Harnessing the Right Inmarsat Service Successfully for your Business

Manoj Mohindra,
Solutions & Sales Engineering,
Inmarsat Maritime

What I will cover?

1. The Maritime Product Portfolio

2. Inmarsat Adding Value

3. A look at the future of Maritime Communications

inmarsat

First things first - INMARSAT!

> Strong Maritime presence with 32 years of experience

> 500,000 Global terminals

- 250,000 maritime terminals

- >30,000 FleetBroadband active installations

> The only GMDSS provider for Maritime

> Future secure, Alphasat & Global Xpress

> We are the Gold Standard – for all our Markets.

inmarsat

1. Maritime Product Portfolio

(a) Networks / Satellites
(b) Terminals
(c) Unique Capability

inmarsat

Committed to servicing User Needs
Realities of today & into the future

I-4   I-4   I-4   AlphaSat   Global Xpress

| 2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018

➡ L-band to remain a major component of Inmarsat services

➡ A new generation of broadband MSS at Ka-band

➡ Independent from L-band constellation, but integrated as a service offering

➡ Life Expectancies into late 2020's

Future Needs driven by requirements for:

- **high bandwidth demand,**
- **worldwide coverage,**
- **dynamic / flexible resource mgnt.**

Provide the capacity where it is needed, when it is needed!

© Inmarsat confidential

a1. Existing & Evolved   I-2 & I-3 Satellite Network (8)
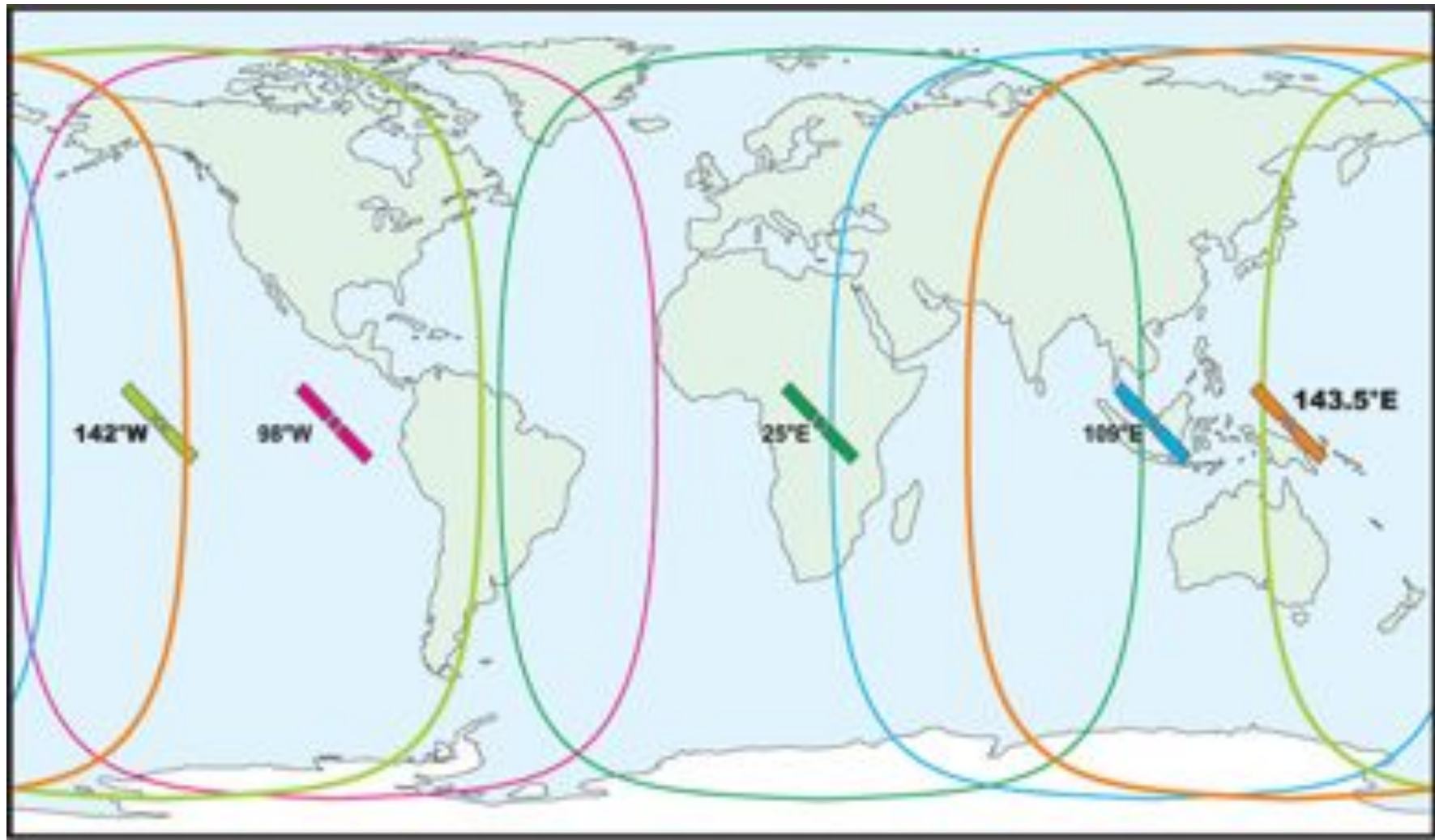
a2. Existing & Evolved (E&E) (I2 & I3 Satellites)

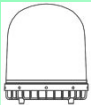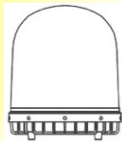| Service	Launch	Voice	Fax	Telex	Data	GMDSS	Beam
Inmarsat-A	1982	√	√	√	Analog 9.6/64k	√	Global
Inmarsat-C	1991		√	√	Digital 0.6k	√	Global
Inmarsat-B	1993	√	√	√	Digital 9.6/64k	√	Global
Inmarsat-M	1993	√	√		Digital 2.4k		Global
Inmarsat-E	1996				EPIRB	√	Global
Inm mini-M	1997	√	√		Digital 2.4k		Spot
Inmarsat D+	1998				Digital 0.02k		Global
Inmarsat GAN	1999	√	√		MPDS(be) /ISDN 64k		Spot
Inm mini C	2002		√	√	Digital 0.6k	√	Global
Fleet-77	2002	√	√		MPDS(be) / ISDN 64k	√	Global
Swift-64	2002	√	√		MPDS(be) / ISDN 64k		Spot
Fleet-33	2003	√	√		MPDS(be) / 9.6 k		Global/Spot
Fleet-55	2003	√	√		MPDS(be)/ ISDN 64k		Global/Spot

inmarsat
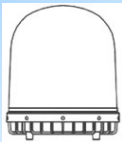
a3. Three Inmarsat BGAN I-4 Satellites
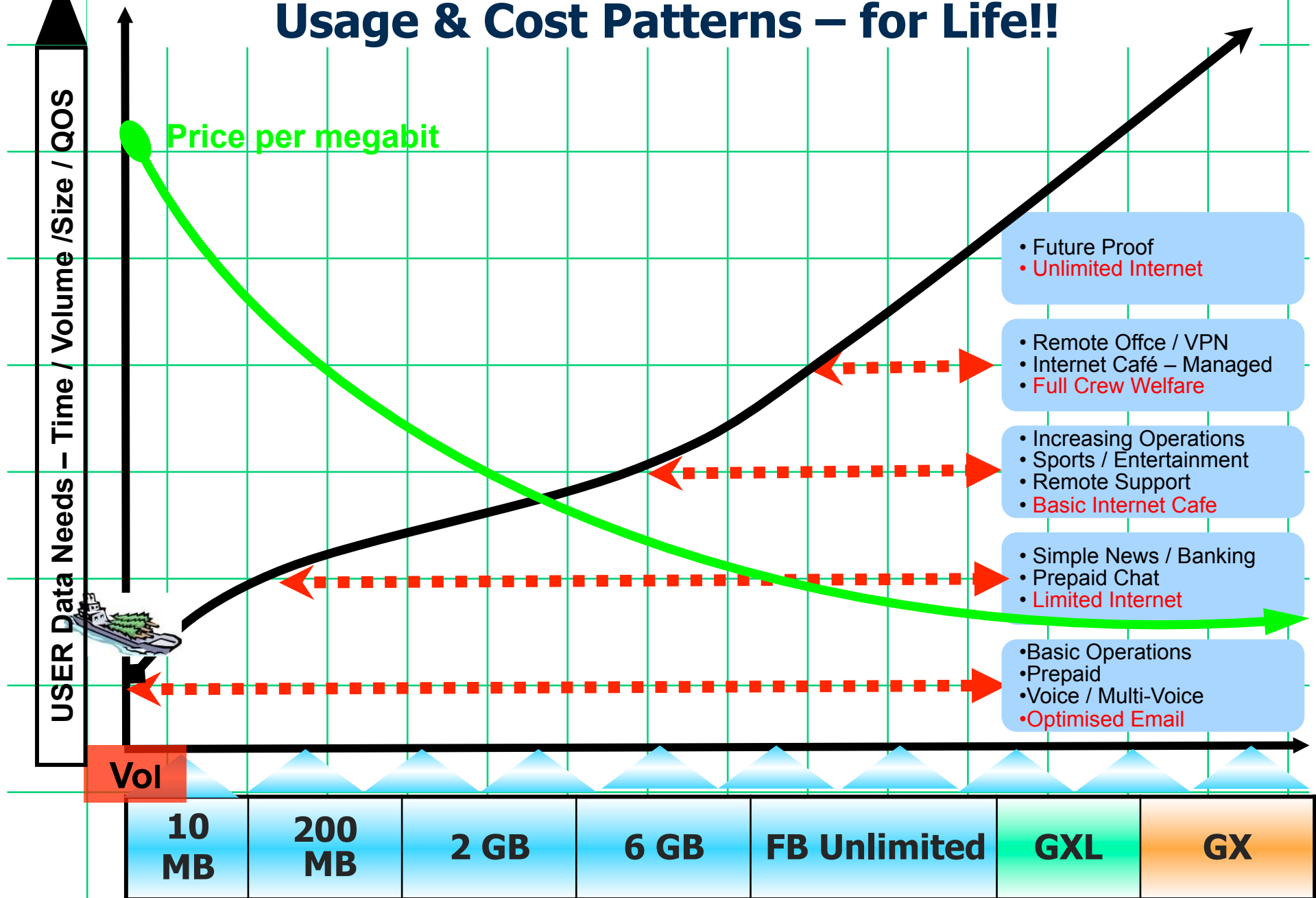

