UNIVERSITAT POLITÈCNICA DE CATALUNYA
BARCELONATECH
Escola d'Enginyeria de Telecomunicació
i Aeroespacial de Castelldefels

CRIDA
I+D+i - ATM

TREBALL DE FI DE GRAU

TFG TITLE: Improvements in Sectorization Optimizer within the Dynamic Airspace Configuration Concept

DEGREE: Grau en Enginyeria de Sistemes Aeroespacials

AUTHOR: Sara Ruano Ferrer

ADVISOR: Cristina Barrado Muxí

SUPERVISOR: Adrián Fabio Bracero

DATE: June 20, 2022

Títol: Millores en un optimitzador de sectoritzacions dins el concepte de Dynamic Airspace Configuration
Autor: Sara Ruano Ferrer

Director: Cristina Barrado Muxí

Supervisor: Adrián Fabio Bracero

Data: 20 de juny de 2022

Resum

L'objectiu del concepte de Dynamic Airspace Configuration (DAC) és crear dissenys d'espai aeri i configuracions més flexibles per millorar-ne l'ús i absorbir la creixent demanda de trànsit aeri. Això modifica la concepció d'un espai aeri format per volums fixes a un que utilitza una major quantitat de blocs de construcció i/o fronteres flexibles. Això es tradueix en un increment del nombre de possibles configuracions, que resulta en la creació d'un problema d'optimització a gran escala.

Per abordar aquest problema, CRIDA ha desenvolupat un optimitzador de sectoritzacions, SECTORIA, que classifica totes les configuracions possibles en termes d'ocupació i en selecciona la més òptima.

L'objectiu d'aquest treball és progressar l'eina per acostar-la a l'entorn operacional. En concret, s'ha afegit una millora en el límit de la capacitat per obtenir solucions òptimes en tots els casos. També s'ha desenvolupat una eina de post-processat per refinar els resultats de l'optimitzador i obtenir plans de configuracions més precisos.

La validació d'aquestes millores s'ha dut a terme en dos casos d'ús: la sectorització actual de l'ACC de Madrid Ruta 1 i una sectorització DAC del mateix espai aeri, considerant l'addició de talls verticals. Les mostres de trànsit utilitzat corresponen a les dates del 22 de juny, el 3 de juliol, el 3 d'agost i el 13 de febrer del 2019.

El primer canvi s'ha validat comparant els resultats obtinguts amb la millora i els obtinguts sense aquesta, mentre que els resultats de l'eina de post-processat s'han comparat amb el pla de configuracions utilitzat en el mateix espai aeri en els dies d'estudi i amb una prova a cegues duta a terme en un expert en la matèria. Els resultats de la primera validació demostren una millora en el tractament de la sobrecàrrega, fent que SECTORIA proposi solucions més factibles. Per atra banda, l'eina de post-processat demostra resultats prometedors, amb millores en les hores ATC de fins el 30%. Després de l'anàlisi dels resultats s'exposen les conclusions i les línies de treball propostes.

Título: Mejoras en un optimizador de sectorizaciones dentro del concepto de Dynamic Airspace Configuration
Autor: Sara Ruano Ferrer

Director: Cristina Barrado Muxí

Supervisor: Adrián Fabio Bracero

Fecha: 20 de junio de 2022

Resumen

El objetivo del concepto de Dynamic Airspace Configuration (DAC) es crear diseños del espacio aéreo y configuraciones más flexibles para mejorar el uso del espacio aéreo y absorber la creciente demanda de tráfico. Esto modifica la concepción de un espacio aéreo formado por volúmenes fijos a uno que utiliza una mayor cantidad de bloques de construcción y/o fronteras flexibles. Esto se traduce en un aumento en el número de posibles configuraciones, que resulta en la creación de un problema de optimización a gran escala.

Para abordar este problema, CRIDA ha desarrollado un optimizador de sectorizaciones, SECTORIA, que clasifica todas las configuraciones posibles en términos de ocupación y selecciona la más óptima.

