NETWORK OPERATIONS – FLIGHT EFFICIENCY USER MANUAL

Network Manager

Edition: 5.0
Edition date: 10-01-2020
Classification: White
Reference nr:

SUPPORTING EUROPEAN AVIATION

DOCUMENT CONTROL

Document Title	NETWORK OPERATIONS – FLIGHT EFFICIENCY USER MANUAL
Document Subtitle	Network Manager
Document Reference	
Edition Number	5.0
Edition Validity Date	10-01-2020
Classification	White
Status	Released Issue
Author(s)	Boris Radovanović
Contact Person(s)	Boris Radovanović

DOCUMENT APPROVAL

The signature table is optional –a minuted approval meeting may be used instead.

The following table identifies all management authorities who have successively approved the present issue of this document.

This table may be replaced by a format document review and approval meeting, with the meeting details recorded and retained that edition's archive folder.

The approval may also be recorded via electronic workflow, where put in place.

Where document approval is made via a meeting or electronic workflow, the details shall be indicated here in place of the approval table.

Document publication approval meeting held on 11-12-2019.

EDITION HISTORY

The following table records the complete history of the successive editions of the present document.

Edition No.	Validity Date	Author(s)	Reason
1.0	16/12/2013	P. Lenne	Full content review
1.1	21/01/2014	P. Lenne	General review and update
1.2	28/01/2014	P. Lenne	General review and update
1.3	14/03/2014	P. Lenne	General review and update
1.4	15/05/2014	P. Lenne	General review and update
1.5	10/04/2015	P. Lenne	General review and update
2.0	15/03/2015	P. Lenne	General review and update
3.0	15/09/2017	B. Radovanović	General review and update
4.0	31/08/2018	B. Radovanović	General review and update
5.0	10/01/2020	B. Radovanović	General review and update

Edition Change Record

Section	Amendment notes
1. Introduction	RP3 targets updates
2. The Opportunity Tool (Group ReRouting Tool - GRRT)	Details how to access the OPP column in CHMI/NOP included
3. Use of GRRT	NM 23.5 Release update (3.2.1)
4. Monitoring, Reporting and Post Operations	
5. ABBREVIATIONS	

The main changes are indicated RED.

Significant deletions of text are indicated with the symbol ✂

TABLE OF CONTENT

1 Introduction

1.1 General

The IATA/CANSO/EUROCONTROL Flight Efficiency Plan signed in 2008 was requesting 'to work in an even closer partnership along with airlines, airports and ANSPs to identify solutions and launch operational actions that will lead to fuel and emissions savings in the short term'.

There is now an established requirement for a much closer and more continuous relationship with the AOs and the CFSPs. As such, NM has been tasked to work with the AOs and the CFSPs participating in the EUR AOG to execute the following tasks on a consistent basis:

- Monitoring of AO flight planning versus best options offered in the route network;
- Identification of improvements in flight planning for various flows and city pairs taking into account the latest network situation;
- Assessment of individual airline flight plans;
- Identification of airspace design actions or airspace utilization rules leading to improvements in flight planning;
- Making suggestions to AOs and CFSPs on better utilisation of the existing airspace structure.

The NMD Flight Efficiency Work Programme (FEWP) identified actions to fully implement the existing Performance Indicators in NMPP and Strategic Objectives in NSP, as well as to ensure measurement of those objectives and targets.

The FEWP addresses the actions foreseen by the Network Manager to further improve flight efficiency in order to:

- Ensure appropriate benefits for the airspace users.;

It is a support to the flight efficiency plan, signed in august 2008 between IATA, CANSO and EUROCONTROL, containing five Action Points that required immediate attention:

- Enhancing European en-route airspace design;
- Improving airspace utilisation and route network availability;
- Efficient TMA design and utilization;
- Optimizing airport operations;
- Improving awareness of performance.

1.1.1 Performance Scheme – Reference Period 3 (RP3) 2020-2014

In response to the Commission Regulation (EU) No 2019/317 of 11 February 2019 (laying down a performance and charging scheme in the single European sky and repealing Implementing Regulations (EU) No 390/2013 and (EU) No 391/2013), a new set of key

performance indicators (KPIs) and associated targets have been set for the 3rd Reference Period (RP3).

It defines Environment KPI applicable at both Union-wide and local level, related to the operational performance of the European ATM network for the period 2020 - 2024.

The average horizontal en-route flight efficiency of the actual trajectory, defined as follows:

- The indicator is the comparison between the length of the en-route part of the actual trajectory derived from surveillance data and the achieved distance, summed over IFR flights within or traversing the airspace as defined in Article 1, hereinafter referred to as 'European airspace';
- 'En-route part' refers to the distance flown outside a circle of 40 NM around the airports;
- Where a flight departs from or arrives at an airport outside the European airspace, the entry or exit points of the European airspace are used for the calculation of this indicator as the origin or destination respectively, rather than the departure or destination airport;
- Where a flight departs from and arrives at an airport inside the European airspace and crosses a non-European airspace, only the part inside the European airspace is used for the calculation of this indicator;
- 'Achieved distance' is a function of the position of the entry and exit points of the flight into and out of each portion of airspace for all parts of the trajectory. Achieved distance represents the contribution that those points make to the great circle distance between origin and destination of the flight;
- The indicator is calculated for the whole calendar year and for each year of the reference period, as an average. When calculating this average, the ten highest daily values and the ten lowest daily values are excluded from the calculation.

Indicators for monitoring are:

The average horizontal en-route flight efficiency of the last filed flight plan trajectory, calculated as follows:

- The difference between the length of the en-route part of the last filed flight plan trajectory and the corresponding portion of the great circle distance, summed over all IFR flights within or traversing the European airspace;
- 'En-route part' refers to the distance flown outside a circle of 40 NM around the airports;
- Where a flight departs from or arrives at an airport outside the European airspace, the entry or exit points of the European airspace are used for the calculation of this indicator as the origin or destination respectively, rather than the departure or destination airport;
- Where a flight departs from, and arrives at, an airport inside the European airspace and crosses a non-European airspace, only the part inside the European airspace is used for the calculation of this indicator;

- The indicator is calculated for the whole calendar year and for each year of the reference period, as an average. When calculating this average, the ten highest daily values and the ten lowest daily values are excluded from the calculation.

The average horizontal en-route flight efficiency of the shortest constrained trajectory, calculated as follows:

- The indicator is the difference between the length of the en-route part of the shortest constrained route available for flight planning, as calculated by the path finding algorithms and flight plan validation systems of the Network Manager, measured between the exit and entry points of two terminal manoeuvring areas, and the corresponding portion of the great circle distance summed over all IFR flights within or traversing the European airspace;
- This indicator considers the airspace restrictions on days with and without military activities published in the Route Availability Document issued by the Network Manager and the actual status of conditional routes at the time of the last filed flight plan;
- 'En-route part' refers to the part outside a circle of 40 NM around the airports;
- Where a flight departs from or arrives at an airport outside the European airspace, the entry or exit points of the European airspace are used for the calculation of this indicator as the origin or destination respectively, rather than the departure or destination airport;
- Where a flight departs from and arrives at an airport inside the European airspace and crosses a non-European airspace, only the part inside the European airspace is used for the calculation of this indicator;
- The indicator is calculated for the whole calendar year and for each year of the reference period, as an average. When calculating this average, the ten highest daily values and the ten lowest daily values are excluded from the calculation.

Other environment indicators for monitoring are:

- The effective use of reserved or segregated airspace calculated as the ratio of the initial requested allocated time for reservation or segregation from general air traffic, and the final allocated time used for the activity requiring such segregation or reservation. The indicator is calculated for all airspace allocations notified to the Network Manager;
- The rate of planning via available airspace structures, including reserved or segregated airspace and conditional routes, for general air traffic calculated as the ratio of aircraft filing flight plans via such airspace structures and the number of aircraft that could have planned through those airspace structures;
- The rate of using available airspace structures, including reserved or segregated airspace, conditional routes, by general air traffic calculated as the ratio of aircraft flying via such airspace structures and the number of aircraft that could have planned through these airspace structures.

Environment target:

As per Commission implementing decision (EU) 2019/903 of 29 May 2019 setting the Union-wide performance targets for the air traffic management network for the third reference period starting on 1 January 2020 and ending on 31 December 2024, union-wide performance targets for the key performance area of environment, as defined in point 2.1 of Section 1 of Annex I to Implementing Regulation (EU) 2019/317, shall be expressed as an average horizontal en-route flight efficiency of the actual trajectory and measured as average additional distance flown compared to the great circle distance and shall not exceed the following percentages:

- 2,53 % in 2020;
- 2,47 % in 2021;
- 2,40 % in 2022;
- 2,40 % in 2023;
- 2,40 % in 2024.

The Network Manager coordinates the following activities to achieve the required improvement in flight efficiency:

1. Enhancing European en-route airspace design through annual improvements of European ATS route network, high priority being given to:

- Full implementation of Free Route Airspace (FRA);
- Implementation of a coherent package of annual improvements and shorter routes;
- Improving efficiency for the most penalised city pairs.

2. Improving airspace utilisation and route network availability through:

- Actively supporting and involving aircraft operators and the computer flight plan service providers in flight plan quality improvements;
- Gradually applying route availability restrictions only where and when required;
- Improving the use and availability of civil/military airspace structures;
- Implementation of single CDR category;
- Aligning the cross border availability of CDR's.

3. Efficient Terminal Manoeuvring Area (TMA) design and utilisation through:

- Implementing advanced navigation capabilities;
- Implementing Continuous Descent Operations (CDO);
- Improved arrival/departure routes, optimised departure profiles, etc.

4. Improving awareness of performance.

1.2 Purpose

The purpose of this document is to frame the support of the flight efficiency initiative within the NMOC such as support to flight plan originator to improve their flight planning, support to major airspace design project etc.

This document contains also all procedure applicable for Flight Efficiency support. Correct and accurate application of the procedures contained in this document is essential to the achievement of consistent support to the flight plan originators.

1.3 Intended Audience

The provisions of the document apply to all personnel engaged in these processes, namely:

- NM Management
- NM OMs
- NM DOMs
- AOs

2 The Opportunity Tool (Group Re-Routing Tool - GRRT)

This is an ETFMS tool capable of recalculating routes based on fixed criteria and ETFMS wind.