F3* F2 F1 F3*
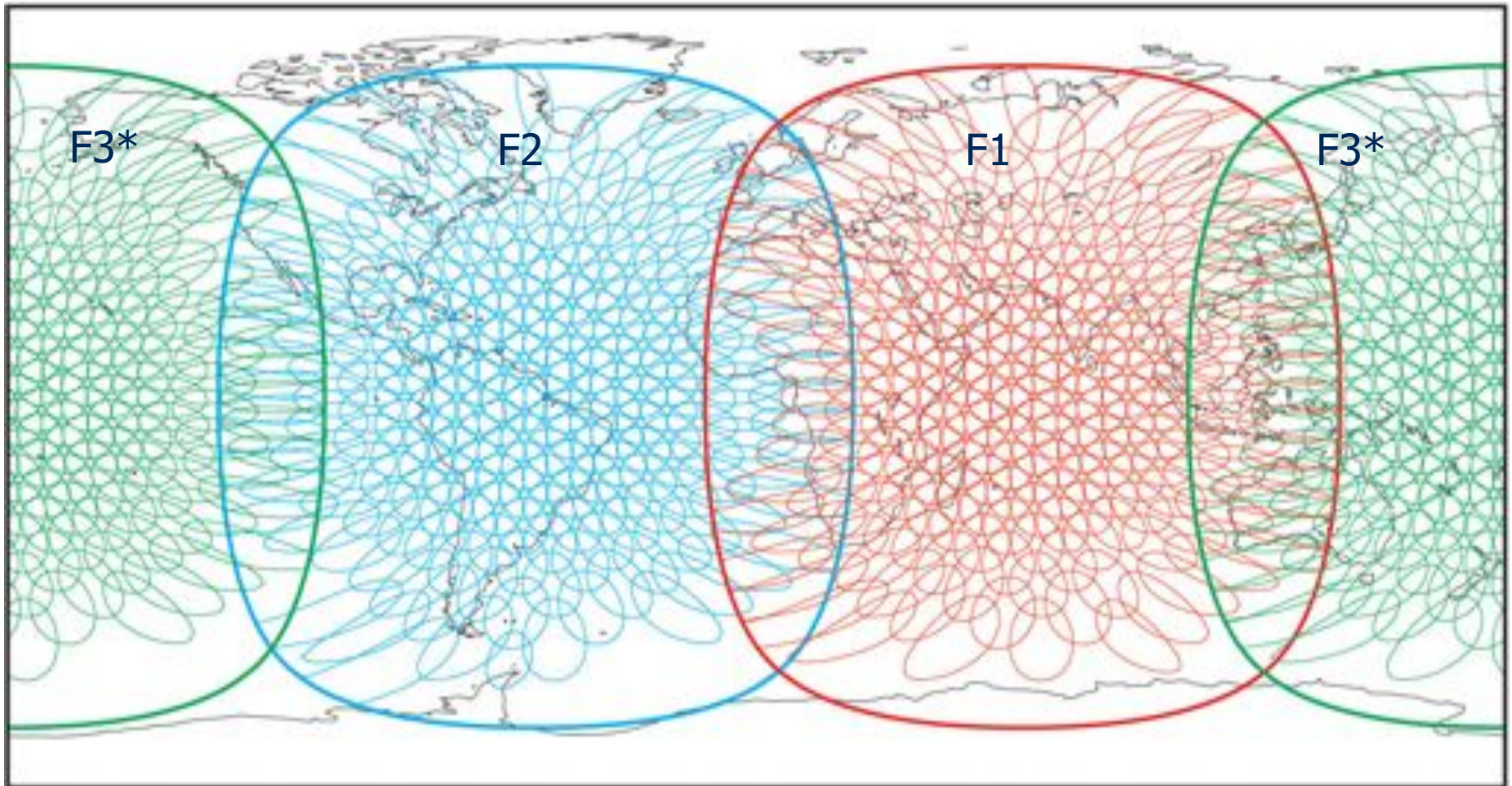
3 Satellites at 53°W, 64°E & 178°E

… with the FleetBroadband Range of Services

inmarsat

Hardware Definition	FB 500 (Class 8)	FB 250 (Class 9)	FB 150	GlobalXpress
Radome View				VSAT /GX &
Antenna Diameter	~ 55cm	~ 25cm	~ < 25cm	~ 1m / 60cm
Antenna G/T (at 5° elvn)	-7 dB/K	-15 dB/K	-	Tbc
Antenna EIRP	22 dBW	15.1 dBW	-	Tbc
Antenna Type	Directional / Stabilised	Directional / Stabilised	Directional / Stabilised	Directional / Stabilised
Antenna target Weight	15 - 20 Kg	3 - 5Kg	3 Kg	-
Voice (Simultaneous with data)	4 - 9 Voice Channels (4kbps)*	4 - 9 Voice channels (4kbps)*	4 Voice channels (4kbps)*	4 + 1 Voice channels
Contended StdIP Tx/Rx Kbps best effort	Up to 432 / 432 (No CIR)	Up to 239 / 284 (No CIR)	Up to 150 (No CIR)	768 / 768 kbps until 2013 1536 / 1536 kbps end 2013
No of PDP Contexts	Upto 11	Upto 11	1	1 + upto 11
ISDN Data	Yes	No ; 3.1Khz audio only	No	Yes on FB
I.P. 'Streaming Mode' Guaranteed Kbps	32, 64, 128 & 256	32, 64, 128	None	Like FB 128 kbps CIR upto 2013 256 kbps CIR from 2013
GMDSS**	SOLAS / Non-Solas / 505	Non-Solas / 505	Non-Solas / 505	Non-Solas / 505 on FB
Package Plans	Limited / AYCE / FAP (No CIR)	Limited / AYCE / FAP (No CIR)	Limited	Unlimited / Fixed / FAP (Yes CIR & MIR)
Interfaces / Ports	RJ11, RJ45, ISDN-RJ45, L-band	RJ11, RJ45, ISDN-RJ45, L-band	RJ11, RJ45	RJ11, RJ45, Others.

b2. NEW PORTFOLIO – Matches Your - Monthly Usage & Cost Patterns – for Life!!

Price per megabit

USER Data Needs – Time / Volume /Size / QOS

Vol

- Future Proof
- Unlimited Internet

- Remote Offce / VPN
- Internet Café – Managed
- Full Crew Welfare

- Increasing Operations
- Sports / Entertainment
- Remote Support
- Basic Internet Cafe

- Simple News / Banking
- Prepaid Chat
- Limited Internet

- Basic Operations
- Prepaid
- Voice / Multi-Voice
- Optimised Email

| 10 MB | 200 MB | 2 GB | 6 GB | FB Unlimited | GXL | GX |

(c) Inmarsat Maritime – Unique Capability

1. Delivering Quality Performance

2. Dynamic Network Management

3. Provisioning Dedicated "Last-Mile" Interconnects

4. FB is One Device and 3 Networks.

5. High Calibre & Capability of our Channel

inmarsat

c1. Delivering Quality Performance
Dynamic Network Management

| INMARSAT	ROBUST

> Inmarsat – Controls own **satellite capacity & Spectrum** based on user consumption & control globally.

> Inmarsat – Manage & monitor **quality globally**.

> FB Performance is always up to **432 be kbps** delivering bandwidth when & where needed.

> As you all know **L –Band (Inmarsat)** operates through any weather.

