



Voice-on-Target: A New Approach to Tactical Networking and Unmanned Systems Control via the Voice Interface to the SA Environment

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Overview

- Motivation and Background
- VoT Concept and Voice Portal architecture
- GSM service utilization in Tactical Network
- Voice C2 in Tactical Operations
- Extending GSM coverage
- Utilization examples and live demo

Motivation

Even the most experienced operators have no chance to concentrate on opening and viewing a computer screen with the map-based situational awareness interface while in the operation involving:

- Small vessel interdiction at high speeds of 30-50 knots
- The remote control of Unmanned Aerial Vehicles (UAVs), while on the fast move through the rugged terrain
- Casualty assistance, while still in the hostile area
- Sniper operations

Unlike a visually-rich common operational picture tool, voice communication interferes substantially less with an operator's ability to carry out a concurrent task.

This is one of the few feasible solutions for tasking unmanned systems while keeping hands and eyes free for more immediate tasks.



USSOCOM - NPS

Field Experimentation Cooperative



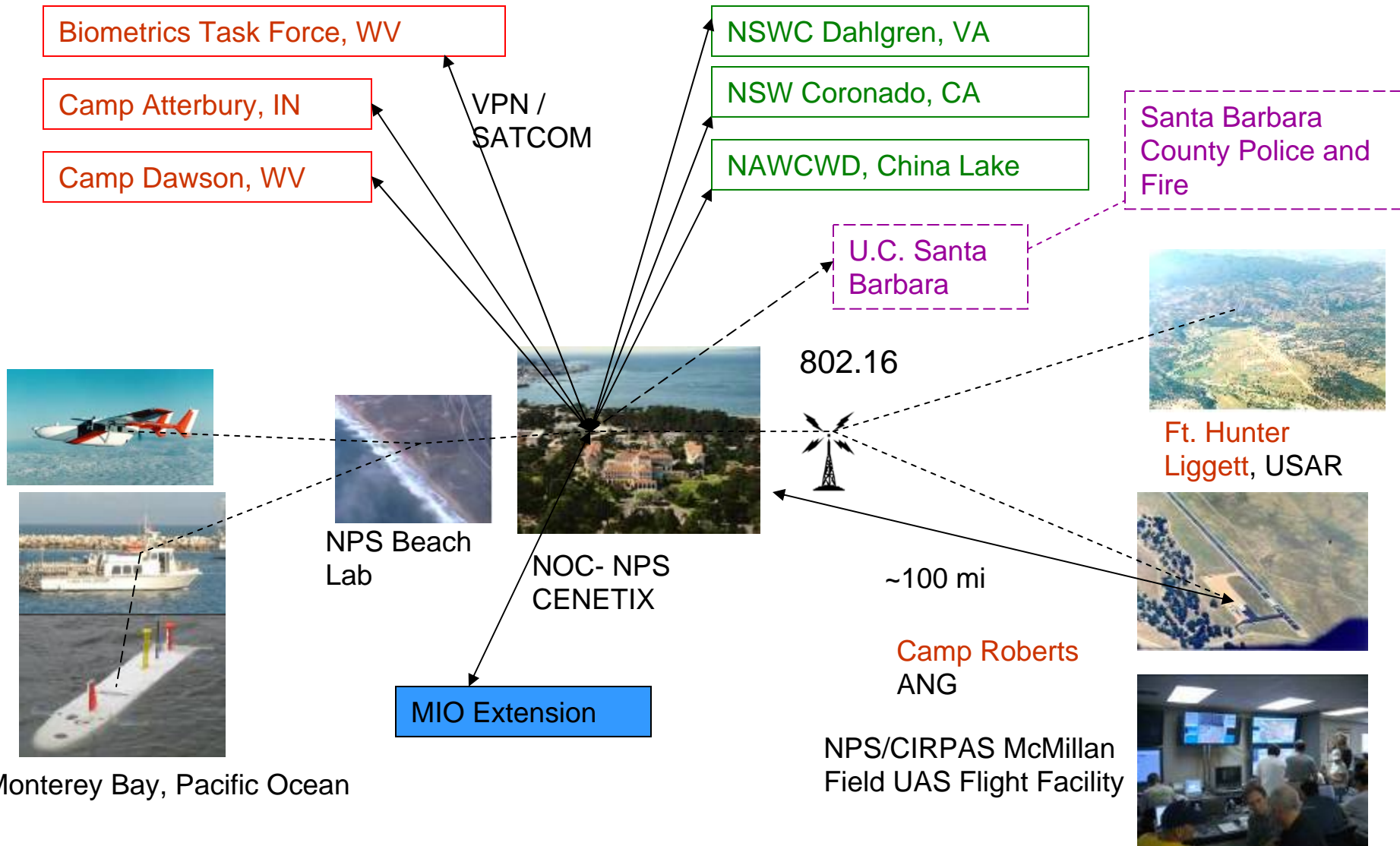
- Networks (wireless, SATCOM, IPv6, etc.)
- Unmanned/autonomous vehicles – collaborative behavior, management, payloads
- Networked sensors
- Situational awareness (SA)/Common operational picture
- Biometrics and forensics with link analysis
- Collaboration technologies with reach-back
- Human systems performance and integration
- IED detectors and jammers
- Decision making
- Modeling and simulation for mission planning and optimized asset utilization

