



MOBILE FORWARD COMMAND POST WHITE PAPER

**INMARSAT GLOBAL GOVERNMENT
COMMUNICATIONS MADE CERTAIN**



01. INTRODUCTION

1.1. OVERVIEW

Based on experience built up during outdoor demonstrations with military end users it became clear there is a requirement for secure connectivity in the field. When troops are deployed in remote environments they need connectivity for Push-To-Talk, Blue Force Tracking, Situational Awareness, and ISR. In short they need secure access to the Battle Management System to conduct their operations as best and safely as possible. Specifically in remote and hostile environments secure connectivity is a real challenge. The ability to connect Mobile Patrol Units and Dismounted Soldiers in the field to the Battle Management System is considered a force multiplier. Since 2019 Inmarsat has been demonstrating secure and multi-megabit comms on the move using its Commercial and Military Ka-band Global Xpress network to military end-users. The capability was perceived very well by the end user community however the solution was still lacking a range extender to let the dismounted soldier in the field benefit from this. Inmarsat is now presenting a modular built Mobile Forward Command Post capable of delivering secure multi-megabit comms in the field backhauled over Global Xpress in a radius of maximum 5 kilometres or a maximum of 50 kilometres around the vehicle, depending on the chosen range extender. In this document we will describe the modular built Mobile Forward Command Post solution.



02. SOLUTION OVERVIEW

2.1. SOLUTION SUMMARY

The Mobile Forward Command Post is a modular built solution enabling secure connectivity in the field backhauled over Global Xpress. The components of the solution are:

- Main communications on the move or on the pause. The main comms is enabled by a GetSat Milli-W vehicular GX terminal using the Inmarsat Global Xpress Ka-band network with its global footprint.
- Power Kit. This optional power kit ensures that the solution

can run without any other external power source for a certain period of time.

- Security & C2 enablement system. This kit encrypts the connectivity end-to-end, supplies a secure 150 meters Wi-Fi hotspot around the vehicle and enables secure VoIP.
- Range extender. The range extender creates a secure 4G/LTE tactical bubble around the vehicle and comes in 2 options: option 1: 'Backpack' with a range of max. 5km. Option 2: 'Cube' with a range of max. 50 km.

2.2. SOLUTION CAPABILITY

The Mobile Forward Command Post provides multi-megabit secure connectivity to soldiers in the field. Depending on the chosen option of the range extender a soldier in the field will have 4G/LTE connectivity for voice and data applications within the 1 to 50 kilometres range of the Mobile Forward Command Post. The Mobile Forward Command Post is back hauled over GX to Command & Control or the Battle Management System. As both the range extender and the GX backhaul are multi-megabit

connections the soldiers in the field will be capable of using a wide range of applications such as video conferencing, transmitting or receiving ISR imagery and video, VoIP, PTT, chat and access to various server or cloud based applications. The solution includes encryption and private VPN capabilities to provide the required security. The solution typically will be deployed in remote and hostile environments where alternative connectivity is non-existing or cannot be trusted. Due to the modular built up (described in the next paragraph) the complete solution comes in Peli Cases, can easily be transported by air, land or sea and when arrived at its destination can be deployed in less than 1 hour in any available vehicle independent of the (un) available power source.

2.3. MODULAR BUILD UP

One of the requirements from the end users was a modular solution. The individual modules work seamlessly together but can also be deployed individually. It is also possible to replace the GetSat Millisat-W GX terminal with a rapid deployable GX terminal if the situation requires that. Typically at a Forward Operating Base a fly away or rapid deployable GX terminal will be used as there is no need for the terminal to be mobile.

Other options to replace the GetSat Millisat-W GX terminal

for a smaller mobile terminal are the Explorer 727 / 325 / 323 Vehicular BGAN terminals. The advantage of these terminals is the smaller size and weight and the low power consumption. However an important drawback of these terminals is the limited throughput while on-the-move (200-300 kbps).

The modular build up also enables an easy transportable solution. Transporting this solutions or just several components of it is made easy over land, sea or air. It is advisable to have several of the Power Kits so in case there

is no alternative power source to power the solution or to recharge the depleted power kit continuous service is guaranteed as long as possible.

