years.

The world's civil aviation authorities declare that due to the enhanced safety afforded by SKYBUOY, all planes must be installed with the equipment and income multiplies 20-fold to $352m annually, (based on the figures above).

The **SKY**BUOY solution relays 'black box data' in real time, from aircraft to secure data storage facilities on the ground. This alleviates the need for black boxes to be recovered from downed aircraft at crash sites. The data can be used in two principal ways: -

1. Downed aircrafts telemetric data can be mined to find the cause of a disaster.

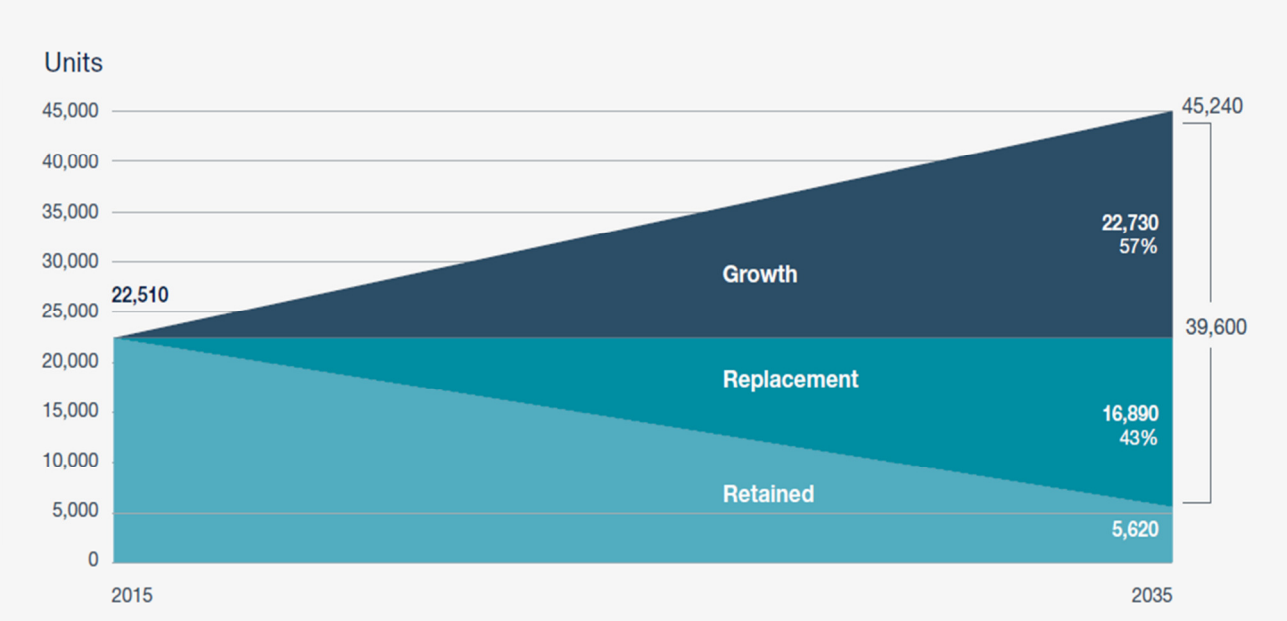
2. Live operational data can be mined to reveal many aspects of aircraft operation and aid in planned maintenance etc.

   Such live data can also be mined for meteorological data and performance parameters, which may improve flight planning.

It should be noted that there are upwards of 10,000 aircraft aloft at any given moment.

(http://uk.flightaware.com/live).

The following chart shows the projected market growth in civil airliners over a twenty-year period, from 2015. Figures are sourced from The Boeing Company: -



