



# **COMPARISON OF CONTROLLER WORKING METHODS AND FLOW CONTROL TACTICS IN THE USA AND IN EUROPE**

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- ◆ **STUDY CONDUCTED WITHIN  
FAA/EUROCONTROL ACTION PLAN 2  
FRAMEWORK**
- ◆ **COMPLEMENTARY TO LARGER  
COMPARISON LED BY PRU and related to  
ALBUQUERQUE, INDIANAPOLIS,  
CLEVELAND- REIMS, MAASTRICHT and  
BARCELONA Centers**





## ◆ FOCUS ON CONTROLLER WORKING

### METHODS IN:

→ CLEVELAND

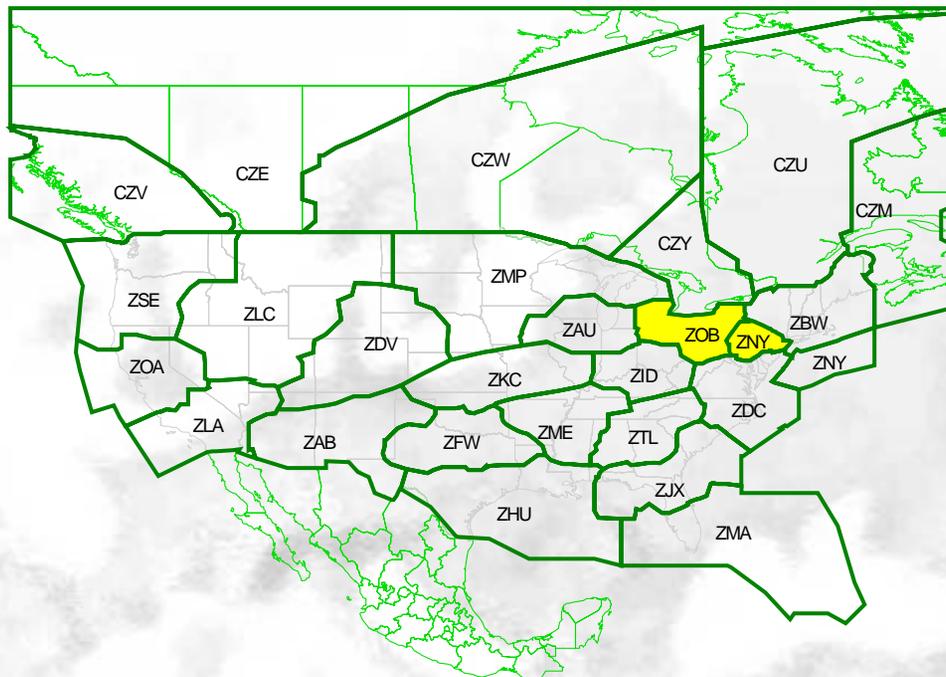
→ NEW YORK,

as comparable airspace with European core area.