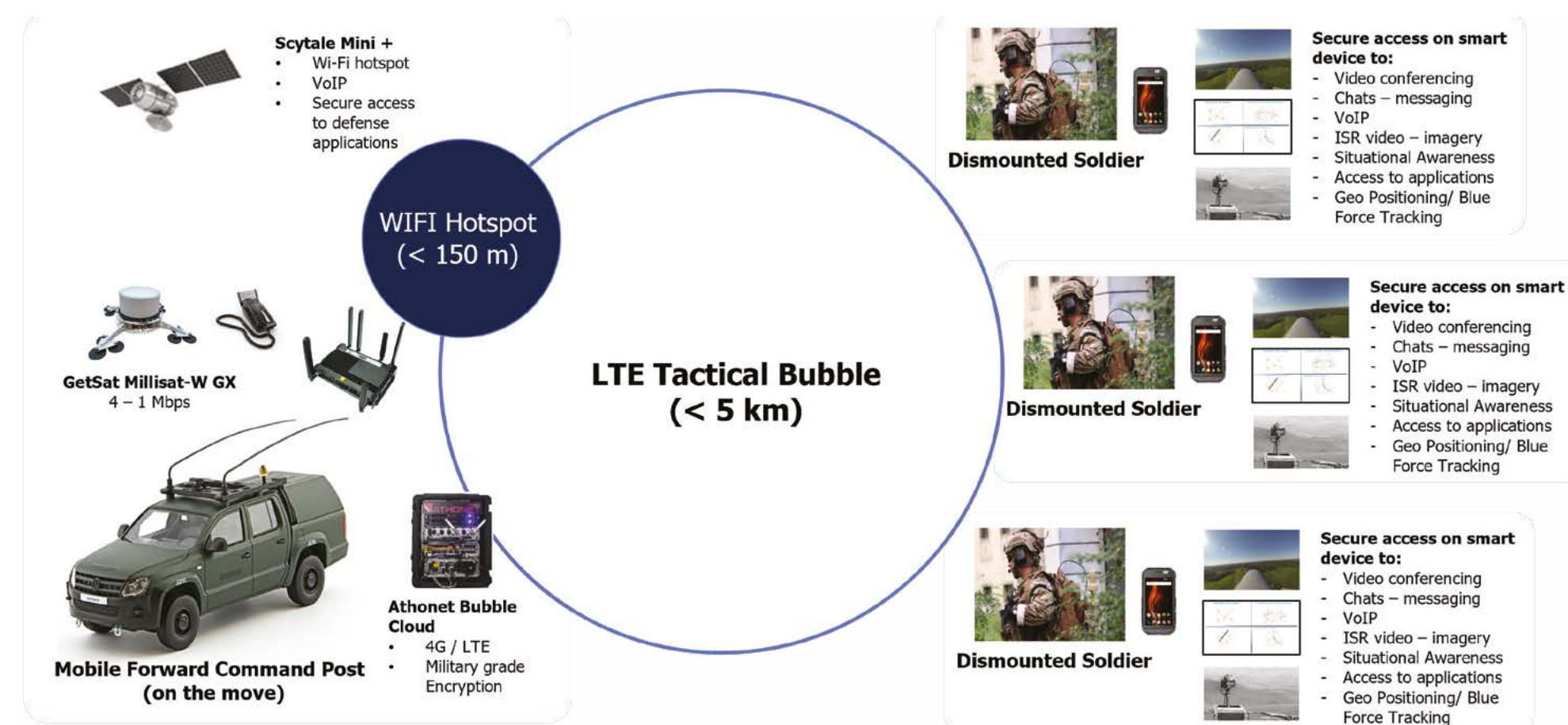


Figure 1: Mobile Forward Command Post - secure connectivity in the field



Figure 2: Mobile Forward Command Post - modular setup

03

SOLUTION COMPONENTS

3.1. MAIN COMMUNICATIONS

3.1.1. GLOBALXPRESS (GX)

Inmarsat Global Xpress (GX) is a global Commercial Ka-band network. The network is currently made up of four geostationary satellites with 89 spot beams and 6 steerable high capacity overlay beams per satellite. The network has full ground and satellite network redundancy and has a Guaranteed CIR Availability – up to 99.5% CIR Availability SLA. GX is designed and optimized from the ground up for mobility broadband and WGS interoperability. GX is currently the only seamless, global, high-performance Ka-band satellite broadband system from a single operator.