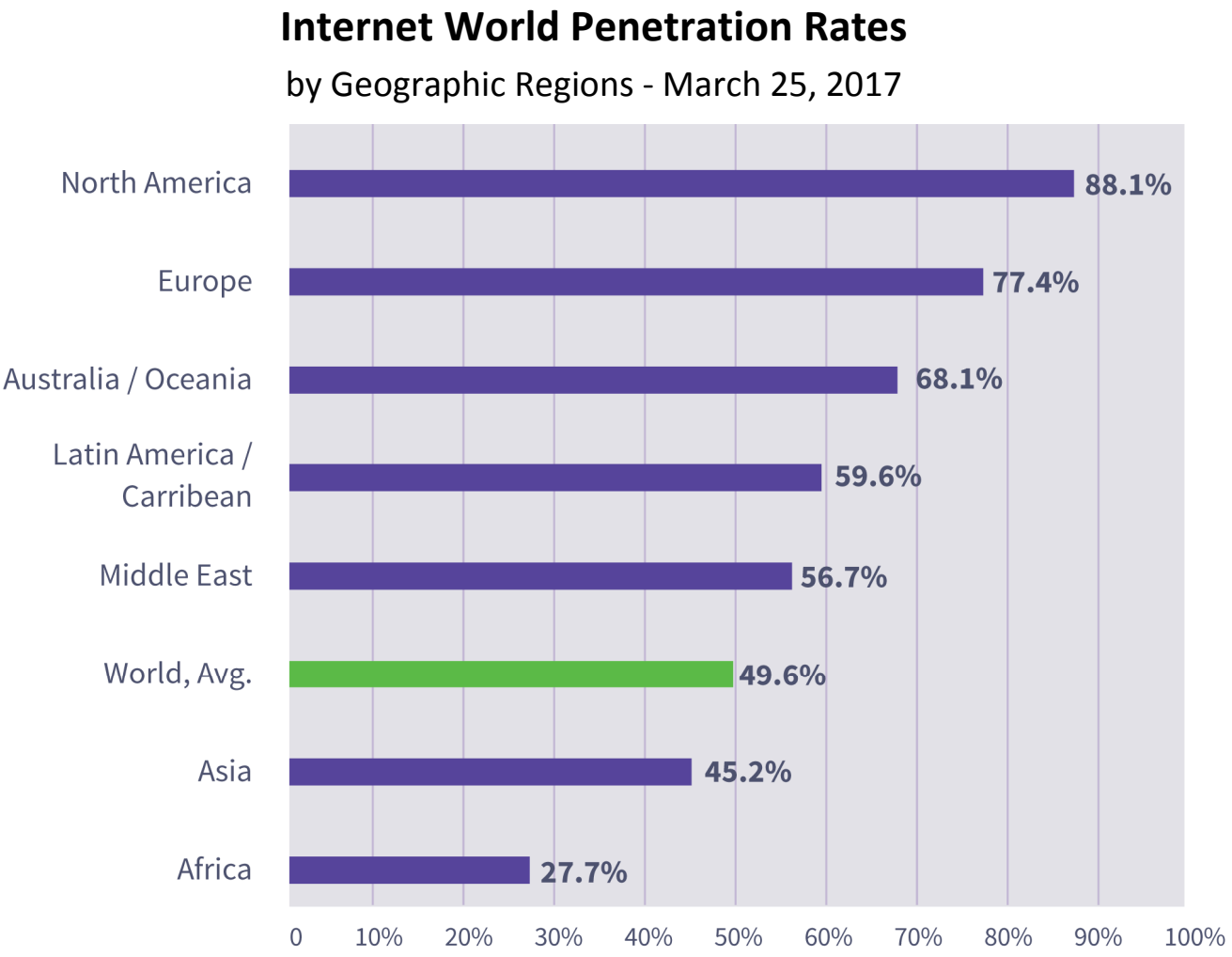
Older, less efficient airplanes replaced with more efficient, newer generation airplanes

IN-FLIGHT COMMUNICATION

Because of the enhanced capability of the SKYBUOY system, passengers and aircrew alike will be able to enjoy the full communications panoply, normally available in terrestrial settings only. It is self-evident that if this facility is available on board aircraft in the sky, it can be extended to ocean going vessels, speeding trains and automobiles.

THE GLOBAL VILLAGE

If **SKY**BUOY is able to connect just 1% of the 3 billion (not currently provisioned) to the Internet, collected into community networks of 100 clients, then turnover of more than $410m can be expected in the first year of sales. The following chart shows where the greatest potential for market growth lies. It is no surprise that this should be Africa, followed by Asia.