Example Scenarios

- Surveillance and reconnaissance
- Tagging, tracking, and locating missions
- Detection and interdiction of small craft with nuc/rad
- Riverine operations
- Simultaneous multiple-site collaboration and SA with actionable intelligence
- Sniper
- Battlefield medical
- Downed pilot
- Security checkpoint

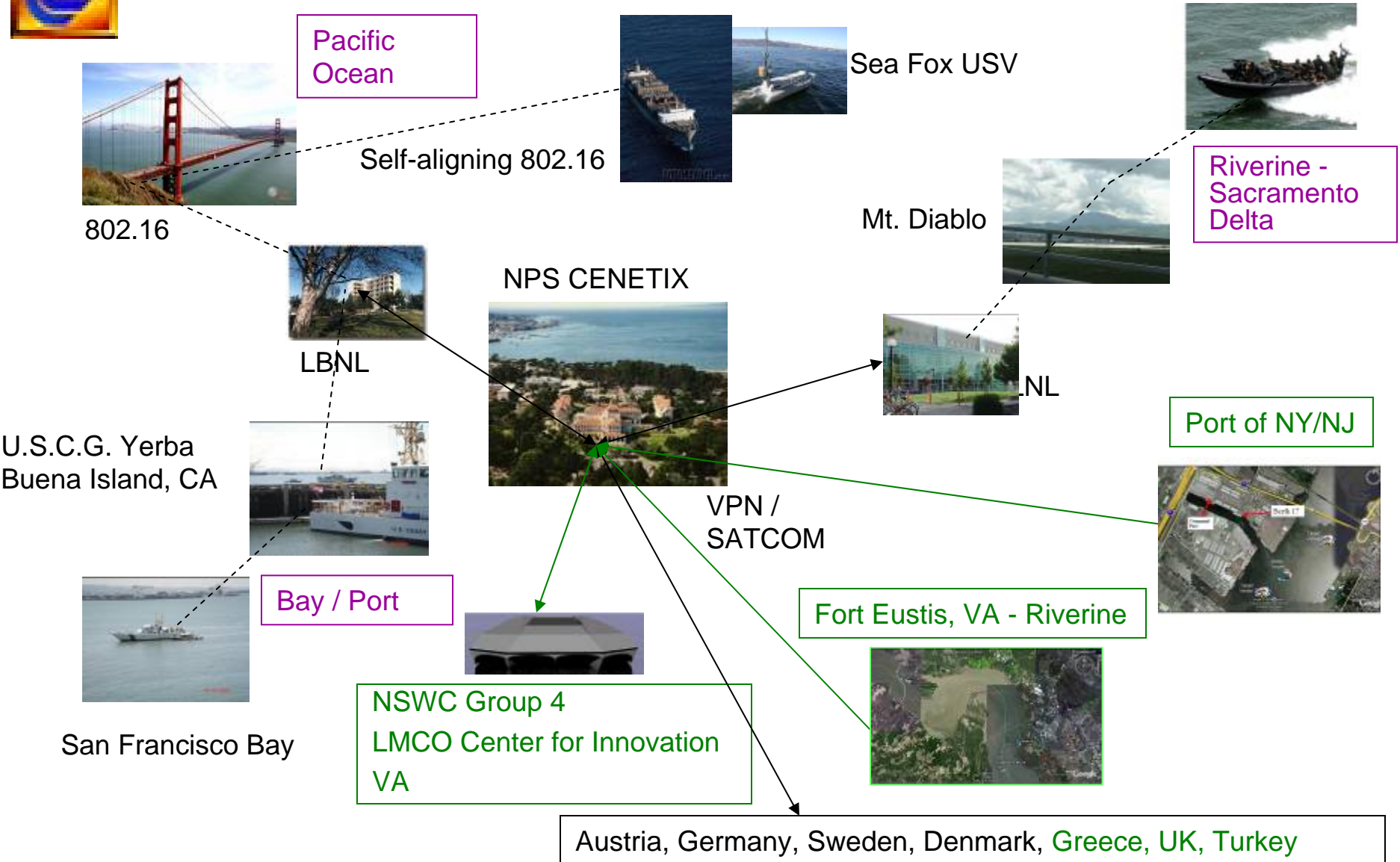


USSOCOM - NPS Field Experimentation Cooperative





Plug-and-Play MIO Testbed





Self-Organizing with Tactical Network: Network-on-Target Demo (designed by E. Bourakov)



SAOFDM_MIO.swf



Enabling Network-Centric UAV, Biometrics and Battlefield Medical Operations in Camp Roberts



JHU/APL Fully Autonomous UAS Swarm for Cooperative Search and Tracking



USMC Distributed Operations – Rapid Network Deployment



Light Reconnaissance Vehicle/Mobile TOC at Checkpoint with Biometrics



Individual Identity Friend or Foe Patch



Rapid Biometrics ID: Facial Image Check



UAV-Enhanced Battlefield Medical SA and Tactical Networking – TOC



Aerial Search Optimization Model - SA Blue Force Tracking and Satellite Tool Kit for UAV Coverage