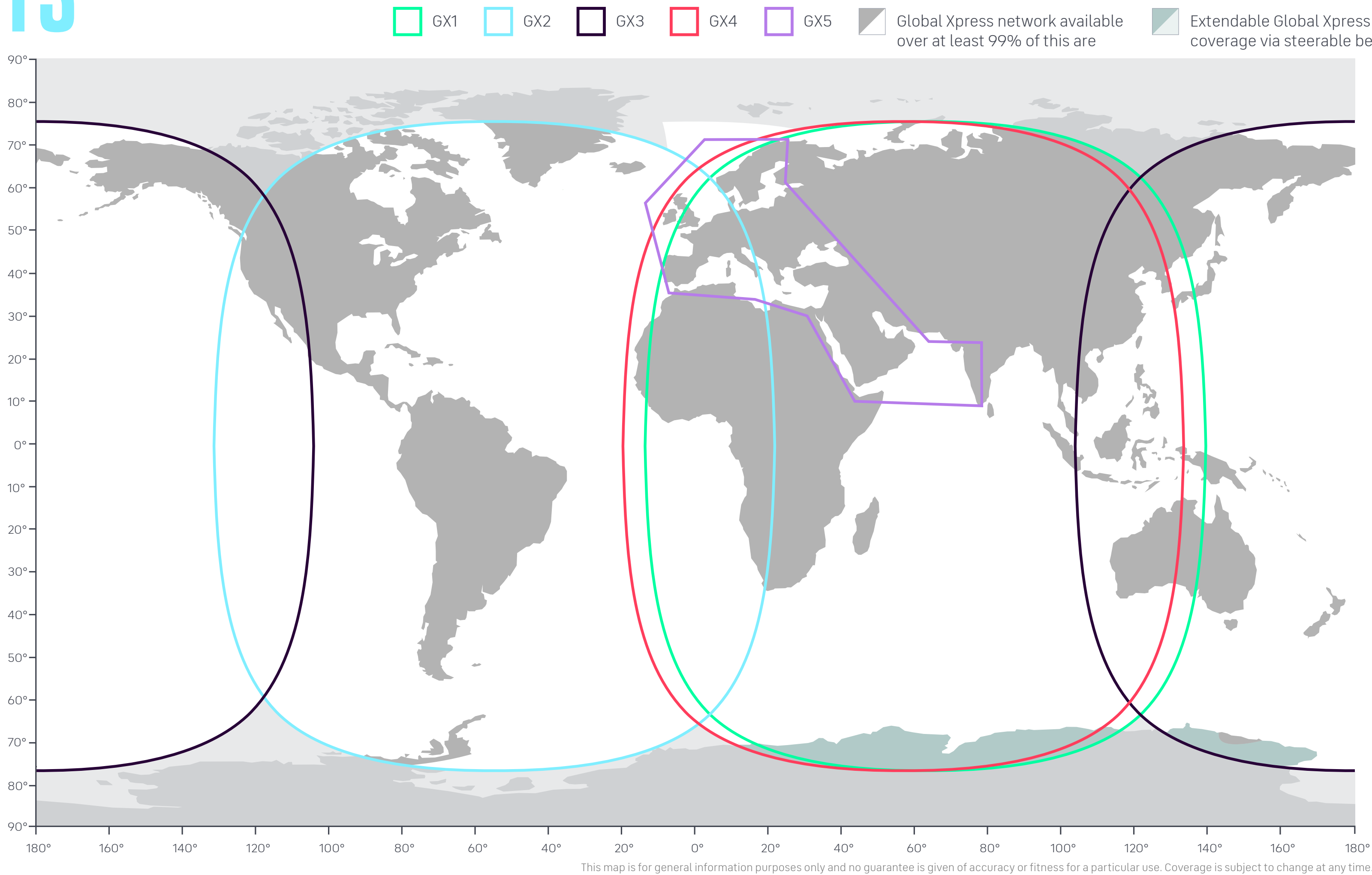


Figure 3: Global Xpress Coverage Map

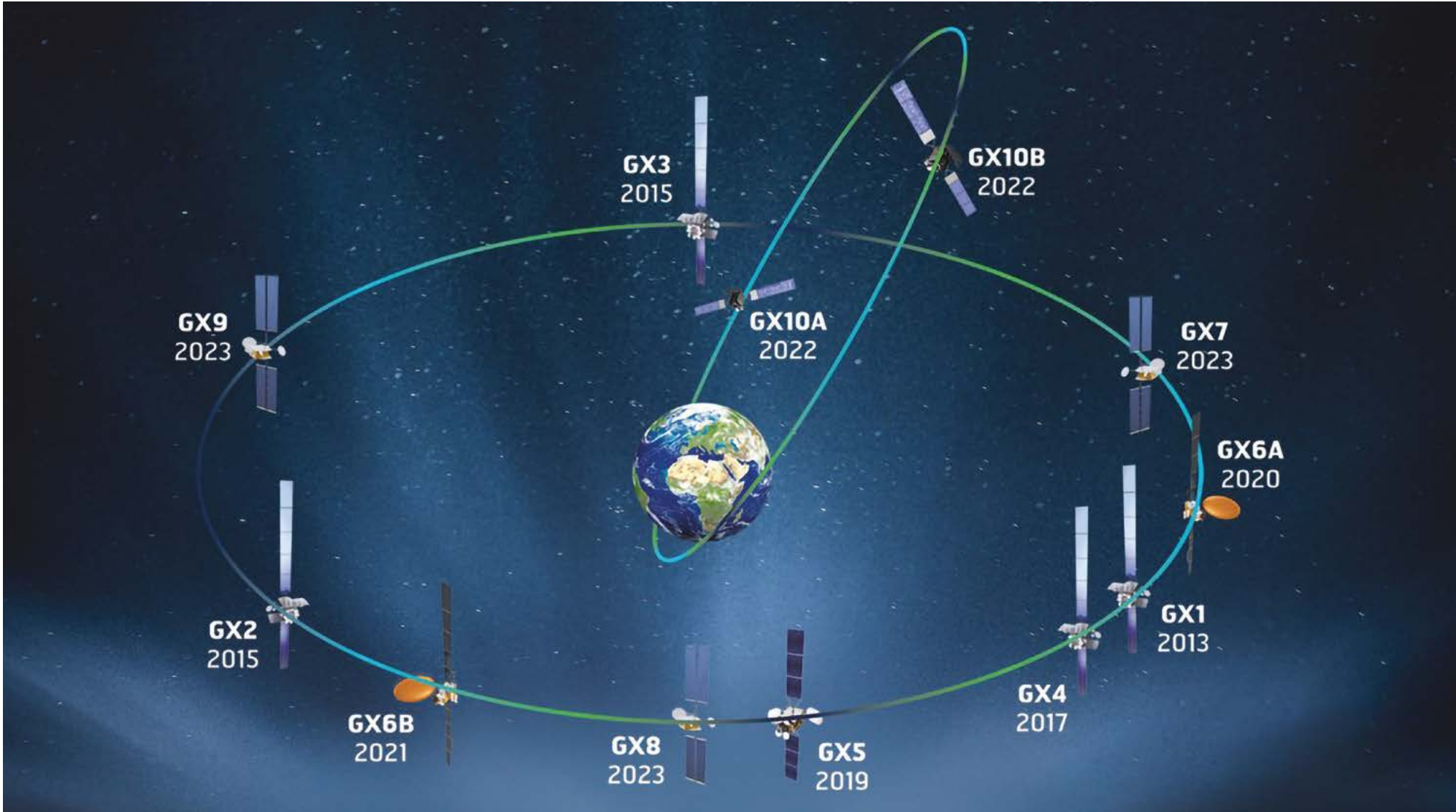


Figure 4: Inmarsat GlobalXpress GEO stationary constellation by 2023

3.1.2. GLOBALXPRESS DEVELOPMENT

The Global Xpress network consists currently (December 2019) of 4 Geo Stationary satellites. Over the coming years the GX network will be expanded with 8 new satellites to cover the North Pole and to be used as additional overlay on the existing Global network. The planned (and ordered) expansion time line is as follows:

- GX5: launched December 2019, Operational Q2 2020. Additional capacity EMEA region.
- GX6A & B: planned launch Q4 2020 and Q4 2021. 2 new satellites with a combined Ka and L-Band payload. Ka capacity is as much as the GX1 – 5 combined.

