Shared situational Awareness Environment for Tactical Level Humanitarian Emergency Operations

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AGENDA

- Introduction
- Background and Approach
- CHE Habitat Components
- CHE SA Tool Agent-Based Architecture
- Experimental Studies
  - Developing SSA Through Peer-to-Peer Collaborative Applications
  - Integrating Network Awareness
- Conclusion and Questions

Research Objective

- Develop and explore shared situational awareness model for Tactical Complex Humanitarian Operation site collaborative environment
- Apply DARPA NICCI Habitat concept to build the multiagent shared SA prototype
- Find the solution for integrating client-server and peer-to-peer collaborative elements
- Identify the solutions for network performance feedback integration
- Explore the CHE unit member roles in maintaining shared situational awareness

Introduction

- DoD has SSA interest
  - Common Operating Picture at Small Unit Level
  - DARPA Advanced Technology Office working on an SSA project
- NPS exploration of SSA
  - LOE with Joint Forces Command (JFCOM)
- Crux of Joint Vision 2020

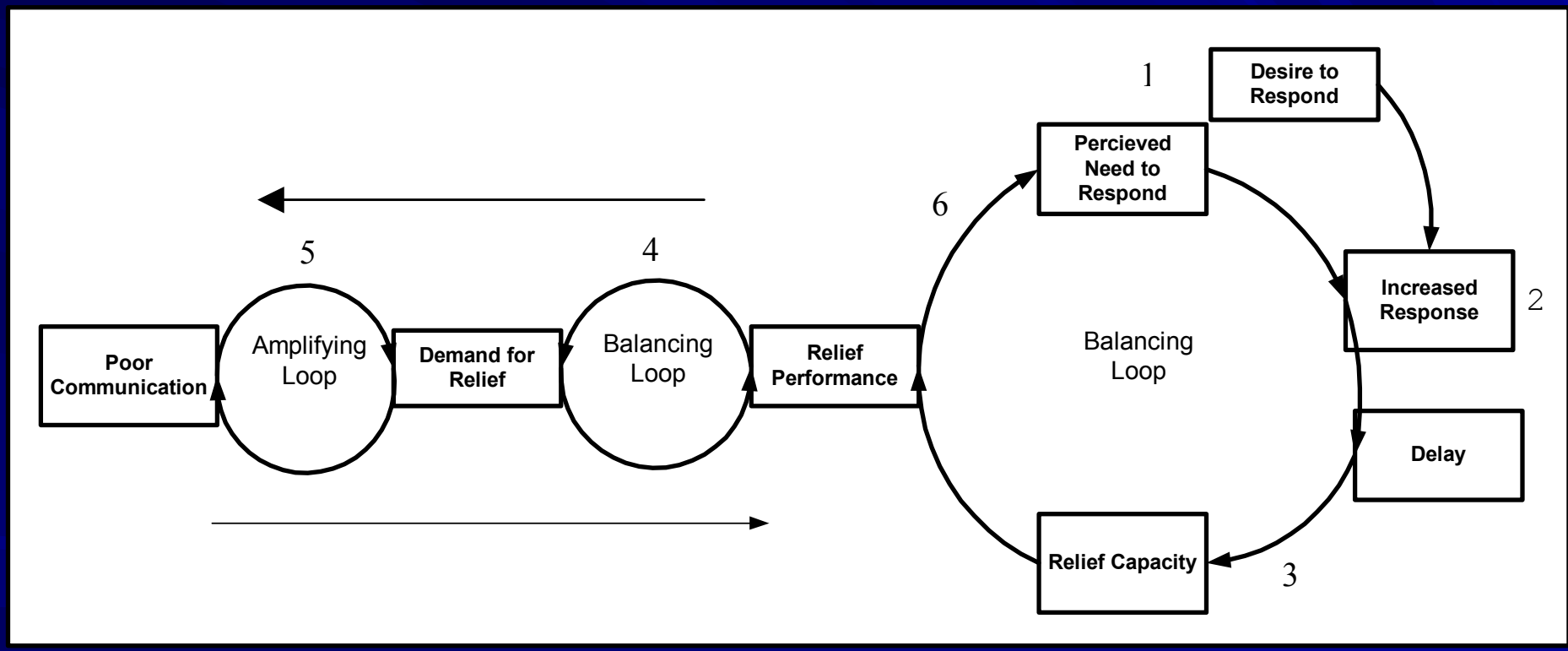
Background and Approach

- DoD Recognized Key Role of Technology
  - Improve Communication Between Organizations
- National Defense University
  - Institute for National Strategic Studies (INSS)
  - Directorate for Advanced Concepts, Technologies, and Information Strategies (ACTIS)

Background and Approach

- CIMILink Project
- Virtual Information Center (VIC)
- Peace Operations Support Tool (POST)
- Virtual Operations Coordination Center (VOCC)