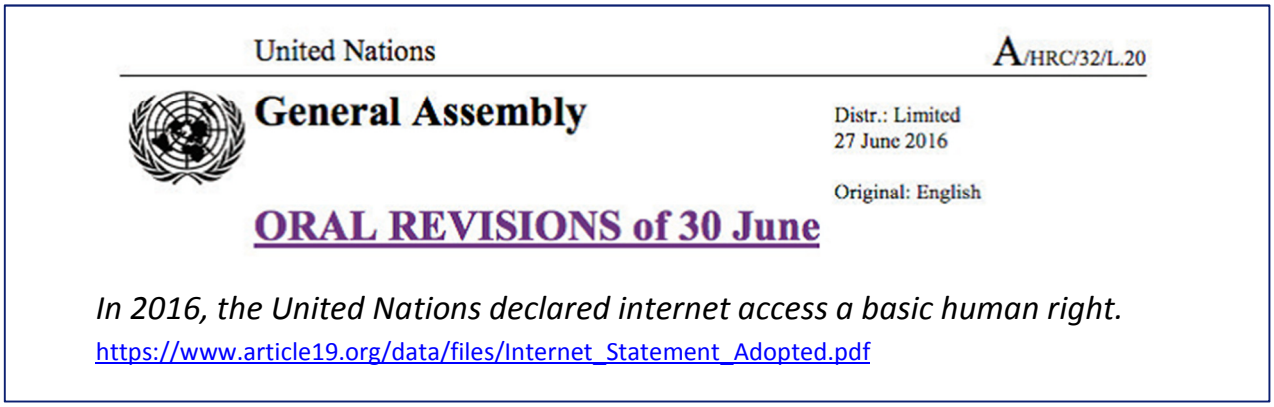
Source: Internet World Stats - http://www.internetworldstats.com/stats.htm
Penetration Rates are based on a world population of 7,519,028,970
and 3,731,973,423 estimated Internet users on March 31, 2017
Copyright ©2017, Miniwatts Marketing Group

Even if it is assumed that only 41% (Population Reference Bureau, 2016, Africa average) can be served by a Wide Area Network (WAN), because of local geographic distribution, then there are still 1.6 billion potential subscribers. If one further presumes that these are in communities of 200 homes of five persons each, the net result is 1.6 million servable communities. Set a market penetration of 1%, this gives rise to 16,400 system sales in the first year.

Projected Market Growth vs. Income

	Penetration	System sales	Service contracts	Sales value	Contract value	Income
yr.1	1.0%	16,400	-	$ 410,000,000	-	$ 410,000,000
yr.2	2.0%	16,728	16,400	$ 418,200,000	$ 57,400,000	$ 475,600,000
yr.3	4.0%	17,397	33,128	$ 434,928,000	$ 115,948,000	$ 550,876,000
yr.4	8.0%	18,789	50,525	$ 469,722,240	$ 176,837,920	$ 646,560,160
yr.5	16.0%	21,795	69,314	$ 544,877,798	$ 242,599,034	$ 787,476,832

The table above shows the annual revenue over five years from a doubling, year-on-year, of the percentage market penetration. The system is positioned at $25,000 per unit, with an average 100 client handsets per WAN installation. From the second year of deployment, a service charge is attached @ $3,500 per year.