UNCLASSIFIED



UAV IPv6
Video

Video

IPv6
Medical E-Tag
Vista

Mannequin

Casualty Site

PelcoNet Video Camera
OFDM
802.16 Link

E-Tag Reader Cell Phone



LRV

OFDM
802.16 Link

NMS views

IPv6/NPS SA screen/B-TAC health monitor

Network Operations Center



PelcoNet 300 Homepage (Server Push) - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search

Address <http://192.168.99.217/pushed.htm> Go Links

PelcoNet

PELCO VIDEO TECHNOLOGIES FOR DIGITAL NETWORKS

Video 1 Video 2 Server Push Control Setup

Server Pushed Video

352x288



Applet started Internet

My Computer
My Network Places
Internet Explorer
Administrative Tools
Command Prompt
Notepad
Windows Firewall
TNT 08-4 BF Med Screen...
WRL2504... WRL0070...

Sony Network Camera SRE-1029 - Microsoft Internet Explorer


File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search Favorites

Address <http://192.168.99.212/en/AViewer.html> Go Links

Setting Home Player

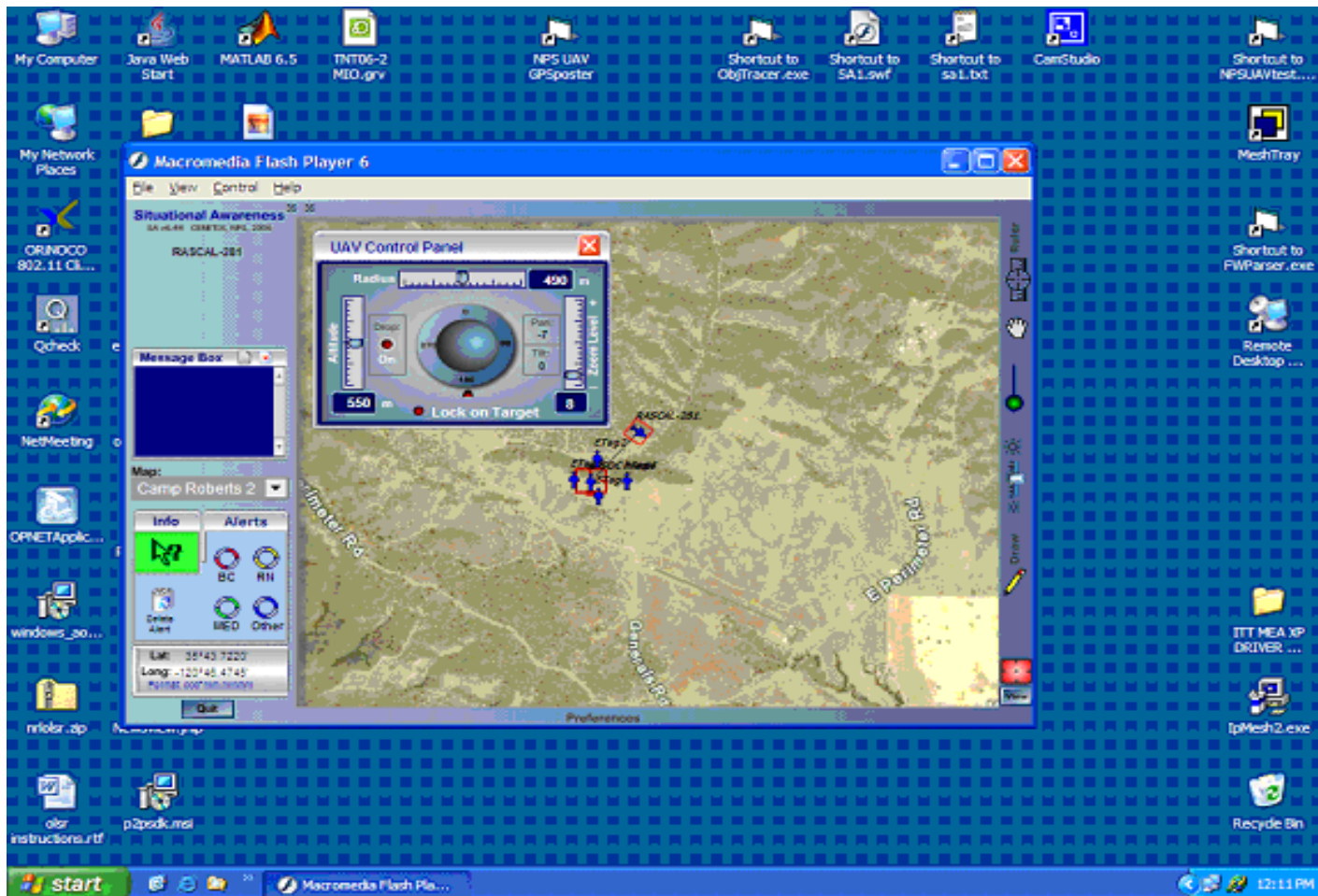
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Internet