Current State Archetype

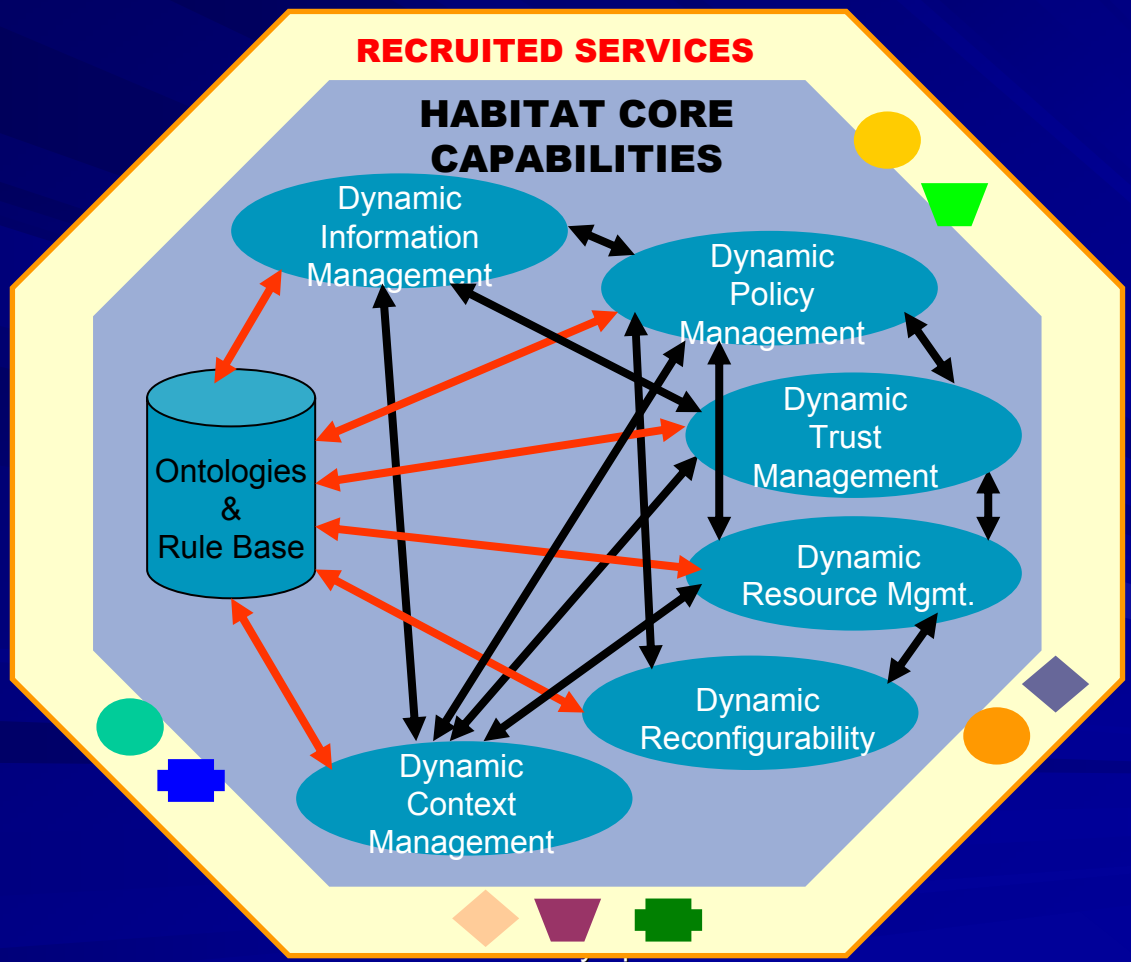


DARPA NICCI Habitat

(Network-Centric Infrastructure for Command, Control and Intelligence)

- The habitat is a dynamic virtual construct that allows a set of collaborating components to come together and form a team to solve a given problem.
- The habitat resides within a global grid, using smart information exchange infrastructure technologies, to facilitate the intelligent tailoring and dissemination of knowledge.
- Simply networking components together does not create a habitat. Components must be able to share resources (information, services, etc.) in a way that optimizes their ability to carry out their assigned tasks effectively within constraints imposed by security or policy.

Habitat Capability Relationships



CHE Habitat Collaborative Components

- Groove ™ P2P Collaborative System
- Mobile Units Shared SA C-S Agents (NPS)
- Relief Operations Coordination Center (ROCC)
- Virtual Civil-Military Operations Center (VCMOC)

CHE Agent-Based Architecture for Situational Awareness Sharing

- Concept: 100% SA view sharing
- Client-Server Elements (C-S)
- Peer-to-Peer Elements (P2P)
- Flash based integration of C-S and P2P components
- Bandwidth Friendly
- CoABS integrated: immediate access to expert sources via the CoABS Grid

CHE SA Tool Agent-Based Architecture

- Agents
  - Tracking Agent
    - GPS or Manual
  - SA Management Agent
  - CoABS Grid Agent
  - Text Messaging Agent
  - Database Agent

PACOM Experiment

- Developing SSA Through Peer-to-Peer and C-S Collaborative Applications

  -CHE Site Monitoring

  -Accessing Remote Data and Expert Sources

  -Displaced Persons Search
- Camp Smith-Camp Kaneohe topology
- Integrating Network Awareness
  - Network Management
  - Management Roles

SA Awareness Tasks for the PACOM Experiment

- A listing of the organizations and their mandates involved in the relief effort
- Points of contact for organizations involved in the relief effort including a listing of the skills, supplies and number of people being provided by each organization
- The capability to manage displaced persons, tracking home of origin, current location, family members, and medical condition
- The ability to search a database to locate specific organizations, points of contact, needs and requirements or displaced persons.

