



United States Coast Guard Office of Search and Rescue  
Global Personnel Recovery System



GPRS

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**GLOBAL PERSONNEL RECOVERY SYSTEM  
(GPRS)**

*PUBLIC SEGMENT OVERVIEW*

**2001 DOD Personnel Recovery Conference  
Technology and Space Support Workshop**



23 January 2001

**LCDR Paul Steward**  
U.S. Coast Guard  
Office of Search and Rescue (G-OPR)





United States Coast Guard Office of Search and Rescue  
Global Personnel Recovery System  
Concept & Origin



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➤ **GPRS Concept**

- **State-of-the-art system that provides enhanced satellite distress alerting, asset tracking and two-way data communications capability; to be carried on next generation GPS satellite constellation (24 satellites plus 6 in-space spares) - two segment approach is planned:**
  - *Public Segment* (Civil SAR)
  - *Government Segment* (Military, Law Enforcement, Disaster Response)

➤ **GPRS Origin**

- **A Canadian Study showed that a system of satellites in mid-earth orbit provides optimum constellation for follow-on satellite-based search and rescue system to augment Cospas-Sarsat**
- ***Public Segment* is a National Search and Rescue Committee (NSARC) Initiative**
  - USCG-chaired, 6 member interagency committee
  - DOT (USCG), DOC (NOAA), DOD (DPMO), DOI (NPS), NASA, FCC
- **DOD is developing the GPRS *Government Segment***



**Blk IIR, IIF, III - GPS**



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*Public Segment Basics*



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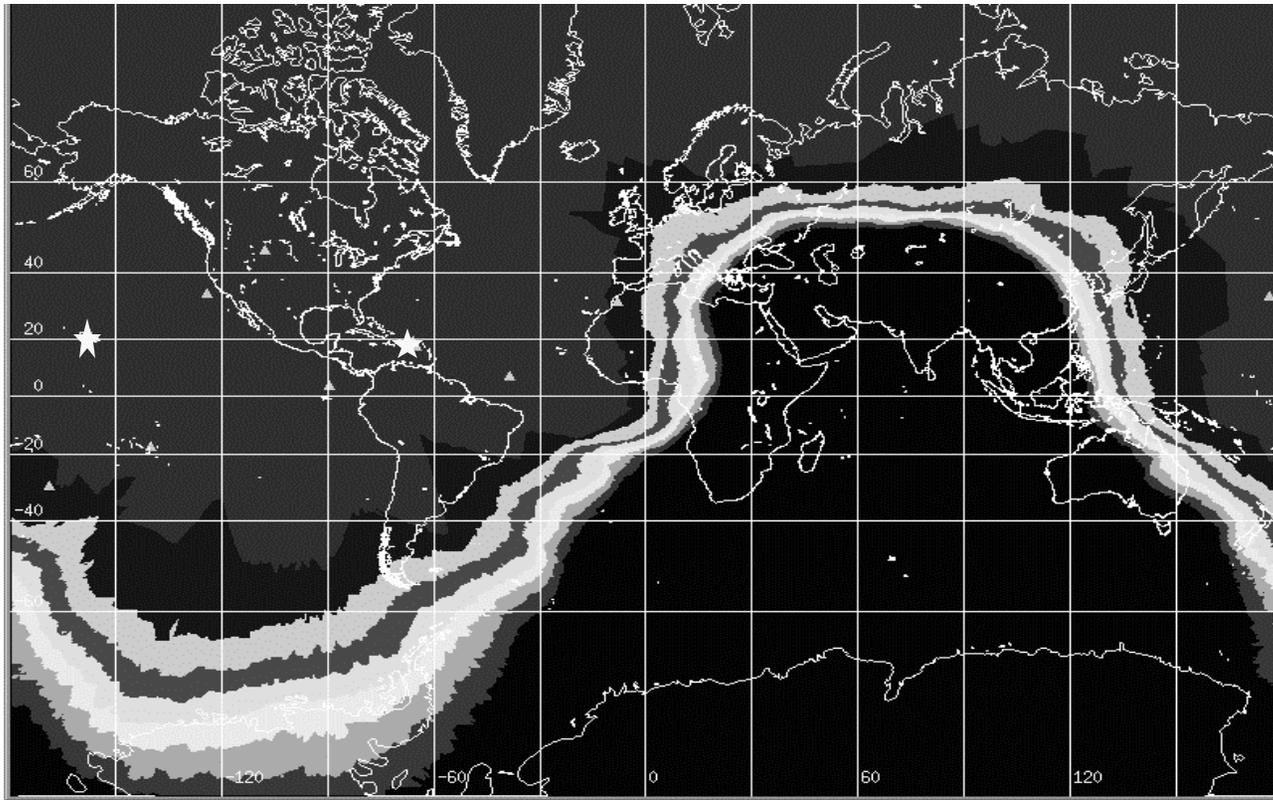
- **Provides 406 MHz transponders on next GPS satellite constellation**
  - Reduces Cospas-Sarsat average distress alert location wait time from over 60 minutes to less than 10 minutes
  - Enhances detection probability – reduced terrain blockage
  - Maximizes system reliability – GPS system priority and satellite population
  - simplifies Cospas-Sarsat operational requirements - single satellite type
  - Preserves free availability of data to global SAR community
- **Requires only simple modification of existing GPS hardware**
- **Benefits from huge investment by DOD in GPS System**
  - Spacecraft integration and launch costs already borne by DOD
- **Space portion to be operated by U.S. government**
- **Ground portion requirements significantly reduced**
  - Requires development of a minimum of 2 stations for U.S. regional coverage vs 12 stations used currently, 5 stations minimum for global coverage vs 38 current stations



