Inmarsat

Australi n Extern l Territories

Satel ite Communications

Prep red for The oint Sta ding Comm tt e on the National api al and E ternal Territories

27th January 2 21

Cover Letter

Inmarsat Global Limited
99 City Road, London
England, EC1Y 1AX

Committee Secretary
Joint Standing Committee on the National Capital and External Territories
PO Box 6021
R1.121 Parliament House, Canberra Act 2600
20th January 2021

Dear Sir / Madam

Inmarsat welcomes the opportunity to provide comments to the Joint Standing Committee on the availability and access for the enablement of communications infrastructure in Australia's external territories. Please find enclosed Inmarsat's Initial Proposal providing an overview of our relevant services for your review.

Inmarsat is comprised of multiple divisions two of which, Inmarsat G2 (Governmental Division) and Inmarsat Enterprise (commercial based land offerings) are collaborating for the provision of our solution in order to provide the most effective and cost effective solution to the Australian Government for this project. More information is provided on Inmarsat's divisions in Section 2 of this document.

Dependent on feasibility and further conversations, Inmarsat confirms its ability to cater to the Australian Government's requirements.

If you have any questions with respect to this submission, please contact Mary Lim at

We look forward to a successful partnership.

Yours sincerely,

Mary Lim

Senior Manager – Regulatory and Market Access

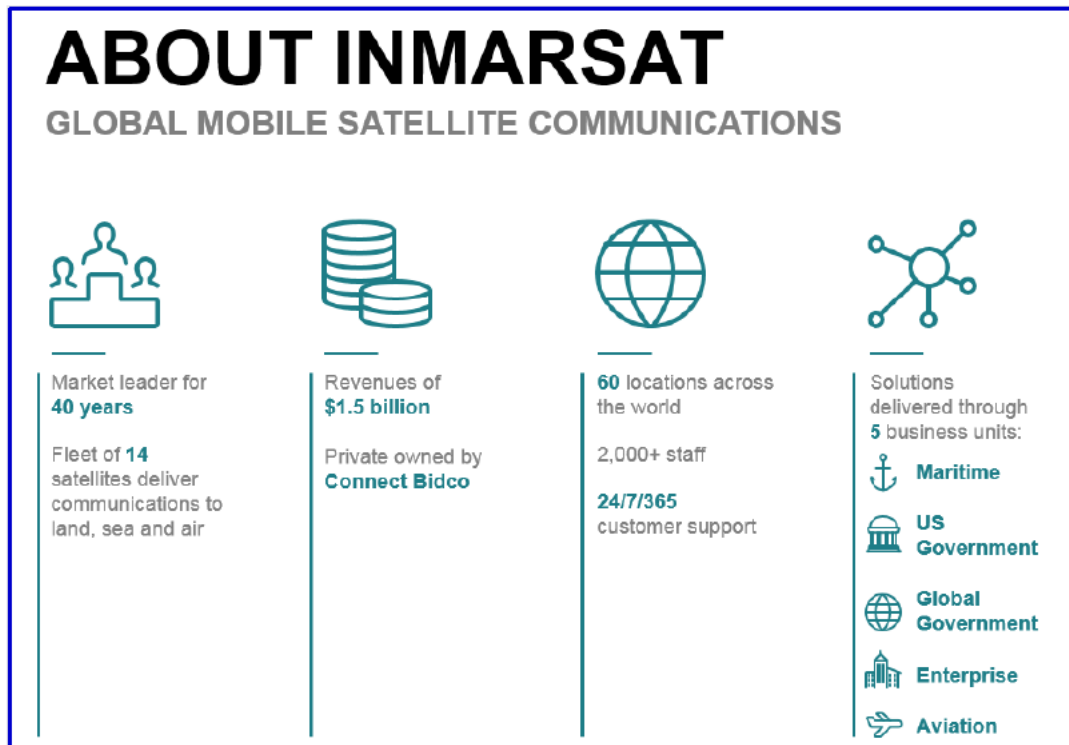Inmarsat Global Limited

Table of Contents

1.   Inmarsat Overview

Inmarsat is _the_ leading global provider of satellite enabled connectivity and managed connectivity services for Governments and organizations across the world.

ABOUT INMARSAT
GLOBAL MOBILE SATELLITE COMMUNICATIONS

Market leader for **40 years**

Fleet of **14** satellites deliver communications to land, sea and air

Revenues of **$1.5 billion**

Private owned by **Connect Bidco**

60 locations across the world

2,000+ staff

24/7/365 customer support

Solutions delivered through **5** business units:

⚓ **Maritime**

🏛 **US Government**

🌐 **Global Government**

🏢 **Enterprise**

✈ **Aviation**

Inmarsat's award-winning satellite network operates at 99.9% availability for safety services.

INMARSAT'S GLOBAL NETWORK

| Combined I-4 and Alphasat coverage | I-4 Americas | Alphasat | I-4 MEAS | I-4 Asia-Pacific |

2. Key Servic s and Technical Expertise

Inma sat is *the* l ading pr vi er of lobal obile sat llite communic tions se vic s a d has been pr viding r liabl vo ce and hig -spe d data communi at ons to gover ments, ente pri es and other organi atio s with a ange of ervi es ha can be used n and at ea r in the air

Inmarsa emp oys o er 1,95 sta f in mo e than 60 locati ns round he w r d, with pres nce i the ajor ports a d center o comm rce on every conti en .

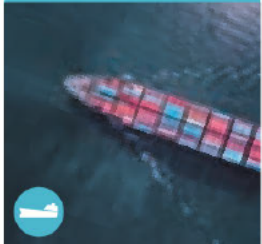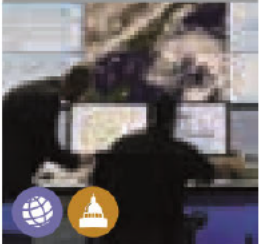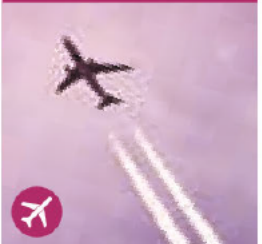nmarsat is a trust d busin ss s partner to the tra spo t, inin , oil and gas, renewable ener y, gri ultu e, aid a d NGO, me ia and u il ties s cto s. We ma age and simp ify the delive y of conn ctivity ervi es, wherev r t ey are eeded and as your requirement chan e.

Our four business units provide unrivalled global, mobile connectivity to our customers in our chosen end markets.

