Collaborative Routing and Coordination Tools (CRCT)

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CRCT Briefing Overview

- **Research and Development (R&D) Background**

- **Capabilities Overview**

- **Status and Next Steps**

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CRCT R&D Background

- *Problem:* **Current process for mitigating weather and airspace congestion related problems is labor intensive and can result in inefficient rerouting**
  - Limited information about future state of the National Airspace System (NAS)
  - Limited ability to evaluate potential strategies
  - Limited ability to coordinate potential strategies with airspace users before they are implemented
- *R&D Objective:* **Provide a Decision Support Tool (DST) that helps select mitigation strategies more effectively and reduces the time required to coordinate those strategies within the FAA and with NAS Users**
  - Initial emphasis on rerouting

Development Objectives

- **Establish techniques for improving accuracy of Traffic Flow Management (TFM) trajectory predictions**

- **Develop DSTs and supporting procedures for:**
  - **Quickly determining the need for intervention in developing weather or traffic congestion situations**
  - **Quickly defining reroute strategies for a single or group of aircraft**
  - **Assessing, in real time, the impact of reroute strategies on NAS resources and NAS users**
  - **Facilitating collaboration, within the FAA and between the FAA and NAS users, on reroute strategies**

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Potential Benefits

- **Improve a flow manager's ability to anticipate flow problem situations requiring reroute action**

- **Allow flow managers to quickly evaluate the impact of reroute plans before they are implemented**

- **Minimize overall impact of reroute strategies on users**
  - **Replace the current system of "blanket" reroutes with aircraft-specific reroutes that may reduce both the total number of aircraft rerouted, and the length of reroutes assigned to individual aircraft**
  - **Provide users with information on how proposed reroute strategies will affect them**

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Primary CRCT Capabilities: Overview