CamStudio

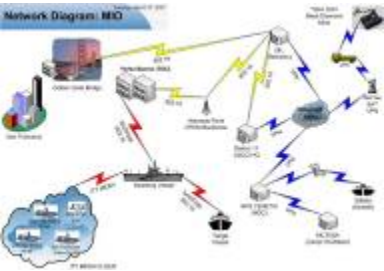
Battlefield Medical Networking: Medical Commander is flying UAV via the SA interface and wireless mesh. Target is casualty. UAV drops-off blood stopping medication





Research Partnerships with International Participants

Maritime Interdiction Operations



Objective

Evaluate the use of networks, advanced sensors, and collaborative technology for rapid Maritime Interdiction Operations (MIO), Port Security, and Riverine Operations –

The ability for a Boarding Party to rapidly set-up ship-to-ship communications that permit searching for radiation and explosive sources and conducting biometric ID while maintaining network connectivity with C2 organizations, and collaborating with remotely located sensor experts, coalition partners, and first responders.

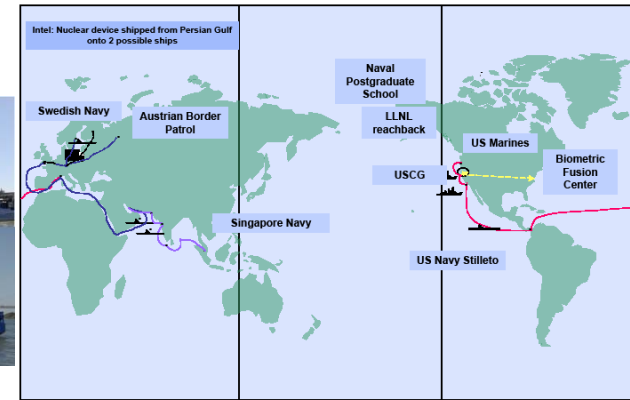


Example Technologies

- Innovative Wireless Networks and Sensors
- SATCOM on-the-Move and Orbital Ad-Hoc Networking
- Drive-by Radiation Detection of Large Ships and Small Boats
- Projectile-Based Wireless Links
- Networked USVs and UGVs
- Collaboration and Decision Making
- Situational Awareness
- IPv6 Sensors-on-the-Move
- Environmental Effects on Target Detection, Comms, and Plume Dispersion
- Forward Deployed Biometrics with Reach-Back
- Tagging and World-Wide Monitoring



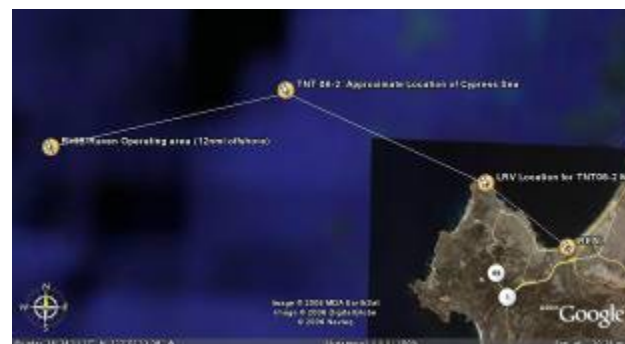
Figure 9. Monitoring vehicle going up North Germany





