Integrated Fisheries Monitoring

Developing the Market-leading, Cloud-based System for Monitoring of Commercial Fishing Activity
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Enhancing Seafood Traceability

In order to combat Illegal, Unreported and Unregulated fishing, we must trace legal harvests.

Recent regulatory initiatives—in the Americas, EU, Asia, and globally—require the adoption of sophisticated technology to improve seafood traceability.

Historically, data capture on-board vessels has proved particularly challenging. Our technology for transmission of Key Data Elements from ship-to-shore provides a “digital passport” covering upstream portions of the supply-chain. Data is cryptographically secured to ensure a strong chain-of-custody with verifiable proof-of-origin.

Our focus is on the vessel. Open APIs enable Logistics Providers, Labor Monitoring Organizations, Sustainability Certifiers, Traceability Providers, and Systems Integrators to integrate high-quality, real-time data pertaining to effort, catch, crew and safety within the broader supply-chain.

We support widely adopted GS1.org and international fisheries data standards.
# A Global Market

## In Total Exports
Seafood Provides 17% of Global Protein Intake

### $140B

## Of Harvest
Provided by 18 Countries

### 76%

## Fishing Vessels
70% located in Asia

<table>
<thead>
<tr>
<th>Class</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMALL</td>
<td>&lt;12 meters</td>
</tr>
<tr>
<td>MEDIUM</td>
<td>12 - 24 meters</td>
</tr>
<tr>
<td>LARGE</td>
<td>&gt; 25 meters</td>
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</tbody>
</table>

50,000 fitted with Vessel Monitoring Systems
Core Services

All packages include a dedicated Alert function, Phone, SMS-chat and text email.

Vessel Monitoring is enhanced with data compression, offering 5-minute tracking resolution—a significant upgrade from 30-60 min reporting via legacy VMS.

In select markets, we offer an integrated electronic logbook: providing a single, streamlined data entry process for reporting of catch to the company, national and transnational (RFMO) regulators. No more rekeying of data into multiple systems.

Upgrades

Provide voice, email, and SMS-chat capabilities to crew-members (separately billed). Quotas and time-of-day restrictions may be specified.

Virtual Observer camera technology monitors on-board activity – with configurations from 1 to 6 cameras. The latest generation of video codecs maximizes resolution and reduces data-transfer costs.

Our wireless sensor technology detects changes in temperature, light, humidity and pressure, providing proof-of-quality indicators.
Benefits to Industry

Our satellite-connected, tamper-resistant solutions enable Vessel Operators to:

- Achieve better product prices through improved communication with processors and other supply-chain participants.
- Improve crew morale by providing Internet access at-sea. Optimizing proxies reduce data costs by 90-95%.
- Monitor product temperature from point-of-harvest to offload.
- Demonstrate compliance with voluntary seafood sustainability certifications.
- Provide Vessel Monitoring (VMS) and Electronic Catch reports to regulators.

Each vessel fits the appropriate sensor package, which varies based on the size, type and fishing method. This connects the vessel to our cloud-based services:

- Wireless mesh technology simplifies installation.
- Machine vision algorithms identify Critical Tracking Events (CTEs)—such as catch being brought onboard—then store optimized video and sensor data.
- Satellite (offshore) and cellular (near-shore) links provide cost-effective real-time data, with lowest-cost routing.
- Offers substantial benefits for crewmembers, providing access to social media, email and voice services while at-sea.
- Communications packages tailored for small, mid and large scale fishing vessels—with industry leading price/performance.
Modules

### Vessel Monitoring
- High-resolution GPS Tracking
- Secure, Encrypted Data Transfer
- Industry Standard Data Formats
- Compatible with most existing Vessel Monitoring Systems
- Share Track Data Selectively with Trading Partners

### Voice & Video Calling
- Voice Calling
- Separate Vessel Operator and Crew Accounts
- Videoconferencing*
- Multiple Voice Lines*
- Concurrent Voice and Internet

* Fleet Broadband and Xpress

### Email / Internet
- Supports Gmail, Yahoo, etc. and most corporate email (IMAP)
- Firewall with Configurable Blacklist/Whitelist to Block Spam
- Optimized Compression and Resizing of Images
- Quotas and Usage Restrictions (i.e. for Crew Email Use)

### Virtual Observers
- PTZ (pan-tilt-zoom) IP66 cameras
- Full-HD, low-light color
- Secure DVR for video storage
- Optimized frame selection for real-time transmission of Critical Tracking Events (i.e. catch).
- High priority data via-satellite, routine footage uploaded via 4G LTE (cellular) upon return to port.