United Nations A/HRC/32/L.20

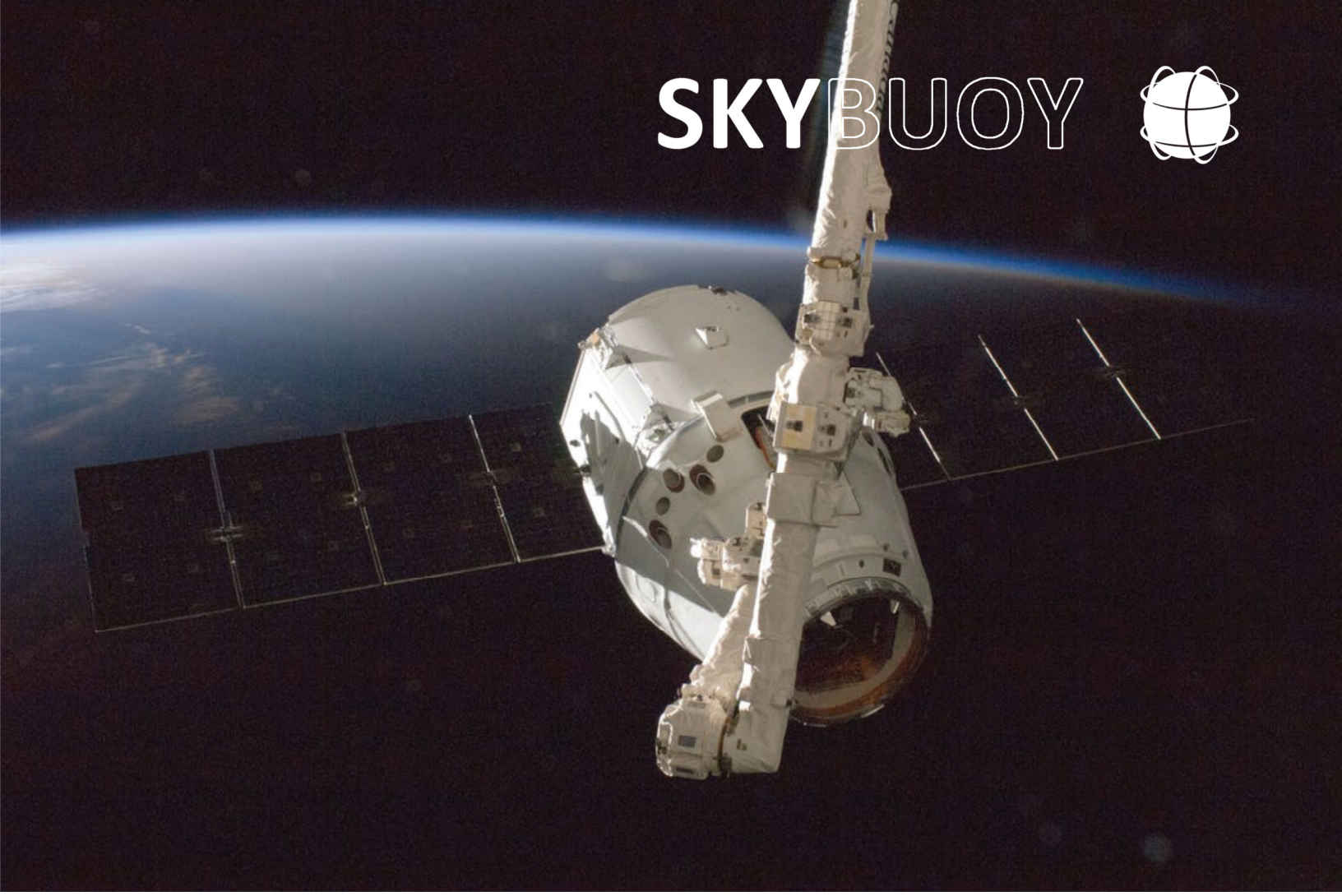
General Assembly

Distr.: Limited
27 June 2016

Original: English

ORAL REVISIONS of 30 June

In 2016, the United Nations declared internet access a basic human right.
https://www.article19.org/data/files/Internet_Statement_Adopted.pdf



GLOBAL COMMUNICATION INFRASTRUCTURE

If **SKY**BUOY were to deliver an international trunk connection, the consortium could charge a significant portion of the values below. An installation fee circa $50m and annual fees of $1m may actually be considered 'lite'. Given several such links, there is an appreciable business to be acquired.

Typical of the global communications cable infrastructure are these two examples: -

Hibernian Express	Cost - $300m	6,021km	Low latency	40 Gbps
MainOne's Submarine Cable System	Cost - $255m	7,200km	High speed	1.92 Tbps

Global and regional infrastructure requires the installation of advanced and often fragile fibre optic cables. “In the high-speed world of automated financial trading, milliseconds matter. So much so, in fact, that a saving of just six milliseconds in transmission time is all that is required to justify the laying of the first transatlantic communications cable for 10 years at a cost of more than $300m.” [1]

“… from 2002 to 2011 operators spent $17.9 billion. TeleGeography counts cable construction spending when the pipes come online, so they estimate that $5.5 billion worth as the spending on cables that come online this year and next [2012, 2013].” [2]

Maintenance of marine cables in particular is equally expensive. “The cost of repairing a submarine cable averages between $1 million to $3 million. Repairs involve specialised cable ships with highly trained crews that cost tens of thousands of dollars per day in addition to the replacement costs of damaged cables and other consumables. According to one survey, the historical average repair period is 20.6 days.” [3]

1. ***The $300m Cable That Will Save Traders Milliseconds*** **Christopher Williams, Technology Correspondent 8:00 BST 11 Sep 2011, The Telegraph**
   http://www.telegraph.co.uk/technology/news/8753784/The-300m-cable-that-will-save-traders-milliseconds.html