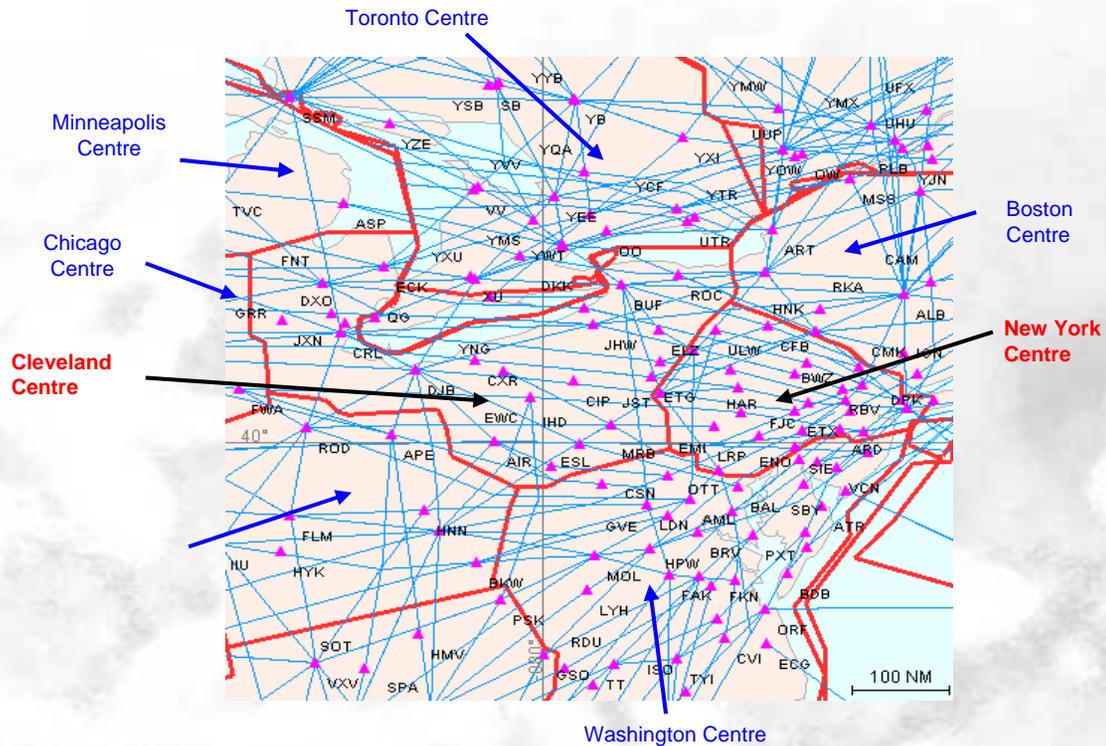




# American Centers



# Surrounding Centers





## **FLOW CONTROL IN COMMAND CENTER**

**visit was organised :**

to understand the overall organisation and flow management,  
prior to going to en-route Centers