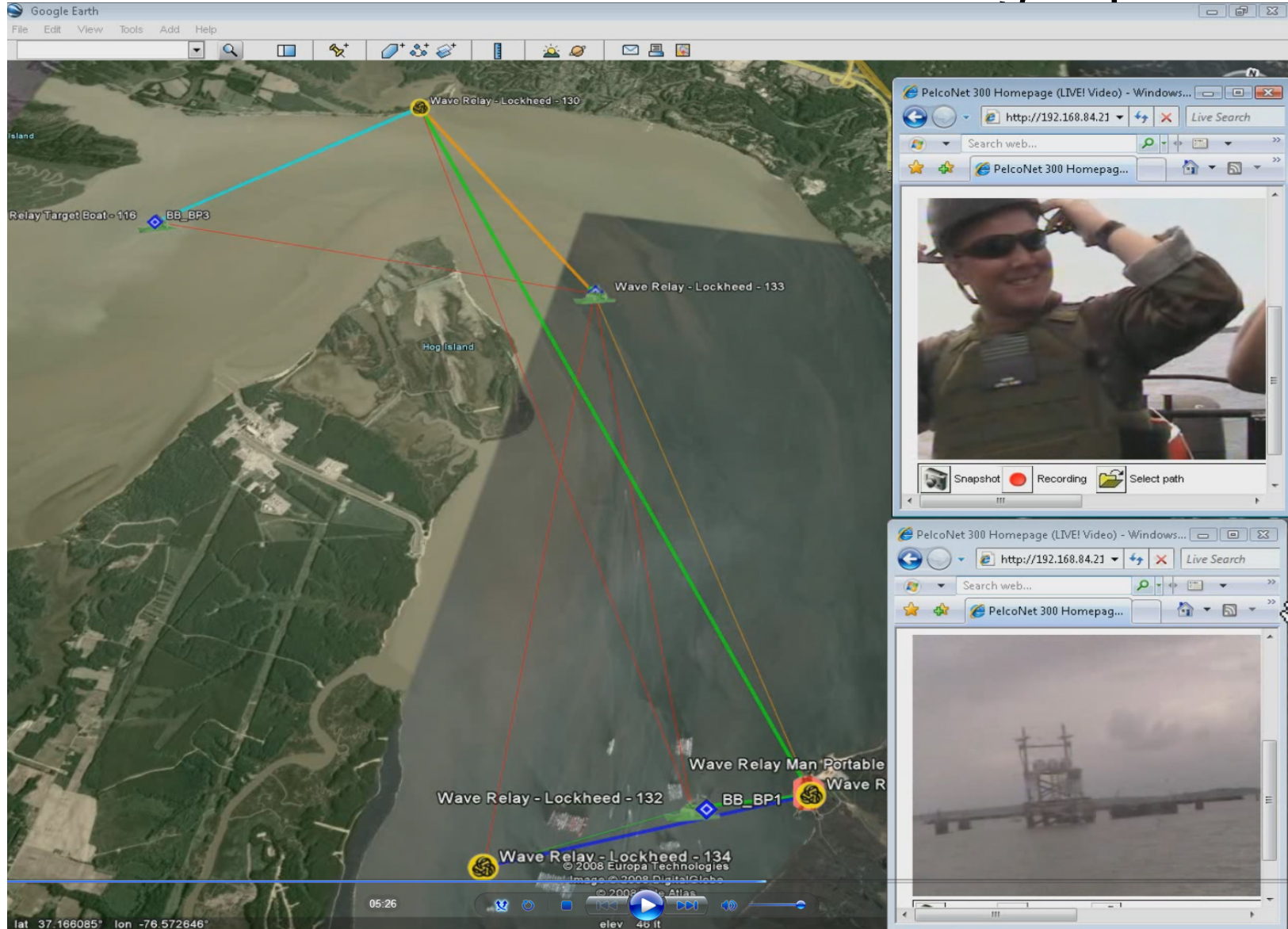
Adding Unmanned Systems to MIO Network: Drive-by Search by