El objetivo de este trabajo es progresar la herramienta para acercarla al entorno operacional. En concreto, se ha añadido una mejora en el límite de la capacidad para obtener soluciones óptimas en todos los casos. También se ha desarrollado una herramienta de post-procesado para refinar los resultados del optimizador y obtener planes de configuraciones más precisos.

La validación de estas mejoras se ha llevado a cabo en dos casos de uso: la sectorización actual del ACC de Madrid Ruta 1 y una sectorización DAC del mismo espacio aéreo, considerando la adición de cortes verticales. Las muestras de tráfico utilizado corresponden a las fechas del 22 de junio, 3 de julio, 3 de agosto y 13 de febrero de 2019.

El primer cambio se ha validado comparando los resultados obtenidos con la mejora y los obtenidos sin esta, mientras que los resultados de la herramienta de post-procesado se han comparado con los planes de configuraciones utilizados en el mismo espacio aéreo en los días de estudio y con un test a ciegas llevado a cabo en un experto en la materia. Los resultados de la primera validación demuestran un mejor manejo de la sobrecarga, haciendo que SECTORIA proponga soluciones más factibles. Por otro lado, la herramienta de post-procesado demuestra resultados prometedores, con mejoras en las horas ATC de hasta el 30%. Tras el análisis de los resultados se exponen las conclusiones y las líneas de trabajo propuestas.

Title : Improvements in Sectorization Optimizer within the Dynamic Airspace Configuration Concept
Author: Sara Ruano Ferrer

Advisor: Cristina Barrado Muxí

Supervisor: Adrián Fabio Bracero

Date: June 20, 2022

Overview

The Dynamic Airspace Configuration (DAC) concept goal is to create more flexible airspace designs and configurations as a way to improve airspace use and absorb the increasing traffic demand. This modifies the conception of an airspace comprised of fixed volumes to one using a bigger quantity of building blocks and/or flexible boundaries. This translates into an increase in the number of possible configurations, which results in the creation of a large-scale optimization problem.

To tackle this problem, CRIDA developed a sectorization optimizer –SECTORIA– which ranks all the possible configurations for a defined time and airspace in terms of occupancy and selects the optimal one.

The aim of this thesis is to progress the tool in order to bring it closer to an operational environment. In particular, an improvement in its capacity constraint is added in order to obtain optimal solutions in all cases. A post-processing tool is also developed to refine the optimizer results and obtain more accurate configuration plans.

The validation of these improvements is then carried out in two use cases: current sectorization in Madrid ACC Route 1 and a DAC sectorization of the same airspace, considering the addition of vertical cuts. The samples of traffic used are corresponding to the dates June 22nd, July 3rd, August 3rd and February 13th, 2019.

The first feature is validated comparing the results obtained with and without the improvement, whereas the post-processing tool results are compared with the configuration plan opened with the current airspace design on the days of study and with a blind test performed on a Subject Matter Expert (SME). Results from the first validation show a better handling of inevitable overload, leading SECTORIA to provide more feasible solutions. On the other hand, the post-processing tool shows promising results, showing improvements in ATC hours which can reach up to 30%. Conclusions and future work are then described following the analysis of the results.

CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS

AB Airspace Block

ACC Area Control Centre

ANSP Air Navigation Service Provider

ASM Airspace Management

ATC Air Traffic Control

ATCo Air Traffic Controller

ATM Air Traffic Management

CBC Coin-or Branch and Cut

COTTON Capacity Optimization in Trajectory-based Operations

DAC Dynamic Airspace Configuration

DCB Demand and Capacity Balance

EAP Extended ATC Planner

ES Elementary Sector

EXE Exercise

FL Flight Level

FRA Free Route Airspace

HEC Hourly Entry Counts

ICO Improved Configuration Optimizer

LTM Local Traffic Manager

MIP Mixed Integer Programming

OCC Occupancy Counts

RTS Real Time Simulation

SAB Shareable Airspace Block

SME Subject Matter Expert

STN State-Task Networks

TBO Trajectory-based Operations

VSAB Vertical Shareable Airspace Block

INTRODUCTION

During the last months, traffic demand has been getting closer to pre-pandemic levels [1]. Therefore, it is imperative to develop mechanisms to improve the management of limited airspace capacity in order to support this expected growth in demand. More efficient allocation is essential to meet today's increasingly complex air traffic demand, and so different approaches have been considered to optimize the use of available airspace.