### Social Media & News
- SMS Chat Services
- FaceBook Chat Services
- RSS Newsfeed Cache
- Optimized Proxy for Mobile Websites (i.e. m.espn.com)
- Low-Graphics/No-Graphics
- Quotas and Restrictions

### Catch Reporting
- Tablet and Laptop Support
- Windows (browser), iOS, Android
- Remotely Updated Form Library
- UTF-8 Internationalization
- Open API for developing 3rd Party Forms (React Native)
- Cryptographically Secure, Digitally Signed, Data Formats.

### Labor Monitoring
- APIs provide a cryptographically secure, private means to conduct crew surveys, and for reporting of suspected labor violations.
- GPS, Sensors and Video feeds confirm compliance for minimum crew numbers, working hours, and trip duration.

### Enterprise Resource Planning
- Vessel Operations
- Supply-chain Workflows
- Supply-chain Sales and CRM
- Safety and Standard Operating Procedure training
- Manage Vessel Registration, Certificates and Permits

### Partner Specified Packages
- Available to academic and non-profit organizations
- Hosted Docker.io, LXD, and Snap containers
- Analyze sensor data directly on-board vessel
- All major Linux distros supported
## Packages

<table>
<thead>
<tr>
<th>Service</th>
<th>Fleet One</th>
<th>Fleet Broadband</th>
<th>Fleet Xpress</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vessel Monitoring</td>
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<tr>
<td>Email / Internet</td>
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<tr>
<td>Social Media / News Services</td>
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<td>Electronic Catch Reporting</td>
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<tr>
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<tr>
<td>Enterprise Resource Planning</td>
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<td>Partner Specified Packages</td>
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<tr>
<td>Virtual Observers</td>
<td>Up to 4 cameras</td>
<td>Up to 4 cameras</td>
<td>Up to 6 cameras</td>
</tr>
<tr>
<td>Storage</td>
<td>1 TB</td>
<td>2 TB</td>
<td>4 TB</td>
</tr>
<tr>
<td>Battery Power</td>
<td>10-30 VDC</td>
<td>10-30 VDC</td>
<td>10-30 VDC</td>
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<tr>
<td>Satellite Comms</td>
<td>100 kbps</td>
<td>250 kbps</td>
<td>2,000 kbps</td>
</tr>
<tr>
<td>Cellular Comms</td>
<td>3G / 4G-LTE</td>
<td>3G / 4G-LTE</td>
<td>3G / 4G-LTE</td>
</tr>
</tbody>
</table>

- Full service

Data rates shown are peak, typical throughput may be lower. Although best efforts are made to provide continuous service, signal strength, rain, and coverage limitations may impact on service availability. The use of satellite and cellular communication equipment and/or data encryption products is restricted in some jurisdictions: operator is responsible for meeting all regulatory requirements. Alert functions are not GMDSS certified, and are not intended as a substitute for the carriage of IMO approved safety equipment, i.e. VHF, HF, EPIRBs and Sat-C.
**Typical Installation:** Fleet One

Broadband (100 kpbs) Internet extends a full mobile-office environment to each vessel. Key features include: a single voice line, always-on Internet for Email, Skype, optimized Web-browsing, and full support for mainstream chat/IM applications.

Our Virtual Observer upgrade provides compressed video streams on-demand; with high-resolution footage stored on a secure DVR for later upload, via cellular, of Critical Tracking Events (CTEs) for each trip.

* Full services on Cellular, limited on Satellite. Tablet, Phones, Smartphone and Laptop supplied by customer.
Typical Installation: Fleet Broadband

Broadband (250 kpbs) Internet extends a full mobile-office environment to each vessel. Key features include: multiple voice lines, always-on Internet for Email, Skype, optimized Web-browsing, and full support for mainstream chat/IM applications.