SA Tasks For the PACOM Experiment

- Timely and accurate situational awareness information concerning the history, current situation and projected situations for the relief area to include danger areas, infrastructure, safe areas, access routes, media contacts, local authorities and maps
- A tool to better coordinate and communicate between NGO and military units involved in the relief operation
- Awareness of logistical needs such as medical, food, shelter and clothing supplies. Where they are needed, when and how much
- Mobile capability provided by the use of wireless and handheld technologies.

TECHNICAL EVALUATION WORKSPACE - Web Links - Groove

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TECHNICAL EVALUATION WORKSPACE

Web Links

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Back | Add Favorite | Up | Browse Together

Members Invite

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- Major Hezekiah B...
- Sam Chance

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ROCC Log...

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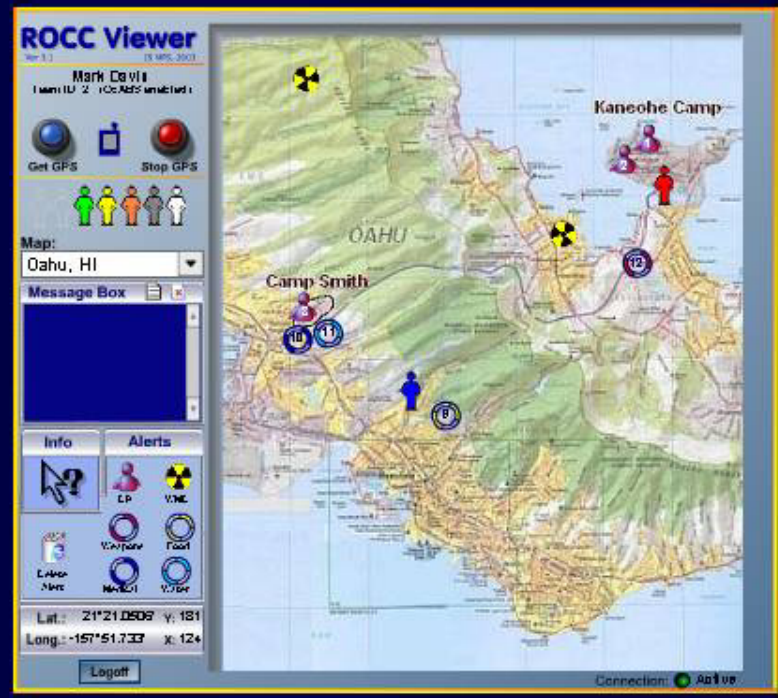

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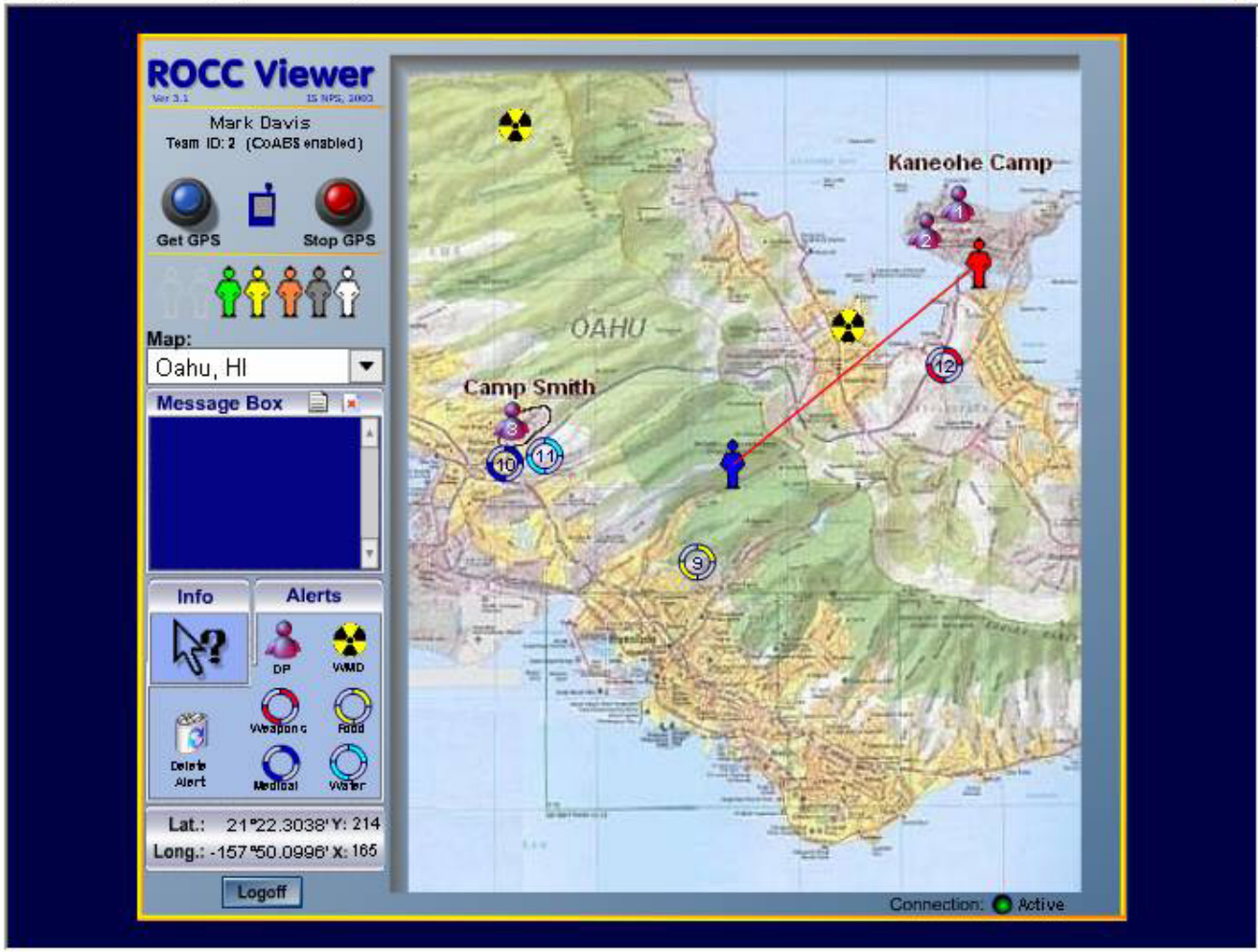