> Inmarsat has **Seamless Coverage** - Average network up time = **99.998%**

> Best for all **Safety & Business critical** applications.

c.2 Ensure User's Office is ready to be connected to the FleetBroadband? (Last-mile)

Consider a **Dedicated link** from DP to your HQ/Corporate IP Connections ("last mile") via:

> Via Dial-up, ADSL, Wireless, Cable, Vsat, shared access of VSAT, Cable, mobile-to-mobile

> Via (bonded-on-demand) ISDN, Leased lines, Internet-based MPLS, Diffserv

> (Vital for End-to-End QOS using FB Streaming service)

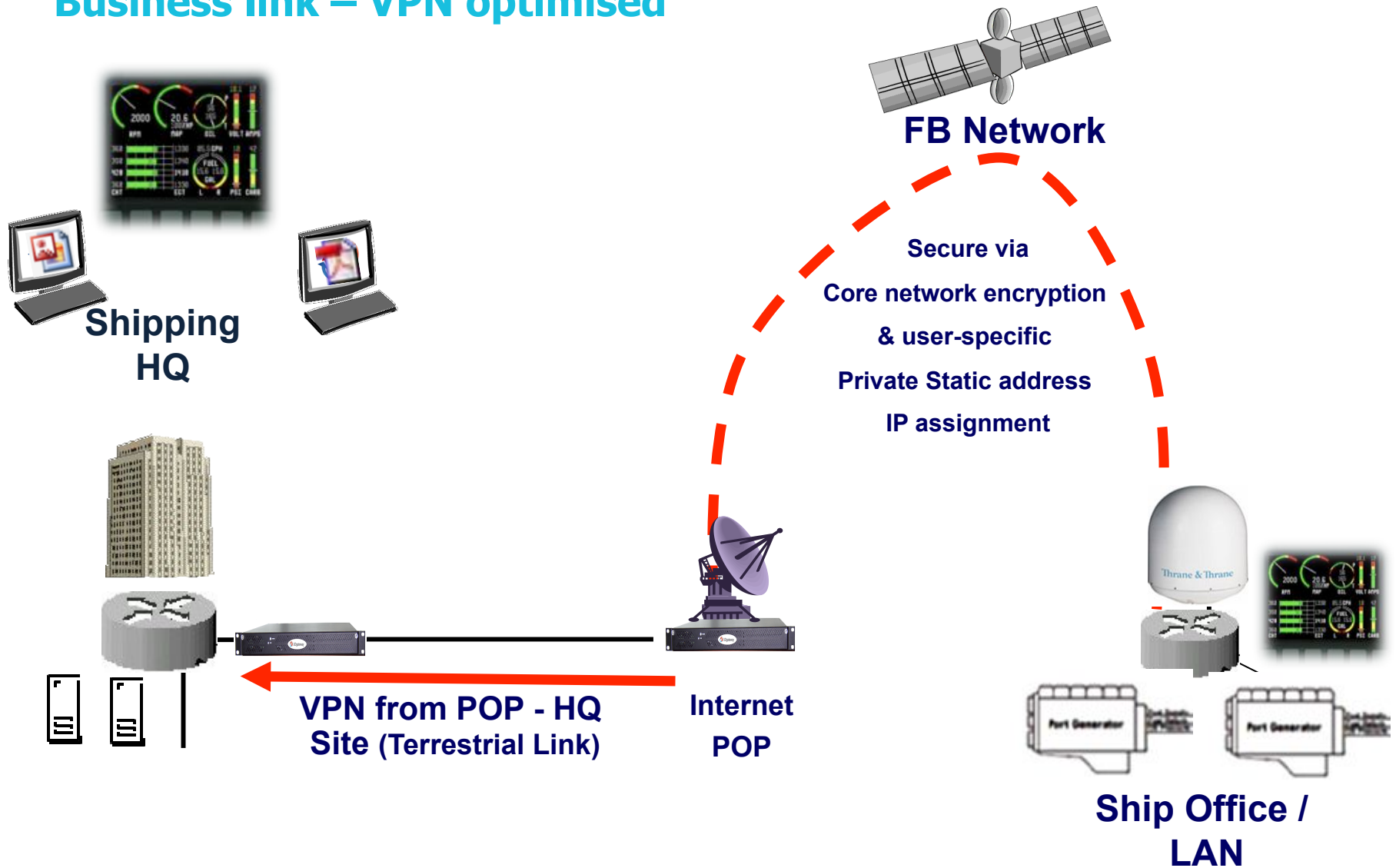**DP /SP / INM**

Internet

DP/SP

FB SAS

Shipping HQ
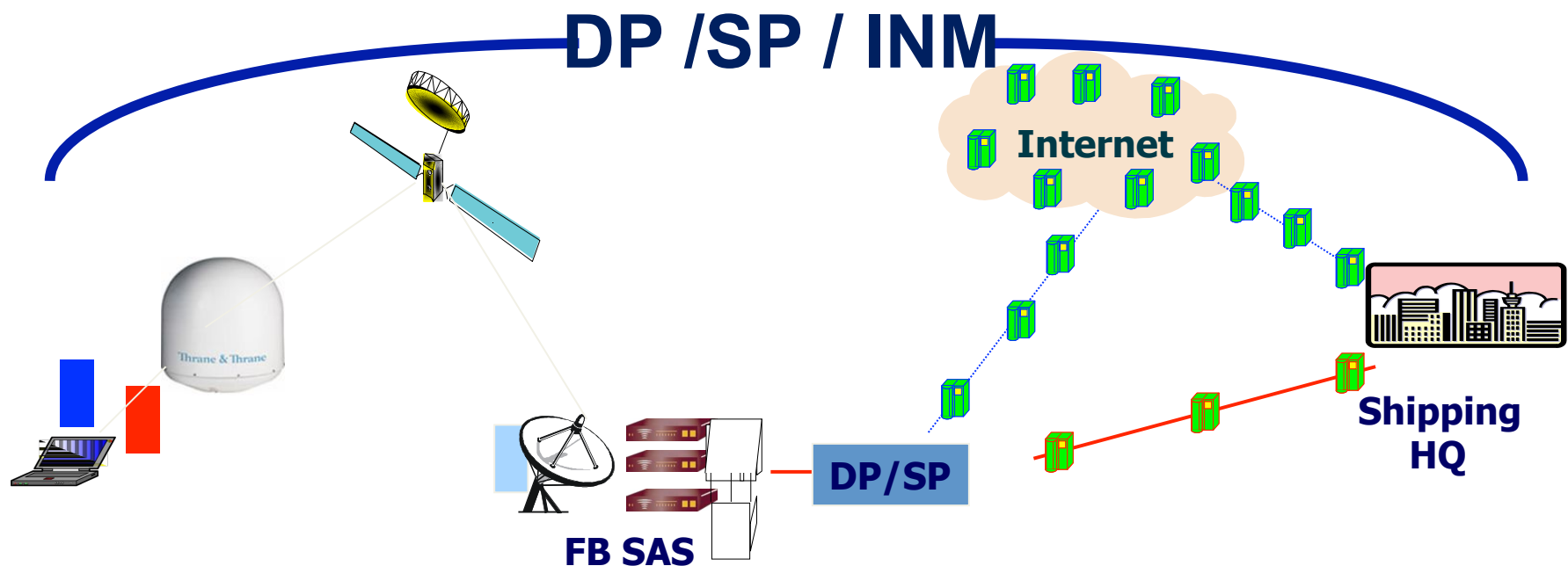
Note: Need for **DEDICATED, Assured or guaranteed** QOS

inmarsat

VPN/remote office/intranet

Business link – VPN optimised

FB Network

Secure via

Core network encryption

& user-specific

Private Static address

IP assignment

Shipping HQ

VPN from POP - HQ Site (Terrestrial Link)

Internet POP

Ship Office / LAN

c.6 FB: one device, 3 networks

(5) Meanwhile, your file exchange server sets up another simultaneous connection dedicated for its batch FTP to HQ

(6) A crew member realises he needs to call his wife and sets up a VOIP call on another dedicated connection.

(4) Engineer from Engine Room, liaises with expert on shore check the parts or fittings – so starts a simultaneous streaming channel dedicated for the camera

32Kbps
VoIP

64kbps

Batch/ FTP

(7) Crew are also sending/Receiving SMS

SMS

(1) Single FB Terminal with single SIM card – starts with STD-IP connection. With other simultaneous connections from different locations onboard

128 kbps

Video

WebMail

Voice

Voice

Voice

Voice

Chat / Browsing

(3) The Captain receives a Telephone calls, Superintendant can call from HQ, Officer can make call to suppliers

(2) Crew can begin Browsing or Email or Interactive access sharing this connection.

Legacy CS Traditional

Interactive Best Effort Standard

Batch High QOS Special

c.7 High Calibre & Capability of our Channel

1. **Worldwide / Regional / Local:**

   - **Access to variety** of Distribution Partners, Service Providers, Dealers & Agents close to the customer.

2. **Channel Accreditation Schemes:**

   - Service Providers are **up-skilled regularly** with the latest Best Practice, Integration knowhow & Advanced solutions (ASAP).

3. **Solutions / Applications Accreditation schemes:**

   - **Off-the-shelf applications** are Tested & Accredited for effective & optimised functionality across our network.

   - This gives users & partners confidence to deploy **solutions risk-free**.

4. **Proof-of-Concept Trialling:**

   - **Enables New & Innovative applications** to be tested live to enable End-customers gain confidence to deploy verifiable solutions.

   - Selected trials benefit from **free airtime and expert consultancy** from Inmarsat or channel.

5. **Their Value Added Services:**

   - To meet integration demands from customers.

inmarsat

c.8 The <u>Inmarsat Advantage…..</u>

> **Reliability:** Inmarsat is leading provider of satellite communications services, Inmarsat is here for the customer today & in the future, Inmarsat is financially stable.

> **Scalability/Future proofing :** Inmarsat offers customers industry leading products today with seamless transition into new groundbreaking technologies in the future.