Identifying and Analyzing Flow Problem Situation

Locating Flights Involved in the Problem

Developing the Reroute Strategy

Evaluating the Reroute Strategy

Implementing the Reroute Strategy

Coordinating Reroute Strategies with Others

ATCSCC

AOC

Other ARTCCs

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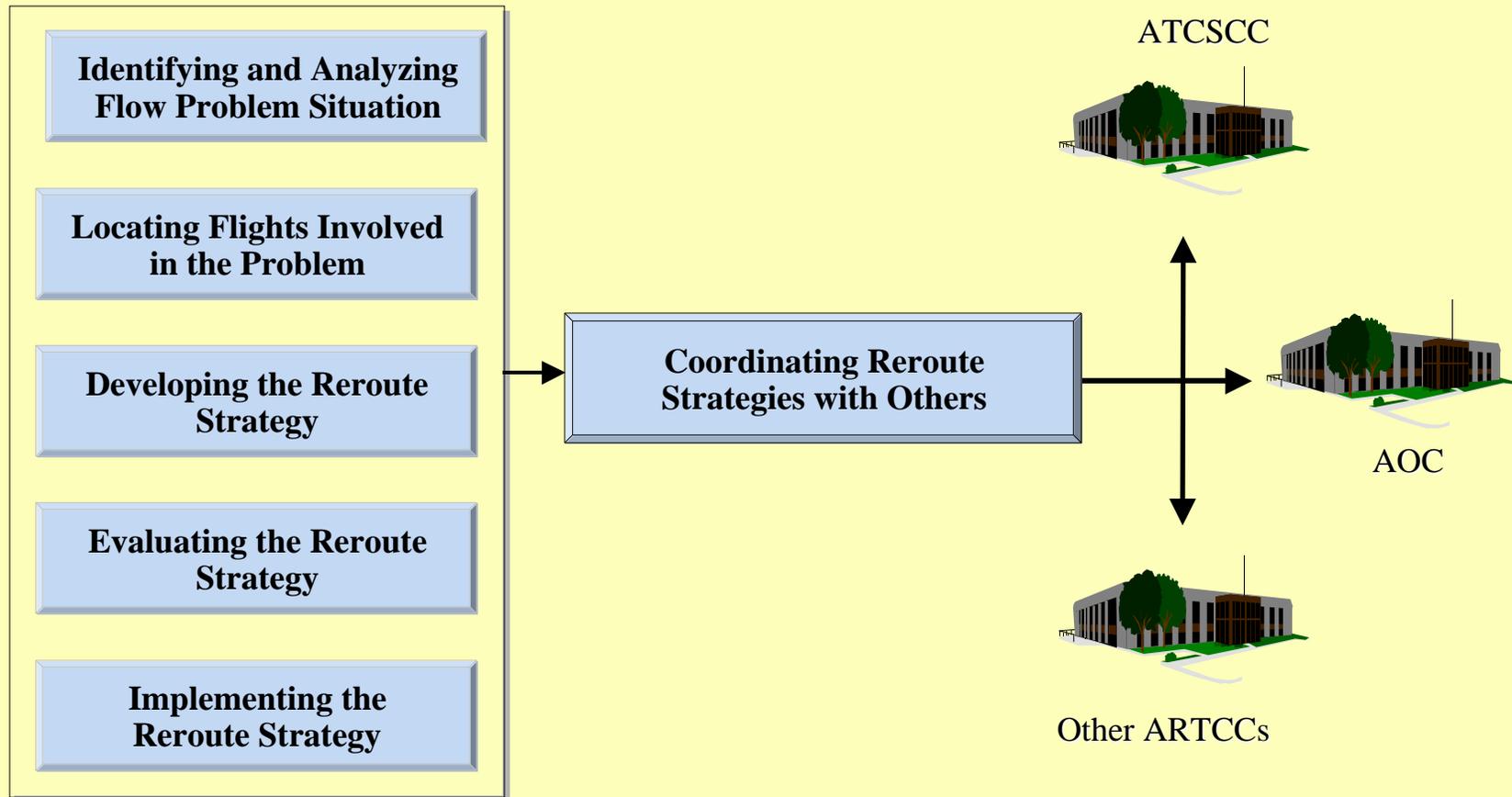
Identifying and Analyzing the Flow Problem Situation

- **Traffic manager can more easily visualize future traffic patterns and flows with Future Situation Display**

- **Traffic manager receives alerts for areas of predicted traffic congestion**

- **Any airspace can be monitored as a flow management constraint (Flow Constrained Area, or FCA)**

- **FCA locations and schedules can be coordinated with other FAA facilities and airspace users**

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Identifying and Analyzing the Flow Problem Situation (Concluded)
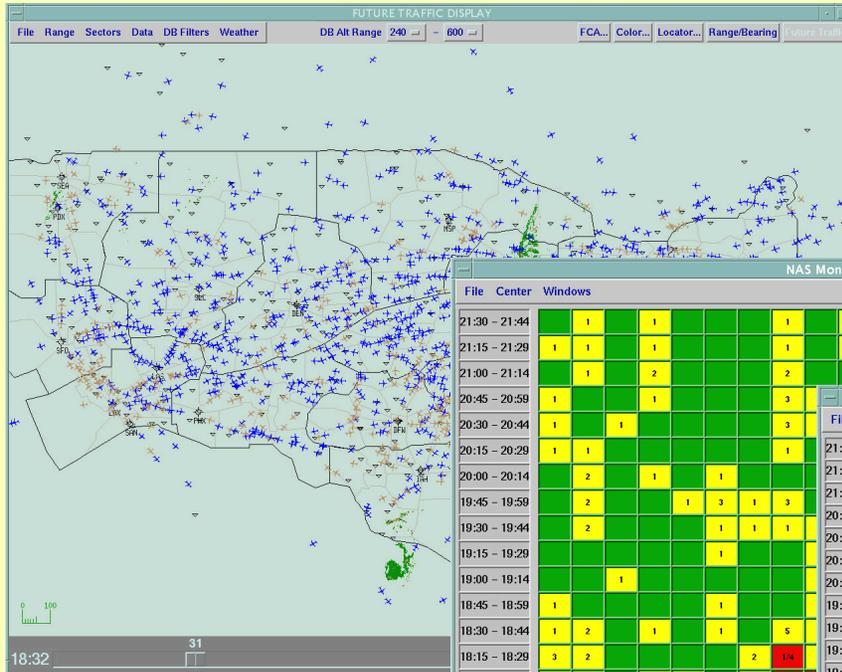
Future Traffic Display showing weather and traffic 31 minutes from current time