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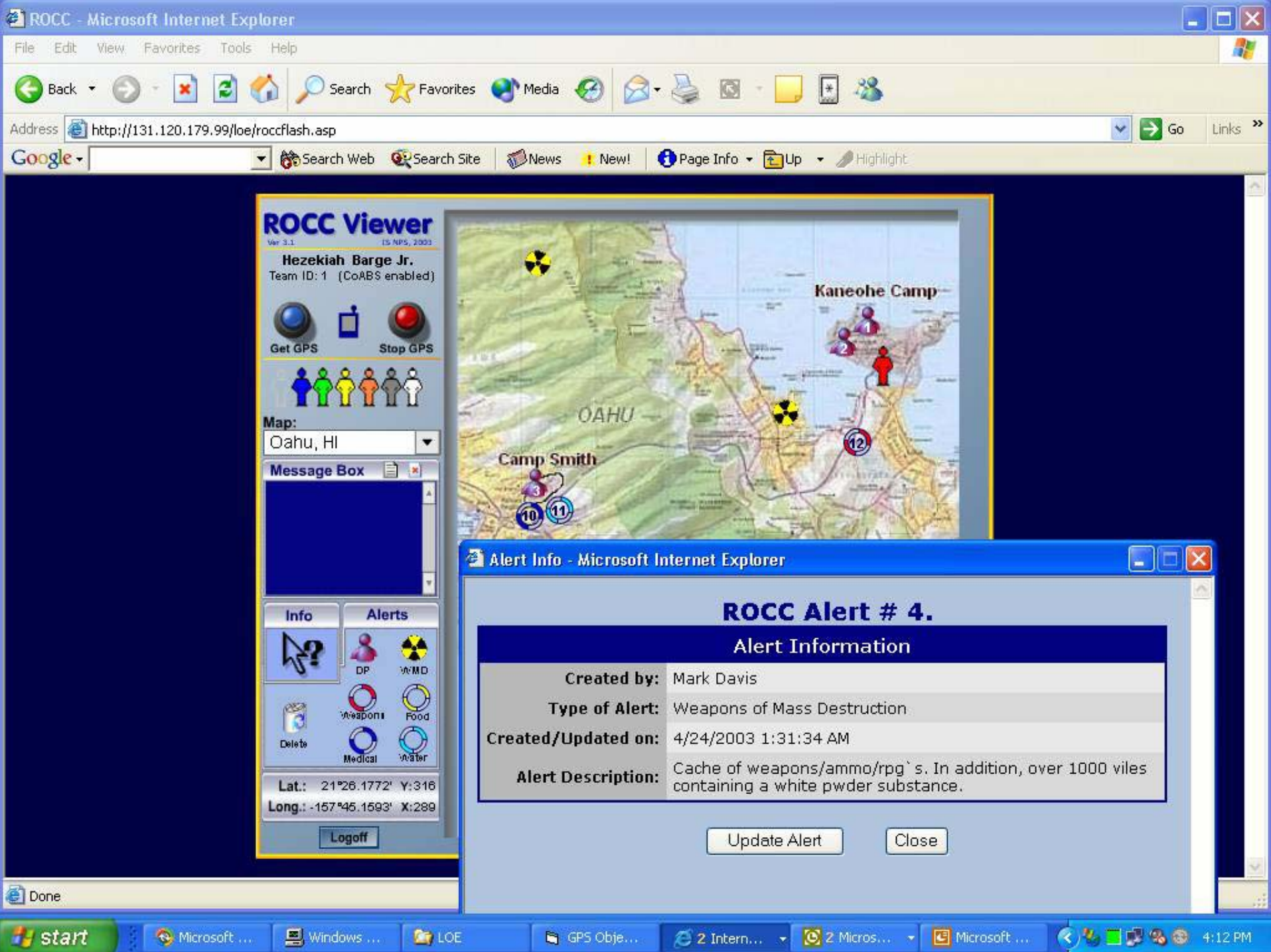
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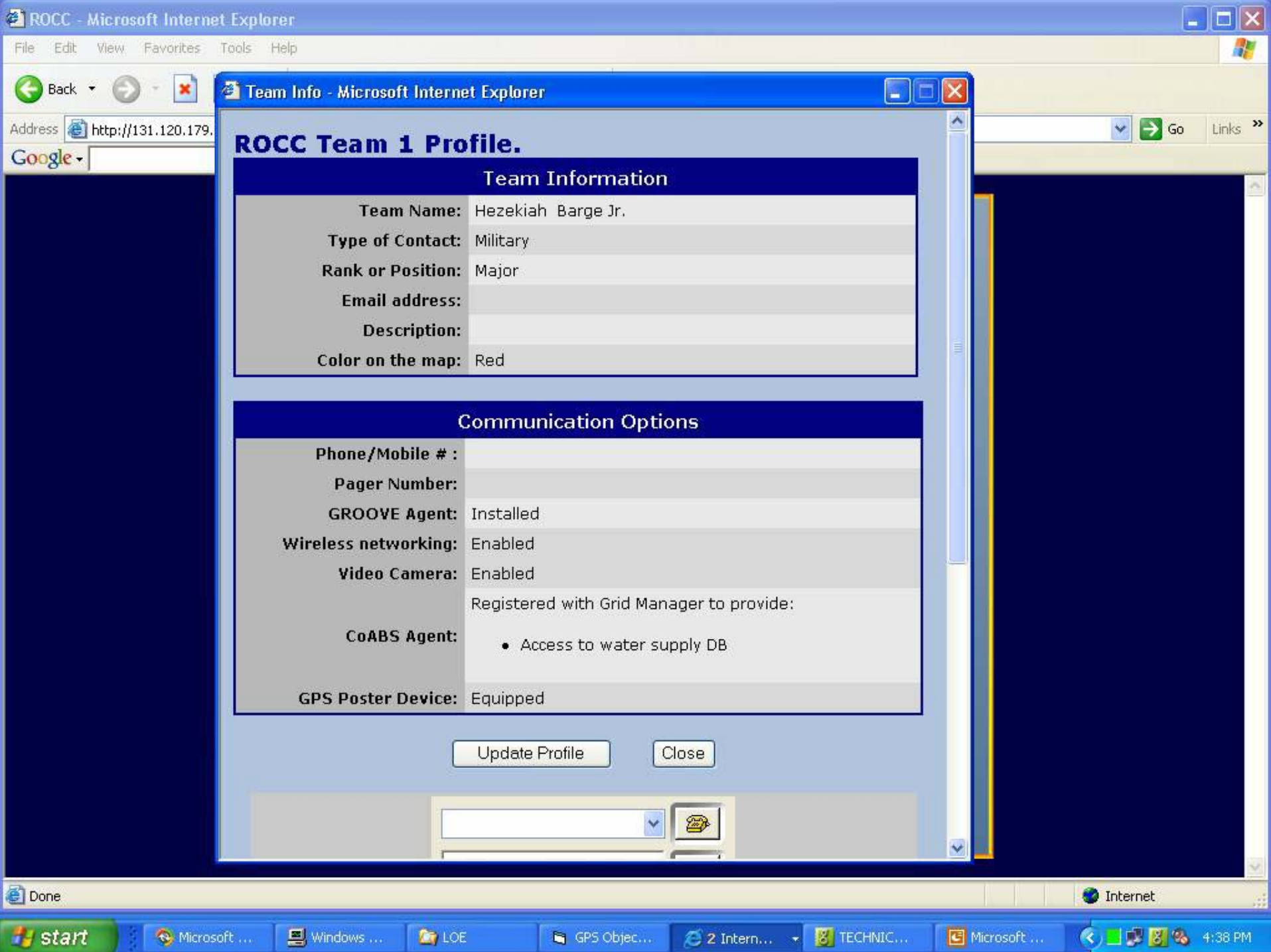
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Team Info - Microsoft Internet Explorer
ROCC Team 1 Profile.