Maritime	Government	Aviation	Enterprise
Inmarsat offers the most reliable and resilient communications solutions to the maritime industry. From the largest commercial fleets to coastal vessels, our services are based on our long track record of managing global networks and consequently, a unique understanding of the challenges of living and working in a maritime environment.	Inmarsat remains a key partner to many governments around the world. We aim to augment a government's existing communications network and ensure that, wherever they need to be, our secure, reliable and powerful mobile satellite networks are always available.	Inmarsat provides cabin connectivity to the Business and General Aviation ('BGA') sectors and the Commercial Aviation sector, through In-Flight Connectivity. Furthermore, our connectivity products in the Safety and Operational Services sector ensure safe and secure communications between the cockpit and air traffic control.	Inmarsat provides a wide portfolio of global voice, broadband data, Machine2Machine ('M2M') and value-added services. We see exciting growth opportunities in the medium-term from emerging new Internet of Things ('IoT') markets in sectors such as mining, smart cities, smart agriculture, logistics and transportation.
Our secure, globally available services and products are helping to drive an evolution in: > Vessel performance and efficiency > Safety management and monitoring > Crew welfare	**Our mission-critical voice, video and data communications solutions help governments on land, at sea and in the air to:** > Maintain their security > Ensure public safety > Deliver remote health, education and other crucial services in regions where terrestrial networks are not able to reach	**Our unique position in the Aviation market is supported by:** > Benefits of owner economics > Long track record serving the Aviation industry > Continual innovation and product development in this sector	**Inmarsat has the ability to:** > Extend the range of terrestrial networks and narrow the digital divide > Enhance resiliency and redundancy > Provide capabilities such as broadcast services and precision navigation services

Inmarsat has over 40 years' experience in providing secured, reliable and robust solutions across several market sectors including Maritime, Government, Aviation and Enterprise.

Inmarsat satellite communication services save lives, empower people and communities, enables sustainable business and trade and supports humanitarian work in remote and challenging locations anywhere on Earth and across a range of industries from Defense to Utilities to Transport.

Inmarsat will meet and exceed the Australian Governments expectations with our:
- Fully redundant and resilient satellite-based connectivity network
- Highly secure environments and management procedures
- Integration capabilities with upstream Government systems and applications
- Global, robust and mature support processes for subsequent rollouts, as required
- Focus on safety and long history providing innovative solutions to reduce harm

3.   Inmarsat Enterprise Solutions

3.1.   IsatData Pro

IsatData Pro is a satellite messaging service that allows integrators to connect a variety of "industrial things" at low cost in truly remote locations, either as a backup to existing wireless or in places without existing wireless coverage. One device will work anywhere around the world, is easy to deploy, and delivers business-critical event data allowing you to reduce operating costs and maximize productivity.

The IsatData Pro is used across many industries and markets, below is a snap shot of some of these.

The IsatData Pro has many functions and uses, a few are listed below:

- Asset tracking, logistics and traceability
    - GPS location/speed/bearing, from 1 location/day to 1 location/minute
    - Key events/changes (start, stop, enter/exit zone, temperature violation, etc.)
- Fleet Management
    - Driver safety (panic, speeding, braking, long hours, no seatbelt, …)
    - Vehicle utilization (odometer, hours of service, idling, …)
    - Logistics (route adherence, ETA, driver ID)
- Messaging, Dispatch and Forms
    - Safety and logistics of having SMS-like capability 'everywhere'
    - Work/change orders
    - Text to speech
- Industrial Automation (Monitoring, Telemetry and SCADA)
    - Periodic heartbeat supplemented with event triggers (tank low, pressure high, etc.)
    - Remote control (open/shut valve, change threshold, etc.)
    - Polling and/or call-out

3.2.   Broadband Global Area Network (BGAN)

Broadband Global Area Network (BGAN) is a global, portable voice and broadband connectivity service offering data speeds of up to 492 kbps, powered by Inmarsat's Global 3G IP satellite network.

The BGAN service is accessed through a range of light and portable terminals. BGAN provides reliable 3G data speeds, both background IP for regular data use, and streaming IP for broadcasting live video, a crystal-clear voice line and SMS functionality.

BGAN offers the following services:

- **Standard IP** - For email, internet and intranet access via a secure VPN connection, at speeds up to 492kbps over a shared channel
- **Streaming IP** - Guaranteed data on demand at rates in excess of 650kbps. Choose the data rate on a case-by-case basis, depending on your application. Also supports ISDN at 64kbps
- **Phone** - Make phone calls at the same time as accessing your data applications. Voicemail and other standard 3G mobile supplementary services are also available
- **Text** - Send and receive text messages via your laptop – up to 160 characters – to or from any mobile phone

BGAN's key features are:

- Lightweight, rugged, highly portable terminals that fit inside a backpack
- Simultaneous voice, text and data usage
- Background IP (up to 492 kbps) for traditional internet and email connectivity
- Streaming IP for video broadcasting
- Vehicular options available for communications-on-the-move
- WLAN facility for multi-person access

3.3. Broadband Global Area Network Machine-to-Machine (BGAN M2M)

Broadband Global Area Network Machine-to-Machine (BGAN M2M) is a reliable, global, two-way IP data service designed for long-term machine-to-machine management of fixed assets. It offers a unique service and terminal features to ensure reliable operations of M2M communications in remote, unmanned environments, giving you full visibility and management of your dispersed assets across an entire operational area.

For customers with data volume requirements ranging from megabytes to gigabytes, such as real-time surveillance or high volume metering and telemetry, Inmarsat's BGAN M2M is the ideal solution. A 3G satellite network service, it provides full IP data connectivity supported by remote terminal management, debugging and configuration options. Using robust and lightweight hardware, BGAN M2M enables a wide range of M2M applications

BGAN M2M is best suited for organizations that manage remote assets and need real-time critical data such as Government, Utilities, Transportation, Environment, Oil & gas and Construction.

BGAN M2M applications are:

- IP and non-IP SCADA
  - o Flow management
  - o Pipeline integrity & data monitoring
  - o Smartgrid applications
- Remote security monitoring
- Secure ATM/POS solutions
- Fixed asset monitoring
- Telemetry
- Surveillance

3.4   Isa Phone 2

T e IsatPho e 2 is Inmarsa 's powerf l, ugged nd depend b e handhel satellite phone w ich ff rs a cr tical omm nic tio s link when ut of r ach f t rrestrial networks, n ma ter how rem te r harsh th env ro m nt.

peratin on t e o t reli ble sate li e communications etwork in the wo ld, IsatP one 2 offe s ou unri all d ba t ry life as well as email SMS nd GPS ca ab liti s to m ke sure you tay connected.

Whet er you are looking for a pre-paid plan or a pay onthly plan, o a ingle sim pl n or shared corpora e allowance plan we can help. Regardles f wh ther you need minimu commitme t of one onth or twel e we have a lan to s it your ne ds.

4.   Inma sat G Gover me t Soluti ns

For Go er ment user enquires, plea e cont ct our Au tral a/NZ Sal s Di ec or:
An rew McLennan
andre .mcle nan inmarsat.c m
+61 9 14 5146

4.1   L-band (ighly Po table) S tellite Data

Inm rsat Aus ral a G2 divisi n is alrea y supplyin a large n mber of I m rs t servi es t Australia Governme t. Th L-ba d S te lite Data ser ice ten to co er 'hig ly-portabl ' nee s f r v ry remote areas of Austral a, includi g of shore Ext rnal Territorie .

