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An Overview of Maritime Satellite Systems

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Today's Options

- Inmarsat Fleet
- Inmarsat Fleet Broadband
- Iridium OpenPort
- Ku-Band VSAT
- C-Band VSAT



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Market in Flux

- **Inmarsat strategy**
 - April 2009 negotiations
 - Downstream with Stratos
 - Harbinger
- **Iridium**
 - Next generation - funding
 - Open Port – how well will it work



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Market in Flux

- VSAT
 - Number of satellite providers
 - Service and System to choose
 - Mislead by information from suppliers
- Thuraya
 - Growing maritime presence
 - 2/3rd of the world, not the Americas
 - Interesting IP and GSM convergence
- Other – Globalstar



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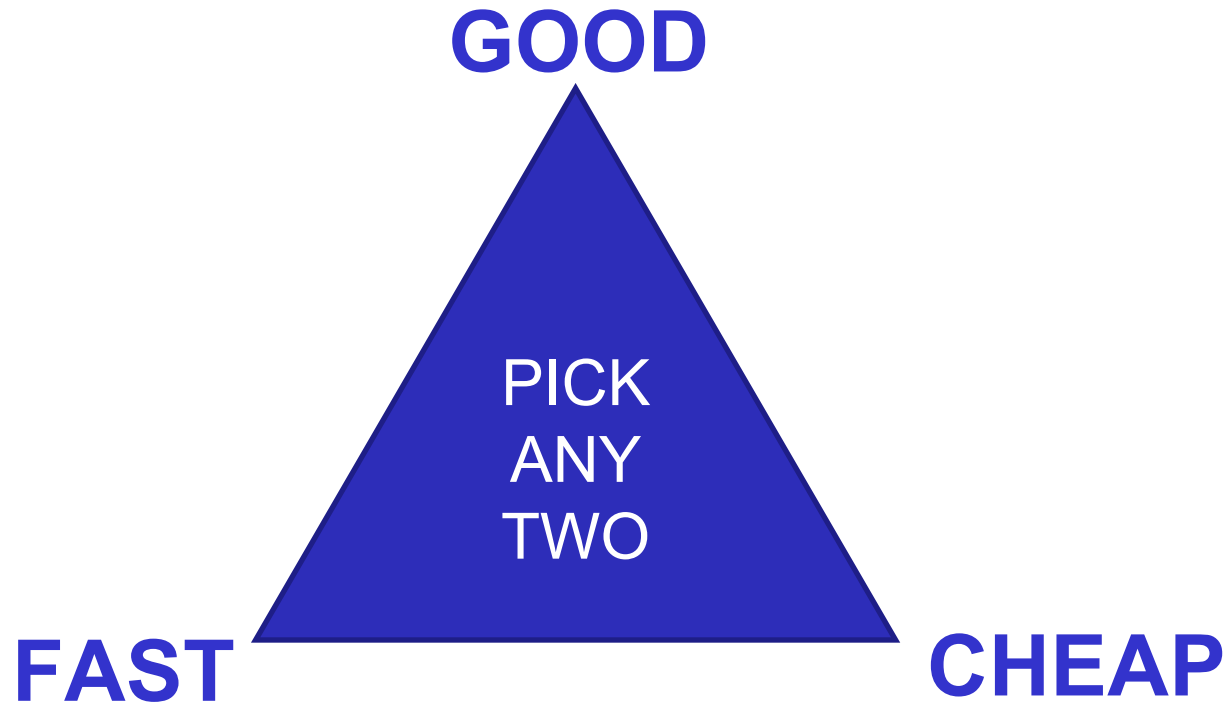
Important Terms

- **CIR : Committed Information Rate**
 - Minimum data throughput the ship will get
 - Not affected by how many ships are online
 - Big impact on monthly costs
- **BIR : Burst Information rate**
 - Maximum throughput available
 - Shared between all ships



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The conundrum of choice!