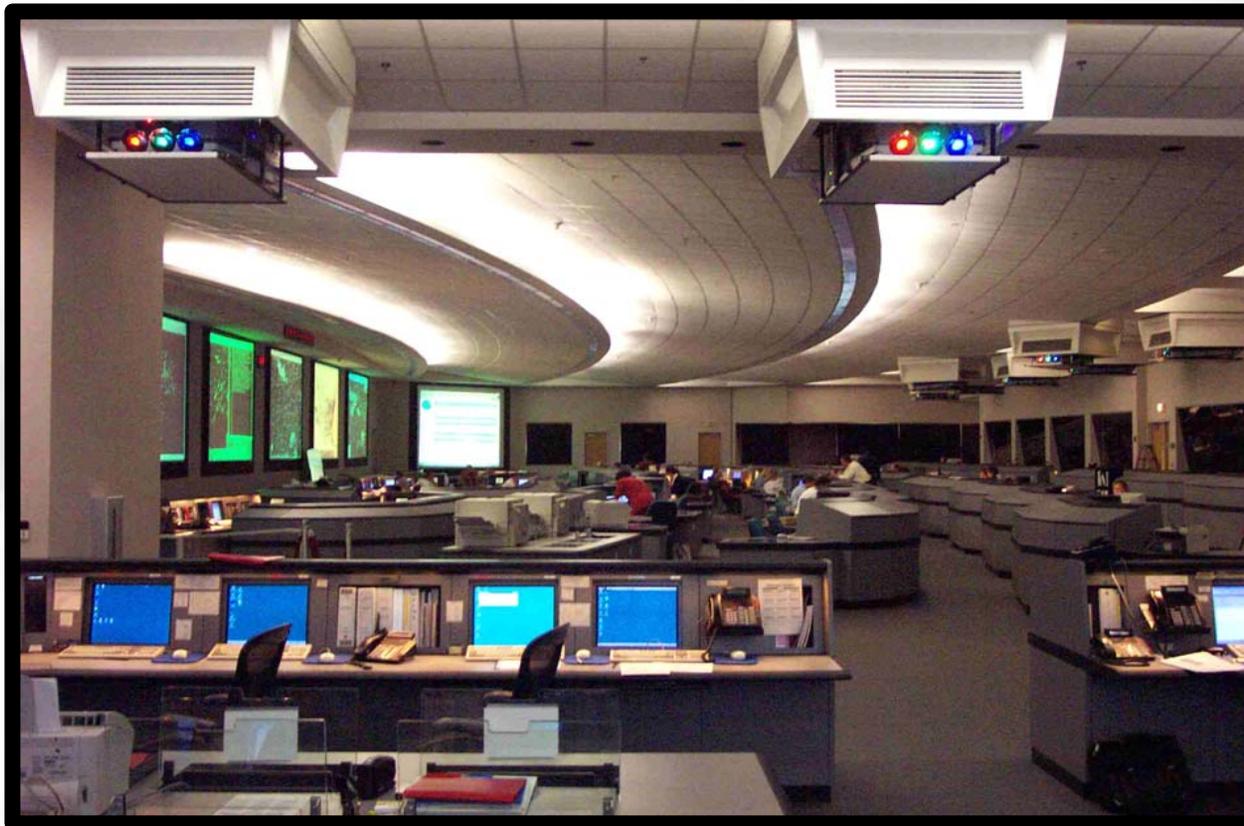


# Command Center





# Command Center





# FLOW CONTROL CENTER ??

- ◆ **Command Center is an AIR TRAFFIC CONTROL COMMAND CENTRE formed of:**
  - 1TFM strategic planning team
  - 2 TFM areas (East and West)
  - a centralised AIS unit
  - a centralised ASM unit
  - a meteo unit
  - other (radio-aid flight inspections etc...)





## Main COMMAND CENTER Actions:

- ◆ Strategic flow management
  - ground stops (notion of tiers)
  - ground delays
  - alternative routings
- ◆ Tactical flow management
  - Miles in Trail





## Main enablers:

- ◆ proficient route structure and distribution of flights
- ◆ textbook scenario validated through experience
- ◆ active participation of airlines (CDM)
- ◆ meaningful delegation of responsibility and initiatives to Centers (TMUs)
- ◆ communication network
  - telecon
  - public web





# CLEVELAND CENTER

- ◆ Center located 30 miles West of Cleveland Airport
- ◆ Area nearby New York Center
- ◆ 7 areas of Qualification
- ◆ 547 controllers
- ◆ 700.000 square miles







# CLEVELAND CENTER

- ◆ Main tasks of the Center are:
  - ➔ to establish in-trail spacing on:
    - ⇒ Eastbound traffic to East coast
    - ⇒ Westbound traffic to Chicago.
  - ➔ to separate those flows from Northbound/Southbound traffic to/from Canada.
  - ➔ To manage arrivals/departures to/from aerodromes inside area (Pittsburgh, Detroit, Cleveland...)





## ◆ **TMUs are FMP with much more tasks and responsibility:**

- link between CC and Airports, TMAs and sectors
- consider observed and forecast weather
- anticipate problems, propose solutions inside/outside Center area
- manage traffic tactically (dynamic re-routing, flight level capping...)
- Apply capacity limitation
- implement MIT
- protect individual sectors from overload





- ◆ **TMUs actions have considerable effect on controller workload:**
  - by optimising use of available airspace spacing in term of Miles in Trail
  - and where necessary modifying up-stream constraints
- ◆ **This contributes significantly**
  - to reduce complexity of traffic sequences
  - to increase of sector throughput