Sector Count Monitor showing predicted counts and alert status for ZOA

NAS Monitor: showing current and predicted alert status for 20 CONUS Centers

Aircraft Time in Sector display for ZOA Sector 32

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Locating Flights Involved in the Problem

- **Rapidly identifies aircraft predicted to operate through an identified constraint (FCA)**

- **Aircraft may be exempted from the FCA (ex., all aircraft landing at ORD airport)**

- **List of affected aircraft can be coordinated with**
  - **Airspace users**
  - **Other FAA facilities**

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Locating Flights Involved in the Problem

(Concluded)

Traffic display showing FCA and affected routes

FCA list showing aircraft associated with FCA

FCA definition window to define FCA and appropriate filters

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Developing the Reroute Strategy

- **Traffic manager can rapidly define aircraft reroutes**

  - **Individual aircraft**

  - **Groups of aircraft**

- **Proposed reroutes can be coordinated with**

  - **Airspace users**

  - **Other FAA facilities**

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Developing the Reroute Strategy (Concluded)
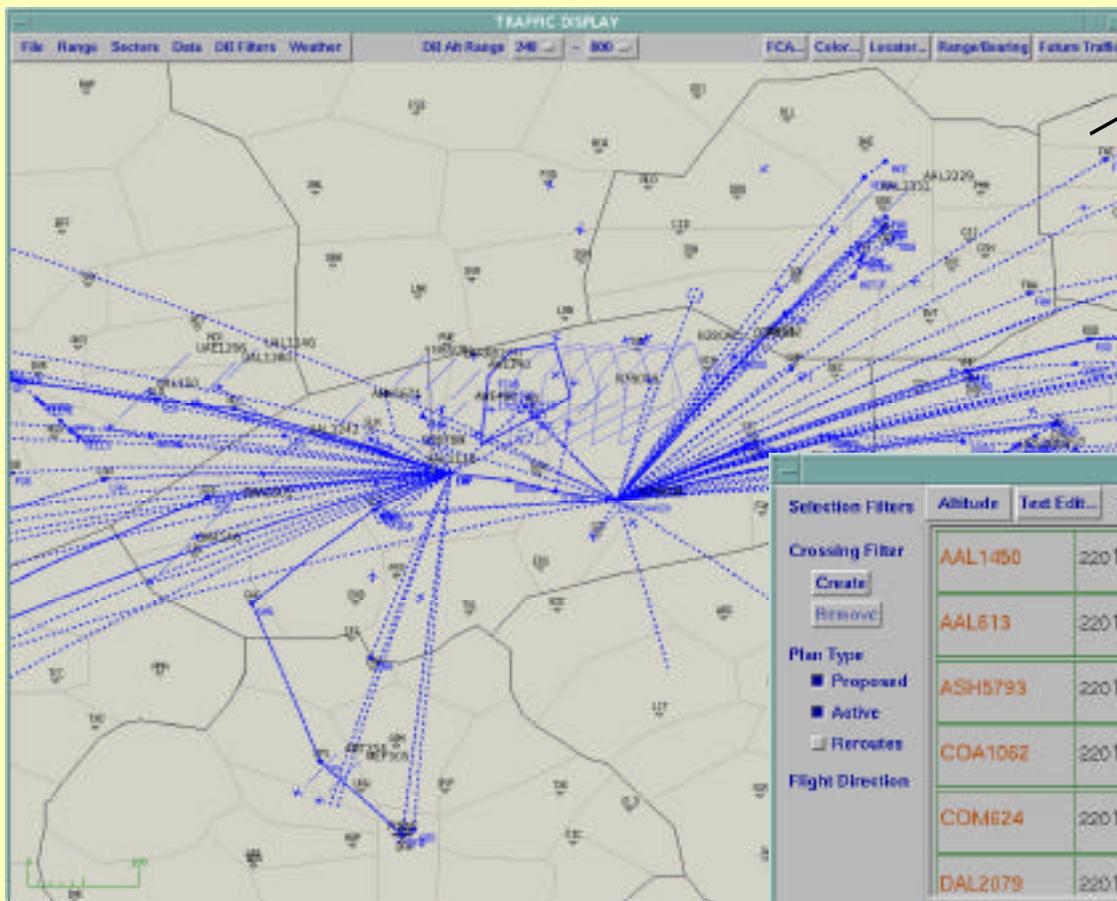
Traffic display showing group reroute definition