At resent Inmarsat upplies the follo ing to A s ralian Governm nt users:

- *iSatDataP o (IDP)* remote-a ea **low- pe d d ta un ts** wi h hundre s use by the is ing boat sect r for Vessel Manag men System (V S) for trac ing, posi ioning an s at fisheri s mana eme t;
  - o an e ample of IDP usage is for Fis ing Boats, enabl ng positi ning trackin nd essaging fe ture essent al for ommercial f sh ng;
  - o a other ex mpl of ID usage is the emerging 'IOT' (Internet Of Things) sector where land machinery and systems can be remotely monitored and managed on an unmanned basis, for 2021-era business efficiency;
- *iSatPhone 2* **satellite phone handsets**, with hundreds in use for disaster recovery and support operations, to assist regional and remote communities.
  - th iSatPhone 2 is opular with Aus ralian at llit phone use s due to its lo pricin and also high y stab e, cons stent voi e and SMS quality;
- ' GAN' **mid-rate data ter inals**, wit tho sands used or unmanned da a systems (nationa infrastructure) in regio al & remote area of Aust alia an offshore xter al ter ito ies;
  - o n example f BGAN idesp ead usage is or BOM (Bureau of Me eorology) remote weather station , epo ting ss ntial real time we ther sen or data acro s vast dist nces to t e BOM a vanced (l ve) weat er modelling ystems;
- *Swift Broadband (SBB)* an *Fleet Broadband (FBB)* are variations of the BGAN service tha are improved a d optimized or air orne (irc aft, helicopter) and m ritime (v s el , all sizes) users;
  - An ex mpl is the po ular Fle t Broadba d (FBB) service o nd on mo t medium-size and larg r A st alian ve sels, bringing const nt all-we ther data onnec ivi y across oceans and s as

All of the above systems and users mentioned, use these Inmarsat satellite data capabilities in Australia's External Territories – especially when in more remote locations.

4.2.   GX High-rate (Portable) Satellite Data

Inmarsat Australia G2 division is supplying **high-rate satellite data** services to users via the Inmarsat *GX (Global Express)* network, which uses the satellite Ka-band for highest data speeds. Commercial GX and Government GX plans are available and can be tuned to corporate grades of service, and levels of data security demanded by Australian users.

The GX network enables services that typically run around 3.0 – 8.0 Mbps with committed base rates as well, so that corporate users can operate with certainty and high levels of availability.

GX services are available in portable (case), vehicle (roof-mounted) and also fixed (building-mounted) formats. GX satellite systems are currently used in majority of the Australian External Territories, using satellite coverage ("see anywhere") to supplement and extend limited fiber and 4G data services.

4.3.   New Vehicle Satellite Data Systems

In early 2021, new systems are emerging to bring enhanced satellite data services to vehicles. The Inmarsat G2 division can deliver best-of-breed, unprecedented data speeds including hardware, satellite airtime and installation services.

These vehicle systems extend data services (typically run on 4G) to areas where 3G/4G services are weaker in coverage, or non-existent. This is particularly important during emergency incidents, where cellular mobile coverage is often at reduced speeds due to heavy usage and ground radio propagation effects. Often the integrated systems are easy-to-install and include WIFI hotspots for fast device joining and familiar existing 'data apps' such as messaging, high-quality voice, imagery sharing and fleet mapping.

These new systems emerging in 2021 include:
- **Vehicle GX** specialized systems, enabling 2.0 – 8.0 Mbps at a committed level to command, coordination or reconnaissance vehicles;
- **Vehicle BGAN** integrated terminals, enabling voice/data/messaging/imagery to business vehicles that roam into far-regional and remote areas – including mid-rate data usage in External Territories outside 4G existing cells.

5.   Case Studies

The following case studies would be beneficial in enabling the communication infrastructure in Australia's external territories of Norfolk Island, Christmas Island and the Cocos (keeling) Islands:

- **Enabling Connected Agriculture**

(I) A location system for livestock farms, which offers location, monitoring and traceability capabilities, detecting anomalies due to temperature, activity, behaviour and calving.
(ii) Agricultural IOT solutions to provide connectivity for monitoring soil moisture and other environmental parameters
(iii) The ability to monitor water storage facilities at remote locations and control pumps and generators remotely

- **Powering eHealth Around the World**

This mobile connectivity enables healthcare professionals to continuously monitor health-related elements of subjects anywhere at any time and provide real-time actionable insights which ultimately improves the decision-making power.

- **BGAN M2M for Utilities**

To provide real-time visibility of the entire grid with M2M/Internet of Things (IoT), such as collection of consumption data, maintenance triggering, recloser connectivity, electricity pole surveillance, monitor water facilities, amongst many others.

inmarsat
The mobile satellite company

EN**A**BLING
connected agriculture

Enabling the connected world

Why Inmarsat?

> **Global**
> Seamless global satellite network and support

> **Reliable**
> Unrivalled record operating critical safety networks for over 40 years

> **Secure**
> Trusted by governments to safeguard digital assets

> **Innovation**
> Continued investment to deliver advanced new capabilities

> **Industry expertise**
> Dedicated agriculture team that speaks your language

How we work

Accessing Inmarsat's award-winning connectivity is simple: either we work with you to build a bespoke solution, which we manage on an ongoing basis, or you procure hardware and airtime through our global partner network.

GROWING THE AGRI-TECH REVOLUTION

The world's population is expected to reach almost 10 billion by 2050, meaning that we will have over two billion extra mouths to feed. The agriculture industry is under immense pressure to increase its productivity, whilst improving sustainability and environmental protection.

Agricultural technology has a key role to play in providing growers with the data and information needed to produce more with less, whilst increasing transparency across the agri-food supply chain. However; unreliable connectivity will limit its effectiveness.

Inmarsat's global satellite connectivity is at the heart of the agri-tech revolution. Whether you are an agri-tech company looking to expand your market reach to areas of low connectivity, or an agribusiness wanting enhanced visibility of crop conditions, livestock wellbeing or an understanding of your supply chain, Inmarsat's global satellite services and solutions are ready to help transform the outcomes of your projects, wherever you are on the planet.

ENABLING THE CONNECTED FARM AND SUPPLY CHAIN

Inmarsat is the world leader in global mobile satellite communications, and has been equipping industries with the connectivity needed to turn their biggest challenges into opportunities for 40 years. We help producers and manufacturers to connect their operations, delivering IoT technologies and harnessing useful data to drive enhanced performance. Whether you want to improve operational efficiency in the field or through the global multi-modal supply chain, our global connectivity has you covered.