Among these techniques, the concept of Dynamic Airspace Configuration (DAC) promises a more flexible use of the airspace by the organization, planning and management of airspace configuration. A more dynamic airspace allocation can result in a better distribution of traffic demand and a better use of Air Traffic Control (ATC) resources. This concept creates different configurations by combining airspace volumes, which are defined considering historic air traffic flows. However, a challenge associated with DAC is the increasing number of possible configurations to choose from. This represents a large-scale optimization challenge.

This project presents improvements on the configuration plan optimizer developed by CRIDA: SECTORIA [2]. These improvements include the possibility of gradually increasing capacity thresholds, so as to provide optimal solutions in case of inevitable workload, and a post-processing tool to refine the optimizer's results. The validation of these features is carried out using the current sectorization of Madrid Area Control Centre (ACC) Route 1 and a DAC sectorization of the same airspace.

The document is structured in five chapters. Chapter 1 reviews the current state-of-the-art for the concept of Dynamic Airspace Configuration and airspace allocation optimizers. Chapter 2 describes the optimization framework used in SECTORIA and identifies its main drawbacks. Chapter 3 proposes a capacity constraint improvement and a post-processing tool. Chapter 4 describes the scenarios used to validate the proposed changes, including a redesign of Madrid ACC airspace and the days of study. Finally, Chapter 5 shows the results obtained as well as their detailed analysis.

CHAPTER 1. STATE OF THE ART

Several authors over the last few years, such as *Bertsimas, Lulli and Odoni* [3] or *Xu, Prats and Delahaye* [4], have studied the application of optimization algorithms to airspace management. Dynamic Airspace Configuration (DAC) is a concept that allows the application of new optimization approaches in the context of airspace allocation. This chapter contains a literature review on DAC and airspace allocation optimization.

1.1. Dynamic Airspace Configuration

Dynamic Airspace Configuration aims to identify optimised airspace configurations for a defined airspace through the implementation of airspace design and configuration subprocesses based on the forecasted air traffic complexity, Air Traffic Controller (ATCo) workload and availability, as well as the traditional count methodologies provided by the Imbalance Prediction and Monitoring Service (Hourly Entry Counts (HEC) and Occupancy Counts (OCC)). The concept shifts from the current practice of using fixed airspace structures to the use of non-defined operational sectors made of a bigger amount of building blocks and/or variable boundaries.

DAC is included within the Demand and Capacity Balance (DCB) procedure across its time horizon. In the strategic planning phase (months before the day of operation), with the design of more flexible airspace structures; in the pre-tactical phase (hours to minutes before the day of operation), with the creation and dynamic modification of the configuration plan (e.g. changing the opened configuration every 20 minutes, if necessary) to optimize the use of airspace capacity and balance the ATCo workload; and in the execution phase, with the implementation of the final configuration by the Area Control Centre.

As DAC is a fairly new concept that has yet to be implemented –with the exception of some flexible airspace structures implemented in France and the MUAC area–, various SESAR projects have explored this topic. Some of these projects are COTTON [5] [6], PJ08-W1 [7], PJ09-W1 [8], PJ09-W2-44 [9], and PJ32-W3 [10]. COTTON was based on Capacity Optimisation in Trajectory-based Operations (TBO). This project considered the use of a pre-defined set of configurations and the election of the optimal one based on TBO. PJ09-W1 and PJ08-W1 are the preliminary projects to PJ09-W2-44. PJ08-W1 focused on Advanced Airspace Management, while PJ09-W1 dealt with an Advanced Demand and Capacity Balance (DCB) concept. The merge of both these projects led to the integration of the DAC concept within the DCB process, the objective of PJ09-W2-44.

1.1.1. Airspace Building Blocks

One of these SESAR projects, particularly PJ08-W1 [7], introduced 5 different airspace design elements, which can be configured resulting in a Configured Sector. These airspace design elements are shown in Fig. 1.1 and listed below:

- **Elementary Sector** (ES), an ATC workable 3D airspace that cannot be split into a controllable sector.