> **Unparalleled Quality:** Inmarsat offers unparalleled quality of service/ products to the customer (network, terminals).

> **Really Global:** Inmarsat is a truly global company, with global support, global distribution, global network coverage.

> **Right Portfolio:** Inmarsat is attentive to the needs of the customers & can deliver - the right solution to meet the varying customer needs & deliver value for money – for life!

inmarsat

… That delivers a High Total Cost Benefit through…..

> **Network Uptime**

- **Are there gaps or issues with the service?**

> **Product Reliability**

- **What is the standard of reliability?**

> **Scalability**

- **Is there an upgrade path for improved services?**

> **Future Proofed**

- **What are the plans for the next generation service?**

> **Financial**

- **Will your supplier be there tomorrow?**

> **Right for me with whatever requirement I have?**

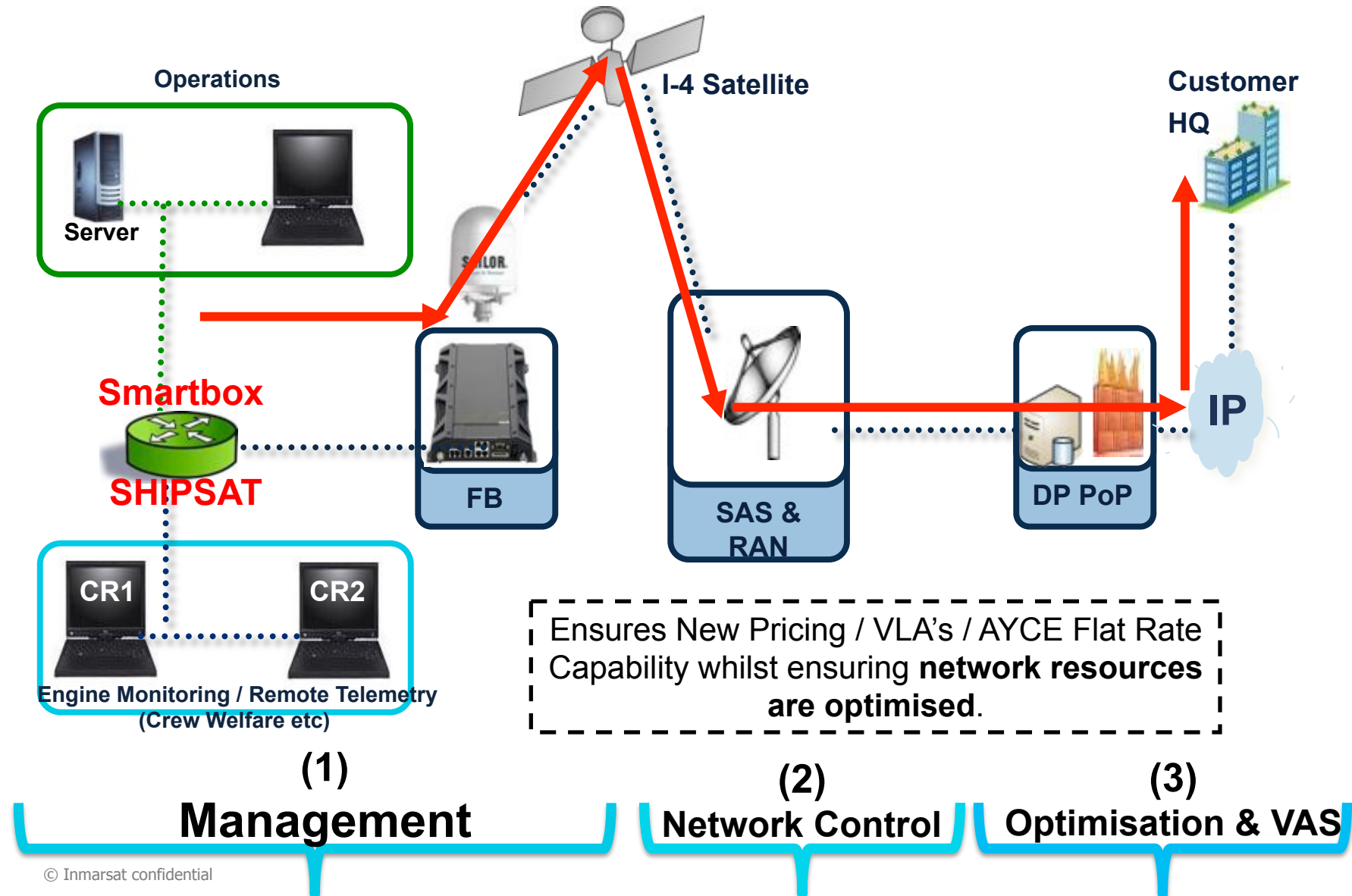- **is provider attentive to the users varying needs & requirements whilst delivering value for money ?**
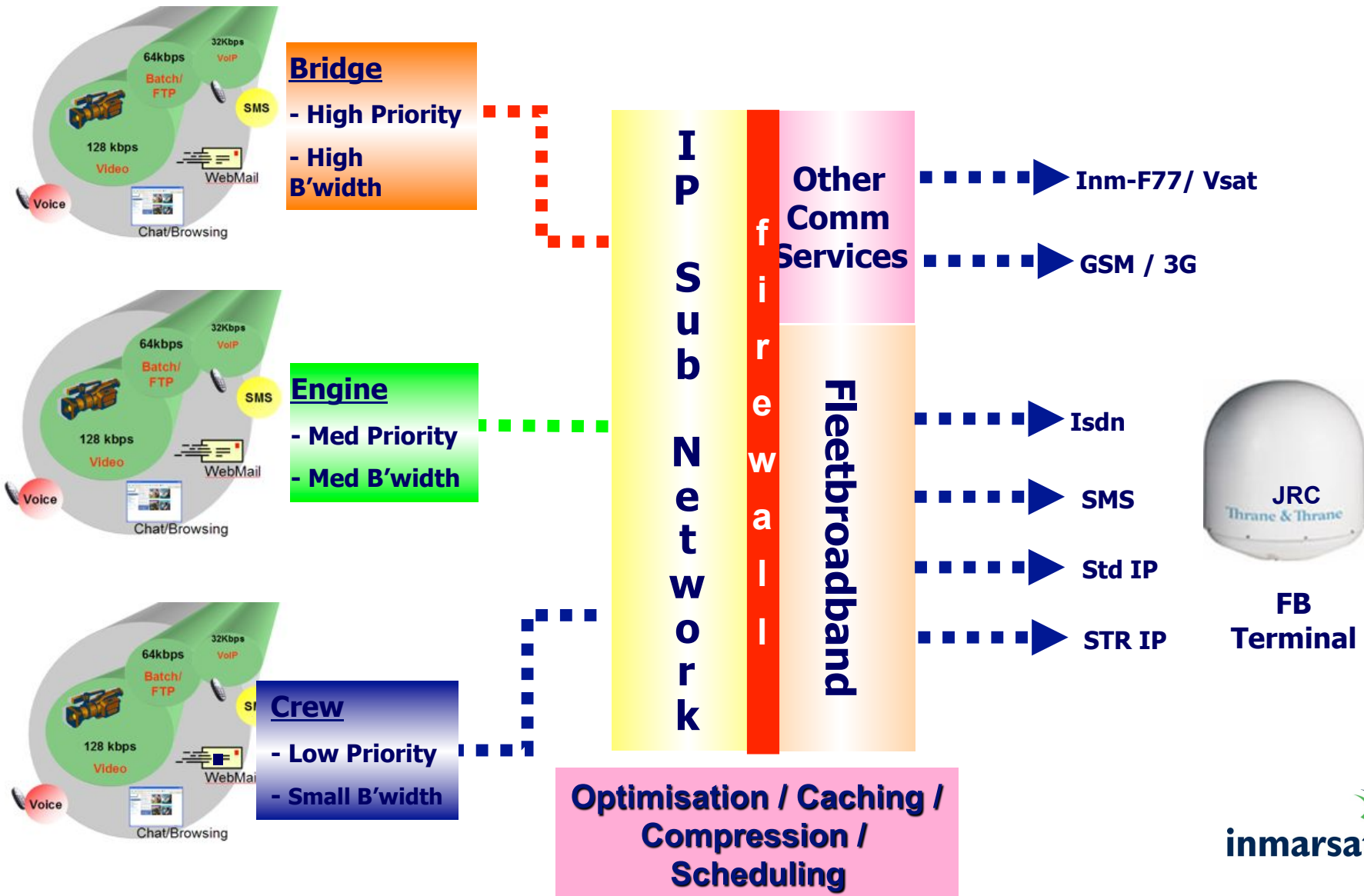
2. Inmarsat Adding Value

2.1 End-to-End Managed Services
(Relies upon 3 Core Components)

Operations

Server

I-4 Satellite

Customer HQ

Smartbox

SHIPSAT

FB

SAS & RAN

DP PoP

IP

CR1

CR2

Engine Monitoring / Remote Telemetry (Crew Welfare etc)

Ensures New Pricing / VLA's / AYCE Flat Rate Capability whilst ensuring **network resources are optimised**.