Team Information
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Type of Contact: Military
Rank or Position: Major
Email address:
Description:
Color on the map: Red
Communication Options
Phone/Mobile # :
Pager Number:
GROOVE Agent: Installed
Wireless networking: Enabled
Video Camera: Enabled
CoABS Agent: Registered with Grid Manager to provide:
• Access to water supply DB
GPS Poster Device: Equipped
Update Profile
Close
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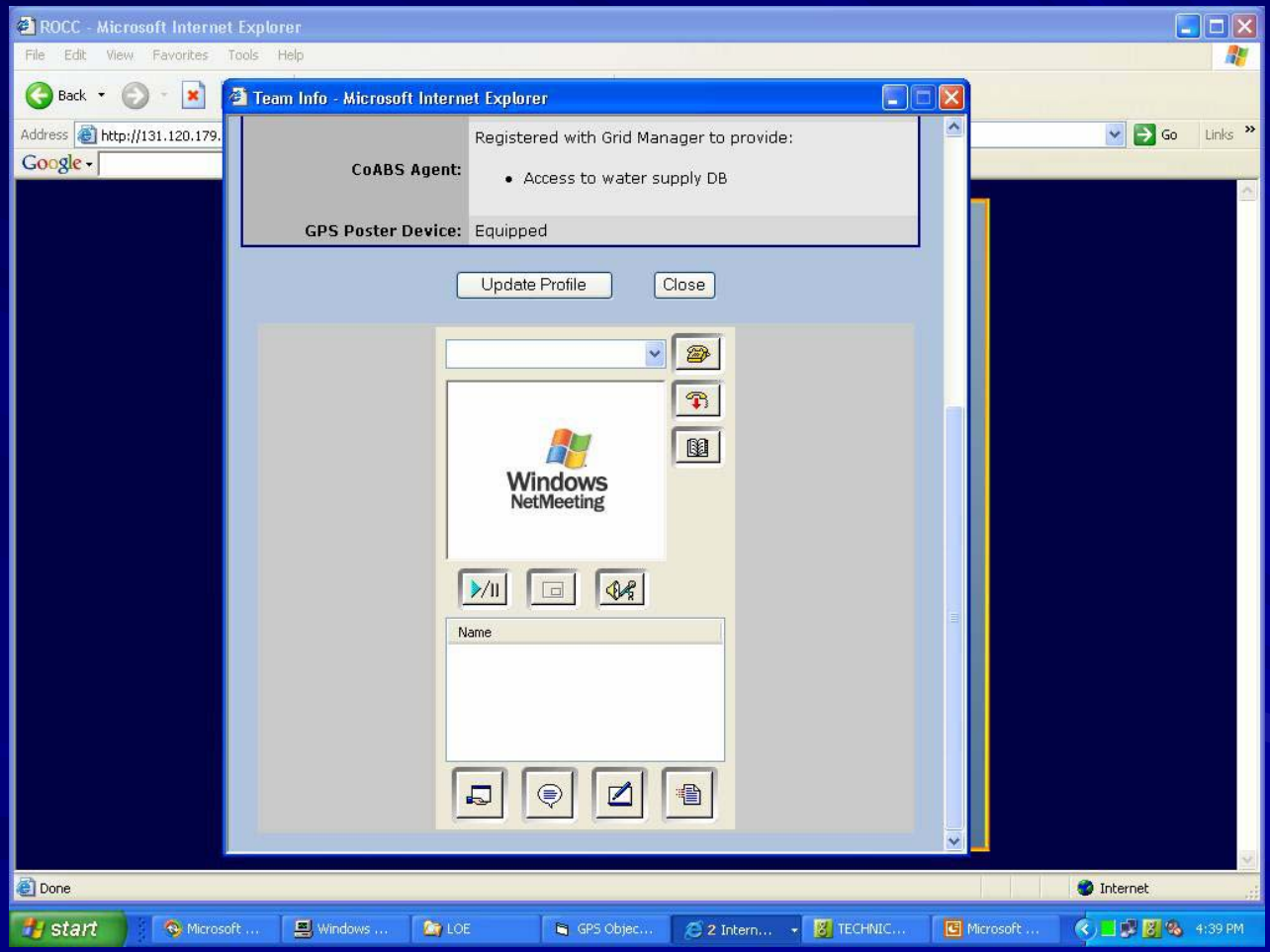
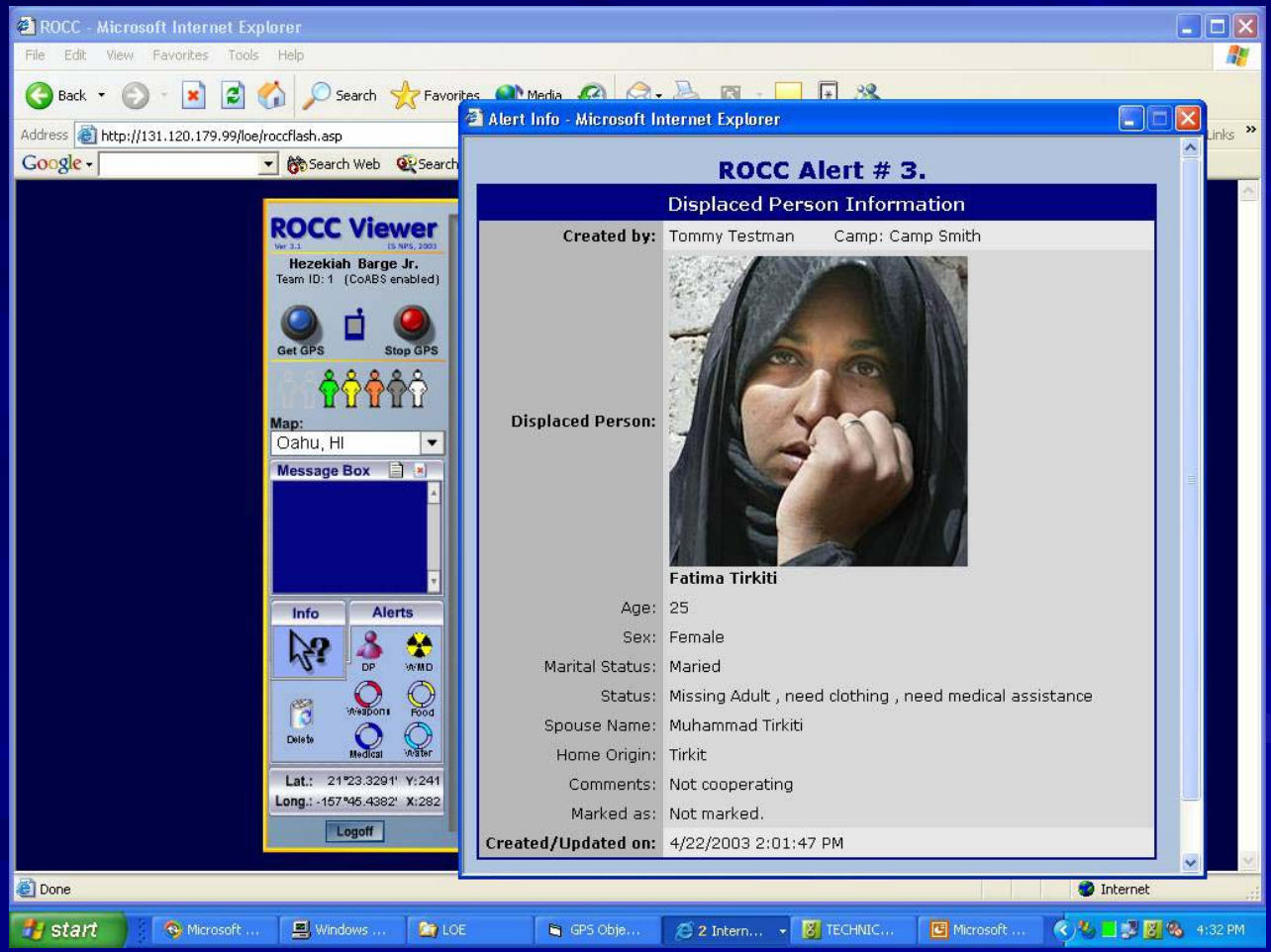
Habitat member profile with embedded video access