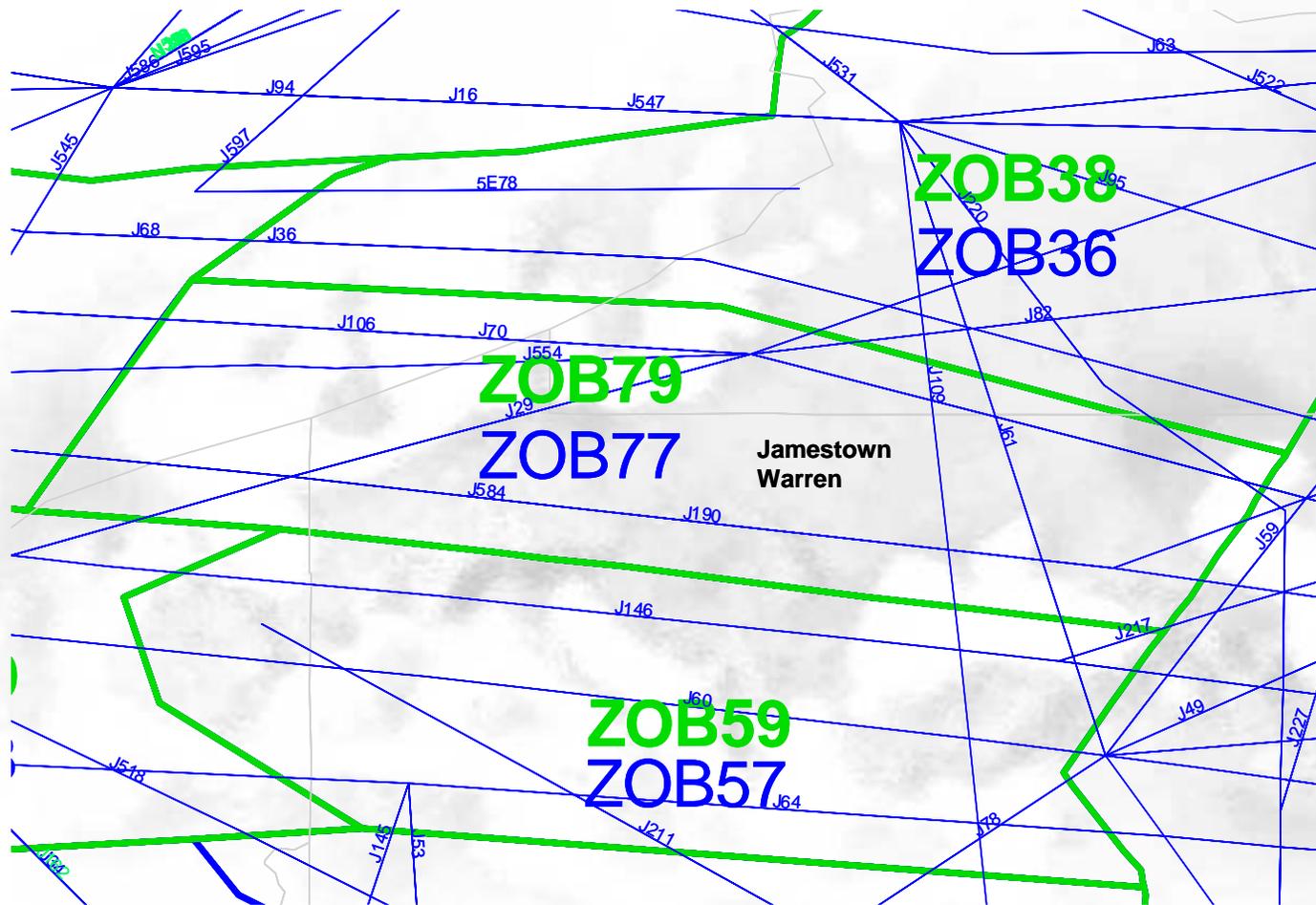
**Several types of traffic require different working methods**

**However specialisation per area is also required and thus reduced number of different working methods is required per controller.**





# AREA VII Sectors JAMESTONE and WARREN





## West East predominant flow

- ◆ **Main task is to implement or adjust MIT (essentially towards East coast)**
  - no urgent actions required but;
    - continual radar monitoring (use of specific temporal view showing current distance in trail between all flights to same direction or airport)
    - flights in above and below sectors to be considered for spacing
  - required distance in trail between two aircraft may be applied with flexibility if total distance between 1st and 3rd corresponds to overall required distance





# West East predominant flow

## ◆ Control techniques:

- planning time about 3 minutes
- frequent important heading changes
- extreme case 2 x 180° to achieve 30 MIT from zero
- courtesy hand-over systematically applied if no MIT
  - ⇒ to enable immediate descent or climb on initial contact
  - ⇒ to discriminate all radar labels