(1)
Management

(2)
Network Control

(3)
Optimisation & VAS

2.2 Delivering the "Smartbox" On-board

Bridge
- High Priority
- High B'width

Engine
- Med Priority
- Med B'width

Crew
- Low Priority
- Small B'width

IP Sub Network

firewall

Other Comm Services

Fleetbroadband

Optimisation / Caching / Compression / Scheduling

Inm-F77/ Vsat

GSM / 3G

Isdn

SMS

Std IP

STR IP

JRC
Thrane & Thrane

FB Terminal

inmarsat

2.3 Embedded New Enhanced IP / VAS Feature
(SP's are Accredited for a range of these)

1. Hub POP Solution or Proxy ✓

2. Client side (Onboard) H/W with Local web cache & Local Firewall ✓

3. > 50 % Compression on Downlink / > 50 % Compression on Uplink ✓

4. Potential for full picture resolution on demand ✓

5. Tamper proof (config or h\w cannot be bypassed) ✓

6. MAC locking of any client h\w if used ✓

7. QoS control for different VLAN on onboard network segments ✓

8. H\W Firewall on vessel (Prevention of unwanted traffic and apps) ✓

9. Sophisticated Firewall on Hub / POP ✓

10. URL filtering / Advertisement blocking / Flash content blocking ✓

11. Category filtering (P2P, video, music, anonymiser) ✓

12. Corporate Policy Consultation with customer (Adult, gambling etc) ✓

13. Presentation layer filtering (video & audio extensions) ✓

14. Port and IP filtering. / Auto suspend capability ✓

15. Facility for Web analysis & Report logging ✓

16. Optimised e-mail (compression & attachment control) ✓

17. Secondary Voice facility e.g. VoIP < 8kbps per user ✓

18. User access control (user allocation credit mgMt) – Pre / Postpaid / Sponsored ✓

19. Volume notification and alerts via e-mail or SMS ✓

20. Chat optimisation ✓

21. Volume triggered application groups - (If vol. Is >x then e-mail only or chat) ✓

2.5 Terminals Offer a Variety of NETWORK, TECHNICAL & IP Features (Compliance with global Standards and Approved)

> **Multiple LANs** on-board

> **Separate "virtual" IP connectivity** for each application or Function.

> **Separate Billing** & logging if required.

> **Separate IP addresses** for user or application-specific shore-to-ship routing.

> Standard ubiquitous Interfaces **on-board** – RJ45, TCP, IP, Internet, Web.

> Standard ubiquitous Interfaces **on-shore** – Internet, Web, Databases etc.

> Service provides **high quality, high speed & accessibility anytime anywhere.**

> Standard kit on most large vessels today **> 30K** active implementations.

> Supports **Variety of COTS Applications**, Compressions and Protocols.

> FB delivers a **variety of connectivity types** with differing features & capabilities.

inmarsat

3. Inmarsat Global Xpress™:

A look at the future of Maritime Communications
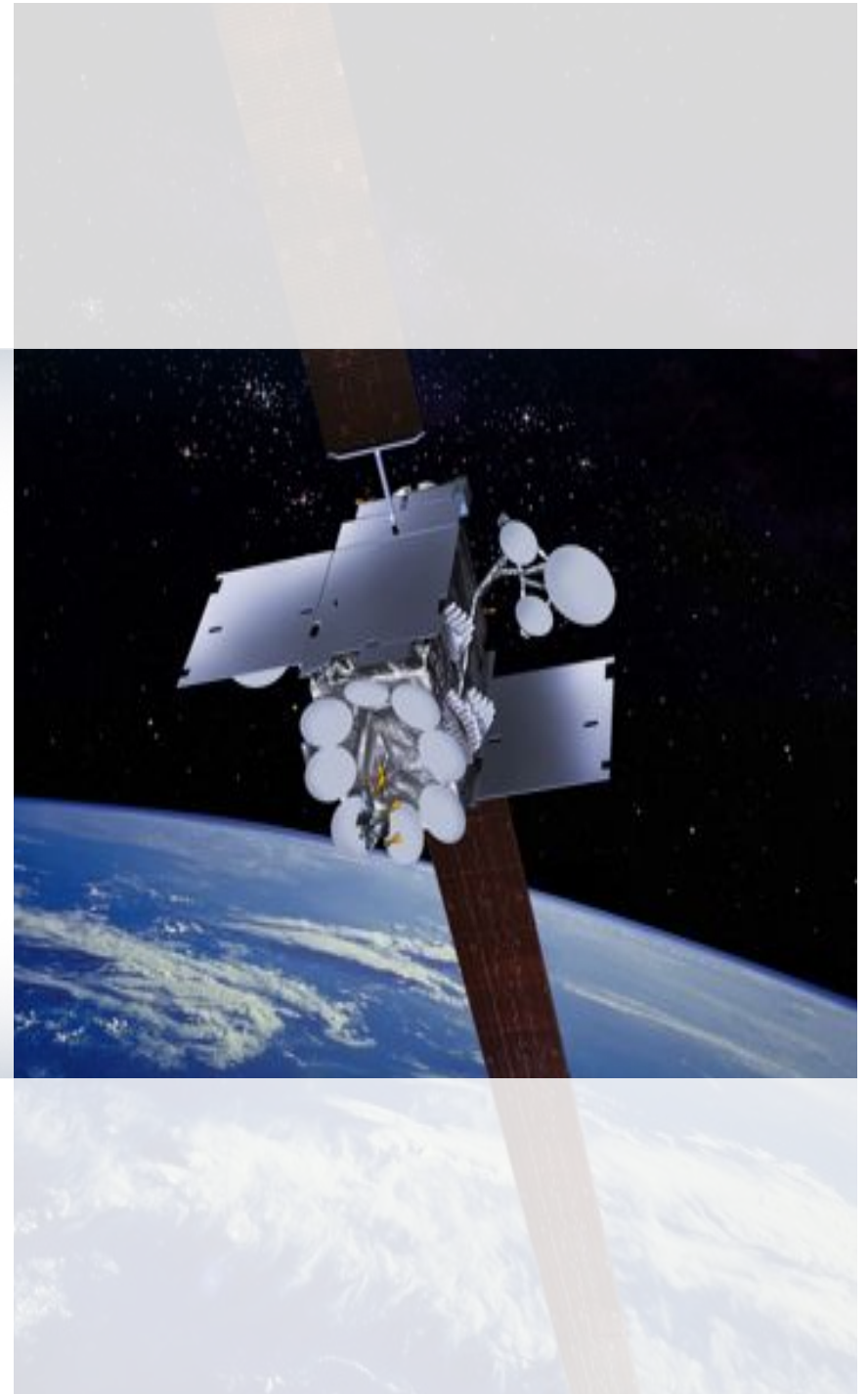
3.1 GX I-5 Satellites

➔ **Global service**

- Service delivering upto 50 Mbps to the ship.
- 89 fixed beams per satellite for global coverage in three satellite configuration
- 72 pairs of 40MHz channels at Commercial Ka-band for Global Service

➔ **High Capacity Overlay service (HCO)**

- 6 steerable spot beams per satellite for multi-regional, dynamic coverage
- Concurrent commercial and military Ka-band services.
- Channelizing from 40MHz - 800MHz