Our Virtual Observer upgrade provides compressed video streams on-demand; with high-resolution footage stored on a secure DVR for later upload, via cellular, of Critical Tracking Events (CTEs) for each trip.

* Full services on Cellular, limited on Satellite. Tablet, Phones, Smartphone and Laptop supplied by customer.
Typical Installation: Fleet Xpress

Particularly attractive for deep-ocean vessels undertaking extended duration voyages, our premium package includes Virtual Observer based video surveillance (up to 6 cameras) and our full suite of highly-optimized Email, Skype, Web-browsing and chat applications.

A 2 mbps Internet connection provides a full office environment on-board; including the ability to retrieve video and sensor data in real-time. Voice calling and video conferencing, for both captain and crew, is supported via Voice-/Video-over-IP. Additional crew welfare features include a movie library and live-streaming of news and sports events.

* Full services on Cellular, limited on Satellite. Tablet, Phones, Smartphone and Laptop supplied by customer.
Secure Communications Server

Nuvo 5100

A state-of-the-art industrial computer featuring the Intel® 6th-Gen Core i5™ TE CPU, with fanless operation and an extended operating temperature range.

Inbuilt connectivity includes Power-over-Ethernet (PoE+), Wi-Fi, Bluetooth, Ethernet and 4G LTE Cellular. 128GB of SSD is available for system use and up to 4TB for video/sensor data.

Equipped with our specialized Ubuntu Server build, the Secure Communications Server acts as the control center for our range of service offerings. Custom proxies provide optimized access to satellite and cellular airtime services – saving you up to 95% on satellite airtime costs.

Specifications:

- Intel Core i5 with 8GB DRAM
- Managed Firewall
- 4xPoE+ (802.3at) and 2xEthernet
- Up to 4TB video storage (SSD)
- Wi-Fi 802.11ac, 2G/3G/4G LTE
- NMEA-0183 and NMEA-2000 inputs
- Operating Range: -13°F (-25°C) to -158°F (70°C)

Access Email, News, Chart Updates, Weather and Oceanographic Data at-sea, while saving up to 95% on airtime costs.

* Tablet, Phones, Smartphone and Laptop supplied by customer.
odoo ERP

odoo provides the infrastructure vessel-side for receiving and processing data. It is a fully fledged ERP product capable of handling both commercial (i.e. vessel management) and regulatory (i.e. catch reporting) functions.

Data is stored within an industry standard PostgreSQL database platform: allowing changes made at-sea to be transparently synchronized via SQL replication. This is highly efficient, even over bandwidth constrained links.

Key Features:

• Open Source ERP Platform
• Over 2,000,000 Users
• Over 5,400 Developers
• Supports 23 Languages
• PostgreSQL Database Platform
• Python/Javascript Development Environment
• Implemented by small, mid and large companies
• Learn more at www.odoo.com
Technology

Full-HD, Low-light IP Video Camera

LOREX LNZ32P4B

The LNZ32P4B 1080p HD Pan-Tilt-Zoom (PTZ) camera can capture HD 1080p video with fast PTZ capabilities that let you move the lens in virtually any direction. These movements can be controlled from your DVR, computer or smartphone.

This security camera also has advanced Color Night Vision™ (CNV) technology, which adds a new dimension of detail to nighttime video.

Fully weatherproof (IP66-rated) this camera is designed to stand up against bad weather and extreme temperatures as low as -22°F (-30°C) and up to 140°F (60°C).

With both ceiling and wall mounting options, the included wall mount bracket is fully weatherproof for a trustworthy installation, indoors or outdoors.

Key Features:

- 1920 x 1080 Full-HD resolution
- Pan-Tilt-Zoom (PTZ) controls
- Advanced 355° rotation, 90° tilt
- Capture full color images at night
- 4×Optical Zoom for viewing fine details
- Single PoE (Power-over-Ethernet) cable

Environmental Specifications:

- IP66-rated
- Operating Temperature Range
  - 22° to 140°F
  - 30° to 60°C
- Operating Humidity: <95% RH
- Auto Day/Night mode: Picture automatically switches to B&W in low light conditions.
FLIR AX8

Combining thermal and visual cameras in a small, affordable package, the AX8 provides continuous temperature monitoring and alarming for critical cold-chain processing areas.