- GX 7,8,9: planned launch Q2 2023. Additional overlay, power and bandwidth dynamically in real time where needed
- GX10 A & B: planned launch 2022. 2 HEO satellites for extended polar coverage above 65N.

This expansion of the GX network will dramatically further increase the available capacity on a global scale including full coverage on the North Pole.

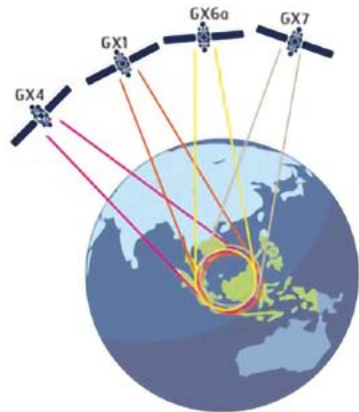


Figure 5: Example of layered capacity capability over Singapore

Layered Capacity Strategy

- Start Global, Overlay Local: Having achieved global coverage with GX1-4, Inmarsat's layered capacity design reuses spectrum with multiple satellites from different angles to provide more capacity and better quality when needed in high traffic areas.
- Resilience: Orbital diversity provides satellite resilience, networks resilience and reduced blockage.

3.1.3. THE SATELLITE TERMINAL

Due to the modular build up the solution can be deployed with:

- An on-the-move or on-the-pause solution with a vehicular GX terminal
- A rapid deployable or stationary GX terminal

The terminal can therefore be tailored to best suit the user application. In the next paragraphs we will present the 2 options.

3.1.3.1. THE GETSAT MILLISAT W GX ON-THE-MOVE TERMINAL

In early 2019 Inmarsat Type Approved the GetSat Millisat W GX. GetSat terminals are the market's smallest and lightest communication-on-the-move terminal with fully autonomous operation to transmit and receive high bandwidth data rates on

the move. The terminal has been extensively tested and demonstrated live on Global Xpress by Inmarsat, in the field in Europe and the United States in 2019.

G2X Land services are provided with up to 6 Mbps Forward CIR and 1 Mbps Return CIR, with return rate MIR up to 3 Mbps. The solution is designed for operation over 20 degrees elevation, below which performance can degrade and blockages can be a major issue. It has to be noted that when the terminal, while on the move, lost line of sight with the satellite due to blockages like buildings or trees it took only a few seconds before automatically picking up the signal again and continue the (IP) connectivity. The terminal performed very well on rough terrain while on-the-move, keeping the throughput and connectivity consistent.



Figure 6: The GetSat Millisat W GX vehicular terminal - comms-on-the-move



3.1.3.2. GLOBALXPRESS CIR AVAILABILITY SLA FOR GETSAT MILLISAT W GX

Due to the terminal characteristics of the GetSat Millisat W GX terminal the CIR is only applicable in specific regions. Outside of these regions it is a Best Effort service. In the graph below the CIR is only applicable in the shaded regions.