2. ***Undersea Cables and their $5.5B Price Tag*** **Stacey Higginbotham GIGAOM, Jul 9, 2012 - 6:35 AM PST**
   http://gigaom.com/2012/07/09/a-visual-guide-to-undersea-cables-and-their-5-5b-price-tag/

3. ***Under the Sea*** **Dean Veverka, Chairman of the ICPC Shipping & Marine, 02/09/2011**
   http://www.shippingandmarine.co.uk/article-page.php?contentid=13866&issueid=418

SKYBUOY

LEVELLING THE PLAYING FIELD

The financial trading market is heavily regulated to prevent unfair advantage accruing to one trading house over another simply by their proximity to the stock exchange. Companies would seek to gain advantage over competitors by installing faster and faster comms links to shave off milliseconds on the arrival of financial data. To offset this, regulators insist on the installation of vast spools of cable to slow that arrival purposely.

Use of **SKY**BUOY would remove that need, because regardless of distance from the trading floor, there would be no noticeable difference in the arrival of key financial data. This will prove very appealing to financial regulators.

CELLULAR PHONE MARKETPLACE

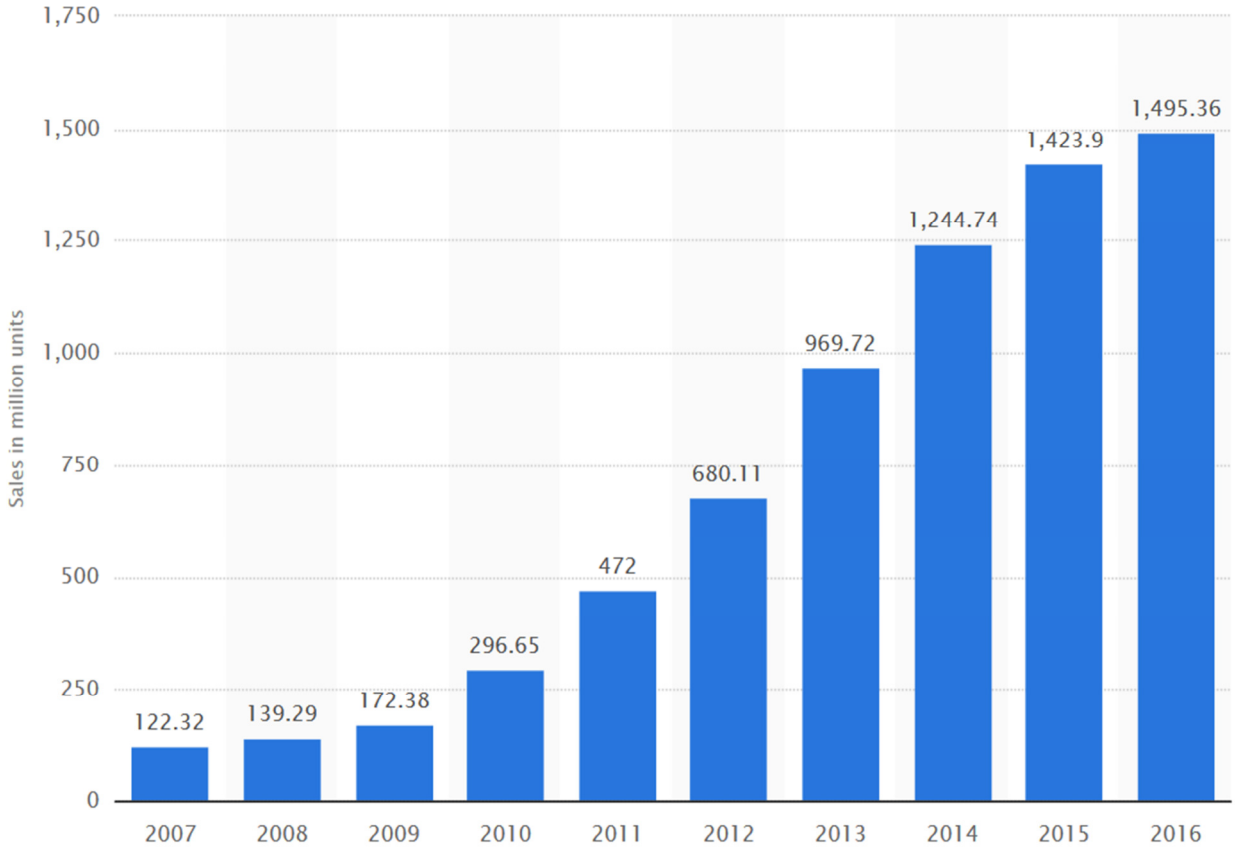
If 5% market penetration in smartphones were assumed, it suggests sales of around 75m units. If these were sold at just $5 each, revenue may be projected at $375m per annum.

