Automating Wide Area Surveillance with Radar, AIS, and GPS

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Agenda

- Typical System Architecture
  - Detection Sensors
  - Automation
  - System Responses
- System Performance and Limitations
  - Impact on IT Organization
  - False Alarms
  - Waterside Detection Performance

Typical System Architecture

Sensors

Marine Radar

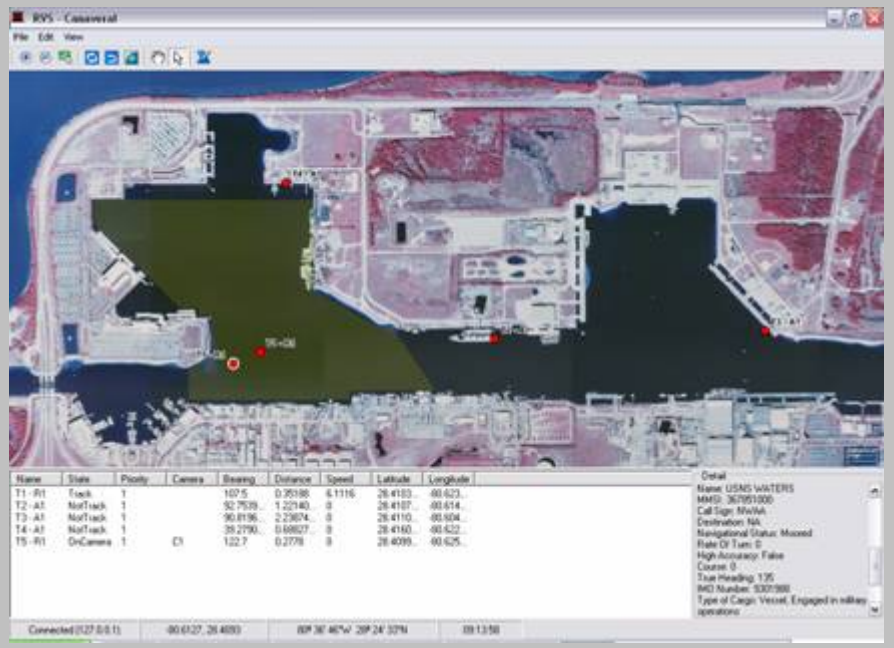
AIS

Ground Radar

GPS

Detect

Situational Awareness Processor

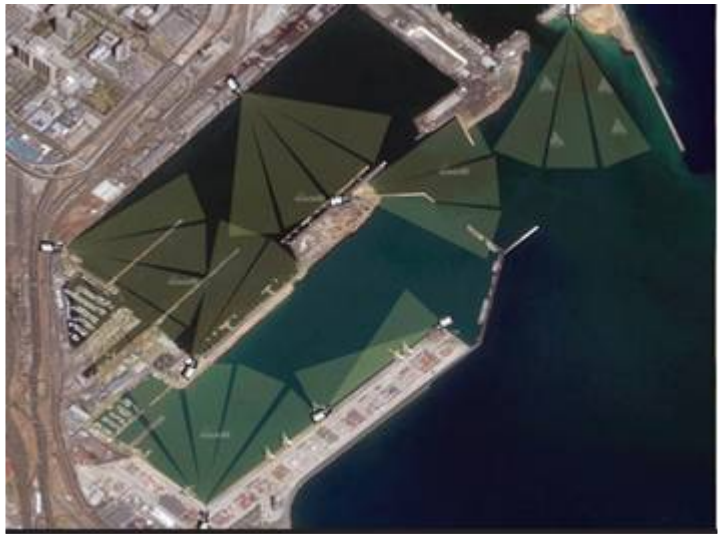


Track, Display, Prioritize

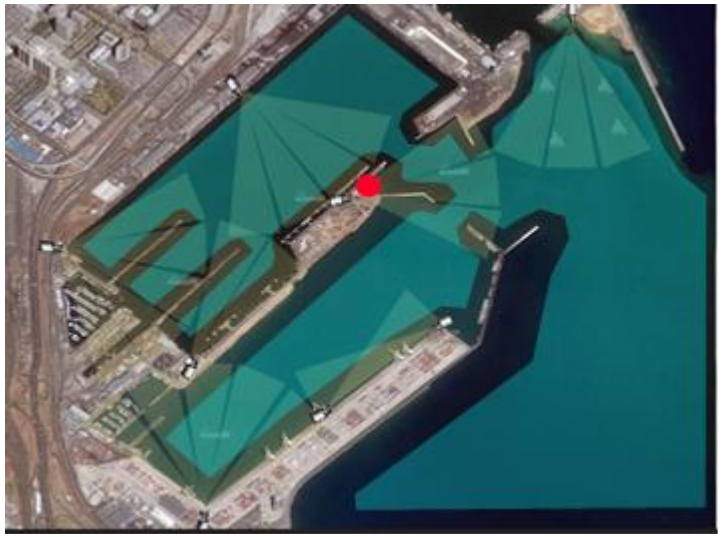
Security Systems

Respond

Video Analytics vs. Radar Detection



- 24 cameras for detection