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The 5 “S” Decision

- Size
- Speed
- Spend
- Service
- Satisfaction



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Size

Satellite	Antenna	Radome	Weight
C-Band VSAT	2.4M	3.8M	850kg
Ku-Band VSAT	1.0 – 1.2M	1.2 - 1.4M	100-150kg
FB 500	50cm	1M	40-80kg
FB 250	25cm	0.5M	15-30kg
OpenPort	57cm x 23cm	57cm x 23cm	11kg



Data Services (Speed)

System	Shared IP			Dedicated IP (Streaming)	
	Max	PayG	Web	Available?	Speed
C-Band VSAT	4Mbps	N	Unlimited	CIR	-
Ku-Band VSAT	4Mbps	N	Unlimited	CIR	-
FB 500	432Kbps	Y	Usage	Y	256Kbps
FB 250	284Kbps	Y	Usage	Y	128Kbps
OpenPort	128Kbps	Y	Usage	N	
Fleet 77	56Kbps	Y	Usage	Y	128Kbps



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Cost Comparison (Spend)

Satellite	Antenna	Voice Costs	Data Costs*
C-Band	\$80,000	\$0.25 / min	\$1,500 per month and up
Ku	\$50,000	\$0.25 / min	\$1,000 per month and up
FB 500	\$17,000	\$1.30 / min	\$8 – \$13 Megabyte
FB 250	\$11,000	\$1.30 / min	\$8 – \$13 Megabyte
OpenPort	\$5,000	\$0.70 / min	\$5 – \$8 Megabyte
Fleet 77	\$17,000	\$1.15 / min	\$20 Megabyte

* Standard IP only. Streaming data is not included



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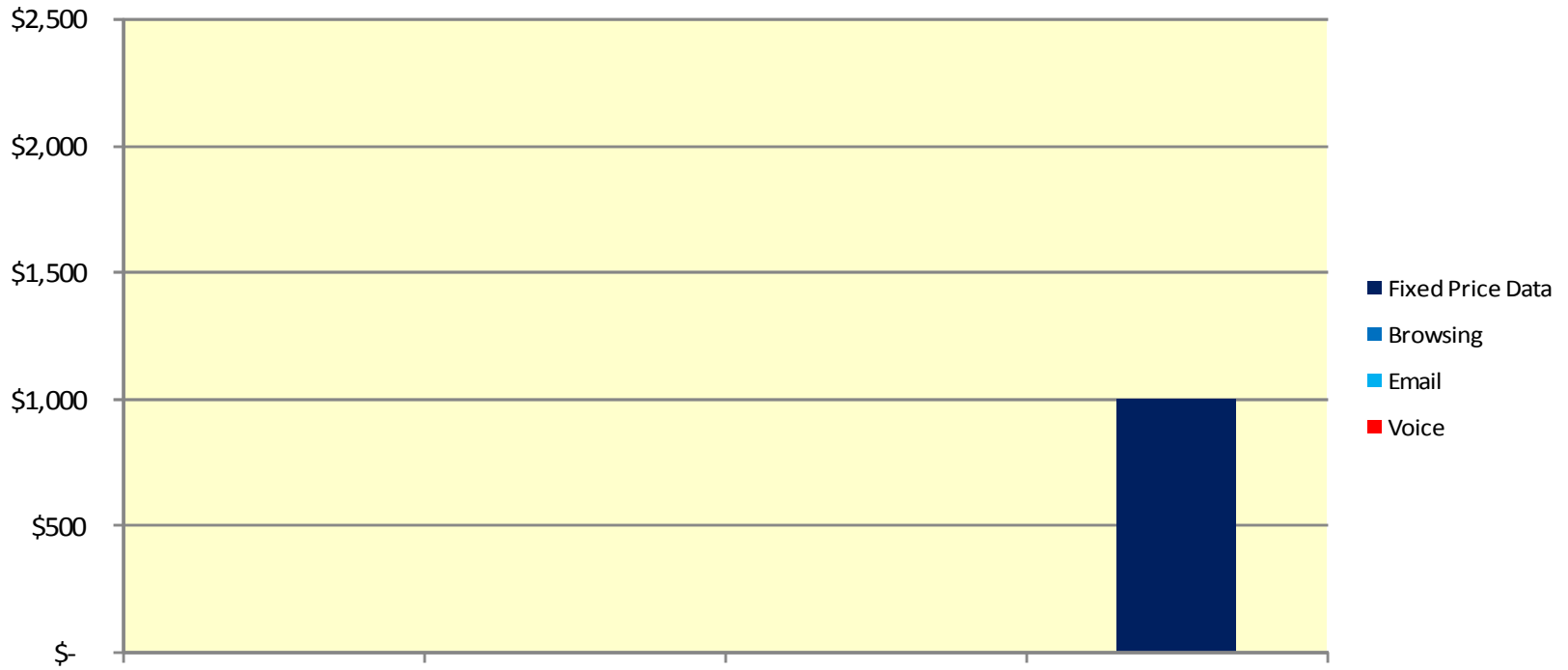
Service Coverage Area