➔ **Satellites contracted delivery at launch sites:**

- I-5 F1   Q3 2013
- I-5 F2   Q1 2014
- I-5 F3   Q3 2014

inmarsat

3.1 GX Spot Beam - Design Advantages

> **Unique spot beam design**

– Global beam composed of 89 spot beams

– Frequency reuse ensures high capacity in each individual spot beam

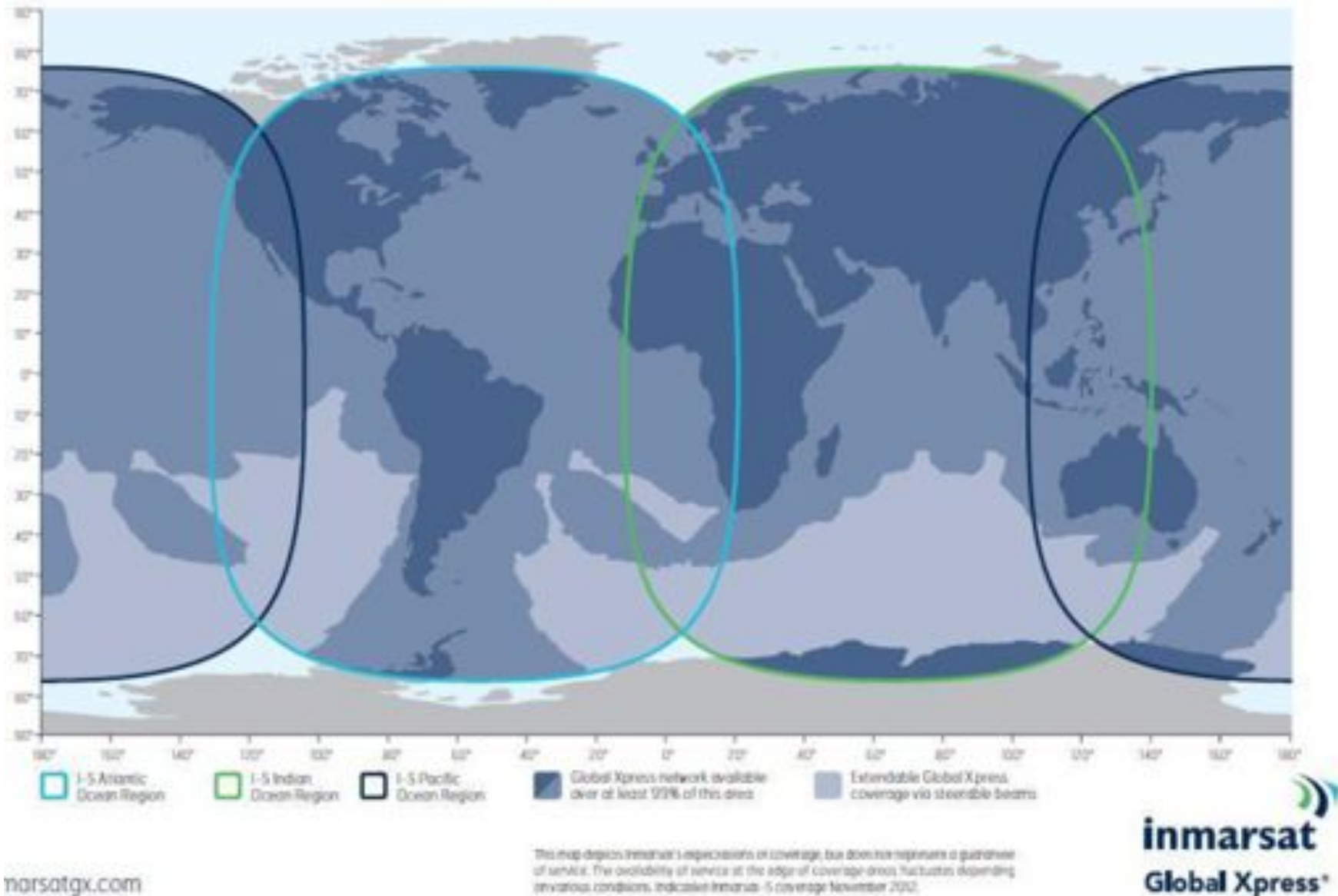– Seamless switch between spot beams

> **Bandwidth Sharing Capability**

– Load balancing between beam pairs

– Dynamic re-allocation of capacity
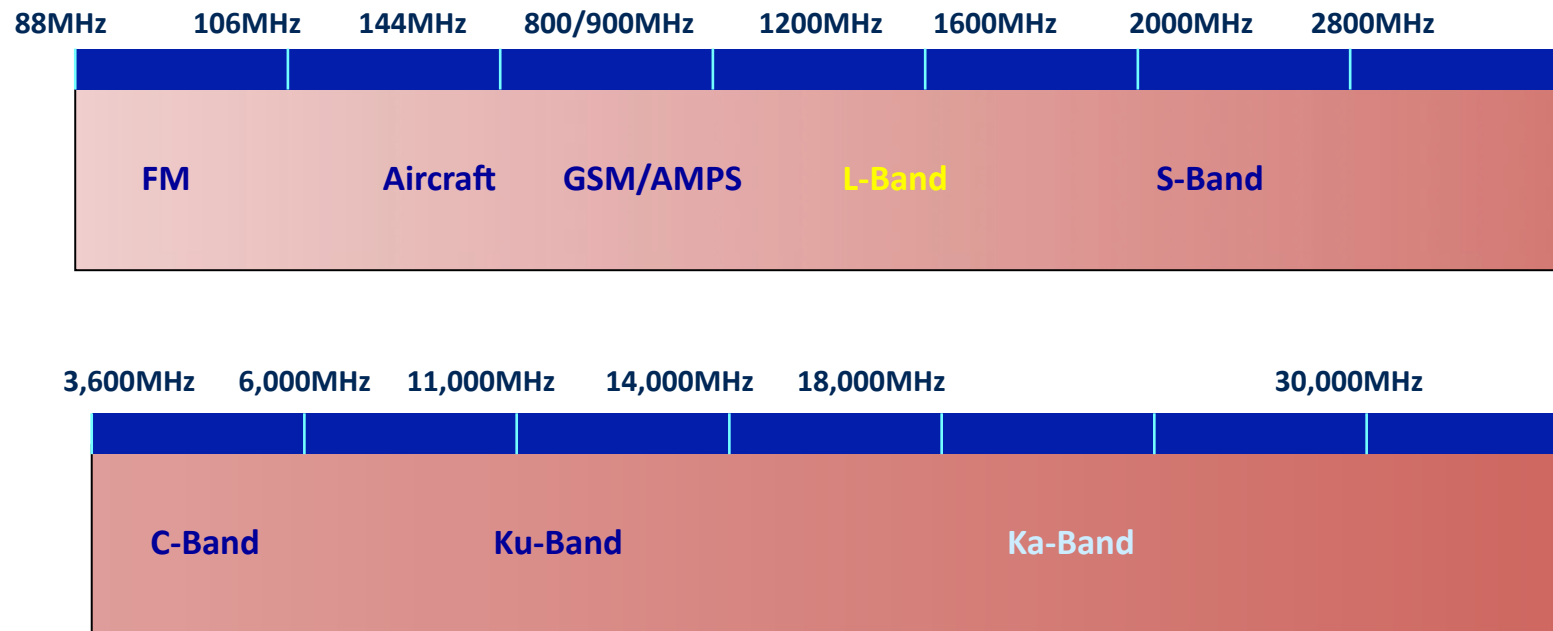
> **High Capacity Overlay Beams**

– Additional steerable beams for additional capacity in high traffic areas

inmarsat

3.1 GX – Global Coverage – Ka & L

3.2 Frequency Spectrum – Why Ka?

88MHz	106MHz	144MHz	800/900MHz	1200MHz	1600MHz	2000MHz	2800MHz

FM	Aircraft	GSM/AMPS	L-Band	S-Band

3,600MHz	6,000MHz	11,000MHz	14,000MHz	18,000MHz	30,000MHz

C-Band	Ku-Band	Ka-Band

inmarsat

# 3.2 Ka-Band Performance

> **Performance in normal conditions**

- Higher performance than Ku

- Full power spot beams in the middle of every ocean

- Full power performance **right to beam edge**

> **Performance in adverse weather conditions**

- Less than 1% difference from Ku-band in adverse weather

- Next generation **adaptive code modulation (ACM)** minimizes rain interference

- Throughput reduces in steps, till GX **L-Band** offers higher performance

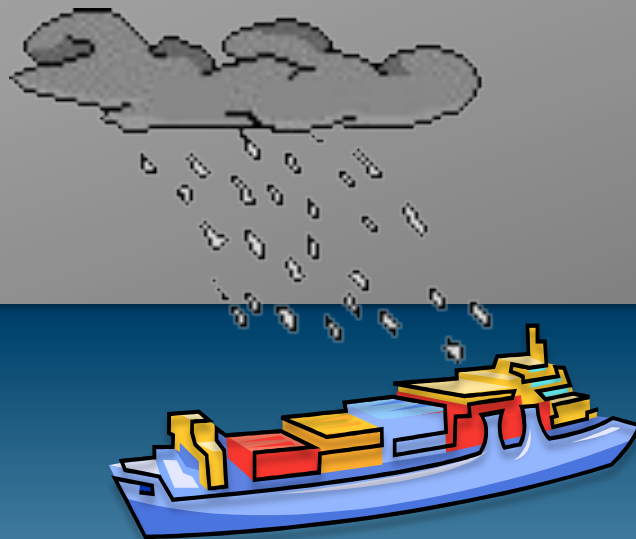- 1m GX antenna in place of 60cm antenna provides further improvements.