Rerouting window showing reroutes for selected aircraft

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Evaluating the Reroute Strategy

- **Traffic manager can evaluate effect of proposed reroutes on sector counts or other measures of traffic congestion**

- **Other facilities can examine the effects of the proposed reroutes on their Center/sectors**

- **Traffic manager can examine future traffic flows using proposed reroutes**

- **Traffic manager can compare predicted effects for alternative strategies**

Evaluating the Reroute Strategy (Concluded)
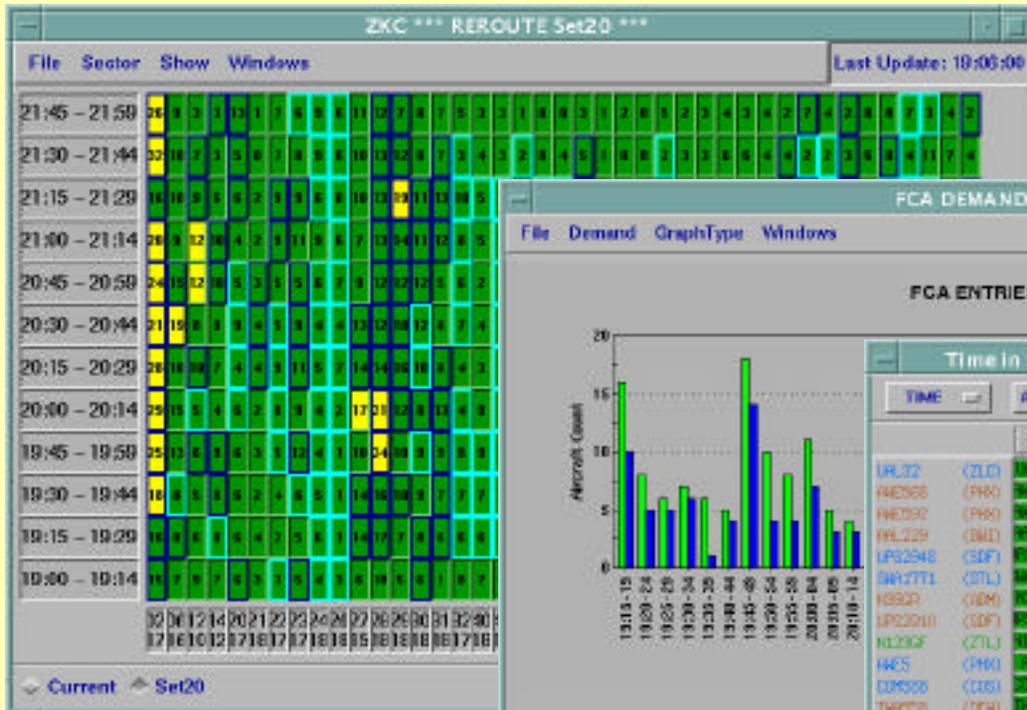
Predicted sector counts for aircraft on reroutes