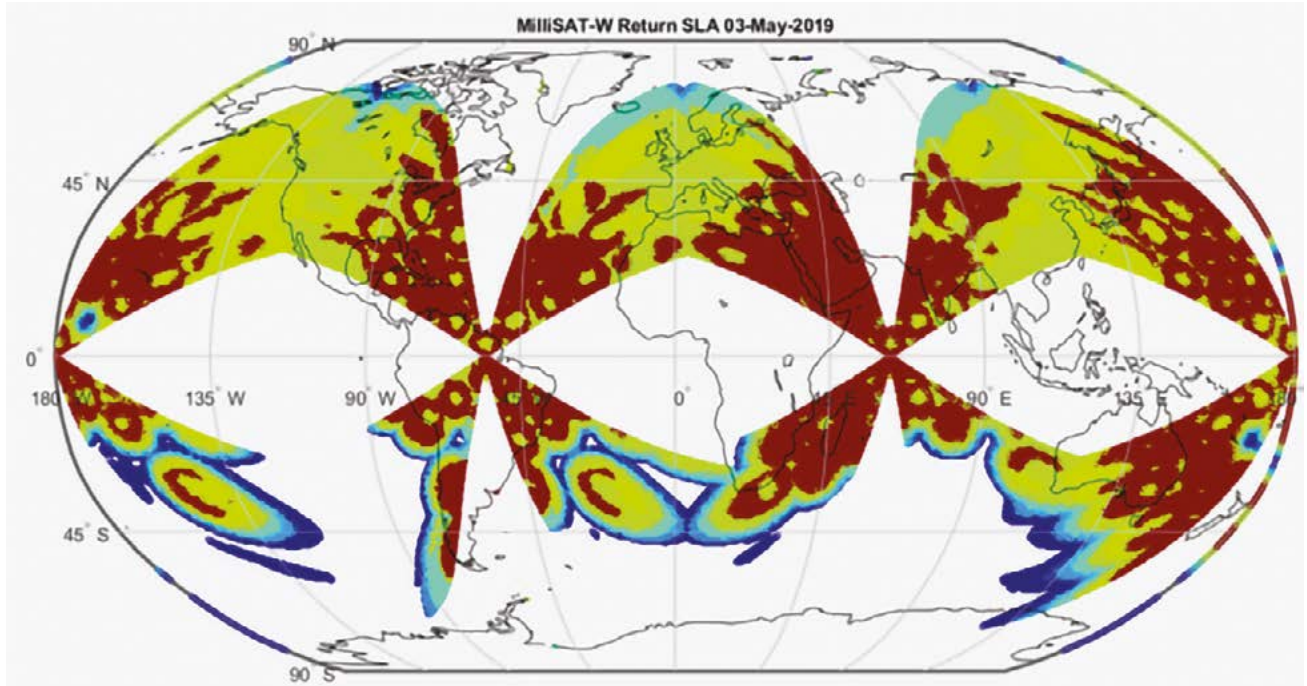


Figure 7: CIR availability map GetSat Millisat W GX



Figure 8: GlobalXpress Type Approved land terminals

3.1.3.3. RAPID DEPLOYABLE GX TERMINALS

There is a wide range of rapid deployable GX land terminals available. The Global Xpress for Government terminal catalogue gives the latest overview of the type approved terminals for Air, Land and Sea. Please request your Official Inmarsat Partner or your Inmarsat Account Manager for the terminal catalogue.

3.2. POWER OPTIONS

The available power kit consists of a Peli Case with the following content built in:

- 24V 200-300 Ah battery.
- 230V mains to 12V-48V converter – min. 1500 Watt.
- Simultaneous UPS and recharge capability 230V.
- Multi options connectors and sockets (commercial standard & military standard).

The power kit will supply power when other power options are (temporarily) not available. Based on the typical usage the power kit battery life is approximately 8 hours.

3.3. SECURITY AND C2 ENABLEMENT SYSTEM

The Security & C2 enablement system is a GRC Scytale solution (<http://www.grcltd.net/solutions>) and in use by several NATO military end users. This solution supplies multi agency users with a private communication network anywhere in the world. Carried in a single Peli Case back pack, the Scytale Lite provides a VoIP, satellite and a wired or wireless data network that can be deployed and configured in less than five minutes - an ideal solution for military users that require quick, flexible communications, with options of a secure VPN. The solution comes in several options from large scale to very small scale deployments. The Scytale version included in the Mobile Forward Command Post comes with 2 VoIP phones, a secure Wi-Fi hotspot of a range of max. 150 meters and end-to-end VPN for secure access to remote applications.



Figure 9: GRC Scytale - Security & C2 enablement system

3.4. RANGE EXTENDER

The range extender extends the secure network and access to dismounted soldiers in the field. The range extender is an Athonet 4G/LTE tactical bubble (<https://www.athonet.com/missioncritical/>) that comes in 2 options:

- Backpack Tactical Bubble: range max. 5 km – 150 Watt – small antenna



Figure 10: Athonet backpack LTE tacticle bubble

- Cube Tactical Bubble: range max. 50 km – 750 - 1500 Watt – x meter telescopic antenna



Figure 11: Athonet Cube LTE tacticle bubble

The range extender options provide field-proven transportable standalone LTE network solutions with a Centralized Mobile Core that is back hauled over GlobalXpress. As both the LTE Tactical Bubble and the GX back haul are multi-megabit connections, the soldiers in the field will be capable of using a wide range

of applications such as video conferencing, transmitting or receiving ISR imagery and video, VoIP, PTT, chat and access to various server or cloud based applications. These will be delivered to small, handheld “mobile phone” type devices, which can be handheld or strapped to the soldiers



4. COMMERCIAL INFORMATION

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