The cost of any kind of impact that the rerouting may have on the flight is measured using an artificial measurement unit. The idea is that each elementary cost criteria can be converted to a common unit of measure. The converted values for each criterion can be added together to give a unique value for a flight (or flight alternative) that will be called Total Cost of the flight (or alternative).

Multiple criteria can be taken into account to compute the cost of a route. Cost factors associated allow to tune the 'balance' between each criterion (the system proposes default cost values). These criterions are hard-coded in the ETFMS.

The criteria are:

- delay
- flying time
- route length
- suspension
- overload
- fuel cost
- take-off weight factor (route charge)

The objective of improving the route network utilisation may be achieved through the assistance to flight plan filers in making them aware of route opportunities.

A route opportunity is seen as:

- Shorter route close to the initial trajectory using missed short cuts;
- Shortest route not considering the initial route, can be far away from the filed route;
- Better utilisation of free route airspace or night network;
- Better utilisation of CDR network.

There are two aspects to concentrate on:

- In strategic, by improving their route catalogue;
- In tactical, by informing AO of the latest route opportunities detected by the system.

For both actions, the GRRT plays a major role.

Results of the GRRT calculations are provided as:

- Rerouting opportunities (OPPs) - flights identified as possibly benefiting from an opportunity are marked with a 'Y' in the Opp column of NOP / CHMI flight list.

- Rerouting proposal messages (RRPs) - will be sent only to subscribed AOs, who will also have possibility to identify OPPs in CHMI/NOP.

NOTE: Information about the opportunities can be access throught NM B2B services (for more details visit https://www.eurocontrol.int/service/network-manager-business-business-b2b-web-services)

When a flight has been identified as possibly benefiting from an opportunity, the flight is marked in the Network Operations NOP and CHMI with a 'Y' in the 'Opp' column. By clicking on the column header, AO User can order the column so that all the flights that are marked with 'Y' are at the top (Figure 1 and Figure 2):

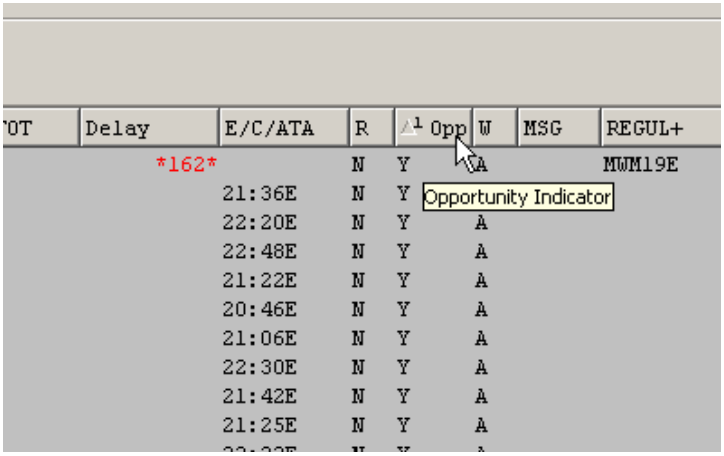

Figure 1 - Opportunity display in the Network Operations CHMI Flight List

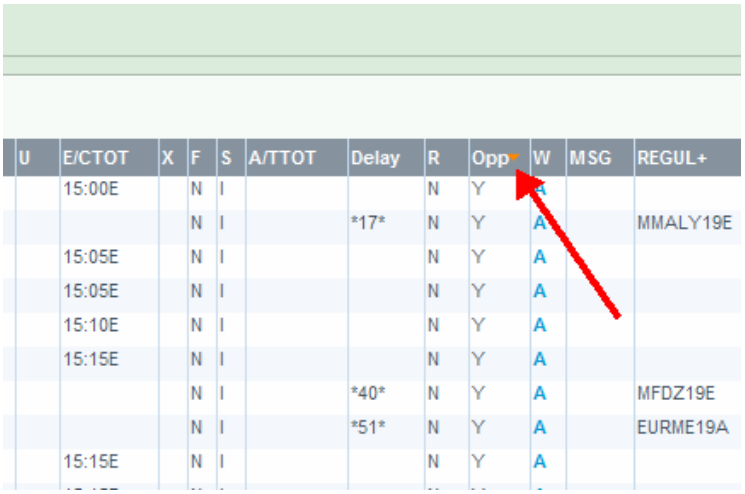

Figure 2 - Fig 1: Opportunity display in the Network Operations NOP Flight List

A report is created after the search for opportunities successfully identified a potential re-route. The report is available in the operational log of the flight. To access the operational log in the CHMI, right-click on the flight and select 'Operational Log' (Figure 3 and Figure 4). To access the operational log in the NOP, click on the blue link from the ARCID of the flight (Figure 5 and Figure 6). The opportunities report is available via the 'Oplog Type': 'HI REROUTE'.

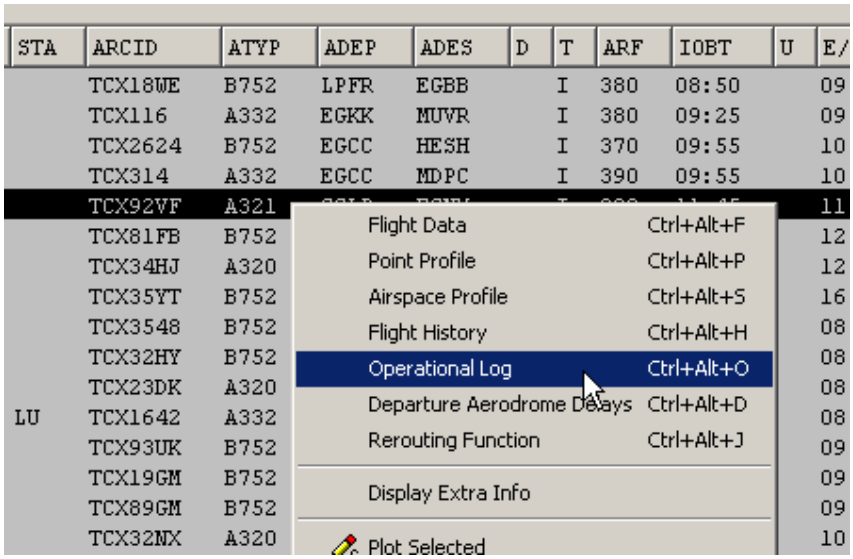

Figure 3 - Accessing the operational log (CHMI)

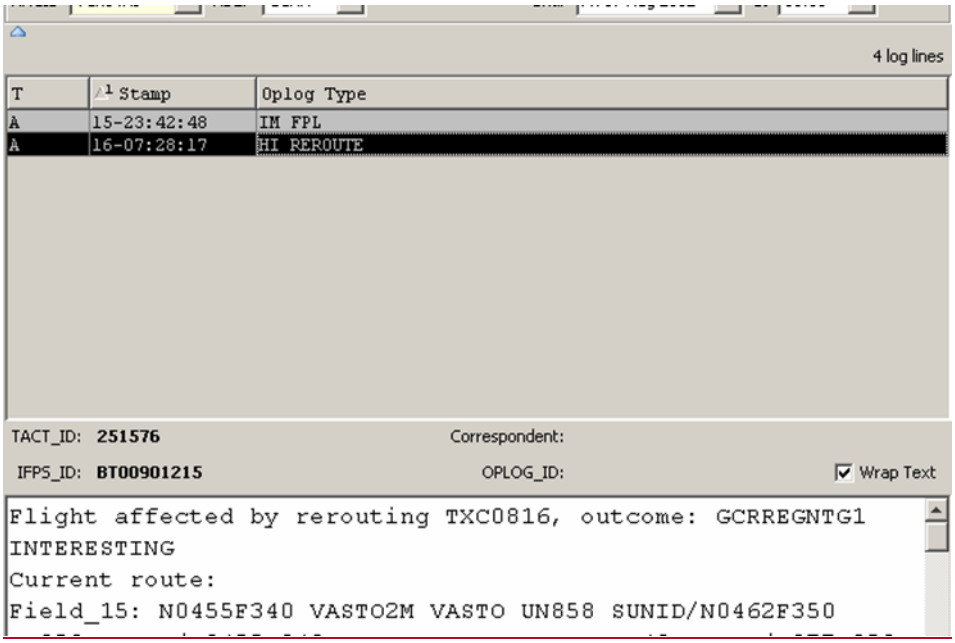

Figure 4 - Operational log - CHMI

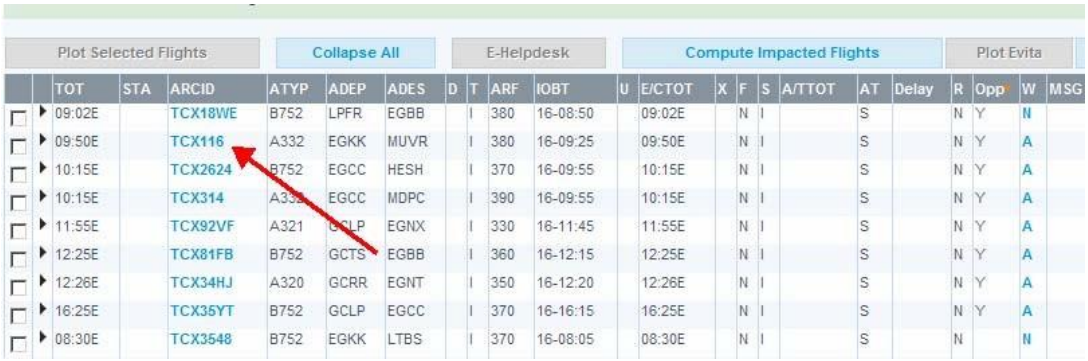

Figure 5 - Accessing the operational log (NOP)

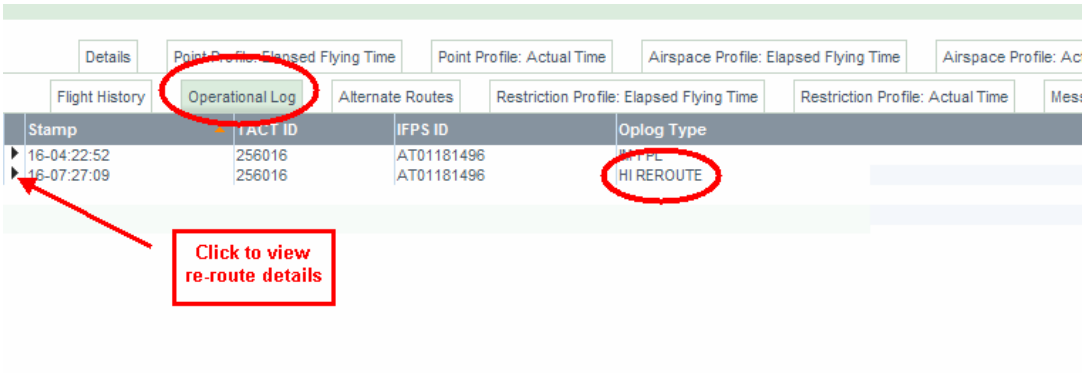

Figure 6 - Operational log - NOP

The report (Figure 7) contains all the routes that were identified as possible candidates; this includes routes that were regarded as not being suitable (too costly, etc).