- Partial coverage
- Several Cameras to Identify
- Extensive set up, tuning
- Daylight operation only
- Highly susceptible to weather
- $450K + $60K Maintenance



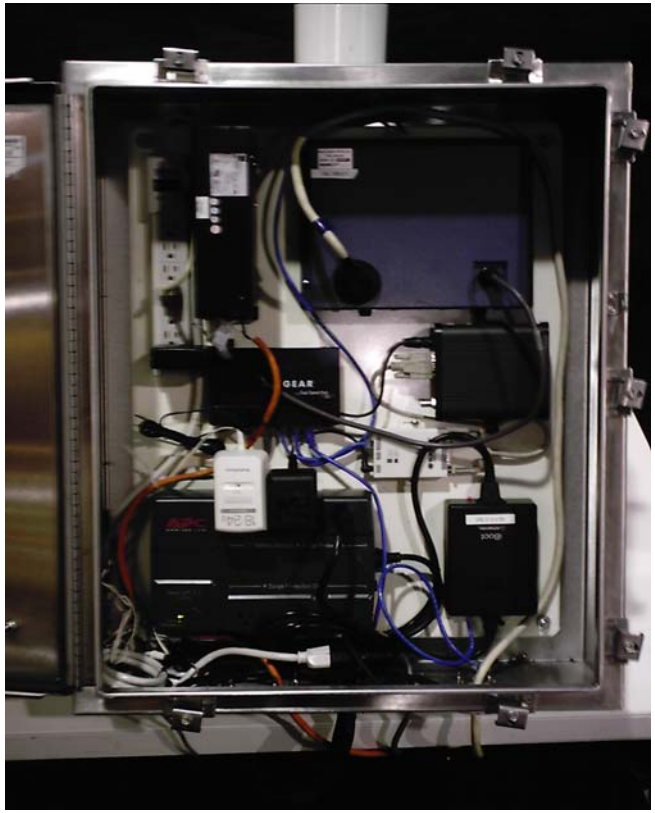
- 1 radar for detection
- Full coverage
- Several Cameras to Identify
- Less set up, maintenance
- 24 hour detection
- Less susceptible to weather
- $250K + $20K Maintenance

Waterside Sensors

- Radar
  - 4kW to 25kW
  - 4’ to 9’ Antenna
  - < 1 mbps Bandwidth
  - 25° Vertical Beamwidth
  - Effective Range 1 - 6 NM

- AIS
  - Required for 65’ + Commercial Vessels
  - Filters Commercial Activity from Radar Returns
  - < 1kbps Bandwidth
  - Effective Range 15 – 40 NM