The highlights featured here reflect a well-measured market sector: -

- There are over 2.6 billion smartphone users worldwide
- 37% of all website visits come from mobile devices
- LTE penetration is highest in South Korea at 97%
- Phone owners in the U.S. use 2.5GB per month
- 18% of Americans use mobile payments
- 87% of people always have their smartphone at their side
- More searches take place on mobile devices than on computers
- Mobile commerce sales grew by 38.7% in 2015
- 69% of users performed at least one mobile banking activity in 2015
- 46% of retailers in the U.S. deployed beacons in 2015
- CPI for Android apps grew by 40%

https://deviceatlas.com/blog/16-mobile-market-statistics-you-should-know-2016

By 2016, the global sale of smartphones had reached almost 1.5 billion.



https://www.statista.com/statistics/263437/global-smartphone-sales-to-end-users-since-2007/

One potentially exciting development coming out of cellular phone development is the ability to power these devices wirelessly. Of the ability to offer communication in the manner described there is no doubt. The mathematical model also suggests the possibility of energy transfer, and this will be explored.

FUTURE DEVELOPMENTS

“I want to die on Mars, just not on impact”

A long time ago [27 September 2016] on a planet far, far away [Earth] Elon Musk made a speech about the imminent colonization of Mars. He made some - at the time - bold claims about the timeline for a manned mission to Mars. There were any number of seemingly insurmountable obstacles in the way of such a mission – The bulk and weight of food and water; muscle wastage; cosmic radiation; human isolation, et cetera, et cetera.

One key component on any extended journey is the need for good quality, reliable communications. **SKY**BUOY will be a significant enabler on any manned mission into deep space, and one less worry for mission planners.

#SpaceX 4000+ futile Internet satellites

SpaceX plans to improve internet speeds and overall connectivity in the U.S. and the rest of the world by putting 4,425 satellites into orbit between 2019 and 2024. The company will transport the satellites into space in multiple batches using their Falcon 9 rockets.

As noted previously, **SKY**BUOY will make unnecessary the hideous expense of launching more than 4,000 satellites into space. **SKY**BUOY is to be preferred on the grounds of (a) speed of deployment at minimal relative cost; (b) speed of communication; (c) reliability; (d) signal quality; (e) volume data handling; (f) ultra-low latency.

As laudable as electric cars are, they suffer from their relatively short range, and the length of time it takes to recharge the batteries – Hence the hybrid, which rather defeats the object. **SKY**BUOY can distribute energy to where it is needed without wires or physical connections.

"Everything was impossible
until somebody did it."

THE SKYBUOY PEOPLE

Parvez Hamid – Director and Co-founder

Parvez has a background in Computer Science, with extensive experience in business administration and R&D project management. At Chem-Ecol he was responsible for running a hi-end chemical engineering laboratory, field trials and logistics. He has been ghostwriter and peer reviewer of technical papers for the Society of Motor Vehicle Engineers, and Institution of Mechanical Engineers. He has 7 years to date as a director of Clean Development Projects Limited.

Neil Faulkner – Director and Co-founder

Neil is responsible for design and development of the SKYBUOY concept, with particular emphasis on materials science and nano-fabrication techniques. Neil is a polymath, with a background in ecology and sustainable development. He has also developed solid-state electricity from waste heat. He has 7 years to date as managing director of Clean Development Projects Limited, offering a scientific and ecological approach to agricultural development and power generation. As time permits, Neil also likes to indulge his other passion for furniture making through a thriving small-time business venture.

Jeremy Coast – Director and Programme Manager

Jeremy is an experienced technical project manager, business / applications analyst and programmer, for UK telecoms and international corporations. He reengineered the geographical calls analysis for BT, and helped develop a new invoicing system for Daimler Chrysler. Jeremy is responsible for managing the R&D programme at Clean Development Projects Limited and SKYBUOY Limited.