The first line of the report shows the opportunity route identification (e.g. LEPAEINN1). This is the alternate route that is regarded as the most interesting. The detailed analysis of this route is present in the report.

The first detailed analysis has the title 'Current route'; this is the original route with the relevant values and the Field 15. For the opportunities search, the important values are:

DEPARTURE_DELAY

FLYING_TIME

ROUTE_LENGTH

For each candidate route identified, there is a detailed analysis stored in the report. Each route starts with its Route_Id and also has its relevant values shown, and the Field 15. If AO is subscribed to receive flight efficiency RRP, the opportunity with the highest delta costs (savings) will be sent (for other details about RRPs please refer to the latest ATFCM Users manual).

The 'Delta cost' is the sum of the route length value of the original route subtracted from the route length value of the alternate route. (e.g. The original route has a ROUTE_LENGTH of 1036 and the alternate route has a ROUTE_LENGTH of 979, the delta is -57 (57nm shorter route)).

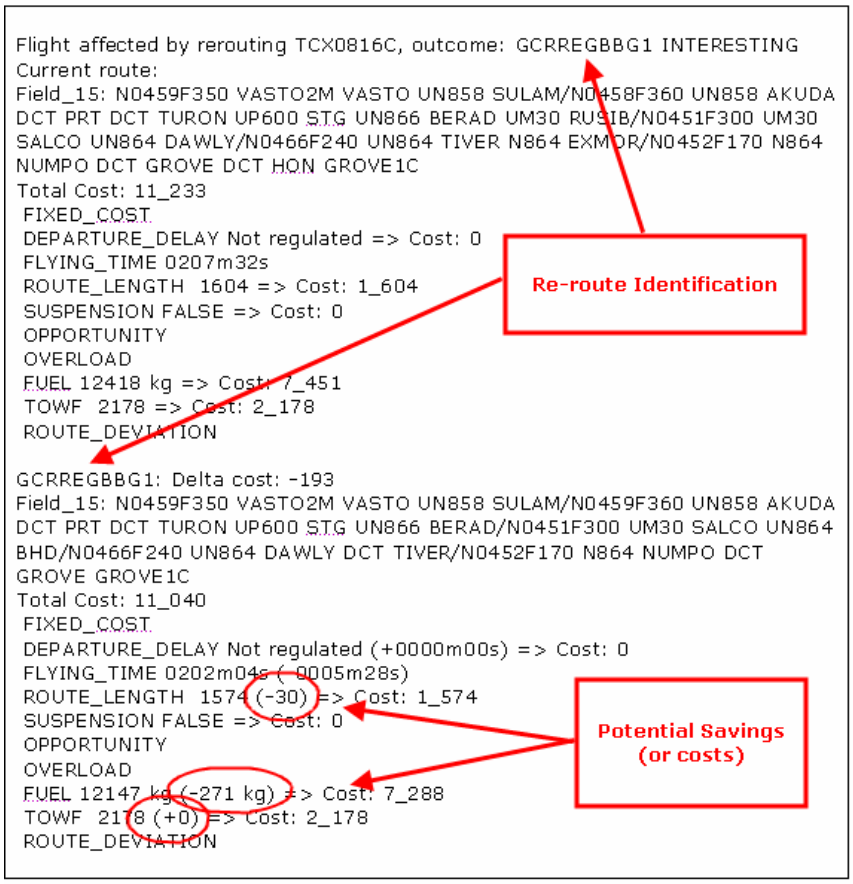

Figure 7 - Opportunity report

For more details visit Network Manager Flight Management Zone channel:

https://www.youtube.com/watch?v=a54sQtJxHTw

3 Use of GRRT

The objective of this work is to ensure a participation of NMD/NMOC staff into the flight efficiency process to ensure the fulfilment of the European Network Operations plan objectives as well as the support of OPL (operations planning) staff around the flight efficiency program.

3.1 Airline Operators subscription

Group re-routing tool will calculate possible route improvements in accordance with AO's predefined criteria stored in the GRRT template.

AOs interested in definition of their own parameters for generation flight efficiency related RRPs and rerouting opportunities will have to subscribe to this service by submitting an email to NM Flight Efficiency Support (NMD/NOM/OPL): nm.flightefficiencysupport@ops.cfmu.eurocontrol.int.

When subscribing, AOs will have to provide information on various parameters that have to be inserted in the GRRT template:

- AO's ICAO three letter code(s);
- Cost criteria;
- Constraints controlling the selection of alternatives;
- Selection criteria;
- Schedule of runs.

In addition to the list above, AOs will have to indicate if they are interested in receive only OPPs or both OPPs and RRPs when beneficial routing alternatives are found by GRRT.

Initially, standard GRRT parameters will be offered to AOs (more details in chapter 3.2.1), or they can send their own preferences that are reflecting their business model.

AO have to be advised that RRPs created by this process are done within the scope of the Flight Efficiency Initiative.

AOs that subscribed to the service should continue to perform qualitative checks of received RRPs/OPPs before submitting the amended FPL, in order to ensure that received RRPs/OPPs are operationally acceptable for them.

NOTE: AO's having their custom template shall be excluded from the general OPPs template (OPS_FE_ALL.NM18).

3.2 GRRT Templates creation

After agreement with AO, parameters have to be inserted into the GRRT template, in ETFMS.

The creation and maintenance of the GRRT templates is done by NM Flight Efficiency Support (NMD/NOM/OPL) with support of Deputy Operations Manager.

How to create GRRT template

(Attributes window)

LOG IN to the ETFMS as Supervisor.

Define valid period.

Open Scenario… and new window will appear (Figure 8).

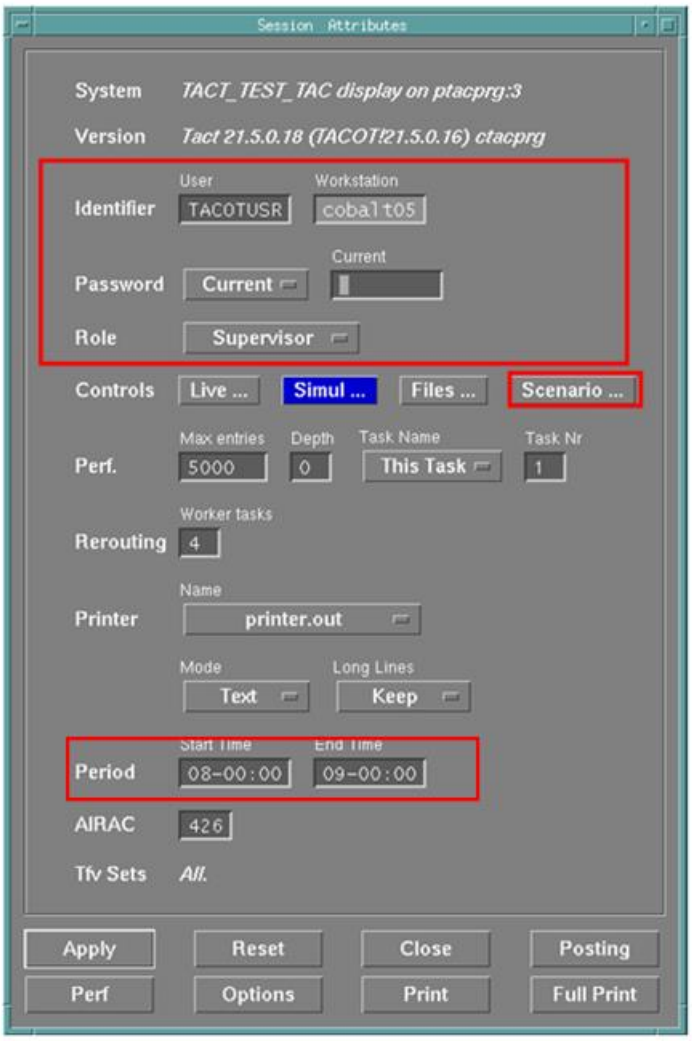

Figure 8 - Log in / Scenario access

(Scenario Display window) - Figure 9.

Select PLAN - New… and then select any date from the list, which will open new tab (named Created from Updates). If the user has no measures selected, then the new plan created will be empty.