Typical Waterside Sensor Enclosure



- NEMA 4X, 30”x24”x8”
- Converts Radar, AIS Data to TCP/IP
- 15 – 30 Min UPS
- IP Power Switch
- CCTV Streamer
- IP Addresses Required for Radar, AIS, CCTV, Power Switch
- Estimate 1 mbps + CCTV

Radar Mounting Options

Ground Sensors

- Radar
  - 300m, 1400m, 12 km Ranges
  - < 1mbps Raw Data
  - XML to SA Processor
  - Expensive But Can be Cost Effective on the Right Terrain

- GPS
  - 900 mHz, Cellular, or Satellite
  - 900 mHz approx. 3 mi Range
  - Vehicle Mounted or Personnel Carried

Automation – Typical Features

- Multiple Sensor Inputs
- Distributed Operation
- Data Fusion
- GIS Mapping
- User Defined Alarm Zones
- AIS Filtering
- GPS Filtering
- User Defined Rules
- Threat Prioritization
- MARSEC Levels

- Operator Alarms
- Distributed Operation
- Manual Control
- Camera Compatibility
- Look Here Now

System Responses

- Alarm Annunciation
  - Security Platform API
  - XML Interface
  - SQL Server Interface
  - Feedback to SA Screen
  - TCP/IP Controlled Dry Contact Switches
- CCTV Response
  - Multiple Cameras
  - Preset Controlled
  - Closest Camera With View Selected
  - Recording Initiated on Alarm

Impact on IT Organization

- Impact on Network
  - IP Addresses Required for Radar, AIS, CCTV, Remote Power
  - < 1mbps for Waterside Sensor Pack
  - < 1mbps for Ground Radar
- Training
  - One week training program at supplier facility
  - On site training during installation and sell-off
- Maintenance
  - Trained System Administrator Maintains Rules and Responses
  - Typically the Same Person Maintaining Access & CCTV Systems
  - Physical Maintenance Similar in Scope to Maintaining a Camera – Quarterly Cleaning and Inspection