Fleet management and driver safety
Page 12

Cold chain monitoring
Page 12

Aquaculture monitoring
Page 11

Supply chain traceability
Page 12

Pollinator monitoring

Irrigation monitoring
Page 08

Machinery monitoring
Page 08

Storage monitoring
Page 08

Indoor animal monitoring
Page 11

Weather monitoring and forecasting
Page 11

Livestock monitoring
Page 10
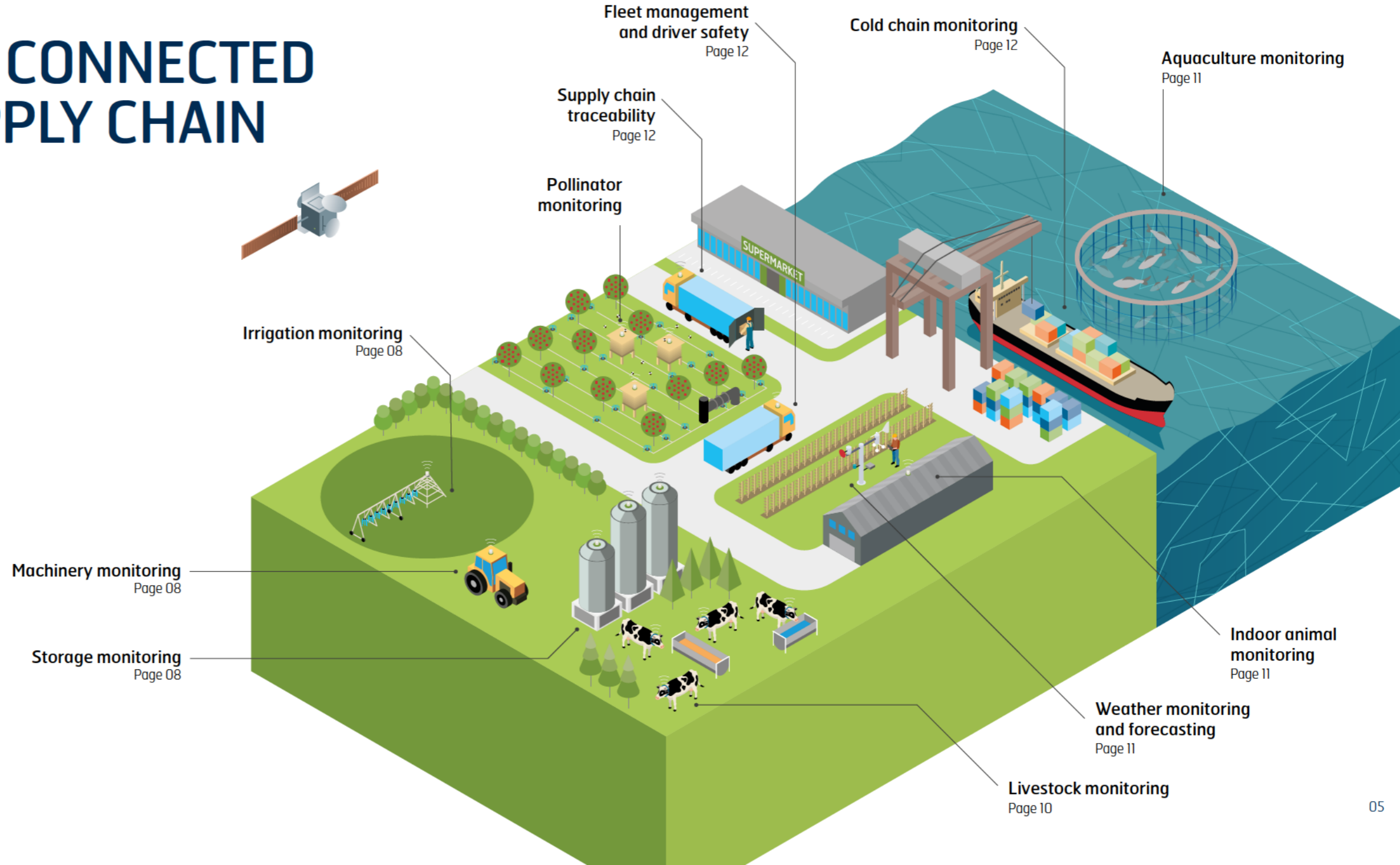
AGRICULTURAL TECHNOLOGY COMPANIES

Agriculture is changing: digitalisation and emerging technologies are beginning to enable food producers to improve productivity, efficiency and sustainability.

This represents a huge opportunity for technology providers, although connectivity challenges in remote areas are constraining growth potential. With many agricultural technologies at the early adoption stage with farmers and growers, it is crucial that technology providers address connectivity head-on so that it does not prevent market-access as innovations are scaled up.

Inmarsat is helping agricultural technology companies to gain access to new markets in remote areas, where terrestrial connectivity is unreliable. We work collaboratively with our partners to identify the right connectivity and hardware solutions to suit the needs of your customers, and use the latest technologies to optimise their innovations to communicate over our network. Satellite is a cost-effective and flexible communications technology for agricultural use, with highly portable hardware and highly compatible with other connectivity types such as cellular.

Our services

We offer a range of reliable, global and mobile satellite connectivity services, which we can tailor and combine to suit your customers' connectivity needs.

- Broadband Global Area Network (BGAN)
- Broadband Global Area Network M2M (BGAN M2M)
- Land Xpress (LX)
- IsatData Pro (IDP)
- LoRaWAN
- IsatPhone 2

Our connectivity services offer two-way messaging making them particularly suitable for supporting applications that need remote control capability or where updates must be installed remotely.

Where deployment areas suffer from no access to power we can provide integrated connectivity solutions that are self-powered (through solar or wind), and include gateways for local networks (e.g. LoRaWAN, private LTE or mesh networks) that can be managed remotely.

Depending on your technology's capabilities, we also offer leases of satellite capacity for your equipment to communicate directly with our constellation. We take a collaborative approach, working with you to design the best connectivity solution for your technology and market needs.

CROPPING

Irrigation monitoring

Applying the correct amount of water according to the individual needs of crops is vital to maximising yield and quality. In the face of increasing pressure on surface and groundwater abstraction as well as increasing episodes of extreme weather events such as droughts, it is essential that growers are able to accurately apply limited water resources when the crop needs it most. All this requires accurate field level data, which traditionally has involved regular field visits during the season. However, when farming crops over large land areas this can soon become a costly approach, and often doesn't provide the ability to respond quickly to changing environmental and crop conditions.

Our solution offers remote management of fields used for irrigation, including remote acquisition of data on soil moisture, weather and control of your irrigation system. This means you can maximise your yield and quality, whilst reducing physical visits to the field, nutrient losses, pollution and making it easier to comply with tightening regulation.

Machinery and vehicle monitoring

During critical operations such as planting and harvest, any disruption caused by machinery breakdowns or a lack of co-ordination between teams ultimately leads to lost time and money. If you are operating downstream processing facilities such as sugar cane mills a reliable and consistent supply of raw material from field to factory is key to achieving maximum efficiency.

Most modern machines, such as harvesters and logistics trucks produce telemetry data that provides information to track maintenance needs and location, which in turn can help you manage front teams and prevent machinery breakdowns.

However, plantations are often located in areas of unreliable or non-existent cellular coverage, which means that transferring this data and information in real-time is challenging. Inmarsat uses our highly reliable

L-band Broadband Global Area Network (BGAN) satellite connectivity to aggregate data from machines in the field, and transfer it in real-time to your operations centre or HQ. This allows you to predict maintenance needs, prevent breakdowns before they happen and respond quickly to incidents in order to maintain throughput and operational efficiency.

Fire monitoring

Fires can begin and take hold rapidly, endangering crops, livestock and infrastructure, as well as risking the health and safety of staff and surrounding communities. Without a way of remotely monitoring and achieving total visibility, a great deal of damage can be done before you are able to react.

Inmarsat's Fire Monitoring Solution incorporates our BGAN connectivity service to provide globally reliable coverage, providing you with real-time alerts in the event of the outbreak of fire, anywhere on your estate.

Crop storage and logistics monitoring

Maintaining optimum conditions for crops, either in storage on-farm or during transit through the multi-modal supply chain, is vital in preventing post-harvest losses. Critical variables such as temperature and humidity can change quickly, affecting crop quality. However, most agribusinesses lack real-time visibility of these conditions, and are thus unable to react quickly to optimise productivity.

Inmarsat's Crop Storage and Logistics Solution allows growers and extended supply chain to remotely monitor crops in store, on land, sea and air. Enabled by our highly reliable, global BGAN satellite connectivity, we can give you visibility of your crops wherever they are. This allows you to optimise supply chain logistics and storage management to improve crop quality, ultimately leading to higher profitability.