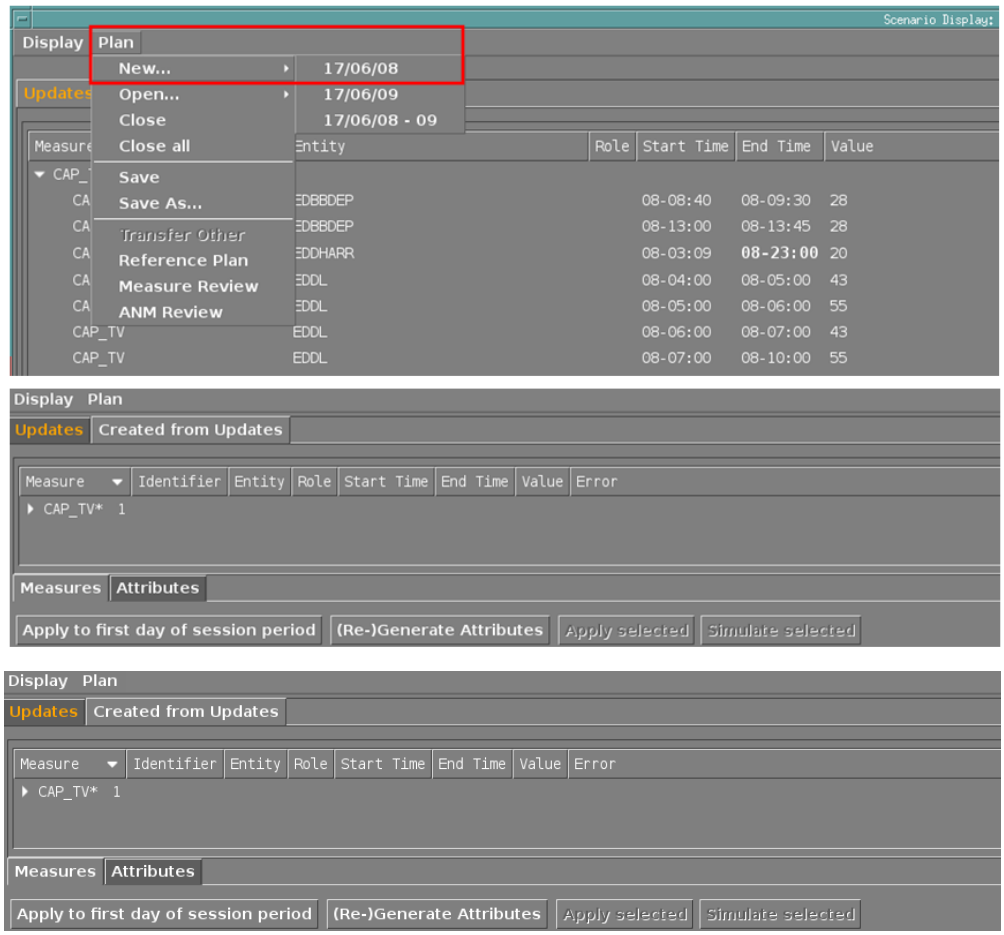

Figure 9 - Scenario Display window access

If fields of this tab are not empty, delete them (right click on the field and delete) - Figure 10.

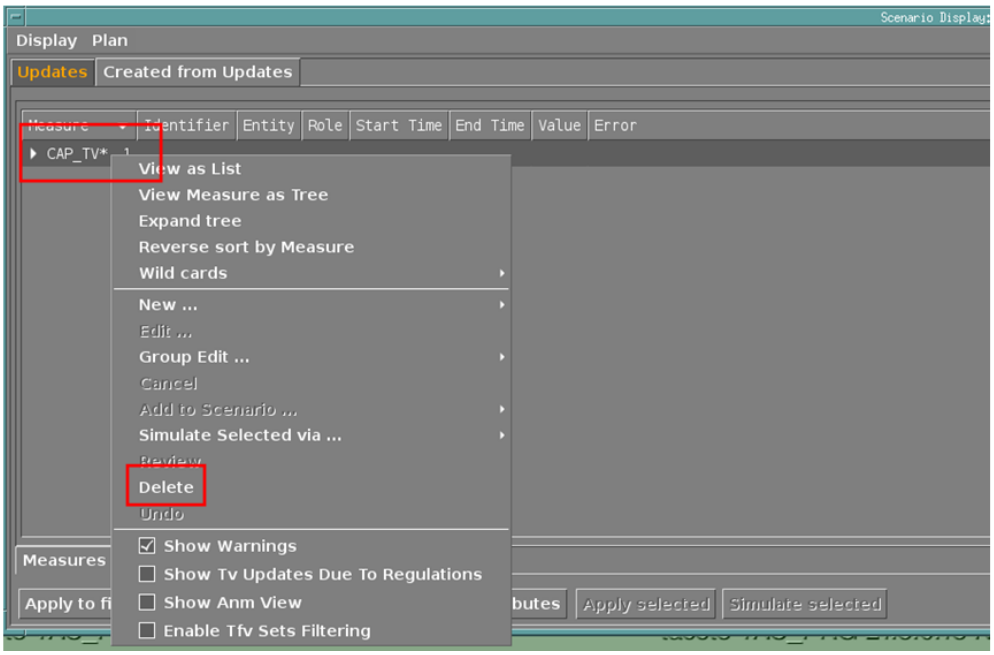

Figure 10 - Cleaning Scenario Display / measures tab

To rename tab, click Attributes and then change the Title (Figure 11). New title should contain ICAO code of AOs which parameters are created. Under the same sections, schedule of GRRT runs will be created (this will be described later).

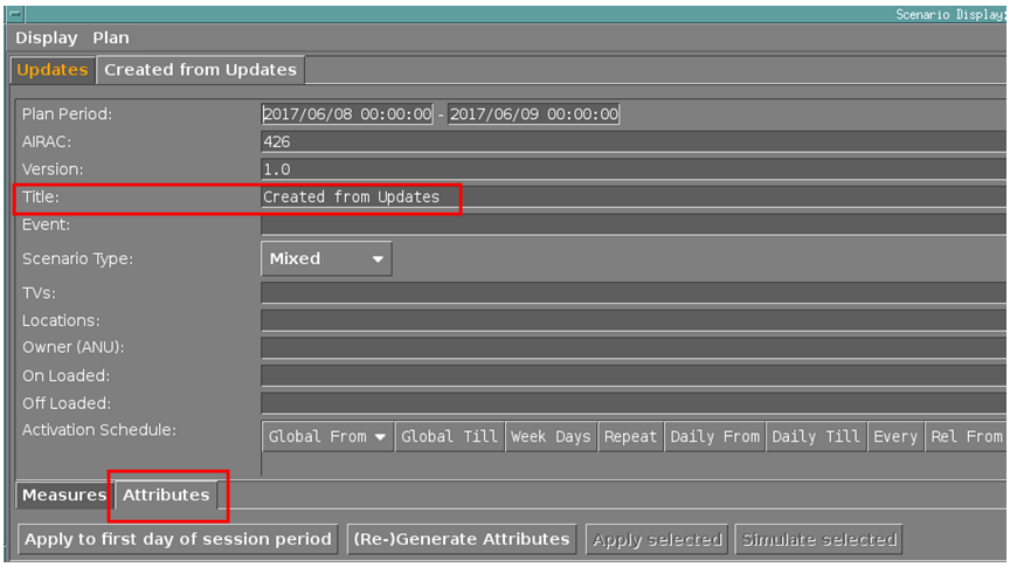

Figure 11 - Renaming

Click Measures to create re-routing parameters.

Right click on empty space and select NEW - Rerouting (Figure 12).

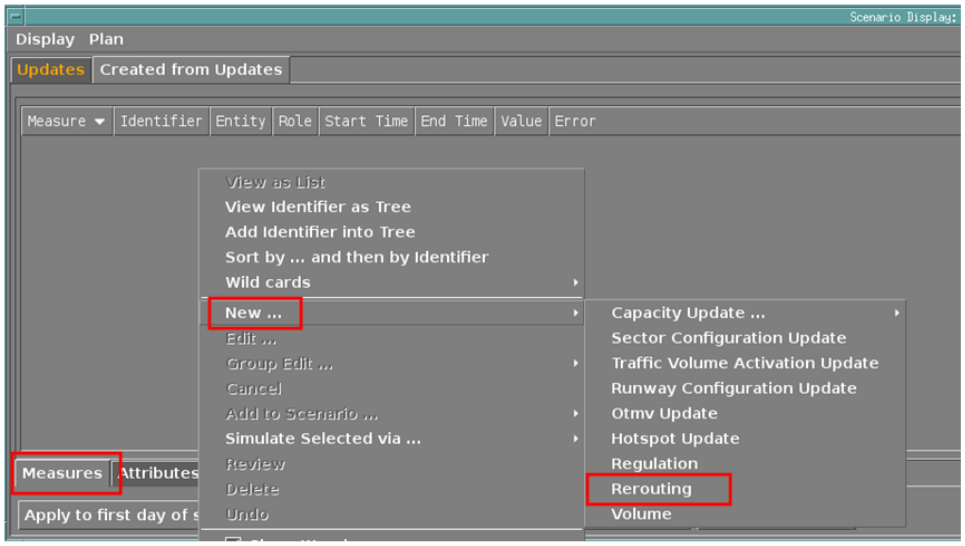

Figure 12 - Measure: Rerouting

New window will appear where AO's parameters have to be inserted (more details will be provided later).

Click OK to save parameters.

Select Plan and SAVE AS and new window will appear (File Manager - save scenario) - Figure 13.

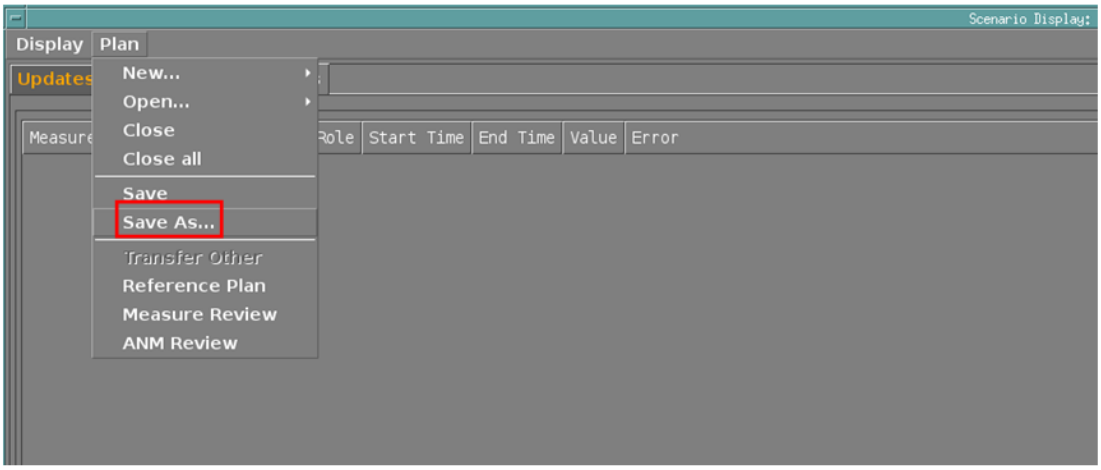

Figure 13 - Saving the template

Define Template name and location (Figure 14).