Aram Kovach – Campaign Manager

11 years to date, President and CEO at Mobius International Inc., Aram is a global strategist and technology digerati, consultant and inventor with numerous patents. Mobile interactive marketing and a self-learning recognition AI system for use with camera cell phones. He also has 19 years to date as CEO at CompEx Inc., offering e-commerce, e-business and solutions integration, interactive and multimedia web portal streaming and hosting.

Clinton Coursey - Director and Network Architect

12 years to date, Sr. Network Architect and Vice President at JPMorgan Chase, Clint was Lead Architect and product engineer for Optical Networking Products. He has also designed and implemented large scale, ultra-long haul and metropolitan DWDM and SONET networks in the Domestic U.S., as well as low latency optical networks focused on algorithmic trading and HFT for investment banking apps.

Catherine Coast – Director and Public Relations Manager

Catherine is an administrator and customer service professional with a wealth of experience across a range of client focused and client engaged environments. This includes the workspace solutions company Regus, where she managed the installation of new office facilities in Hertfordshire, UK. With 7 years to date, Catherine is also the owner and creator of Violet's Knickers – a luxury online lingerie boutique.

Ray Thompson – Design Consultant and Antarctic Explorer

Ray is an R&D engineering consultant based at Imperial College, London. He has designed and engineered a micro-meteor collection system for the International Space Station, and cutting-edge (literally) radio frequency surgical tools for liver sectioning. He is also an Antarctic science expert, testing medical devices in extreme conditions. This included a 22-day expedition crossing Antarctica. Ray is advising on structural elements of the project, including materials, machining and assembly.

Jeremy Wren – Design Consultant

Jeremy is a highly experienced and talented R&D engineer in electronics. He is also an accomplished marine and automobile electrician. Jeremy is consulting for the team in the design of power handling, monitoring, communications and testing aspects of the project. Jeremy has a classified résumé developing communication systems for British services.

Dr Tom Hansard – Intellectual Property Consultant

Tom is originally a Physicist with excellent academics including a 1st Class MPhys and PhD, but after gaining his Doctorate, he decided to pursue a career as a Patents Attorney for Swindell & Pearson Ltd, a modern and progressive firm of European patent attorneys.

THE MATH

Current in a wire creates a magnetic moment B1:

$$B_1 = \frac{\mu_0 I}{2\pi r}$$

A fermion has an intrinsic magnetic moment and spin polarity B2:

$$B_2 = \frac{2E}{\mu\delta}$$

If current in a conductor is magnetically antiparallel to the spin of a fermion δ AND exceeds a specific threshold, it will induce a flip in that spin:

$$B_1 \nparallel \delta \wedge B_1 \geq B_2 \Rightarrow \Delta\delta$$

If current in a conductor is parallel to the spin of a fermion, no spin change is induced:

$$B_1 \parallel \delta \wedge B_1 \geq B_2 \Rightarrow \delta$$

The change in the first fermion (Alice) will cause a change in the spin of the second fermion

$$\text{(Bob):} \begin{cases} |\Phi^- \geq \frac{1}{\sqrt{2}}(|0>A \otimes |0>B - |1>A \otimes |1>B) \\ |\Phi^+ \geq \frac{1}{\sqrt{2}}(|0>A \otimes |0>B + |1>A \otimes |1>B) \\ |\Psi^- \geq \frac{1}{\sqrt{2}}(|0>A \otimes |1>B - |1>A \otimes |0>B) \\ |\Psi^+ \geq \frac{1}{\sqrt{2}}(|0>A \otimes |1>B + |1>A \otimes |0>B) \end{cases}$$

The spin and magnetic moment of a fermion induces magnetically parallel current in an adjacent conductor (μx is the magnetic permeability of the chip medium):

$$I = \frac{2\pi r B}{\mu_x}$$

Change in the spin of Bob induces a current in an adjacent conductor:
(Where the spin does not flip, no change in current is induced.)

$$\Delta\delta \Rightarrow \Delta I^{\leftrightarrow}$$

PROOFS

The communication system comprises four fundamental parts. Cited here are some of the academic papers that support the physics behind the **SKY**BUOY proposition in each of these areas.