A wealth of digital technologies are fast being adopted by growers, which provide the ability to monitor fields remotely and improve productivity with objective data and information.

However, to take advantage of this digital revolution, agribusinesses must have access to reliable internet connectivity to get the data from field to platform. With the right approach to connectivity, data can be aggregated into platforms and shared with the people who need it most, wherever they are.

Inmarsat enables connectivity for agribusinesses globally using our highly reliable L-band services. From here we can build out end-to-end solutions or use our connectivity as an enabler for systems you already use.

LIVESTOCK AND AQUACULTURE

Livestock farmers operating over large ranches and estates are challenged every day to maximise productivity, increase health and welfare and react quickly to adverse incidents to prevent losses.

There are many new technologies coming to market which allow real-time monitoring of animals and assets in the field. All these technologies depend on real-time communications to get the data from field to platform, however, many areas where livestock are farmed are by their nature, remote and lacking in cellular connectivity.

Inmarsat helps you adopt the latest technology on your ranch or farm with the most cost-effective connectivity services and solutions. We can work with you to design a bespoke solution or augment your current solution with the reliable connectivity you need to gain transparency and control.

Livestock monitoring

In large farms and ranches your herds often graze over huge land areas. With limited human resource, monitoring soon becomes a costly and inefficient exercise.

When you do need to drive out to monitor herds, our mobile connectivity services enable you to access your applications and stay in touch on the go.

Inmarsat supports the remote monitoring of cattle through sensor technology enabled by our L-band, Broadband Global Area Network (BGAN) satellite service, which offers highly reliable connectivity in remote areas. Using this capability, farmers can monitor the whereabouts and health of their herds, allowing them to pinpoint and respond to potential risks quickly, resulting in enhanced yields and security.

Remote water monitoring and control

Access to water for livestock is crucial, and farmers on large ranches typically spend a lot of time and money manually checking tanks, dams, troughs and other systems frequently. Using our highly reliable satellite network, Inmarsat enables farmers to remotely monitor their systems wherever they are located, including water levels, system faults and usage trends. This enables huge efficiencies through less manual monitoring, peace of mind and better health and welfare for animals. Additionally, our services allow farmers to remotely control pumps, gates and other infrastructure allowing quicker responses to issues and less field visits.

Indoor animal monitoring

Maintaining optimum conditions in intensive farming systems for pigs, poultry and other species is vital to maximize growth, health and welfare. Monitoring and controlling key variables such as such as water levels, temperature, humidity, ammonia and CO_2 in real-time allows you to gain full control. However, many farms are located in areas without terrestrial connectivity, which is a barrier to real-time monitoring.

Inmarsat utilises our highly reliable satellite connectivity to enable real-time monitoring and visibility of conditions. With our partners, we design dashboards and instrument solutions that share data with all the key stakeholders and set up alerts that notify you if a critical event occurs.

Aquaculture

Sea and freshwater farmers are constantly looking for innovative ways to accelerate growth of their stocks and improve efficiency. Maintaining optimum conditions is crucial, and this requires constant monitoring. However, many aquaculture farms are located in remote areas with low connectivity. Using our global satellite network, Inmarsat is enabling the industry to remotely monitor and control their installations, reducing costs and increasing yield.

Inmarsat's aquaculture management solution enables farmers to remotely monitor and control conditions at their farms to produce optimum yields. Our solutions are built to your requirements and include real-time monitoring of dissolved oxygen, pH, ammonia, temperature and salinity. Systems such as automatic feeders can be operated remotely via our global satellite connectivity, enabling you to have control without visiting the site. When a site visit is required, workers are connected to the operations centre at all times by our reliable data and voice communication capabilities.

AGRI-FOOD SUPPLY CHAIN

Fleet monitoring

Agribusinesses face the challenge of operating large, diverse fleets of vehicles that are difficult to manage. These challenges are compounded by the fact that they often operate across remote regions where connectivity is fragmented or non-existent.

Inmarsat offers a range of services, including IsatData Pro and BGAN M2M, to track vehicles in areas of low cellular coverage via our global network. We can build our connectivity into your systems or create a customised solution from scratch. We deliver key data such as location, vehicle weight, and conditions in transit such as temperature and humidity, speed and braking force, providing granular insights into an integral layer of the supply chain.

Supply chain traceability

Implementing agricultural traceability will be key to the successful agribusinesses of the future. Consumers are increasingly demanding transparency over where their food has come from. Traceability also allows the rapid identification of the origin of food safety and other incidents, meaning quicker, more precise recalls and response should an issue be identified.

Inmarsat builds and manages custom solutions that enable manufacturers and producers alike to achieve total visibility of their assets, allowing interventions to be made to improve outcomes. Inmarsat's ubiquitous L-band satellite connectivity and our presence on land, in the air and at sea positions us uniquely to help solve these problems and serve the global supply chain.

Cold chain monitoring

Keeping a temperature sensitive consignment within the optimal range throughout its entire journey is a huge challenge. Every year the industry loses billions to post-harvest loss as a result of sub-optimal conditions in transit.

Inmarsat enables you to monitor the conditions of your temperature sensitive consignments with L-band satellite connectivity, operating with up to 99.9% uptime. We work with you to use the latest sensor technology to monitor critical conditions in transit, including temperature, humidity and if required, other key variables such as Volatile Organic Compounds. With our solutions we deliver maximum transparency so you receive real-time alerts when conditions fluctuate, and allow you to control them via a real-time dashboard.

The agricultural supply chain is vast and complex, making it difficult for farmers, agribusinesses and manufacturers to maintain visibility of critical dependencies at each stage in the process.

A lack of visibility and control can lead to huge post-harvest losses, while the inability to make accurate sustainability and provenance claims on products or to react to rapidly changing demand from customers or food safety incidents, can result in significant problems.

Inmarsat is in a unique position to provide this visibility, using our highly reliable satellite network and existing capability that connects the world's ocean going vessels, aircraft and land based transportation. These services ensure that your assets are generating data wherever they are in the supply chain, so you can benefit from increased visibility and faster decision-making.