inmarsat

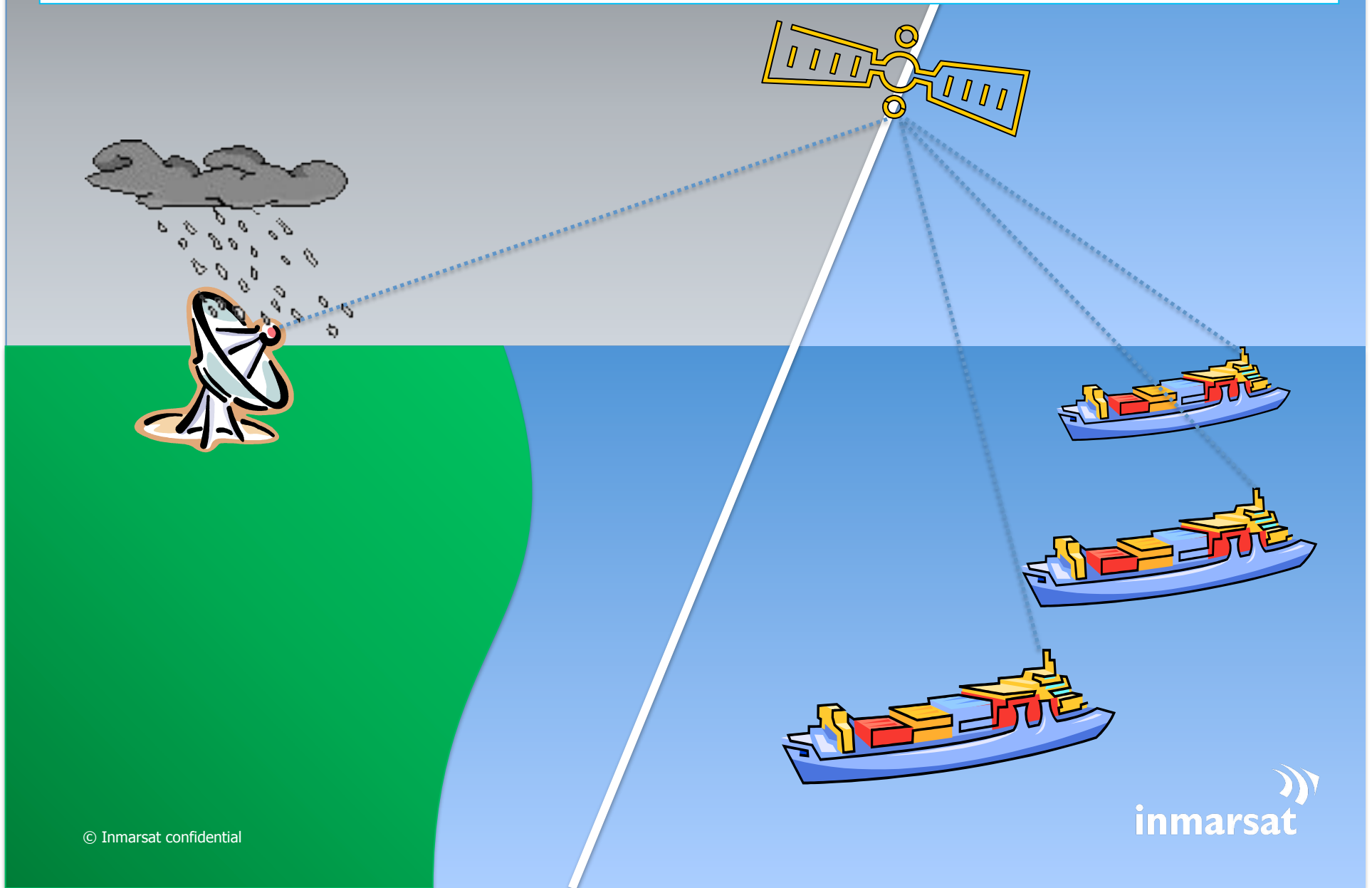# 3.2 Significant Variation in VSAT Performance across ONE SPOT BEAM
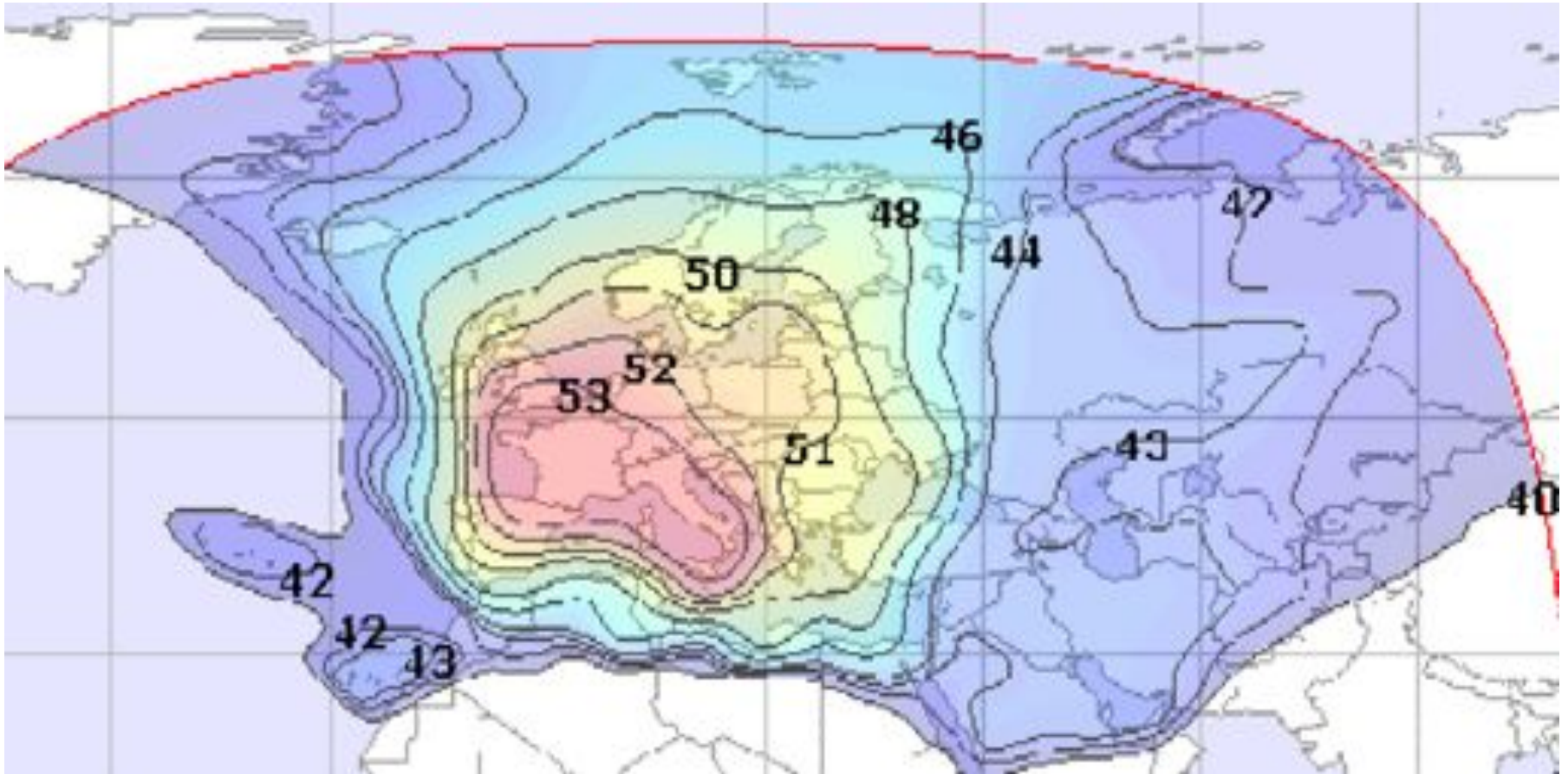
3.2 Impact of Weather conditions?

Where else can rain interference occur?

inmarsat

3.2 Rain at a **Ku** teleport interferes with **ALL** ships
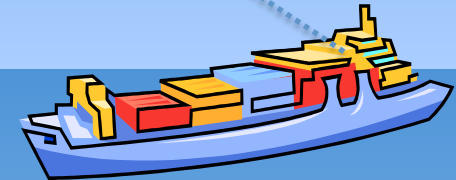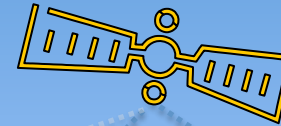
© Inmarsat confidential

3.2 GX Ka has Dual-SAS Design

GX SAS
Site #1

GX SAS
Site #2

- Two GX SAS sites in each ocean region

- Physical separation of hundreds of miles

- Automatic switchover

- Virtually eliminates SAS outages

Inmarsat Continues to deliver High quality Redundancy for GMDSS & now Ka band resilience

inmarsat

3.2 So, GX Network Design Advantages are…

> **Future proof network**

- **60 cm GX-Ka** terminal has far higher capacity than a **1m Ku**

- Overlaying beams can expand capacity where needed

- Additional Ka-band satellites can be added to constellation

> **Hybrid L-band network – with no incremental cost**

- Where regulations prohibit GX Ka

- Line of sight blockage to satellite

- Maintains connectivity with **same IP address** at changeover

- Continue full VoIP capability during GX L-band use

inmarsat

3.3 The Gx Network Delivers.....

Superior design....Superior performance

› A Design for reliability and performance

- Next-gen ACM handles rain at the ship

- Dual SAS sites for redundancy (rain & local outages)