Save Template under UNPUBLISHED_TDS/grrt_templates folder.

Close this window by selecting OK.

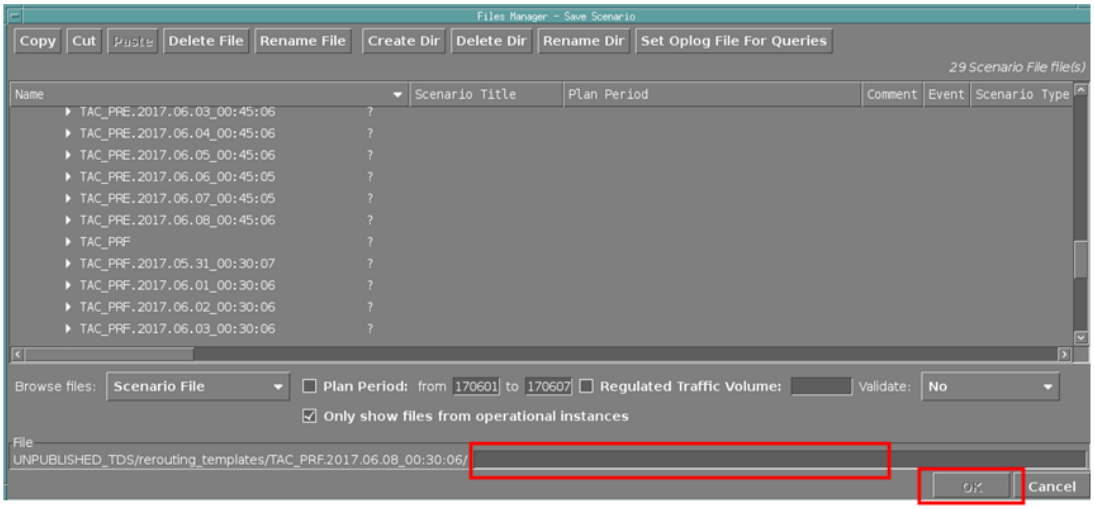

Figure 14 - Saving the template / Template name and location selection

When file is saved with all parameters inserted, open (Attributes window) and log out from the ETFMS.

3.2.1 GRRT template parameters (Re-route Editor)

When GRRT template is opened as, it is described in the previous chapter, it is necessary to define parameters according to the AO's specification.

Only GRRT pages that will have to be modified when new template is created will be mentioned here. More details about all GRRT template pages are available in TACT / SRD[1].

[1] To open document:

- Right Click in an empty place in the screen → Open Documentation → TACT / SRD

Description page (Figure 15)

Actions:

- Insert Identifier - AO's ICAO code;
- Under Count Location select Aircraft Operator - enter AO's ICAO CODE in the Identifier box. If more than one AO code is inserted, then the separation between codes will be made with "space". By creating this, all flights from specific operator will be selected;
- As Measure subtype select Ground Horizontal rerouting;
- If AO has requested to receive RRPs together with OPPs - select Generate Proposal: RRP. If only OPPs will be generated, then it should be Generate Proposal: NO;
- Select purpose - Flight efficiency;
- Add NOTE if required under Scenario reference - Note;
- Select RPL & PFD + FPL flights to look for opportunities;
- Select Compute OBT Validity Period - For chosen alternative only.

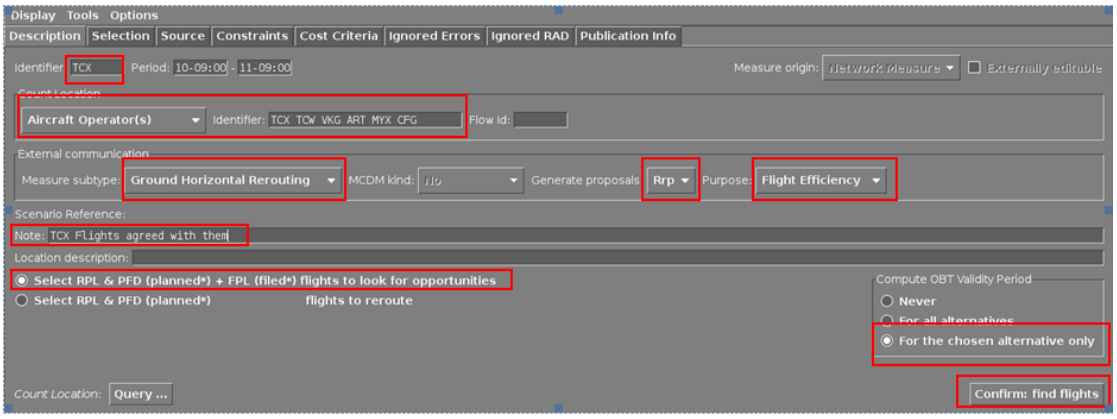

Figure 15 - Template Description page

Click Confirm find flights.

Selection page (Figure 16)

This page is used to filter flights that will become candidates for rerouting.

By right clicking the column, it is possible to access Wild cards - Configure window where additional filtering might be defined (Include/exclude).

Or,

- In the reroute editor – put the mouse on a place that has a tool tip (for example, on the tab title 'Source'). When the tooltip appears, press F1. This will open firefox in the documentation describing more in details the tooltip place. There are many places where tooltip is available (e.g. for the cost criteria).

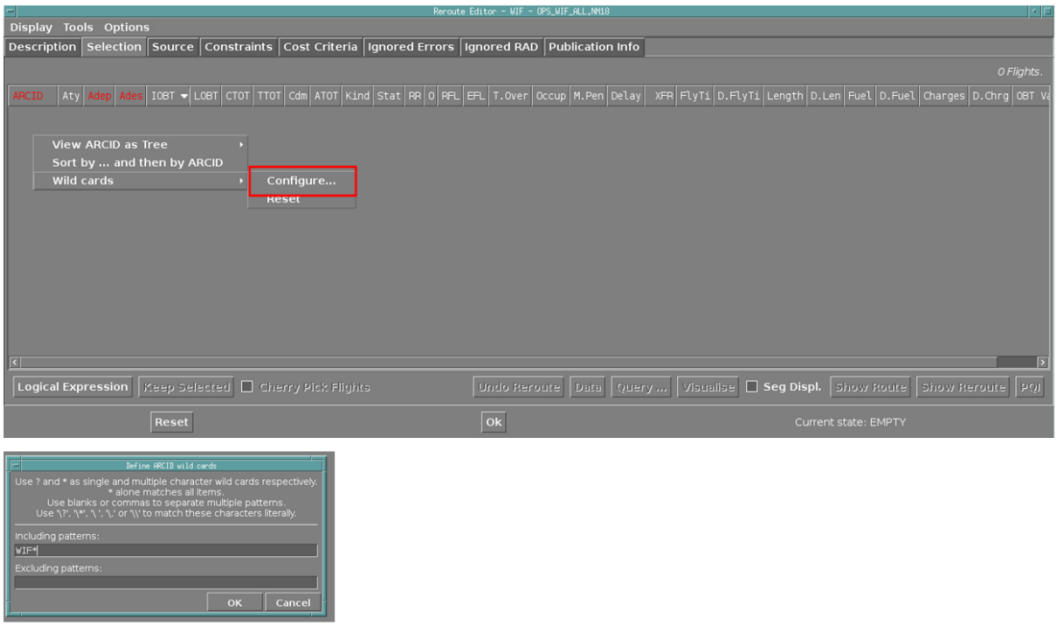

Figure 16 - Template Selection page

All columns can be filtered, to reflect specific AO needs (e.g. ADEP exclude BKPR).

Source page

This page is used to define the source through which alternative will investigated (Path Generator, City Pair Stats, Flights currently in System, Vertical and Manual).

Constraints page (Figure 17)

This page allows the user to specify a set of constraints against which the generated flight alternatives will be checked. Depending on the selected "source" from the "Description" page and the type of constraint, some of the constraints will act as instructions during the path generation and vertical profile calculation process of each alternative. In all cases of selected "source" and type of constraint, with the exception of the "opportunity" constraint, the constraints will be used to exclude the generated alternatives that do not comply with these constraints.

Usually, AVOIDANCE criteria will be requested from the user (e.g. ongoing crisis/conflict zone can be avoided). Additionally, AO may request to avoid any other airspace.

To add airspace that will be avoided:

- Click Plus to ADD criteria;
- Select AVOID, select AIRSPACE/ POINT/ROUTE and type element ID.

When performing calculations, GRRT considers all relevant information available in ETFMS. However, in order to increase effectiveness of the tool and facilitate solution generation, it is necessary to define airspaces through which rerouting will not be offered by GRRT algorithm (supplement to the CACD data available in ETFMS):

- In case of general template (OPS_FE_ALL.NM18) this will be introduced based on the information available on the Crisis Management page at NOP Protected portal (officially closed areas and airspaces for which warning is issued will be introduced as "AVOID AIRSPACE" criteria);
- In case of the custom AO templates, this will be done in accordance with AO preferences.