OUR CONNECTIVITY SERVICES

Inmarsat provides the widest range of connectivity services and solutions to the agriculture sector.

|	**Land Xpress**	**BGAN**	**BGAN M2M**	**IsatData Pro**	**IsatPhone 2**
	Ka-band	L-band	L-band	L-band	L-band
	Up to 16 Mbps receive, 4 Mbps send	492kbps	Up to 448 / 464kbps (send / receive)	6,400 / 10,000 bytes (send / receive)	2.4kbps voice codec
	VoIP, video conferencing, VPN access, email live video and audio streaming, high-speed broadband for internet access, high-speed file transfer, video surveillance	Email, internet access, Cideo conferencing, video transfer, voice, file transfer, IP SCADA, data backhaul, telemetry.	IP and non- IP SCADA, secure ATM/POS solutions, automation, remote fixed asset monitoring, including telemetry and surveillance, IoT	Asset tracking, fleet management, industrial automation, remote monitoring and control, workflow automation, in-cab dispatch and messaging, IoT	Voice, SMS, short-messasge email, tracking and emergency assistance

Inmarsat I-4 and I-5 network coverage
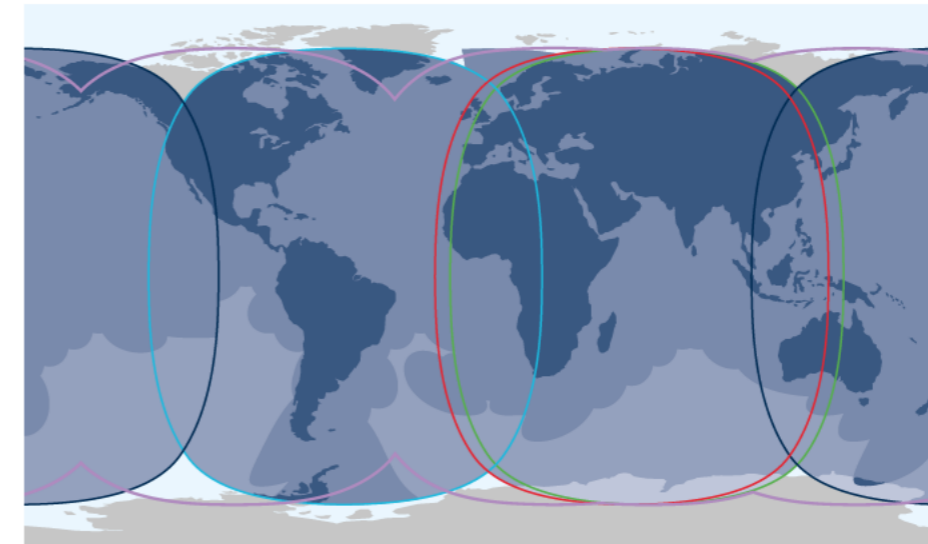
- ☐ I-5 F2
- ☐ I-5 F1
- ☐ I-5 F3
- ☐ I-5 F4
- ☐ I-4 and Alphasat coverage

- ■ Global Xpress network available over at least 99% of this area
- ■ Extendable Global Xpress coverage via steerable beams

This map is for general information purposes only and should not be construed or used as a legal description or representation. No guarantee or warranty is given that the map is spatially or temporally accurate or fit for a particular use. Coverage is subject to change at any time. Inmarsat shall have no liability for decisions made or actions taken/not taken in reliance upon the map or for any resulting losses suffered.
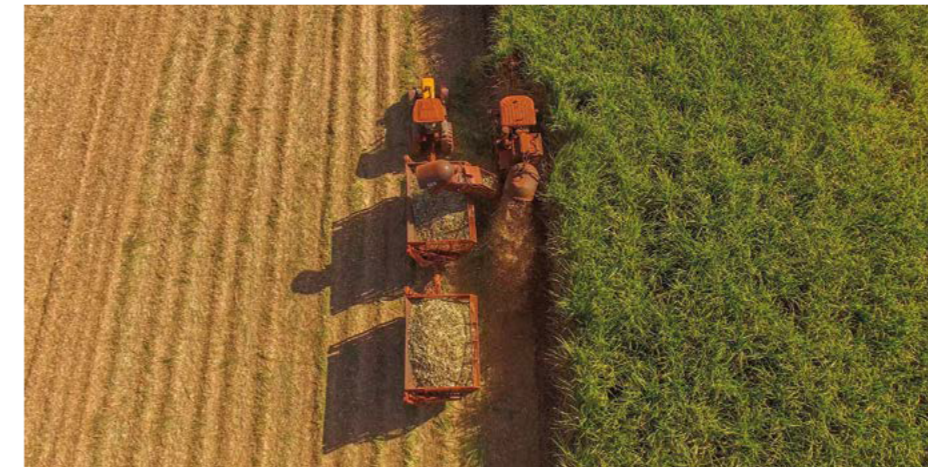
About Inmarsat

Inmarsat is the leading provider of global mobile satellite communications services. Since 1979, Inmarsat has been providing reliable voice and high-speed data communications to governments, enterprises and other organisations, with a range of services that can be used on land, at sea or in the air. Inmarsat operates around the world, with a presence in the major ports and centres of commerce on every continent. Inmarsat is listed on the London Stock Exchange (ISAT.L). For more information, please visit www.inmarsat.com

About Inmarsat Enterprise

Inmarsat Enterprise is enabling safer, more efficient, more sustainable operations wherever businesses operate on land. Our customers trust us to deliver the industry standard in reliable mobile satellite connectivity, underpinning mission critical communications, remote operations, machine-to-machine (M2M) applications and the Industrial Internet of Things (IoT). With expertise in agriculture, aid and NGO, media, mining, oil and gas, renewables, transport and utilities we work with our partners to build solutions that deliver transformational outcomes and ensure the right level of ongoing management.

inmarsat
The mobile satellite company

Powering eHealth
around the world

Providing remote connectivity
solutions for eHealth

Bridging the healthcare provision gap

Despite carrying the heaviest global burden of disease, emerging nations have the lowest percentage of healthcare workers.

Providing remote communities in developing countries access to quality healthcare is a pressing global challenge. The World Health Organization (WHO) recommends a minimum standard of 2.28 physicians, nurses and midwives for every 1,000 people in any population, yet a WHO survey of 12 African countries showed they had just 0.09 physicians and 0.55 nurses and midwives for that number. However, 0.09 physicians and 0.55 nurses is only an average – in rural communities the figure can be zero.

The challenge for hospitals and clinics is employing and retaining enough trained medical staff to cope with the number of people needing care. Once trained, many professionals decide to work abroad, or stay in the urban centres where they studied.

In countries where more than half the population live in isolated areas, this results in a huge gap between rural and urban healthcare provision, which means communities sometimes have a gap of weeks, months or even years between visits from healthcare workers.

Even when healthcare workers do visit, they may not have access to tools and resources necessary to diagnose or treat every medical condition they encounter. So, the global focus is on finding ways of bridging that healthcare gap by using 21st century solutions to deliver 21st century care.

Technology-enabled eHealth services are one answer, but in remote areas where terrestrial or cellular coverage is patchy or non-existent, they can be severely compromised. Inmarsat understands these challenges and has developed a portfolio of cost effective services to power eHealth solutions where they are needed most. Satellite connectivity provides a vital link enabling local health teams to connect with and access international medical expertise.

Inmarsat's connectivity services enable

> Electronic health records

> eSurveillance systems

> eConsultation

> ePrescription

> Monitoring of vital signs

> Knowledge management systems

> eLearning

> Telemedicine

> mHealth

Saving and improving lives beyond the reach of terrestrial coverage

Through our dependable voice and data services, we enable hospitals and clinics to disseminate resources and expertise.

Our services power eHealth solutions which can assist remote medical teams in assessing and treating health issues and controlling or monitoring outbreaks of communicable diseases. eHealth solutions can also deliver training to health workers where they live. Our global satellite network provides coverage to the most isolated communities in the world and delivers unbeatable 99.9 per cent availability, so they can always rely on getting a connection when they need it.

Through the broadest range of dependable voice and data services, we enable hospitals and clinics to reach out into rural areas and collaborate, facilitating diagnosis and treatment, which would otherwise be impossible.

Essential medical expertise via satellite

Satellite connectivity can make specialised medical care available anywhere.