USV, UAV Relay to the Fast Boat, UGV in the Tunnel

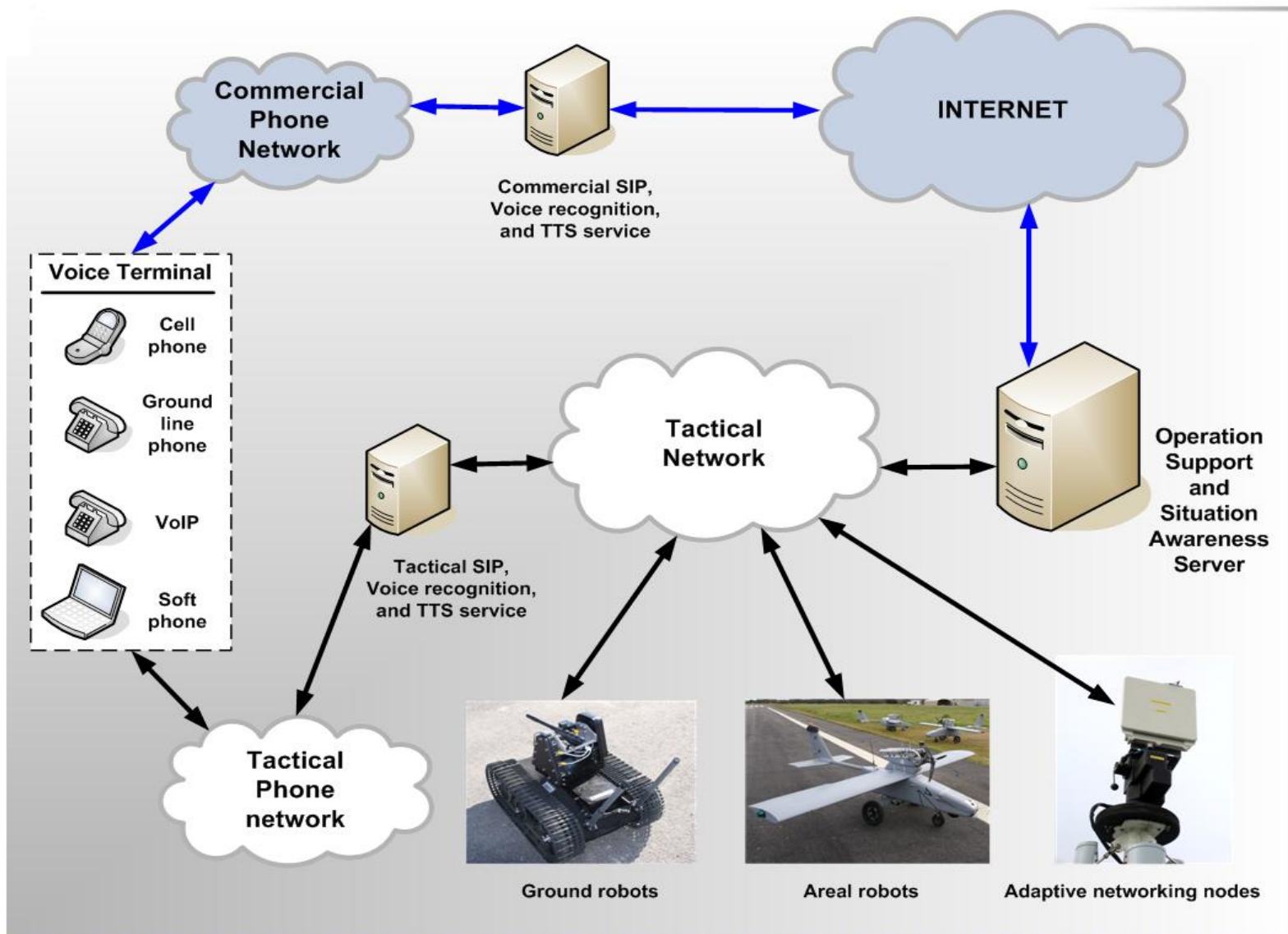


USV provided radiation detection in small-boat drive-by with real-time expert reachback; network-controlled USV & UGV

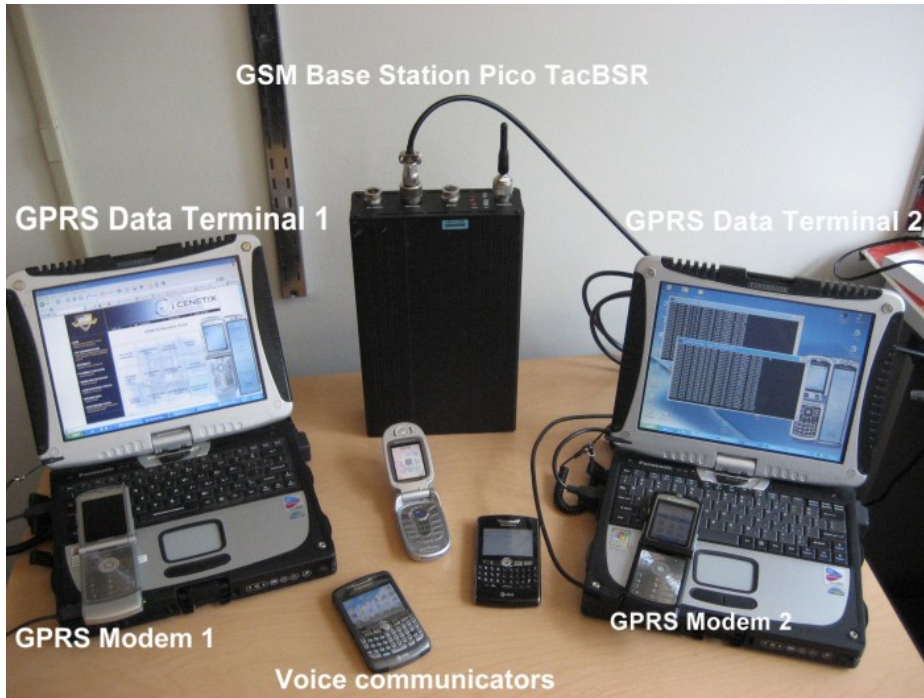
MIO 08-4 Days 3 & 4, Ft. Eustis, VA: Small craft stand-off detection and interdiction at high speeds