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U.S. Regional Coverage: 2 Ground Stations - Puerto Rico & Hawaii



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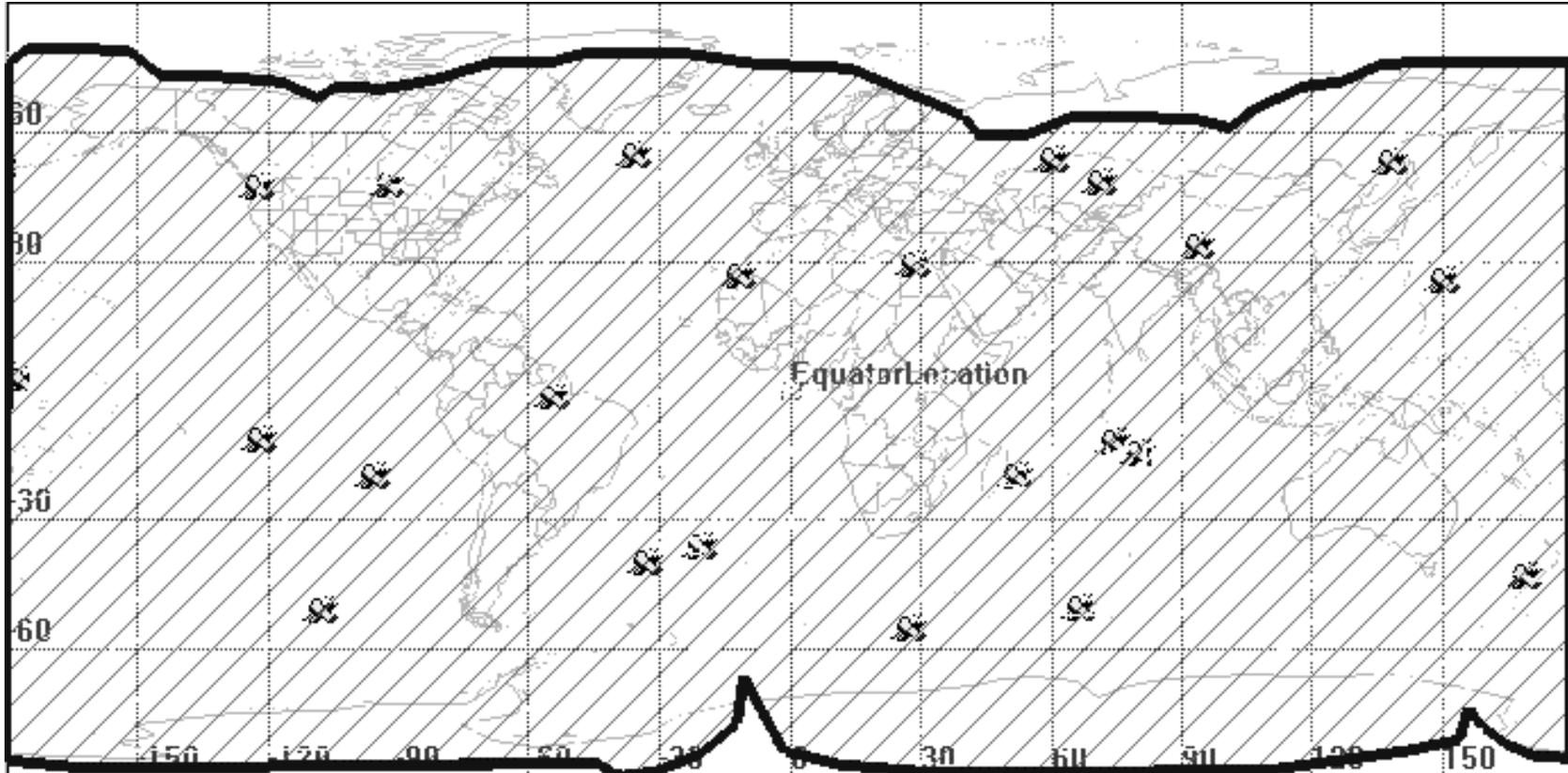
- |               |                 |                |
|---------------|-----------------|----------------|
| Purple = 100% | Blue=95%        | Light Blue=90% |
| Green=85%     | Light Green=80% | Yellow = 75%   |
| Orange=70%    | Red=65%         | Black = <65%   |