With BGAN, remote medical teams can access the information they need to diagnose, treat, and monitor patients, sharing vital health statistics with other experts located anywhere in the world, in real-time. Our portable satellite terminals are robust, lightweight and easy-to-use, making them ideal for doctors on the road. Within minutes of arriving in a community, and with no specialist training, health workers can be online, accessing health records and decision support systems to aid in diagnosis and treatment.

Telemedicine applications developed by our solutions providers enable physicians at an urban hospital, or even thousands of miles away in a global centre of excellence, to conduct patient consultations. They can monitor vital signs, take part in live video conferences, and receive live streamed ultrasound scans, ECGs and X-rays for rapid expert diagnosis.

Essential connectivity solutions for remote medical teams

	BGAN Link	IsatPhone 2	IsatHub
Usage	Both fixed and portable	Handheld	Portable – smartphone or tablet connectivity
Services	Standard IP, SMS	Voice, SMS, data	Standard IP, voice, SMS
Transport Protocol	TCP / IP, UDP / IP	Circuit-switched	TCP / IP, UDP / IP
Performance	Up to 492kbps (send and receive)	2.4kbps voice codec	Up to 240 / 384kbps (send / receive) Voice - 4kbps
Latency	800 milliseconds	500 milliseconds	800 milliseconds
Connection charge	No connection charge	30 seconds	50KB data 30 seconds voice
Pricing unit	Available in 2 and 30GB monthly packages	Per minute	Per MB data, Per minute voice, Per SMS
Billing increment	Flat monthly fee, additional data available dependent on package charged per MB	15 seconds	20KB data 15 seconds voice
Typical monthly consumption	2GB and 30GB monthly packages	Unlimited	Dependent on usage
Coverage	Global	Global	Global
Terminal manufacturers	Hughes, Cobham Satcom	Inmarsat	AddValue
Typical applications	Email, internet access, secure VPN, SMS, file transfer	Voice, SMS, short message email, tracking and emergency assistance	Smart phone or tablet connectivity for email, internet and app access, file transfer, voice, SMS

Accessing apps and staying in touch

In today's digital world, access to smart device apps, the internet and telephone calls can make a big difference to health and wellbeing.

Access to your apps

Our IsatHub service enables medical workers to use smart phones or tablets with our global satellite network, no matter where they go. They can access eHealth apps, check or request information and send pictures or data back to HQ about population figures and disease outbreaks, all in real-time. This allows for analysis by health prevention agencies, potentially mitigating the spread and impact of disease.

The service can be accessed through lightweight, portable terminals about the size and weight of a paperback book, and offer data speeds of up to 384kbps.

Stay in touch, stay safe

For healthcare workers operating way outside mobile or terrestrial coverage areas, our IsatPhone 2 handheld satellite phone is a lifeline. Engineered to cope with the most inhospitable environments, IsatPhone 2 delivers a reliable connection and a crystal clear line. Network registration takes under 45 seconds and the satellite phone offers unrivalled battery life – eight hours of talk time and up to 160 hours on standby.

IsatPhone 2 also delivers important safety features. Its emergency assistance button sends GPS location data and a text message to a pre-set contact number, and a tracking capability transmits location information. Customers on monthly plans benefit from free-of-charge worldwide emergency assistance from GEOS. Once configured, a single push of a button will send a message to GEOS' 24/7 emergency response centre which will then contact the user to get them the help they need.

Affordable communications for rural clinics

Often located hundreds of miles away from urban centres, rural clinics can rely on satellite communications to keep them connected.

For rural healthcare centres and longer term medical projects, Inmarsat's fixed satellite services including BGAN Link offer long term connectivity solutions with a wide range of flexible, affordable service plans. Our connectivity provides rural medical teams with instant access to specialised doctors who can assist in diagnosis and treatment.

BGAN Link delivers the reliability and functionality of BGAN with high monthly volumes of always-on Standard IP data for a fixed monthly cost, making it an attractive choice for long-term eHealth and telemedicine initiatives. Terminals have low power consumption and can run on mains electricity, batteries or solar panels

Access to eLearning improves provision of healthcare services

Healthcare professionals in remote, low income and politically unsafe locations can now learn skills and qualifications via satellite.

Our BGAN Link service empowers medical students and healthcare professionals, enabling them to improve their qualifications and medical acumen. Access to online courses and learning materials and the opportunity to attend virtual classes without having to travel hundreds of miles to urban centres, is valuable in the provision of quality healthcare.

Inmarsat's services make learning opportunities available that otherwise may not have been possible and as a result, medical students and qualified professionals are more likely to stay in their communities to practise medicine, providing healthcare advice and drawing from their deep understanding of local lifestyles.

Statistics from the World Health Organization (WHO), 2006 - 2013, show the extent of the healthcare challenge:

> Globally, approximately 6.6 million children under five die every year – almost all could be saved if they had access to simple and affordable interventions such as vaccines, medication and clean water.

> 800 women die every day because of pregnancy and childbirth complications. One third of women in Africa have no access to healthcare professionals when they give birth.

> Around 70 per cent of HIV/AIDS deaths in 2012 were in sub-Saharan Africa. Many people in low income countries do not know their HIV status and so cannot be prescribed anti-retroviral drugs.

Satellite connectivity provided by Inmarsat and eHealth technology solutions can begin to help bridge the healthcare gap

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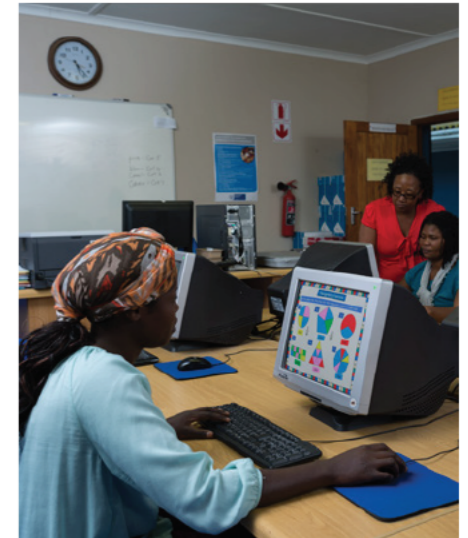
BGAN Link benefits

1 Fixed monthly fee means that you can anticipate and control project costs

2 Global network availability so you can initiate projects whenever they're needed

3 Easy to set up and maintain, with no requirement for specialist staff or training

4 Reliable network — 99.9% satellite and ground network availability

5 Low power consumption — so projects in rural areas with limited power access can still be serviced with connectivity through a range of battery, mains and solar power options

BGAN Link for eHealth

BGAN Link enables an eHealth preventative monitoring solution in rural Benin communities

SOS Children's Villages Benin and Safe Triage Ltd use BGAN Link to bring health monitoring to remote communities in Benin. Linking on-site medical teams to urban hospitals for real-time access to diagnostic expertise, the scheme enables early identification and treatment prioritisation of potentially life-threatening diseases.

In rural locations across Africa and the rest of the world, communities sometimes have a gap of weeks, months or even years between visits from healthcare workers. Most rural villages lack a permanent healthcare facility, so these sporadic visits from medical staff are often the villagers' only opportunity to receive medical care. And even when healthcare workers do visit, they may not have access to tools and resources necessary to diagnose or treat every medical condition they encounter.