Satellite	Type	Coverage
C-Band VSAT	Gyro / Directional	70°N - 70°S
Ku-Band VSAT	Gyro / Directional	Regional***
FB 500	Gyro / Directional	70°N - 70°S
FB 250	Gyro / Directional	70°N - 70°S
OpenPort	Omni directional	Pole to pole



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Broadband Cost Analysis



Fleet 77
Voice

No Voice

Iridium OpenPort
Email

No Email

VSAT
Browsing

No Browsing



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Satisfaction: User Experience

- Voice, Email & Browsing performance
- Factors
 - Number of concurrent users on beam
 - Capacity connection - BIR
 - Provider oversubscription
- Iridium & Inmarsat
 - Capacity limits – Expansion not possible
 - Extremely high cost
- Without CIR – impact satisfaction



Satisfaction: System Reliability

- Inmarsat has set a high standard
 - End-to-end design specification
 - Quality assurance
 - Meets regulatory needs
- Iridium must overcome...
 - System reliability
 - Satellite longevity
 - Funding



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Satisfaction: VSAT Reliability

- Maritime is used to Inmarsat quality
- VSAT lacks a governing authority
 - Multiple manufacturers
 - No end-to-end QA standards



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A Word of Caution

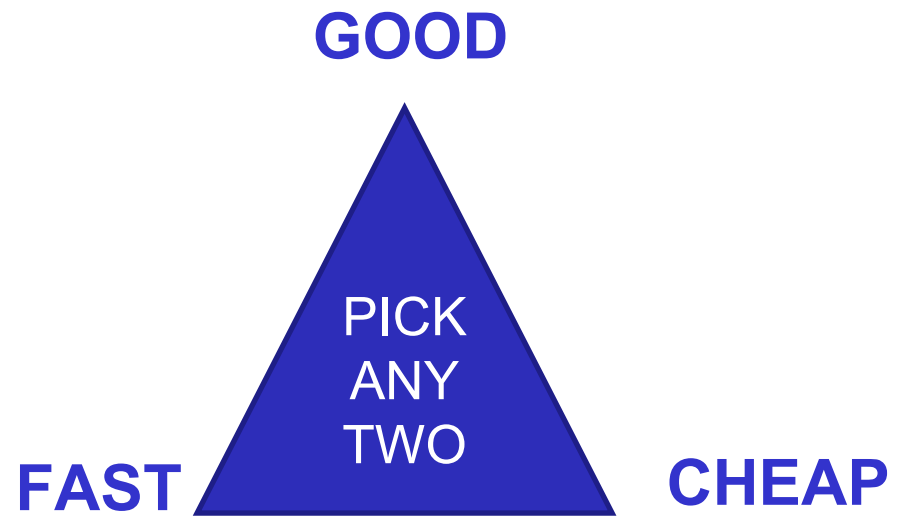
- Desire to use “shore-based” applications
 - Citrix
 - Exchange
- Maritime is very different
 - Latency
 - Performance
 - Costs
- The danger
 - Satellite goes down and the ship can't work



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The Decision

- Size
- Speed
- Spend
- Service
- Satisfaction





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THANK YOU!