Measuring only 54 x 25 x 95 mm, the AX8 is easy to install in space-constrained areas.

With AX8, you can view thermal imagery, visible light imagery, or the two combined into FLIR's proprietary, patent pending MSX multispectral dynamic image.

The AX8 can provide proof that correct product temperatures were maintained from point-of-harvest until offload, often in a less intrusive and lower-cost manner than installing a network of wireless or wired temperature sensors.

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Key Features:

- IP66/67 Rated
- 640x480 visible-light sensor
- 6400 pixel (80x60) Infrared sensor
- Ethernet/IP and Modbus TCP Interfaces
- Operating Range - 22°F (-30°C) to 140°F (60°C)
Fleet One

Based on Inmarsat’s dependable, global I-4 satellite network, Fleet One makes it easy to talk, text, and send and receive emails at sea.

Fleet One offers one voice line and data up to 100kbps – ideal for accessing full color weather images, navigational charts and routing information, as well as sending reports and browsing the web.

Key Features:

- Internet: Up to 100 kbps
- Single Voice/Fax/SMS line
- Compact, Lightweight Antenna
- 505 Emergency Calling
- Easy installation
- Seasonal Airtime Plans. No long-term commitments.

Unrivaled Reliability

Inmarsat provides the most robust communications links, with average network availability greater than any mobile phone provider and exceeding 99.9%.

And with Inmarsat’s free 505 Emergency Calling service included, Fleet One helps keep sailors safe.
Fleet Broadband

Fleet Broadband provides cost-effective voice and data through a compact antenna, delivered globally via the I-4 satellite and ground network with 99.9 per cent network availability under all sea conditions.

Over 50,000 vessels trust Fleet Broadband for their operational communications such as email, phone and applications that help them do everything from plotting the most fuel-efficient route to diagnosing mechanical faults remotely by video link.

Ideal for coastal merchant fishing fleets, FB250 offers data speeds of up to 250kbps and live-streaming for applications such as video conferencing, plus up to nine telephone lines with Fleet Broadband multi-voice for crystal clear crew calling.

Key Features:
- Internet Data: Up to 250 kbps
- Video conferencing: 128 kbps
- Flexible Airtime Plans
- 505 Emergency Calling
- Certified Installer Network

Communicate with Confidence

SAILOR products are highly regarded by maritime professionals for their design and build quality, which results in excellent reliability. Fast and dependable service is available through the COBHAM network of On Board Service Centers (OSC). With OSC locations all around the world, service and support is always available, whenever and wherever it is needed.
Fleet Xpress

Operational efficiency moves to the next level with Fleet Xpress.

High data speeds and maximum reliability are realized by Inmarsat's Global Xpress Ka-band technology combined with the proven reliability of Inmarsat's Fleet Broadband L-band services.

Guaranteed global bandwidth ensures that vessel owners and operators can improve business intelligence, enhance efficiency, performance and crew welfare, and in turn run their businesses more effectively.

Key Features:

- Dual Ku- and L-band connectivity
- Internet Data: Up to 6 / 3 mbps (download/upload)
- Video conferencing and Voice-over-IP
- Inmarsat Service Enablement Platform
- Fully Managed Service

Service Enablement Platform

The Inmarsat Service Enablement Platform will power a revolutionary new maritime applications ecosystem.

It allows Certified Application Partners to develop and publish innovative applications over the Fleet Xpress service, such as video monitoring, engine monitoring, enhanced weather and oceanographic overlays, and fuel consumption reporting.
Digi XBee

Digi’s programmable XBee Gateway connects XBee devices with cloud-based applications over Cellular, Wi-Fi or Ethernet.

Featuring a simple Python-based development platform, the gateway enables custom applications to run locally while interfacing across existing Cellular/Wi-Fi/Ethernet networks for WAN connectivity to cloud-based software applications.

Key Features:

- Battery powered sensors with integrated ZigBee®
- Real-time temperature, humidity and light
- Easy installation and configuration
- Long battery life for reliable operation
- Small size for unobtrusive installation

![Storage Temperature Chart]

Storage Temperature