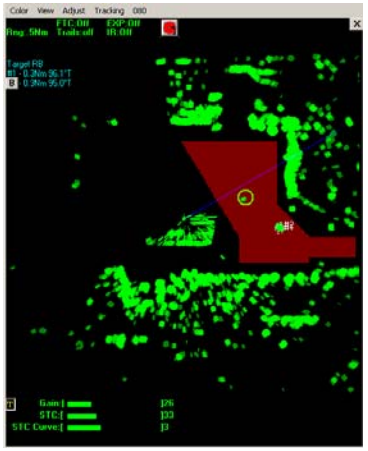
False Alarms

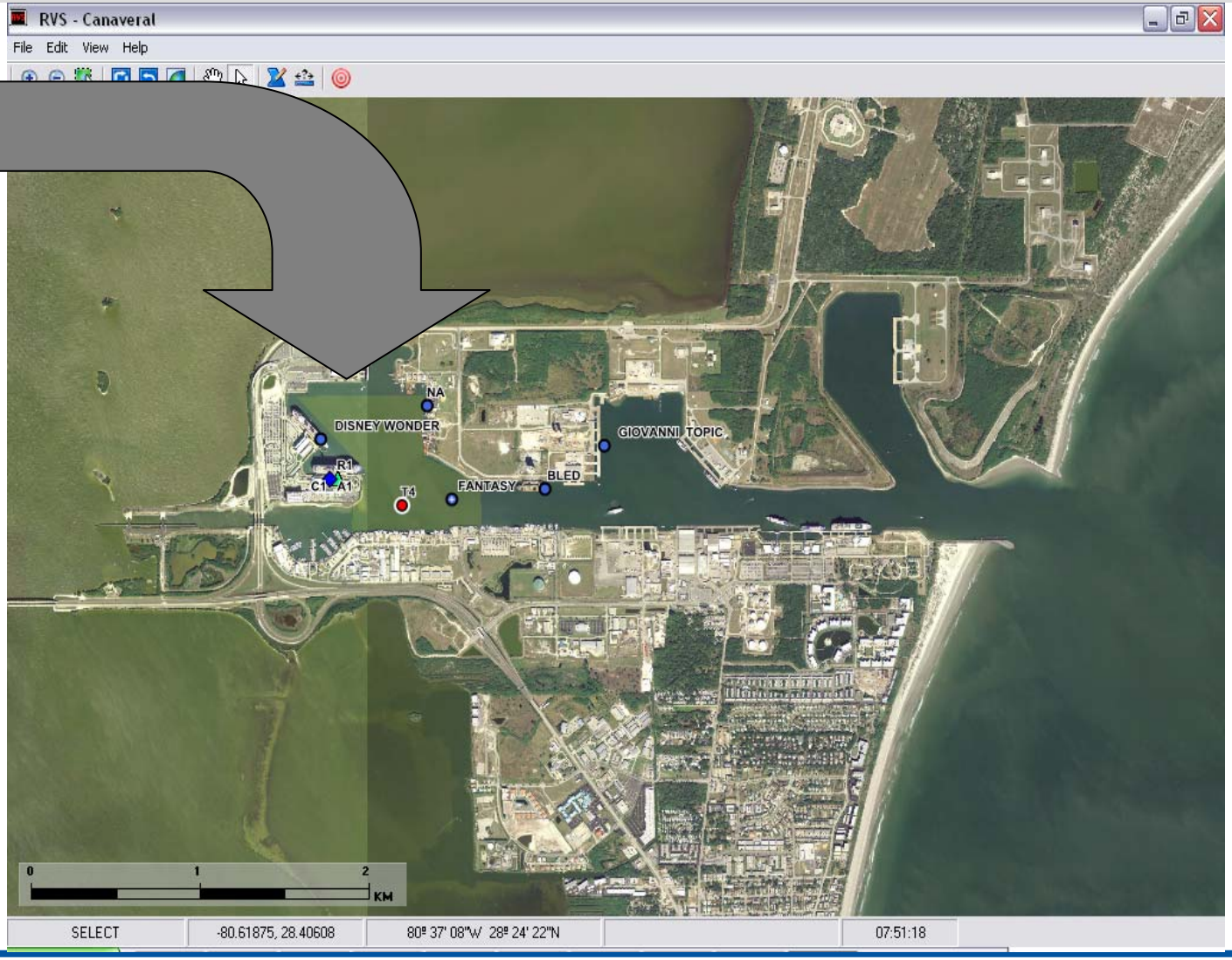
- Evaluate the Cost, Benefit
- Adjust Detection Sensitivity
  - Alarm Zone
  - Gain / STC
- Adjust Alarming Sensitivity Rules
  - Proximity
  - Speed / Bearing / Heading
  - Time of Day / Day of Week
  - Ignore AIS / GPS
  - Set Alarm Threshold
  - Priority = 0 Means Ignore

Waterside Detection Parameters

- Selectable Parameters
  1. Radar Power
  2. Antenna Size
  3. Antenna Height
  4. Alarm Zone
  5. Circle Size
  6. Rotation Speed
  7. Gain / STC
- Determine Detection Performance
  1. Small Target Detection Range
  2. Minimum Alarm Zone to Shoreline Distance
  3. Radius of Blind Spot
  4. What's Detected Versus Ignored
  5. Max Speed of Detected Object
  6. Update Rate of Radar
  7. Sensitivity

Alarm Zones




RVS - Canaveral
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Detection Response Time

- Radar Rotation (24 RPM = 2.5 sec per sweep)
- Radar Report Setting (fastest is 2 sweeps or 5 seconds)
- Data Transfer Rate (fastest is one second)
- RVS Processing Time (spec is 5 seconds on appropriate server)
- Typical Response Time Budget = 5 + 1 + 5 = 11 sec

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Thank You