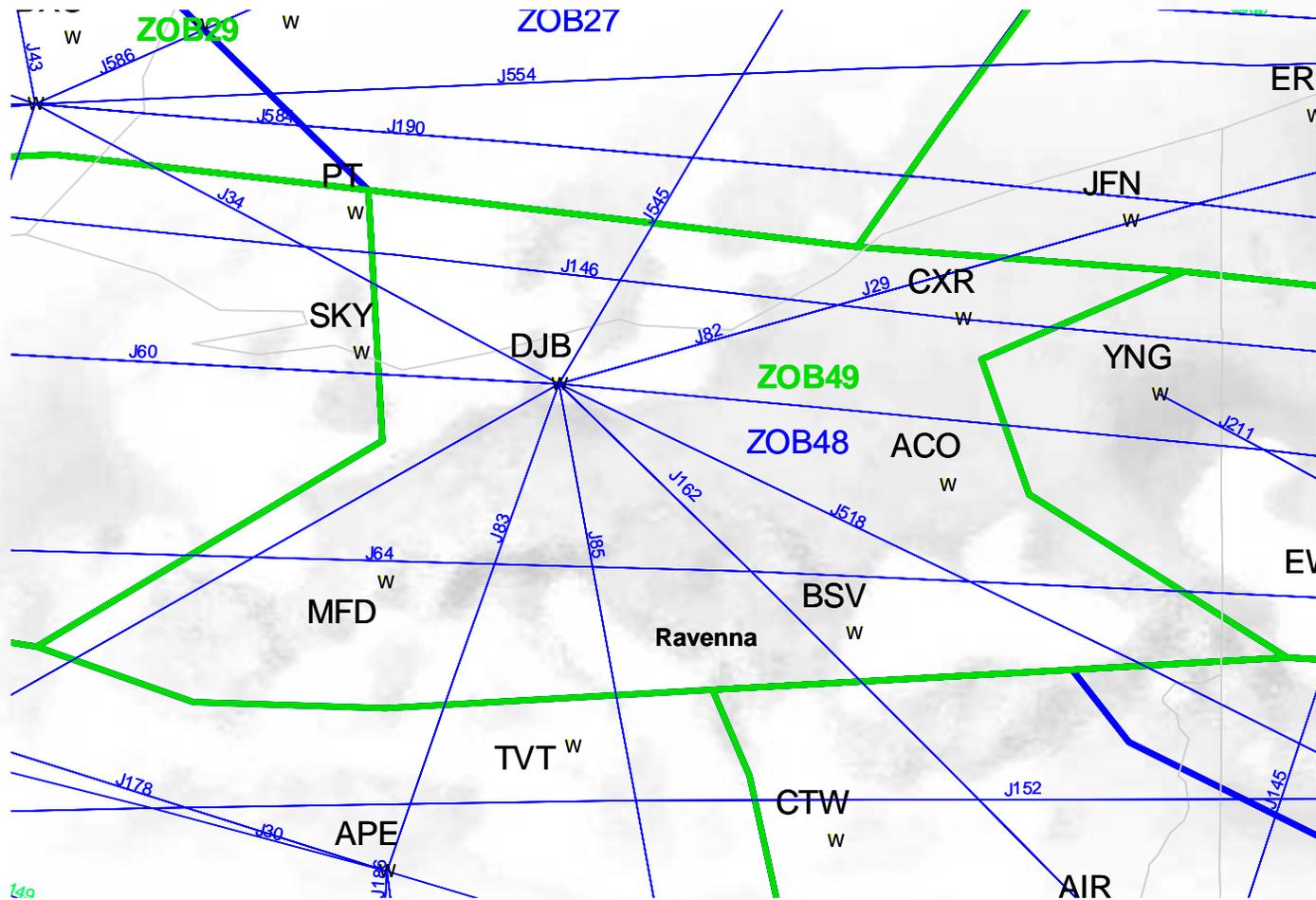
## West East predominant flow

- ◆ **Mostly all work carried by R-side (including co-ordinations by phone)**
- ◆ **Personal control technique makes difficult to assist the R-side**
- ◆ **Thus D-side seldom involved in conflict detection/resolution**
- ◆ **However D-side updates trajectories and performs some co-ordinations**
- ◆ **Tracker may assist detecting conflict and update trajectories in case heavy traffic**