This is why eHealth solutions are critical to medical care provision in rural communities. Using these solutions, remote medical workers are able to gather diagnostic information whilst on site, share it with their colleagues in urban hospitals and clinics and collaborate to facilitate diagnosis and treatment, which would otherwise be impossible for villagers to access.

However, these solutions can only be effective if the location they are used in has access to voice and data connectivity. Cellular and terrestrial services are in short supply in these locations, if they are available at all. Inmarsat's global 3G satellite network delivers 99.9% availability over its satellite and ground network, providing voice and broadband connectivity no matter how remote the location, which is why SOS Children's Villages Benin and Safe Triage Ltd chose to use Inmarsat's BGAN Link service for their eHealth initiative in Benin, Africa.

Safe Triage enables remote medical teams to capture and share relevant patient medical information in real-time back to receiving hospitals where specialists are able to assess and advise appropriate interventions. The easy to use, ruggedised tablet PC, utilises a simple touchscreen interface to capture patient details and

SOS CHILDREN'S VILLAGES BENIN

SafeTriage
Enhanced Pre-Hospital Care

"The connectivity provided by the BGAN Link service was integral to the success of this pilot. The reliability of the data connection meant that patient data could quickly and efficiently be shared with medical clinics from the village, and more importantly, enable us to diagnose chronic illnesses amongst the men, women and children of these rural communities and refer them for immediate treatment."

Mr Salimane Issifou, National Director, SOS Children's Villages Benin

information about their condition with appropriate vital sign monitoring equipment linked wirelessly to the device. All information is transmitted via satellite or GSM networks to a secure web based information portal in the hospital or clinic for relevant healthcare professionals to access.

"We were delighted to support SOS Children's Villages Benin in their vision and that the ST Telemedicine Unit worked so effectively in the assessment and treatment of patients in remote areas of Benin who would normally have difficulty accessing specialist care," said David Morgan, Medical Director, ST.

Early diagnosis enables preventative treatment

In September 2014, SOS Children's Villages Benin and Safe Triage Ltd, in conjunction with Inmarsat, began a three-month initiative of Safe Triage, an eHealth solution that holds a range of medical data from patients on a shared server, from which doctors could remotely monitor and diagnose patients. This data was transmitted in real-time over Inmarsat's BGAN Link service.

The project involved SOS Children's Villages Benin working with clinics in rural locations in the Abomey and Dassa-Zoumé regions of Benin, and used a series of community consultation programmes to monitor,

diagnose and treat men, women and children. The clinics utilised the Safe Triage telemedicine applications to gather the patients' medical information on smart tablets, which were then sent in real time via satellite to a secure server, which doctors in hospitals and clinics used to monitor and evaluate the villagers' health.

The impact of eHealthcare

Over the course of the three month initiative, the clinics met with more than 850 men, women and children through their Family Strengthening programme and Family Based Care programme. These initiatives allowed the villagers access to the medical expertise and resources of larger urban hospitals, which would have previously been out of their reach. Thanks to the real-time sharing of medical data over BGAN Link, doctors were able to identify instances of diabetes, hypoglaecemia and hypertension and other conditions, and refer these patients for treatment. By catching these conditions early, and not waiting for more serious symptoms to develop, treatment becomes easier and safer. The programmes identified more than 70 individuals with serious conditions that required immediate treatment, treatment that they would otherwise have been unable to access.

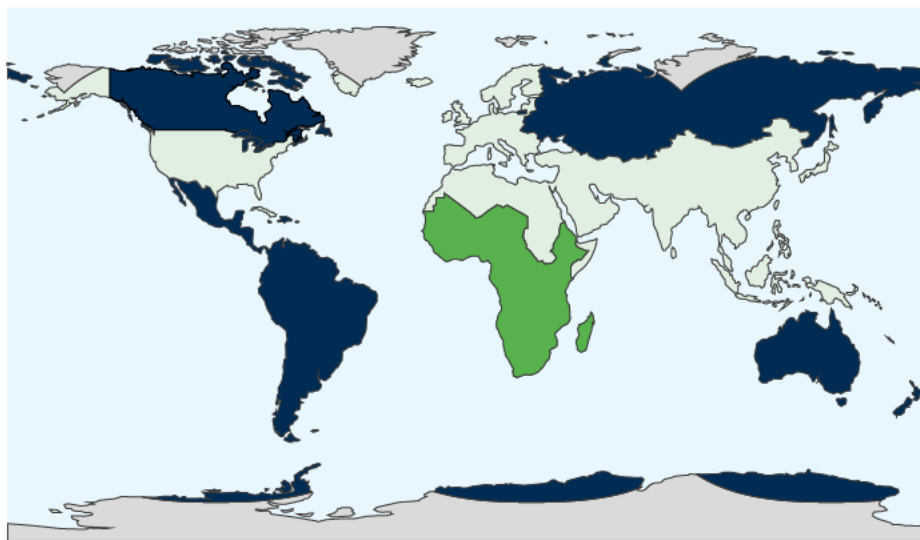## Reliable, affordable connectivit fo long te m projects

BG N Li k s n affordabl , fix d L-band satell te broadb nd servi e. Desig ed for se in ne locati n, B AN L nk off rs high ata vol mes f r a xed mon hly c st, and pro ides s ee s f p to h lf a megabit, ak ng it an attr ctive hoi e for longe - t rm id and human tarian pr jects. As ell a being deally su ted to provide conn cti ity for eHe lth and telemedicine ini iati es, GAN Link c n easily andle th d m nds of a rem t office — V N, email, corporate app cations, i ternet an intran t cce s, so a y pro ect can be ad in stere on si e, s ving time and resource . Acces ed through robus termina s, esign d for hars condit ons and w th low powe consu ption ra es, BG N Link c n be de loy d quickl and e sil to almos a y l cation n the pl net no ma te how remote r c allengi g. And nc the proj ct s c mple e, you an m ve the GA ink service o new l catio p to ou ti es year so you can serv mul iple pro ects with just one subscription.

Abo t nma sat

Inma sat is t e leadin provi er of glob l mobile satellite comm nicat onss rvices. inc 1979, Inmars t has be npro idi g reliable voi e and high-spe dd ta communications to go ern ents, enterprises an oth r orga iz tions, w th a ran e f se vi es that can be us d o lan , at sea or in t e air. Inma sat e pl ys a ound 1, 00 staff in mor th n 60 l cati n around he world, w th a res nce in he major po ts and entres of comme ce o ever co tinent.

Lea n more about h w I mar at's service enable id and Hu anitarian agencies to deliver effective eHealthcare:

BGAN Link coverage

Global plan   Geo plan   Sub-Saharan Africa plan (also inclusive of Geo plan)

The BGAN Link Unlimited Geo plan is available in **Eastern Europe** — Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Mongolia, Russian Federation, Tajikistan, Turkmenistan, Ukraine and Uzbekistan. **LatAm** — South American region including Mexico and Caribbean Islands excluding Cuba. **North America** - Canada only. **Sub-Saharan Africa** — all African countries excluding Morocco, Algeria, Libya, Egypt, Sudan, Somalia, Tunisia and Western Sahara. **APAC** — Australia, New Zealand and some Pacific islands. **Antarctica** - highlighted regions only.

Inmarsat.com/empowering-ehealth