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GPRS Global Coverage



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“Snap-shot” GPRS Coverage operating at 24 satellite minimum specification



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*Government Segment*

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- ***Government Segment*** would add the following enhanced capabilities:
  - **High-capacity two-way secure communications data link - provides command and control function and asset tracking for SAR / LE / military other applications**
    - **Includes:**
      - **5 ground stations for global coverage**
      - **Hardened, portable “lap tops” for operational asset use**
      - **406 MHz beacons with secure two-way data capability for individual use**
      - **Allows users to create own secure “virtual” networks**
    - **Available to all government agencies**
    - ***Two-way data link would also aid in distress confirmation / false alert mitigation for Public Segment***
- **DOD to determine cost (estimated \$300+M)**
  - **Includes space segment costs under existing GPS program (Sandia Lab / Boeing)**
- **Joint DOD program with multiple funding sources**
- ***Government Segment*** developed in parallel to ***Public Segment***



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GPRS Impact on USCG SAR Operations



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➤ ***Public Segment*** would dramatically enhance current Cospas-Sarsat distress alerting, improving civil SAR operations and particularly USCG SAR response:

- **“Golden Hour” response criteria - Much shorter receipt time of distress alerts with position**
- ***Public Segment* backward compatible - will work with all existing and future 406 MHz distress beacons**



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**GPRS** Public Segment Implementation Timeline and Estimated Cost

- **NASA has committed to fund *Public Segment* start-up efforts - \$19M**
  - **2001-2005 - develop/install 406 MHz transponders - \$11M (\$370K for each of 30 satellites)**
  - **2001-2009 - develop and test prototype ground station - \$8M**
- **Assuming NOAA as lead agency for *Public Segment* operational implementation:**
  - **2007-2009 - Site selection and construction of 2 ground stations**
  - **2009 - Initial Operating Capability (IOC) - 12 -15 satellites in orbit**
  - **2009-2015 - *Public Segment* operational for routing satellite distress alerts**
  - **2015 (beyond) - Full Operating Capability (FOC) with 24 satellites, 6 spares**
- **Cost of funding operational implementation of *Public Segment* (includes procurement of ground stations and operating costs through 2015):**
  - **Regional U.S. Coverage (2 additional ground stations) - \$15M**
- **\$15M would be spread over a 10 year period (FY06-15)**
  - **Under Sarsat Agreement, cost shared equally among NOAA, USCG, USAF**
    - \$500K per agency each year
- **After 2015, recurring funding for operational support would be required**



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GPRS Implementation



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## What does USCG need to do?

- **Commitment critical if SAR mission is to get on GPS constellation**
- **Short term (FY01):**
  - **Support GPRS *Public Segment* development**
  - **Provide USCG and NSARC endorsement to NASA in support of GPRS as critical SAR enhancement**
  - **Provide USCG and NSARC request to NOAA to consider assuming GPRS operational lead agency role under U.S. Sarsat Program**
  - **Assist DOD in establishing formal Joint Program for GPRS**
    - **Promote GPRS *Government Segment* with DOD contacts & the interagency community**
    - **No short term commitment of USCG funds or billets**
- **Long term (FY06-15):**
  - **Participate in funding of *Public Segment* operational ground system**



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**Cospas-Sarsat -- USCG Responsibilities**



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## **Why Do it?**

- **USCG largest “user” of Cospas-Sarsat - approximately 400 lives saved annually**
  - **From Cospas-Sarsat inception in 1984 over 11,000 lives have been saved**
  - **USCG responsible for saving approximately 3,500 of these lives**
  - **Average time for USCG receipt of Sarsat position - 70 min**
  - **Estimated time for USCG receipt of GPRS position - under 10 min**
  
- **USCG signatory on interagency Sarsat Agreement with NOAA, NASA, USAF - under this agreement:**
  - **NOAA is lead Sarsat agency responsible for receiving, processing and routing distress alerts; also lead for all domestic and international Cospas-Sarsat issues**
  - **NASA responsible for all R&D**
  - **USCG and USAF, as Maritime and Inland SAR Coordinators, responsible for receiving and responding to Cospas-Sarsat alerts**
  - **NOAA, USCG, USAF assume equal shares of U.S. Sarsat operational costs**



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**.....Taking the SEARCH out of  
SEARCH AND RESCUE**

**Questions?**