# AREA IV RAVENNA Sector





# Traffic mixed and Crossing flows

- ◆ **Pressure on R-side often high sometimes very high**
- ◆ **high level of skill and training required**
- ◆ **However two imaginative techniques were observed:**
  - ➔ to allocate to evolving and crossing traffic temporarily flight level of other series to prevent the conflict to happen with main flow (just to check the aircraft is level 10 NM before)
  - ➔ to vector North South traffic to West or East extremities of sector where main flows flights are steady for transfer







# Everything together

- ◆ **Allegheny/Clarksburg sectors have to manage:**
  - Crossing (N/S) traffic to/from TORONTO
  - Eastbound traffic to New York
  - Westbound traffic to Chicago and California
  - Evolving traffic to/from important Airports (Cleveland, Pittsburgh and Detroit) inside the area
- ◆ **All to be separated and sequenced**





# Everything together

- ◆ **Observing those sectors we may say:**
- ◆ Intense workload is frequent
- ◆ Control is relying on individual performance
- ◆ This looks really very high from a European perspective
- ◆ However ratio of incidents seems to be similar to European one





# SPECIAL HAND-OFF

- ◆ **Transferring conditions:**
  - no exchange of estimates required
  - explicit proposal, flashing “O”
  - explicit acceptance for each individual flight
  
- ◆ This enables receiving controller:
  - to make short analysis of situation at each flashing “O”
  - to refuse incoming traffic to moderate his workload immediately.
  
- ◆ **Possible refusal is seen as a additional layer of safety making tight traffic flow acceptable**







# New York Center

- ◆ Almost all flights in ZNY ARTCC are either starting or finishing their journey
- ◆ Most ZNY sectors are handling specialised inbound or outbound traffic
- ◆ Traffic handling, altitude restrictions, predefined procedures must be respected close to perfect





# New York Center

- ◆ Cleveland is task to bring NYC traffic on required tracks and with correct in-trail spacing
- ◆ ZNY has no time nor space to change much of arrival sequencing prepared by adjacent Centers
- ◆ ZNY is merely completing the job made by neighbouring Centers
- ◆ Without preparation ZNY could simply not do the job







# Outbound Traffic

## **Sector 34 and 35 in charge of:**

- ◆ bringing up dense outbound traffic to RFL to NW
- ◆ crossing those traffic with little traffic from South/West to North/East





# Outbound Traffic

## ◆ **First technique :**

Apply speed control to departure (300 KTS to enable maintenance of distance in trail established by TRACON .

This reduce monitoring of spacing. However different aircraft speed envelopes may contradict