- Near-global Ka-band coverage

- Spot beam design offers consistently higher performance

› FleetBroadband high performance, global backup

- Weather, coverage and local blockages

- Regulatory outages

› The result: 99.98% availability

inmarsat

3.41 What is Service Enablement?

The main functions

A unified network (initially GX + FBB) for mobile users:
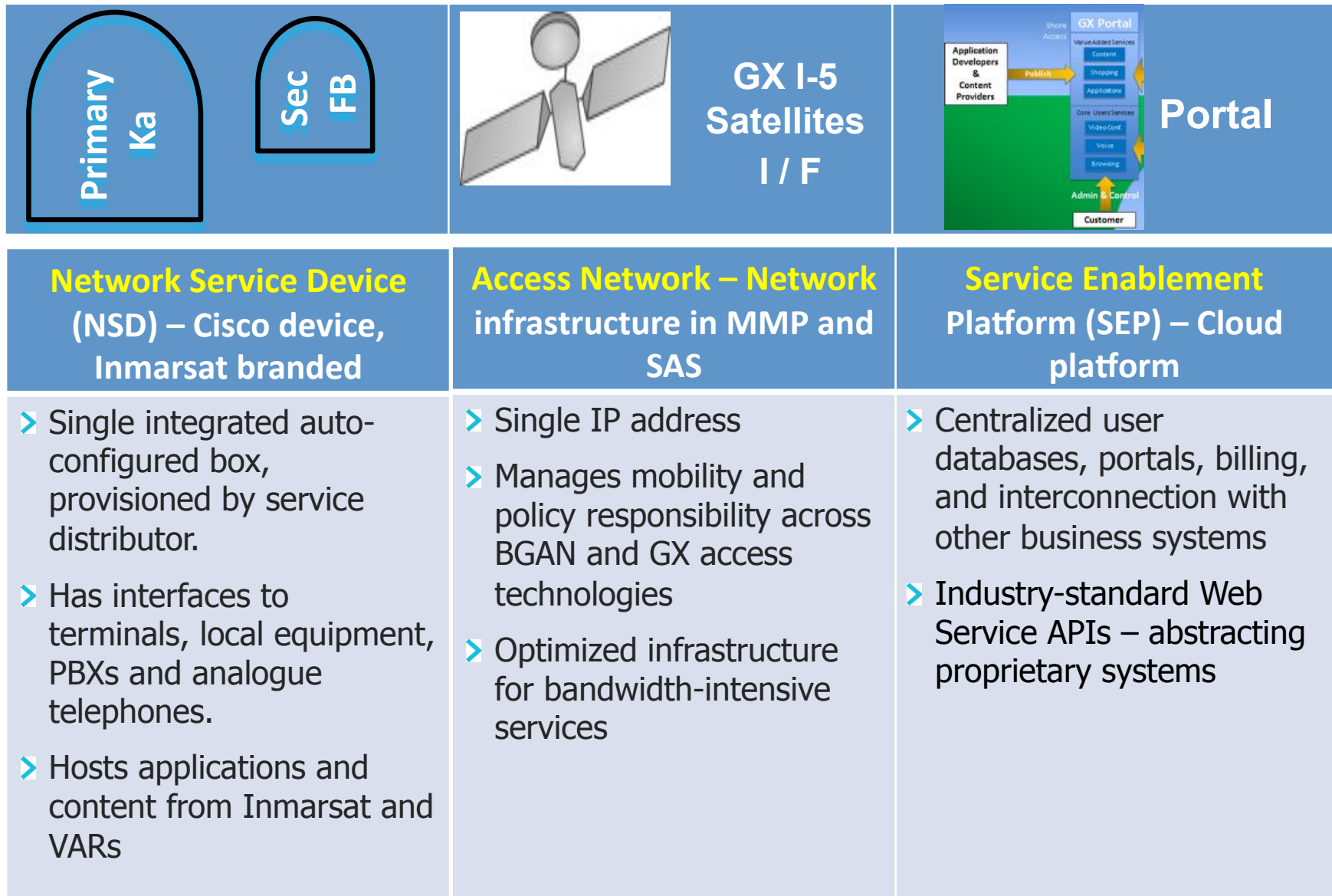
> Presented through a single IP connection

> Self-care for accounts and features

> End-user billing

> Service infrastructure

> Application hosting infrastructure

> Standard network services

Rich 3rd Party Developer Support

> A secure "Inmarsat Service API" used to build all internal and external services

> Best practice toolsets for development and integration

inmarsat

3.42 How does it do it?

The main components

Primary Ka / Sec FB	GX I-5 Satellites I / F	Portal
Network Service Device (NSD) – Cisco device, Inmarsat branded	**Access Network – Network infrastructure in MMP and SAS**	**Service Enablement Platform (SEP) – Cloud platform**
> Single integrated auto-configured box, provisioned by service distributor. > Has interfaces to terminals, local equipment, PBXs and analogue telephones. > Hosts applications and content from Inmarsat and VARs	> Single IP address > Manages mobility and policy responsibility across BGAN and GX access technologies > Optimized infrastructure for bandwidth-intensive services	> Centralized user databases, portals, billing, and interconnection with other business systems > Industry-standard Web Service APIs – abstracting proprietary systems

3.43 Core functionality

Automatic traffic routing

> Ka is primary, fallback to FB after timeout (configured on portal)

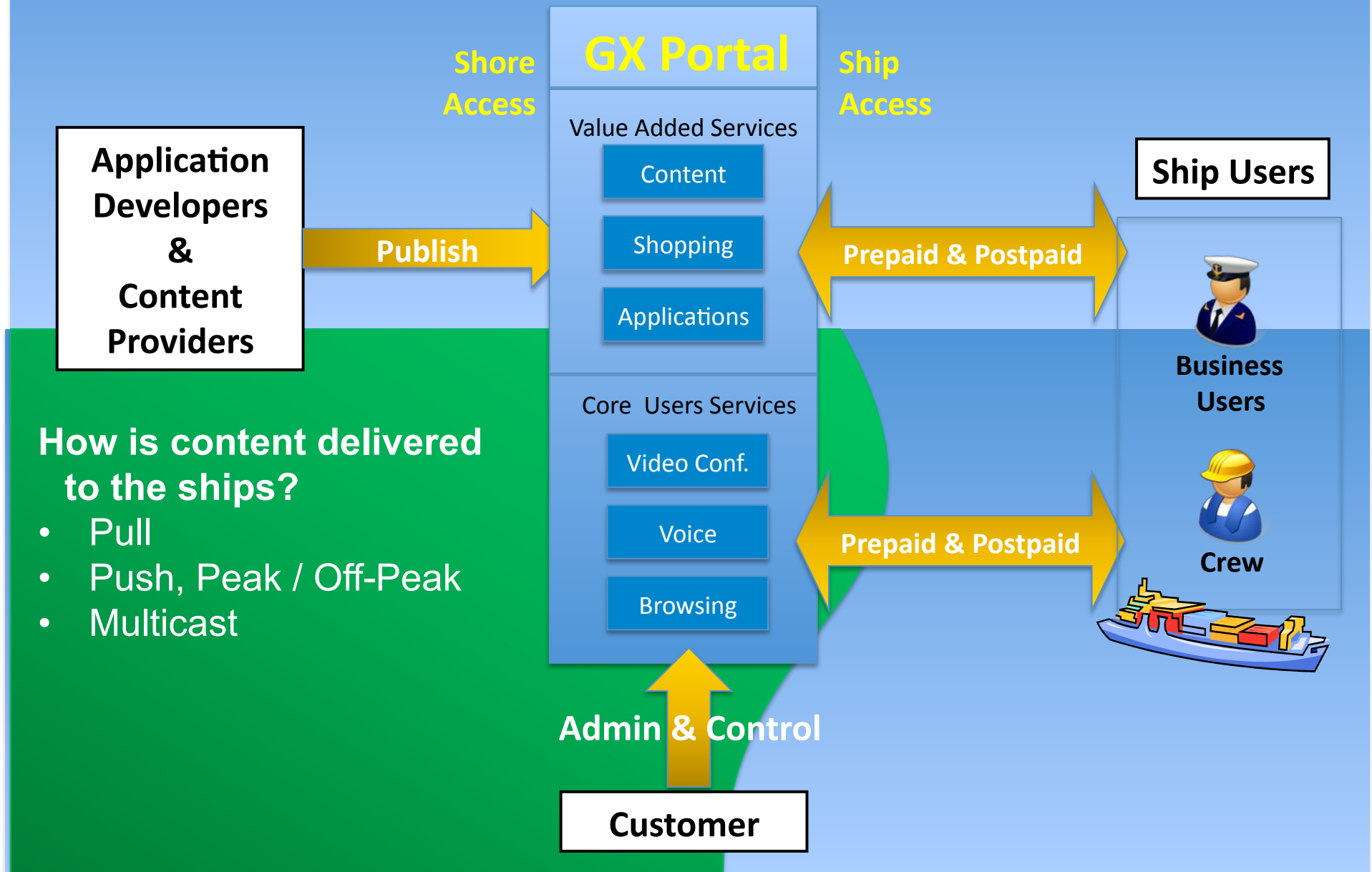> Returns to Ka when available

> Switches both voice and data

Firewall and proxy (web access)

> Configured on shore portal, replicated to Ship Manager

> Master control on shore to control browsing

> Whitelist / Blacklist for specific websites or by site type

Web acceleration

> IP compression and image downsampling

> Optional mobile site selection (with override capability)

3.44 GX Application & Content Enablement

Shore Access

GX Portal

Ship Access

Application Developers & Content Providers

Ship Users

Value Added Services

- Content
- Shopping
- Applications

Publish

Prepaid & Postpaid

Business Users

How is content delivered to the ships?
- Pull
- Push, Peak / Off-Peak
- Multicast

Core Users Services

- Video Conf.
- Voice
- Browsing

Prepaid & Postpaid

Crew

Admin & Control

Customer

3.53 Summarizing Global Xpress

Quality and reliability

> Fifth generation Inmarsat satellite network

> Designed for global mobility customer

Expanded value to the customer

> Cost effective and 'budget-able'

> End-to-end managed service

> Rich content and applications ecosystem

Highest service levels available today

> Ultra fast satellite broadband

> Fully redundant network design

> Dual satellite constellation

inmarsat

In Conclusion, Inmarsat delivers today…..

1. The best of L-band Coverage, Bandwidth, Reliability & GMDSS Safety.

2. The simplicity of plug & play right from the onboard ship environment right all the way through to the last mile interfacing to meet customer requirements.

3. Worldwide access & support to the Terminal maintenance & Service Enablement through our experienced DP's, SP's and solution providers.

4. Ability to maintain currency through integrating the latest IT, IP and Value add capabilities possible.

5. All the bandwidth Today & Tomorrow through a fully vested programme of I4 & I5 generation of Satellites.

Global Xpress Maritime

The high capacity, high reliability, future-proof solution for maritime communications.

One Inmarsat

Unrivalled expertise in cross-platform technologies