First **The entanglement of elementary particles that can span great distances and survive over suitable time spans**

a) "Intercontinental quantum liaisons between entangled electrons in ion traps of thermoluminescent crystals," Robert Desbrandes and Daniel L. Van Gent

To deploy a commercially viable communications system successfully, there must be a reliable link between the two nodes. This is dependent on the longevity and range of the entanglement. The experiment documented suggests this is not a problem. The pairing survived shipping across the Atlantic and heating. To be inferred are the lack of cryogenic preservation and indeed the application of heat did not sever the link.

Second **The capture and retention of elementary particles**

a) "Carrier capture into a semiconductor quantum well," PWM Blom et al

b) "Carrier capture into a GaAs quantum well with a separate confinement region: comment on quantum and classical aspects," Martin Moško and Karol Kálna

A commercially sustainable means of entrapment and retention is critical to the success of the development. Quantum wells appear to be the solution as these references demonstrate. The production of quantum wells via photolithography offers great commercial promise.

Third **The spin control of elementary particles**

a) "Manipulation of the Rashba Spin-orbit Interaction in Double-sided doped In0.53Ga0.47As/InAs Quantum-well Structures," Kyung Ho Kim et al

b) "Electrical control of quantum dot spin qubits," Edward Alexander Laird

c) "Entanglement in a three spin system controlled by electric and magnetic fields," Jakub Łuczak and Bogdan R Bułka

The transfer of data by means of entangled particles is achievable through the manipulation of the spin of the pairs. This must be readily achieved and be consistent. The references here show how this has been developed for application in quantum computing, whereby the spin of the particle is used to store a qubit.

Fourth **The detection of the spin of elementary particles**

a) "Manipulation of the Rashba Spin-orbit Interaction in Double-sided doped In0.53Ga0.47As/InAs Quantum-well Structures," Kyung Ho Kim et al

Spin control is irrelevant if the change in spin is not detected in the pair recipient. The reference demonstrates how the experimenters would be able to detect that very control.

This is in addition to the ever-increasing, and highly publicised, achievements in the quantum field as reported in the popular and scientific press. Some of these have made quite a splash, but not all will be realised and most are not directly relevant to what **SKY**BUOY proposes.

What the **SKY**BUOY team offer is unique, having knitted together all four of the critical component parts, as outlined above, into a credible and commercially viable whole.

However, one especially beneficial achievement on the part of the various scientific teams around the world is to prove that the quirky, even "spooky", nature of quantum mechanics is not science fiction, or the fevered imaginings of madmen.

Some additional references –

“Chinese satellite makes breakthrough in quantum communication”, 16 June 2017
http://www.scmp.com/news/china/chinese-satellite-makes-breakthrough-quantum

“Russian scientists make teleportation a 'two-way road' using the same quantum resource”, 9 June 2016
https://m.phys.org/news/2016-06-russian-scientists-teleportation-two-way-road.html

“Worldwide quantum web may be possible with help from graphs”, 8 June 2017
https://m.phys.org/news/2016-06-worldwide-quantum-web-graphs.html

“Counterfactual quantum communication achieved for the first time”, 18 May 2017
https://www.weforum.org/scientists-have-achieved-quantum-communication-for-the-first-time

“Envisioning a Future Quantum Internet”, 4 May 2017
https://m.phys.org/news/2017-05-envisioning-future-quantum-internet.html

And in the neighbourhood –

“3 of Nature’s Greatest Mysteries May Be Solved Thanks to Quantum Biology”
3 September 2017

“Though strange, the field has advanced our understanding of the natural world immensely. Now, by applying quantum mechanics to biology, we are beginning to unravel some of science' biggest and longest running mysteries. The burgeoning field of quantum biology is today, helping us to understand bird migration, photosynthesis, and maybe even our sense of smell.” - Bigthink

http://bigthink.com/philip-perry/3-of-natures-greatest-mysteries-may-be-solved-thanks-to-quantum-biology

“How quantum biology might explain life’s biggest questions”
Filmed June 2015

https://www.ted.com/talks/jim_al_khalili_how_quantum_biology_might_explain_life_s_biggest_questions

As science delves ever deeper into the fundamental building blocks of our universe, a new world of possibilities is opening up. **SKY**BUOY may the first commercially viable application in this new world, but it will certainly not be the last. This represents a fantastic opportunity to get in at the beginning.