## ◆ **Second technique:**

Stop climb of faster until overpass of slower

This may induce penalty to following traffic by slowing down





## ◆ Anticipation versus reaction:

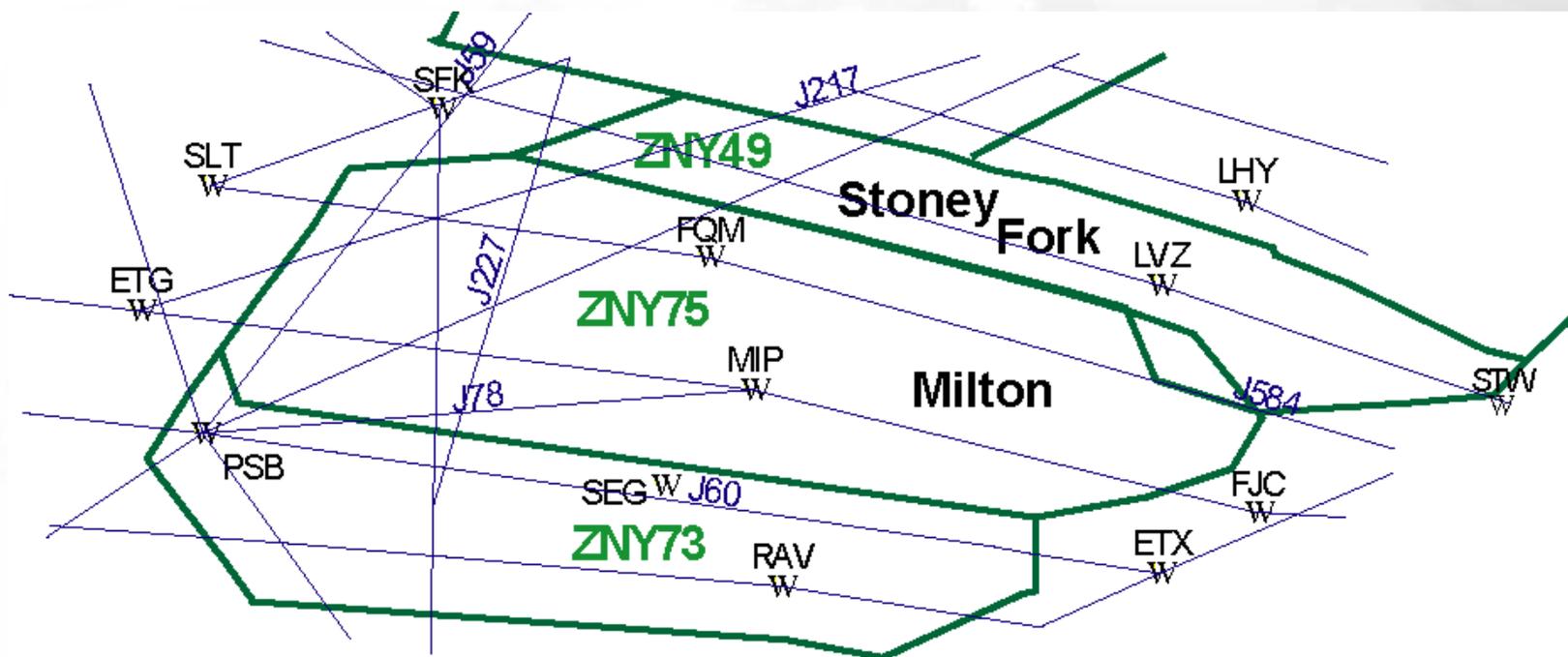
Optimistic RFL allocations were observed several times

Re-descent were induced accordingly

No pilot complaints were heard



# Stoney Fork and Milton arriving sectors





# Inbound Traffic

- ◆ Stoney Fork narrow sector handles traffic to JFK and TEB.
  - TEB and JFK arrivals on same single route
  - but TEB below JFK
  - each destination spaced by MIT
- ◆ Milton sector handles traffic to EWR and LGA
  - on separate routes

**For both only speed adjustment can be used**

**Few vectoring allowed in Milton**

**Use of stack impose restrictions to upstream Centers (including holding in their areas)**





## Inbound Traffic

- ◆ 260 Kt. often applied more than 150 prior to destination.
  - No pilot complaints
- ◆ Turboprops on same routes are kept at altitudes below jet traffic
  - enabling constant flow for similar traffic types
  - both traffic are brought together close to final approach when their speed become compatible to make then combined more easily
- ◆ At one occasion Citation was considered as turboprop to avoid heavy penalisation of jet flow behind





# Problems

- ◆ **New York geared for good and “normal” weather**
- ◆ **During**
  - thunderstorm
  - unfavourable wind
  - snow
  - low visibility,**spacing is to be increased significantly.**  
**Even sectors are to be closed or reallocated to different traffic flows in case of thunderstorm**





# Problems

- ◆ **Despite this, ATM in New York remains very efficient and safe**
- ◆ **Use of historical scenarios to face unusual situations renders the organisation reactive and flexible**





# CONCLUSIONS

## ◆ Flow Control:

- similar tactical ATFM (re-routing, flight level capping and MIT could be introduced in Europe
- it will supplement the efficient pre-tactical Flow Management currently in ops
- huge co-ordination with staff and step by step approach are required





# CONCLUSIONS

- ◆ **Innovative generic control techniques should be adapted to European environment:**
  - prevention of conflict occurrence by temporary use of opposed flight level series
  - simplification of conflict resolution in vectoring crossing aircraft to non evolving areas inside sector
  - segregate traffic types (jet/props) until final approach where speed become more compatible
- ◆ **R-side lonesome cowboy attitude shall not be adopted**





**Thank you**