VoT Concept and Voice Portal architecture

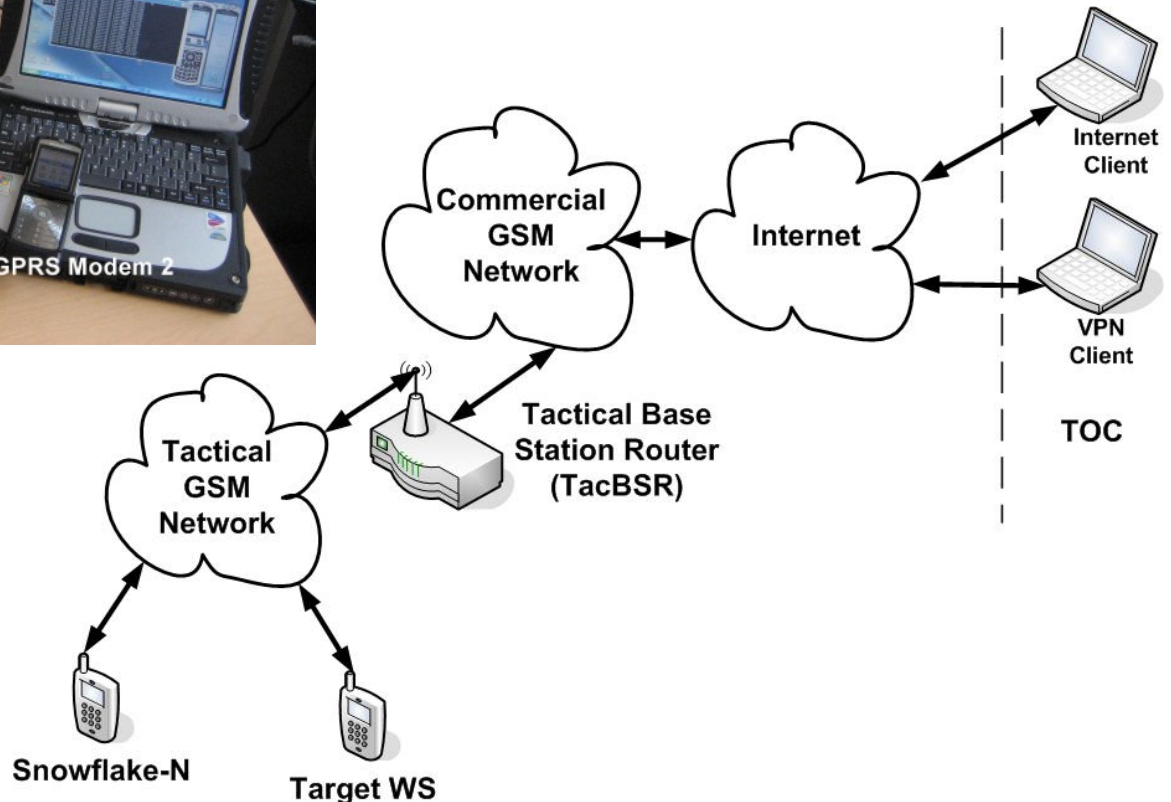


Extending GSM coverage



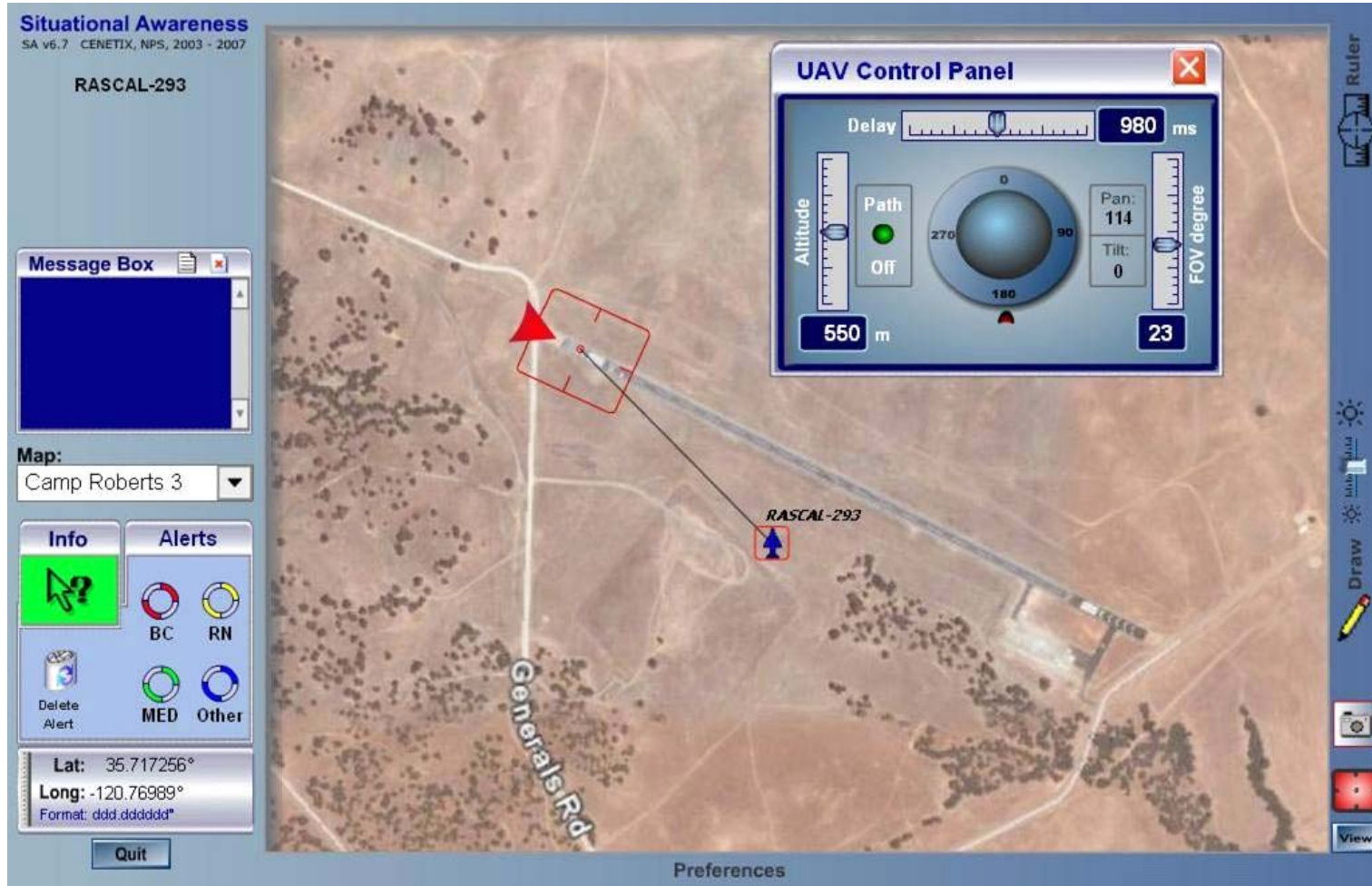
Tactical Cellular Network:

- fast GSM infrastructure deployment
- commercial GSM network extension



- ubiquitous control link
- two way communication
- positioning information

Utilization examples



Situational Awareness user interface for mission tasking.