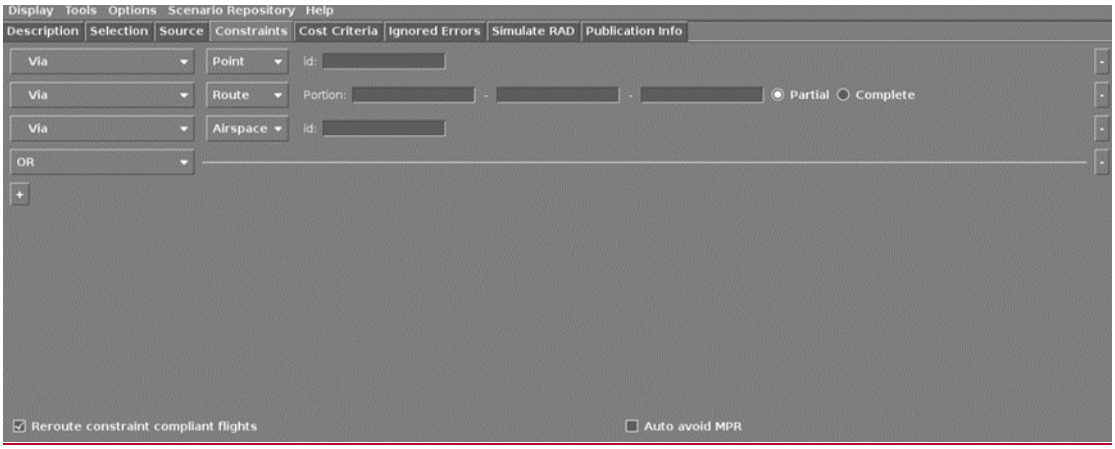

Figure 17 - Template Constrains page

All listed criteria needs to be satisfied when trajectory calculation is performed. If only one criteria (or group of criteria) should be satisfied in the proposal, than OR operator will be used for separation.

To allow avoidance of the most penalising regulation (TV based on AIRSPACE or POINT) Auto avoid MPR option will be used. In order to have higher effectiveness of this functionality schedule has to be defined in a way that will trigger the GRRT 2hrs before EOBT until the EOBT.

Cost Criteria page (Figure 18)

The user can specify costs for the following criteria. Some criteria have a "Limit Deterioration" check box with an associated value. The system will discard, and not consider, any alternative that exceeds the specified limit (in other words, any alternative that exceeds the specified limit for any of the criteria for which a limit is specified is considered "infinitely costly").

The cost criteria are:

- "Fixed Cost": Addition of a fixed value to the total cost of the normal profile prior to comparing with the total cost of each generated alternative. A positive cost penalizes the normal profile, making all alternative profiles cheaper in comparison and making it more likely that an alternative will be cheaper than the normal profile. The fixed cost can also be negative; in this case the system selects an alternative only if it improves on the normal profile by at least this many cost units. Thus, a negative fixed cost is the minimal improvement necessary for an alternative to be accepted.
- "Delay". Departure delay of the alternative. The user specifies the cost of each minute of delay incurred by the alternative. The user can also specify a limit on the deterioration of the delay.
- "Flying Time" (total elapsed time). The user specifies the cost of each minute of flying time via the "cost/minute" field. The user can also specify a limit on the deterioration of the flying time.
- "Route Length". The user specifies the cost of each NM of route length via the "cost/NM" field. The user can also specify a limit on the deterioration the route length.

- "Suspension". The user specifies a fixed cost to be added to the total cost of the alternative due to flight suspension, via the "cost if suspended" field. The user can also tick the "Forbid Suspension" box to cause any suspended alternative to incur an infinite cost and to be discarded.
- "Opportunity". An alternative is an opportunity if it was invalid at some time preceding the corresponding opportunity constraint and is now Valid. This criterion penalizes alternatives that are not opportunities, i.e. alternatives that do not cross a recently released constraint (such as a RAD or closed airspace that became open). With this criterion, opportunities (i.e. alternatives that became valid only after the start of the AIRAC or the specified point in time) are more interesting than alternatives that were always valid. The alternatives that were always valid incur the cost specified by this criterion. Opportunity only specifies that this cost is infinite, which marks as uninteresting any alternative that is not an opportunity.
- "Overload". The user specifies a cost per minute of overloads caused by the alternative on all other flights. More specifically: for each traffic volume that will be overloaded if the alternative is applied, the system computes the minutes of delay caused by a regulation on this traffic volume that will resolve this overload. Consequently, all delays per overloaded traffic volume are added and then divided by the number of overloaded traffic volumes. The cost of the criterion is this result multiplied by the specified cost of each minute of delay. With "Limit Deterioration", the user can also specify an upper limit on the number of minutes of delay caused by an alternative.
- "Fuel cost". The user specifies the estimated price of fuel per ton via the "cost/ton" field. The user can also specify an upper limit to the fuel consumption, in kg. Information on fuel prices is available at IATA website (http://www.iata.org/publications/economics/fuel-monitor/Pages/index.aspx).
- "TOWF" (Take-Off Weight Factor), a way to estimate route charges. When "TOWF" is selected, the user specifies the TOW (take-off weight) of the aircraft as a percentage of the maximum take-off weight of the aircraft type. Thus, a percentage lower than 100% will lower the estimated cost of route charges whereas a percentage higher than 100% will increase the cost. The user can also specify an upper limit for the estimated cost of route charges with "Limit Deterioration".
- "Route Deviation". The user specifies a cost for each nautical mile where the alternative profile uses a segment not on the original profile. In other words, this criterion will cause the system to select the alternative that least deviates from the original profile, even if the original profile does not use the shortest possible route. If the Route Deviation cost per nautical mile is nonzero, the system adjusts internal parameters of the path finder to find routes that deviate from the original profile as little as possible. The user can also specify an upper limit on the cost with "Limit Deterioration"

NOTE: Deterioration limitation. Setting one criterion to a very large value means that an improvement in it will allow a huge degradation in other criteria. To avoid this, for each criterion, it is possible to limit the maximum deterioration. Negative value of the “Limit Deterioration” means that this cost criteria must improve for selected value.

Default cost criteria values are:

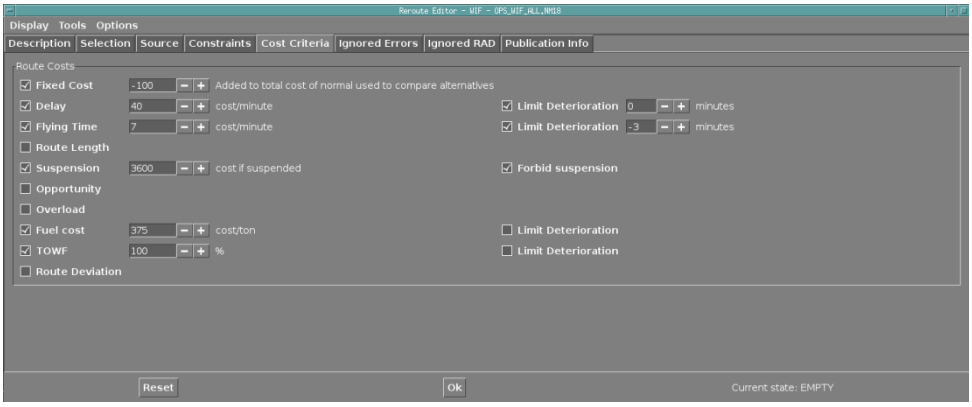

Figure 18 - Template Cost criteria page

Saving Parameters:

To save parameters, click OK at the bottom of the Reroute Editor window. Then, in Scenario Display window select PLAN - SAVE/SAVE AS…

3.2.2 GRRT schedule

GRRT Schedule is defined through Scenario Display window - Attributes Tab.

Right click at the blank space in table Activation Schedule and select Add Schedule to create new line (Figure 19).

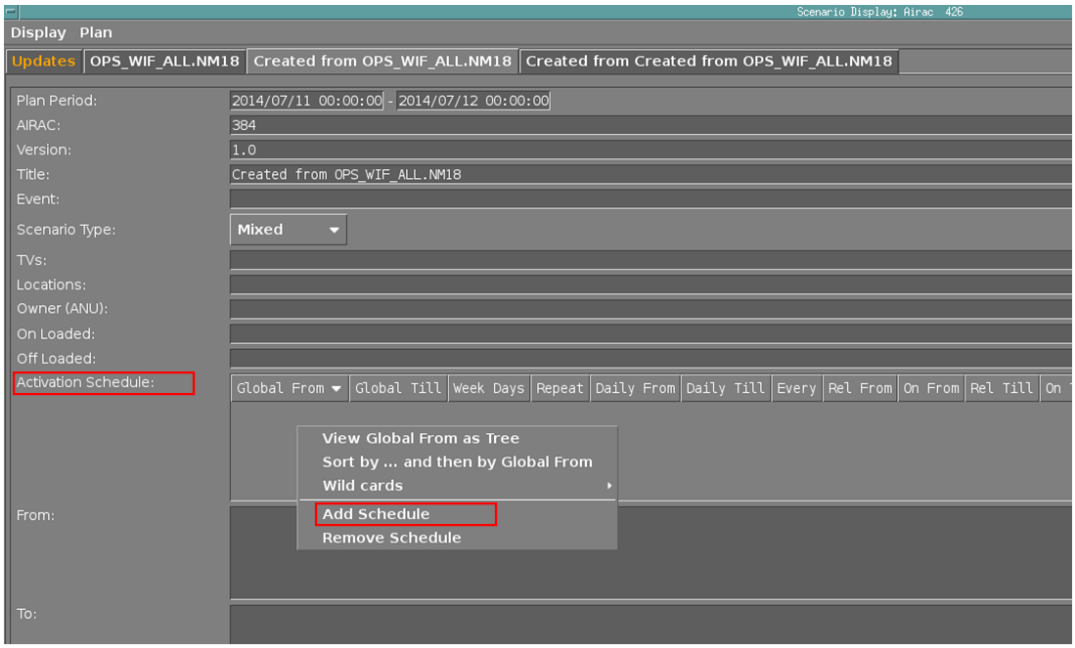

Figure 19 - Add schedule

Schedule Columns:

Global From - defines start date

Global Till - defines end date

Week Days - defines days of week for which schedule will run

Repeat - select ONCE.

Daily From - select time when GRRT will run

Daily Till - only if under Repeat is selected EVERY

Every - only if under Repeat is selected EVERY - define frequency of runs within Daily From / Till range

Rel From - select CLOCK or MIDNIGHT.

On From - Select time

Rel Till - select CLOCK or MIDNIGHT

On Till - Select time.

Columns On From / Till are used to define a scope of rerouting candidates based on their EOBT time. Depending on the Rel From / Till value this scope can be defined relatively against the CLOCK value or absolutely against MIDNIGHT (time is in UTC).