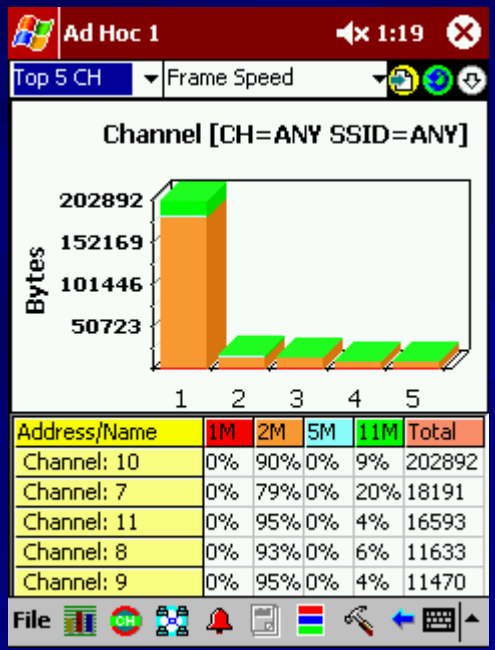
Displaced Person Alert

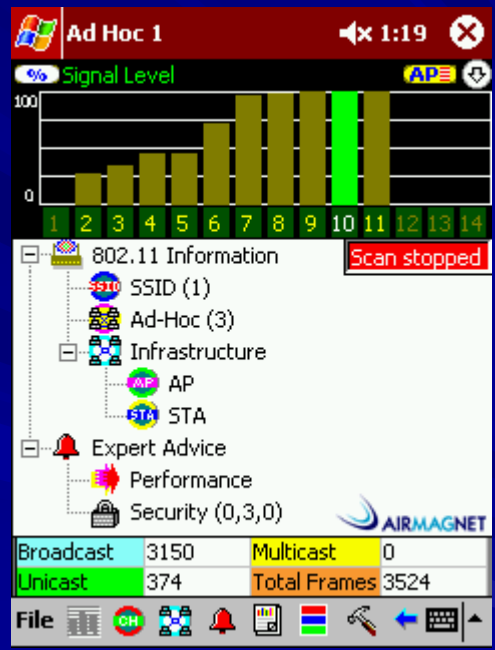


Integrating Network Awareness in Shared SA

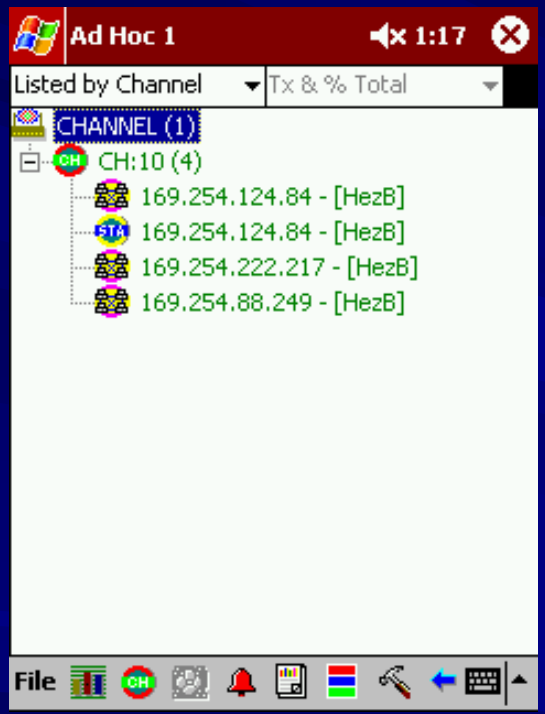
- Demonstrate intra-camp communication utilizing local area network technologies.
- Demonstrate global connectivity using a satellite system for reach-back communication.
- Conduct and analyze network management functions.

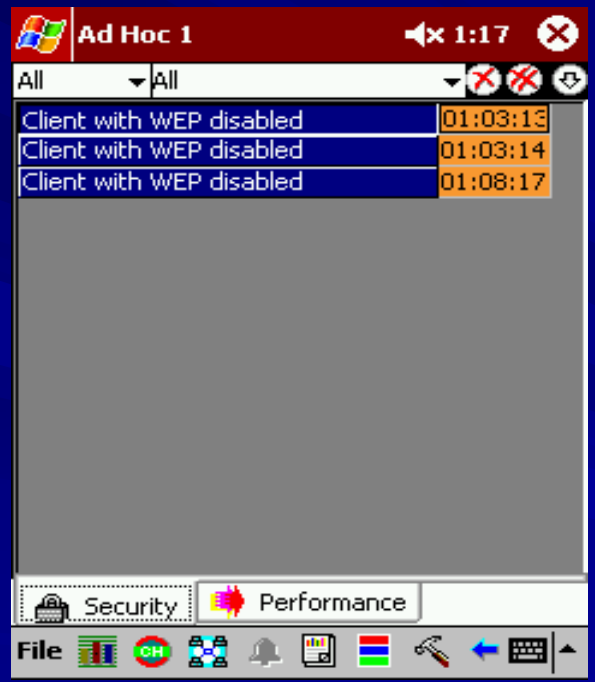
Exploring Network Performance Feedback: Pocket PC Solution

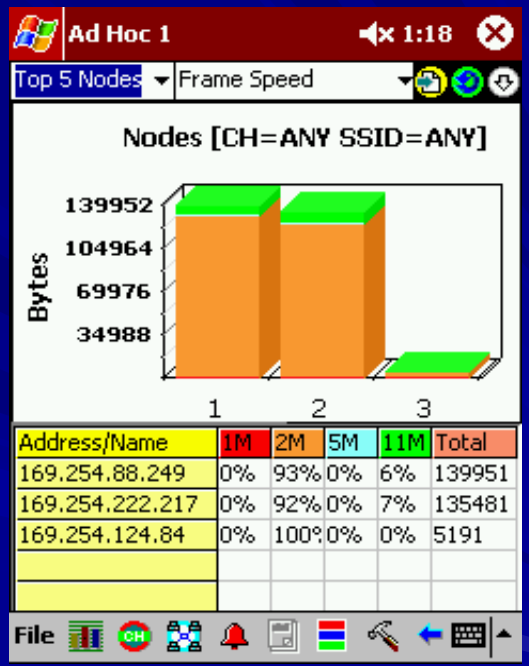




Informative but Complex Network Performance Views







Findings and Conclusion: Shared SA Findings

- Tested SA solution enables self-organizing habitat environment
- Developed model of shared SA effectively facilitated humanitarian relief efforts
- Effective Use of Peer-to-Peer Networking to Conduct Camp Management Tasks

Network Awareness Findings

- Despite not having internet reach-back connectivity, the habitat members who were in charge of camp management functions were able perform their jobs as camp managers
- Other role players were able to self organize and collaborate with each other on a WLAN without access points even when the wide area satellite link went down.
- This was all made possible through use of the P2P Groove combined with multiagent C-S SA platform Providing timely feedback on network performance via the Pocket PC appeared to be efficient, but requires one of the CHE unit members to be the interpreter of this information

Findings on Human Roles

- Shared SA findings strongly confirm the need in Groove workspace manager (VoIP, files), SA Agents Event observer, and CoABS Grid communicator
- The network awareness findings confirm the critical need in allocating human network operator role to one or more CHE unit members
- Such person would be capable of rapidly interpreting network performance feedback into the shared situational awareness view changes suggesting adjustments of Groove-based actions to CHE collaborators

Future Studies

- Automating access to expert sources: CoABS interface to PACOM Virtual CMOC and other critical CHE data bases
- Automating network performance feedback operator function: integrating Simple Network Management Protocol (SNMP) agents, which are in control of the networking elements, with the collaborative tools

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Questions?