The UAV waypoint for taking high resolution image is assigned by voice command.

Utilization examples

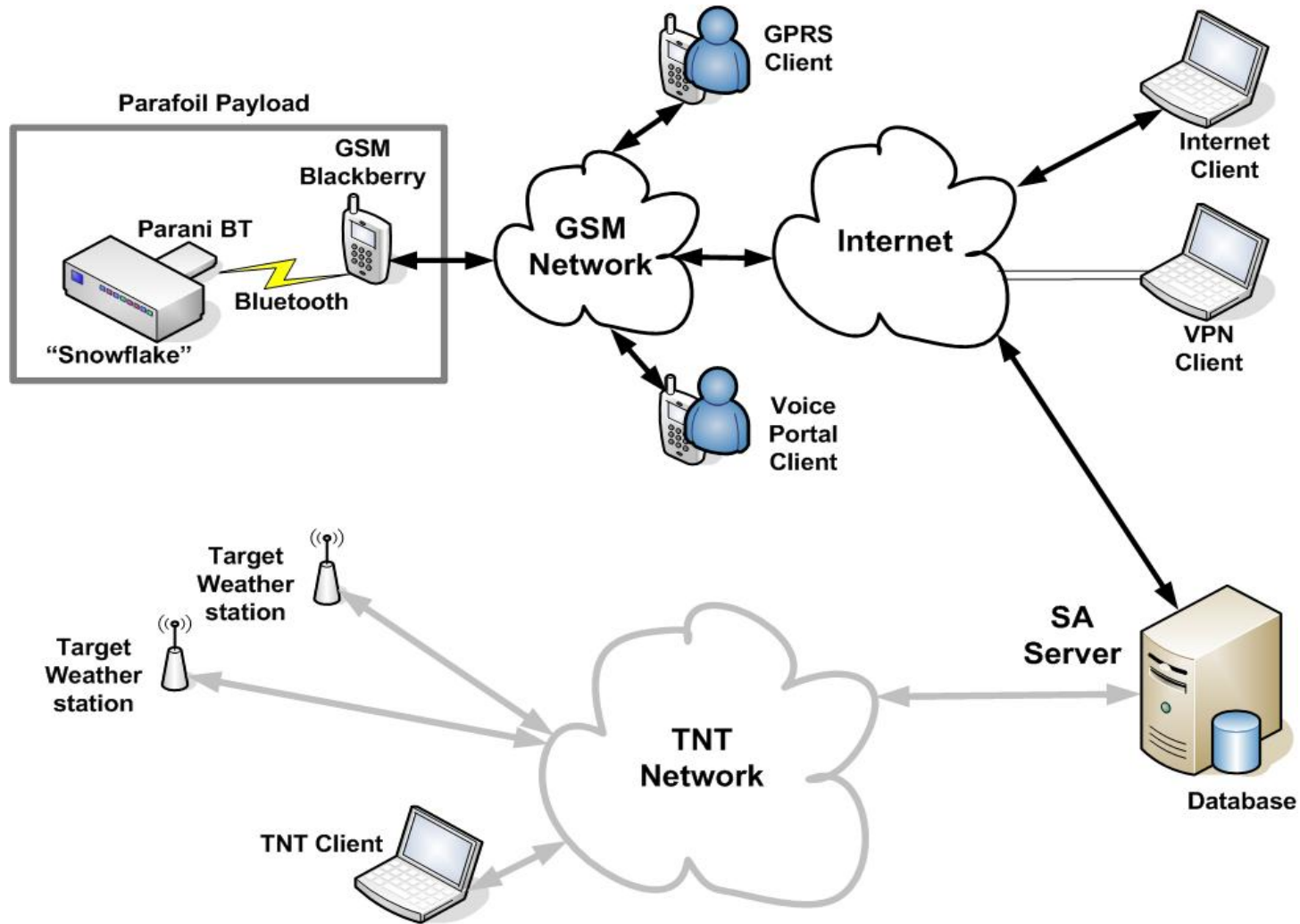


Two armed “Snowflake” units ready for deployment and control over the Voice Portal In Camp Roberts, CA



Fully deployed “Snowflake” and its payload.

Utilization examples



"Snowflake" deployment network infrastructure with voice control utilization

Summary

- Alternative approach to sharing situational awareness information between man and machine in the tactical network-centric environment
- Long time anticipated seamless natural language to communicate with unmanned systems in the battlefield.
- “Humanizing ” the unmanned systems data exchange by enabling mapping data transfer commands into the voice commands.
- Tactical operation commander could literally hear unmanned systems “talking” back to commander providing voice report of current task execution status.
- VoT approach enables “sensing” unmanned systems networking and improve operator's cognition and situational understanding.
- GSM network utilization naturally brings very much desirable in many operations capability – a global reach.

Questions

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