Example 1:

Daily From = 0500

Rel From = CLOCK

On From = 0700

Rel Till = CLOCK

On Till = 0900

In this case, GRRT will run at 0500, by taking in consideration all flights with EOBT between 0500 + 0700 = 1200 UTC and 0500 + 0900 = 1400UTC.

Example 2:

Daily From = 0500

Rel From = MIDNIGHT

On From = 0700

Rel Till = MIDNIGHT

On Till = 0900

In this case, GRRT will run at 0500, by taking in consideration all flights with EOBT 0700 UTC and 0900 UTC.

The default values of schedule are (Figure 20):

Global From	Global Till	Week Days	Repeat	Daily From	Daily Till	Every	Rel From	On From	Rel Till	On Till	Error
14/03/11	19/01/01	1234567	ONCE	02:00			CLOCK	02:00	CLOCK	06:00	
14/03/11	19/01/01	1234567	ONCE	04:00			CLOCK	04:00	CLOCK	06:00	
14/03/11	19/01/01	1234567	ONCE	06:00			CLOCK	04:00	CLOCK	06:00	
14/03/11	19/01/01	1234567	ONCE	08:00			CLOCK	04:00	CLOCK	06:00	
14/03/11	19/01/01	1234567	ONCE	10:00			CLOCK	04:00	CLOCK	06:00	
14/03/11	19/01/01	1234567	ONCE	12:00			CLOCK	04:00	CLOCK	06:00	
14/03/11	19/01/01	1234567	ONCE	14:00			CLOCK	04:00	CLOCK	06:00	
14/03/06	99/99/99	1234567	ONCE	16:00			CLOCK	04:00	CLOCK	10:00	

Figure 20 - Default values of the schedule

When schedule is modified save GRRT template (PLAN - SAVE/SAVE AS..)

3.2.3 GRRT modification/update

To modify existing template, open it from the Scenario Display window (PLAN - OPEN - FILE). Find template and open it by selecting its name and clicking on the OK in Files Manager window (Figure 21, Figure 22 and Figure 23).

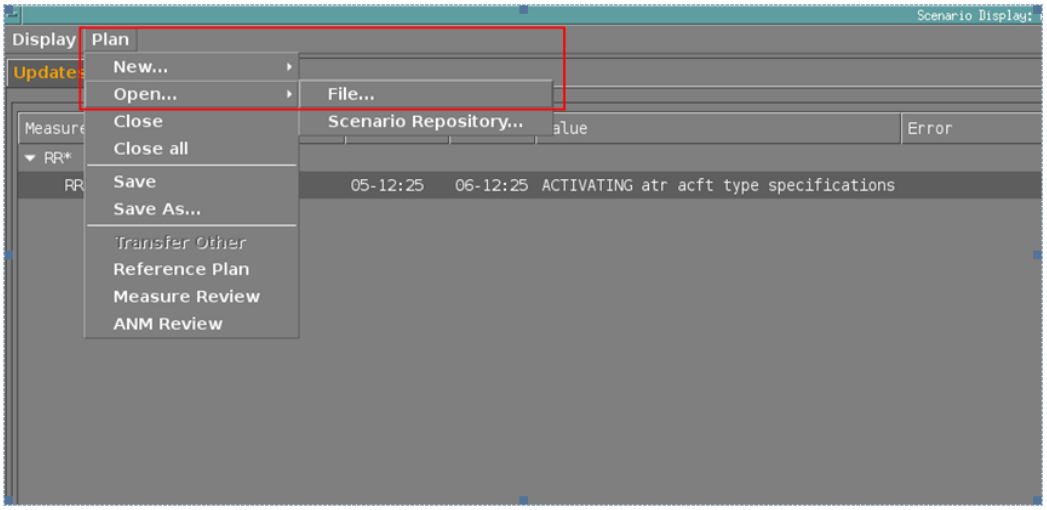

Figure 21 - Template selection

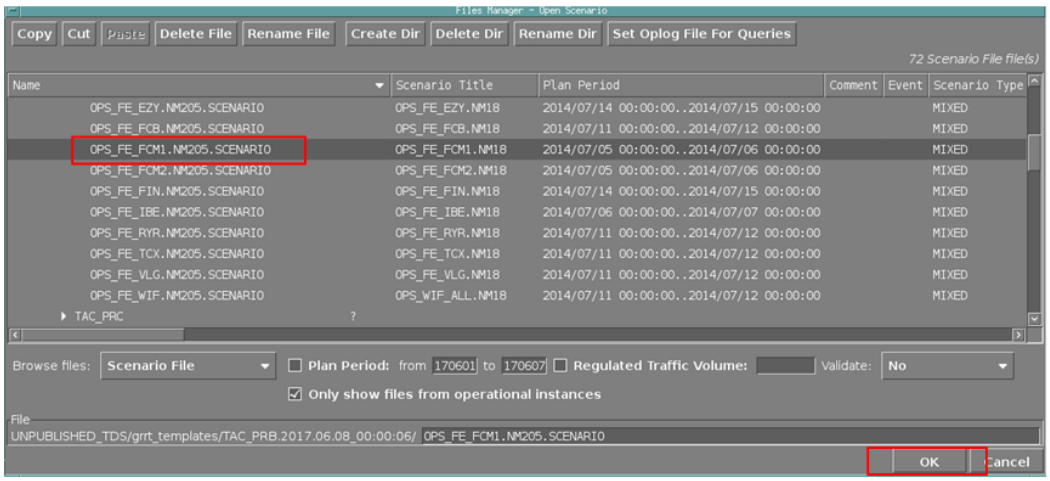

Figure 22 - Template selection 2

- Select Tab with GRRT template name;
- On Measures page click RR*;
- Select RR with AO identifier.

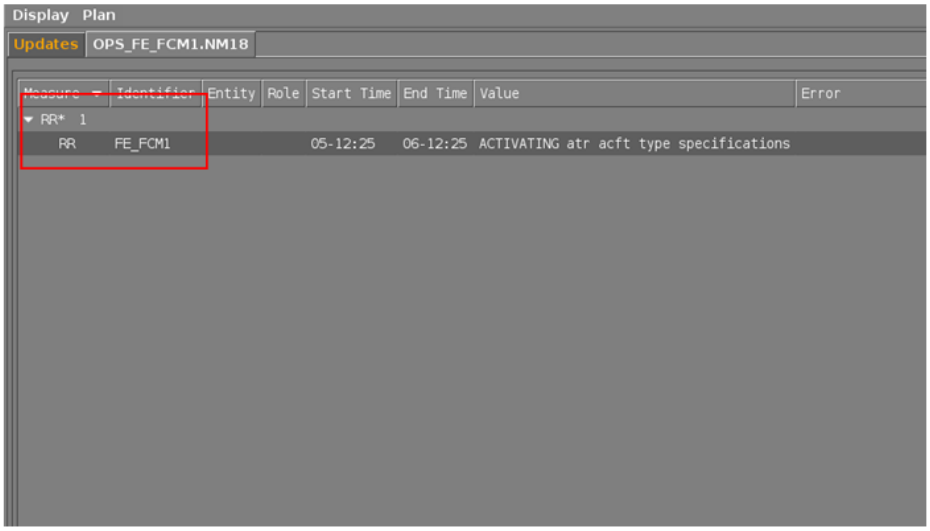

Figure 23 - Template selection 3

Right click and select Edit – this will open Re-route Editor (Figure 24).

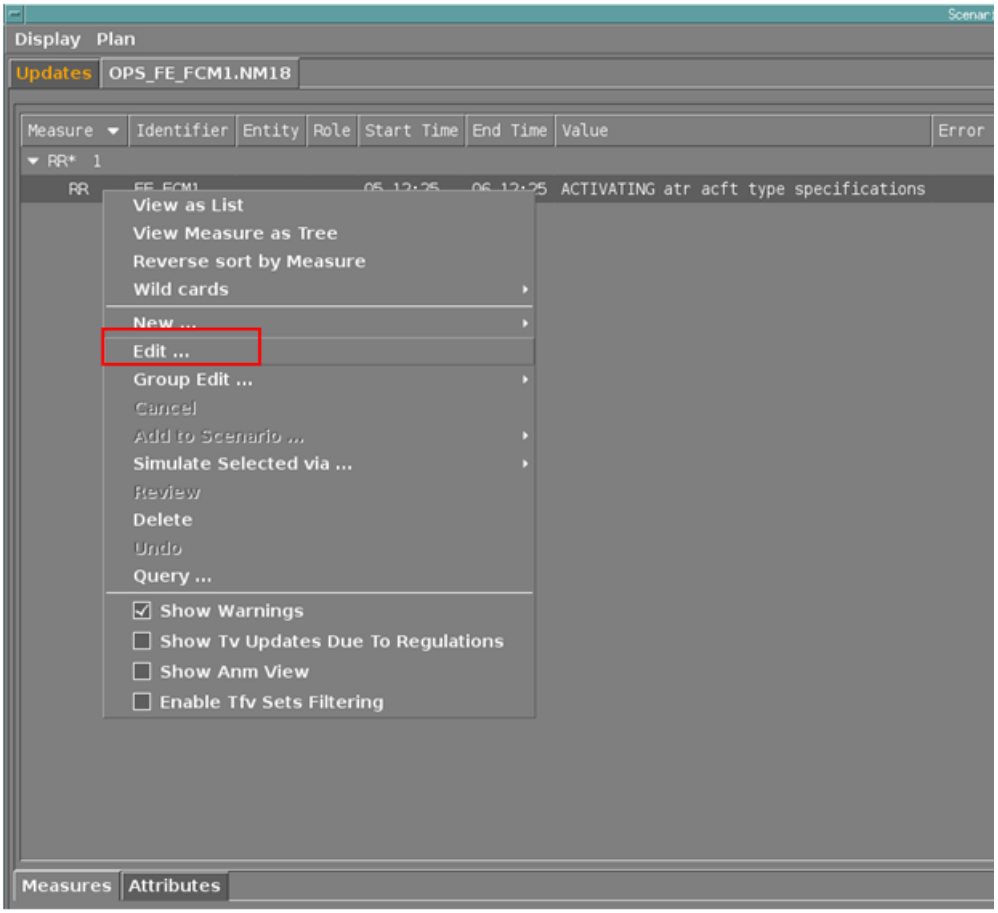

Figure 24 - Edit / modify template

Modification/update of existing template can be used when new template has to be created. In that case, existing template is opened, its parameters are modified where necessary to reflect AO request and then the template is saved under different name.