FCA entry times based on reroutes
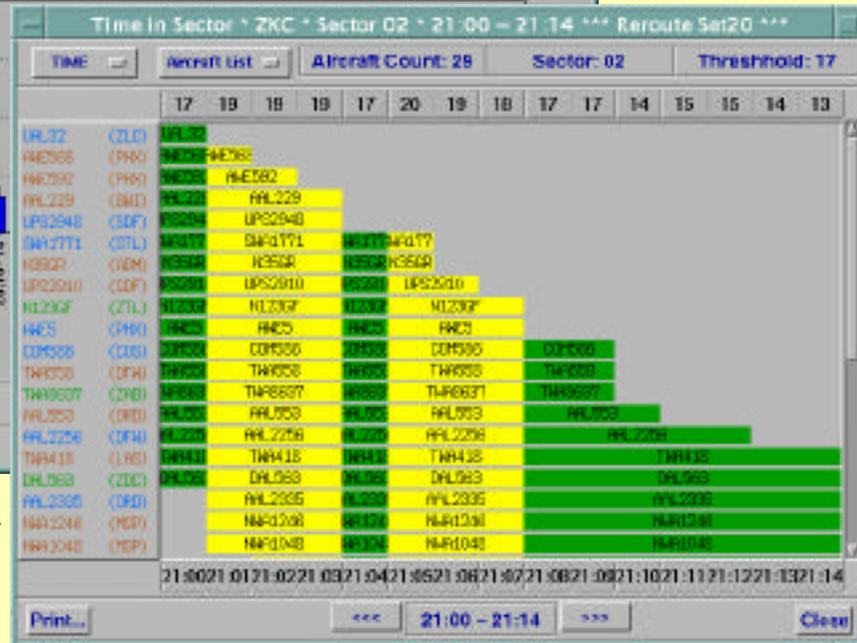
Aircraft sector transit times showing changes caused by reroutes

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Coordinating and Implementing the Reroute Strategy

- **Web-based capability developed for initial collaboration on reroute strategies**

- **Electronic means for sharing data and reroute strategies being investigated**
  - **Within ARTCC**
  - **Other ARTCCs**
  - **ATCSCC**
  - **Users**

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Status and Next Steps

- **Conducting limited demonstrations and field evaluations**
  - **ZKC field lab and TMU**
  - **ATCSCC A-lab and Operations floor**
  - **ZID training room and TMU**

- **Transitioning initial R&D results to FAA**
  - **Working with AUA-700 on Collaborative Routing Implementation Plan**
  - **Working with Volpe Center to incorporate results of CRCT FCA and trajectory modeling R&D into ETMS**

- **Doing R&D on "end state" concept**
  - **Integrated Impact Assessment (Reroute, MIT, Schedule)**
  - **Automating FCA and reroute capabilities**

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Support Slides

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CRCT Functional Architecture

Surveillance
Radars

**Flight Plans
Track Data
Sectorization**

ARTCC
Host

**Gridded Wind,
Temp, Pressure**

NOAA

**Flight Plans
Position Reports
NOWRAD WXR**

ETMS

**Altitude
Restrictions**

Adaptation
Data

Track & Plan Manager,
Conflict Detection

Host/ETMS Data Synthesis
Trajectory Prediction
ATC Constraint Modeling
Hypothetical Route Simulation
Conflict Prediction, Alerting

Sector Load Prediction
"What-If" Load Analysis
Display Counts, Alerts

Traffic
Monitor

User Interface

Plan-View Display
Future Situation Display
"What-If" Scenario Construction
Conflict/FCA Alerts
NOWRAD Display
WEB Interface

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