One AO can have more than one template if different parameters are used for different group of flights (e.g. specific parameters for Boing and specific parameters for Airbus aircrafts). In this case existing template can be modified and saved under different name.

3.3 Analysing and Using GRRT Results in SIMEX

SIMEX can be used for the GRRT template result analysis. More details on how SIMEX is used can be found in SIMEX manual.

- Load the Template;
- Select Tab with GRRT template name;
- On Measures page click RR*;
- Select RR with AO identifier;
- Right click and select Simulate Selected via Editor.

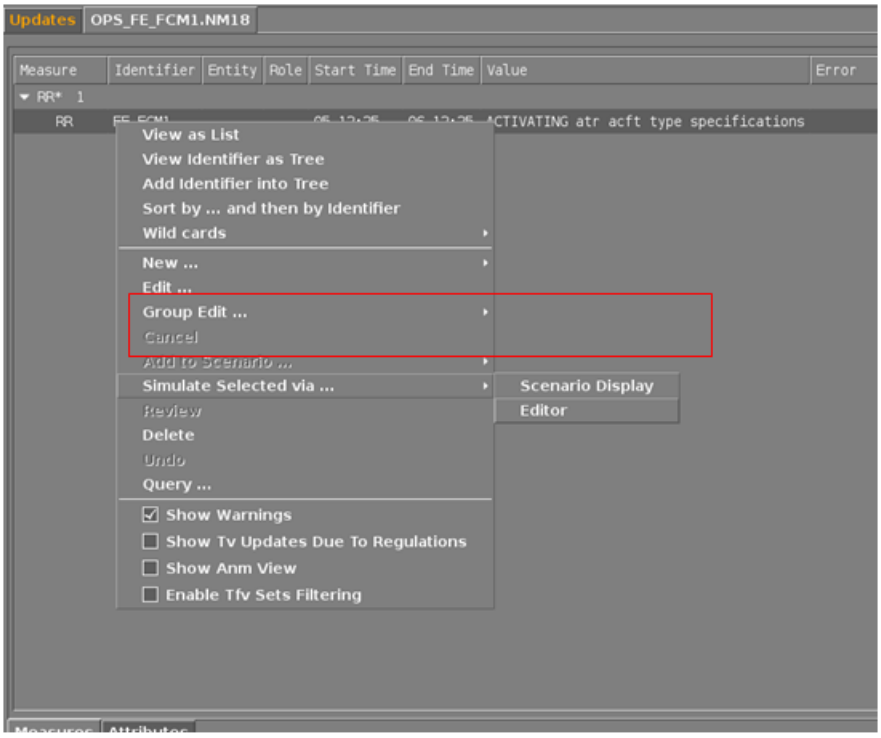

Figure 25 - Simulate via Editor

Reroute editor will be opened in SIMEX environment.

Flights can then be selected and investigated.

Open Selection tab.

Select sub-set of flights and press button KEEP SELECTED (This is not necessary if all flights have to be selected).

Then press Apply or Apply and Trace (this button will visualize flight alternatives) button to reroute selected flights according to the defined criteria (Results: Figure 26 and Figure 27).

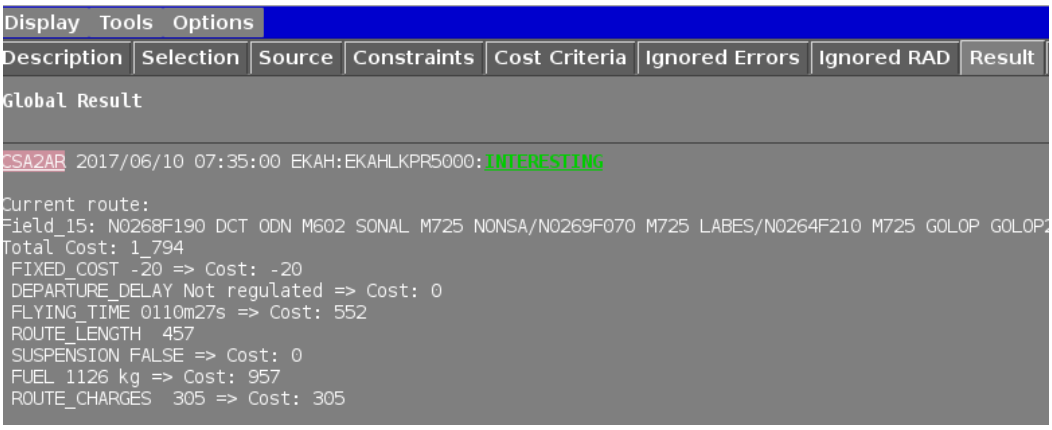

Figure 26 - GRRT results

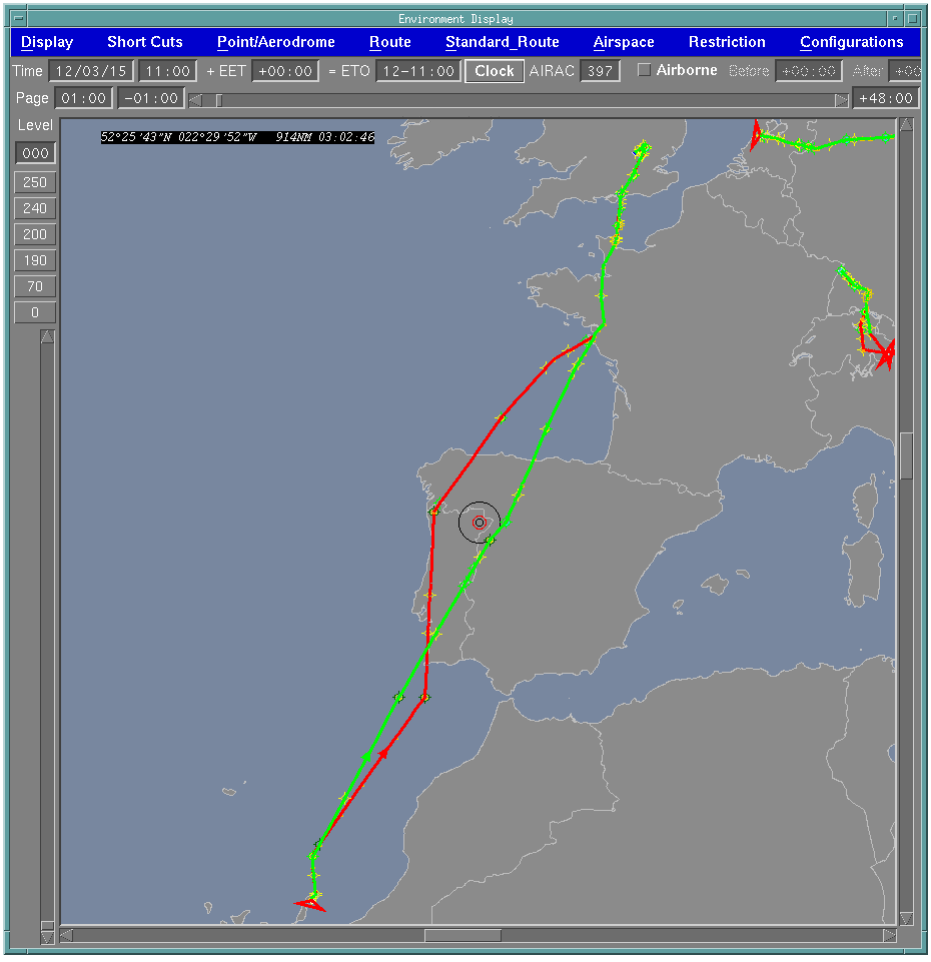

Figure 27 - GRRT planned (red) vs actual (green) route visualisation

4 Monitoring, Reporting and Post Operations

EUROCONTROL NMD/ACD/~~PFR~~ Operational performance evolution unit measures, monitors and analyses actual trajectory (KEA) and last filed flight plan trajectory (KEP) KPIs. It also monitors acceptance rate of generated rerouting proposals (RRPs) and re-routing opportunities (OPP).

More information can be found in Network Manager Annual Report and Network Manager Operations Report: http://www.eurocontrol.int/articles/network-operations-monitoring-and-reporting.

The unit can be contacted at: nm.ops.perf@eurocontrol.int.

INTENTIONALLY BLANK PAGE

Abbreviations

Term	Definition
ADEP	Aerodrome of departure
AO	Aircraft operator
AOG	Airline operations group
ATM	Air Traffic Management
CACD	Central Airspace and Capacity Database
CANSO	Civil Air Navigation Services Organisation
CDR	Conditional Route
CFSP	Computer Flight Planning Service Providers
CHMI	Collaboration Human Machine Interface
DOM	Deputy Operations Manager
ETFMS	Enhanced Tactical Flow Management System
EU	European union
FDP	Flight Data Processing
FE	Flight Efficiency
FEWP	Flight Efficiency Work Programme
FPL	Flight Plan
GRRT	Group rerouting tool
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
IFPS	Integrated Initial Flight Plan Processing System
KEA	Average horizontal en-route flight efficiency of the actual trajectory
KEP	Average horizontal en-route flight efficiency of the last filed flight plan
KPI	Key Performance Indicator

MPR	Most Penalising Regulation
NM	Network Manager
NMD	Network Management Directorate
NMIR	Network Manager Interactive Reporting
NMOC	Network Manager Operations Centre
NMPP	Network Manager Performance Plan
NOP	Network Operations Plan / Network Operations Portal
NPP	Network Performance Plan
NSP	Network Strategic Plan
OBT	Off-Block Time
OM	Operations Manager
OPP	Rerouting opportunity
PRB	Performance Review Body
RP	Reference Period
RRP	Rerouting Proposal Message
SES	Single European Sky
TOW	Take-Off Weight
TOWF	Take-Off Weight Factor

Table 1 - Abbreviations table

DOCUMENT FINAL PAGE

EUROCONTROL

SUPPORTING EUROPEAN AVIATION

www.eurocontrol.int