- **Airspace Block** (AB), a primary volume that needs to be merged with other AB to conform a workable sector.

- **Shareable Airspace Block** (SAB), a non-controllable sector that needs to be attached to any adjacent ES or AB to build an operating sector. That is, no operating sector can be comprised of only SABs.

- **Vertical Shareable Airspace Block** (VSAB), this non-workable sector is the same concept as a SAB, but in the vertical plane. It splits the space vertically and typically cover 1.000 to 4.000 ft.

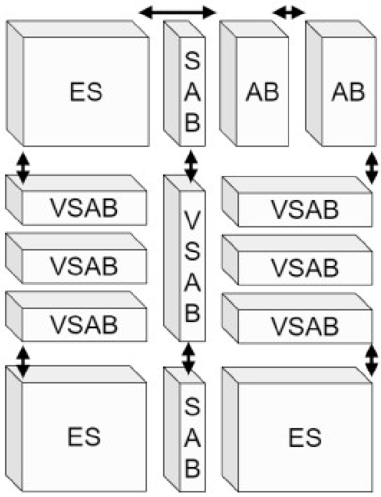


Fig. 1.1: Example of DAC Airspace design elements

The combination of the different types of the airspace volumes listed above defines the configuration plan for a particular airspace. This configuration can change dynamically in response to air traffic demand, by modifying the combination of airspace volumes to allocate air traffic.

1.1.2. DAC in Madrid ACC

The Madrid Air Control Centre is a highly complex environment with substantial levels of traffic demand [11]. However, this airspace is currently only using the concept of Elementary Sectors, with the exception of a VSAB defined in the Zamora Sector (ZMM, see Fig. 1.2) between FL325 and FL345. As a result, the airspace design is not very flexible and so the DAC concept could be used to improve traffic allocation and the overall capacity.

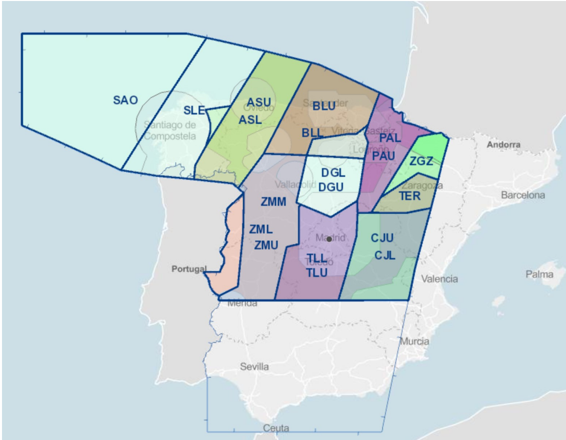


Fig. 1.2: 2D map of current Madrid ACC. Sectors with more than one volume have more than one name in their boundaries (i.e. Bilbao sector has an upper and a lower sector, so within its boundary BLU and BLL are written).

Two different SESAR projects have analysed the impact of the DAC concept in the Madrid ACC: PJ08-W1-EXE03 and PJ09-W2-S44-EXE01, both carried out in CRIDA. It is important to note that the former is still in the course of validation.

1.1.2.1. PJ08-W1-EXE03

PJ08-W1-EXE03 (see [7]) was aimed to assess the DAC dynamicity versus ATC capability and demonstrate DAC performance improvements considering human factors. Additionally, this exercise evaluated airspace design criteria and operational procedures appropriateness for DAC implementation. All this was carried out through several Fast Time Simulation activities to design the airspace and sector configurations, and a Real Time Simulation to assess the operational feasibility of DAC for ATC environment.

Through a workshop with operational staff, Shareable Airspace Bloks (SAB) and Elementary Sectors were defined for Madrid ACC, as well as the sector design criteria for that airspace. The validation was performed focusing on the eastern area of the ACC modifying the current sectors ZGZ, TER, CJU and CJL (see Fig. 1.2) to the ones depicted in Fig. 1.3.

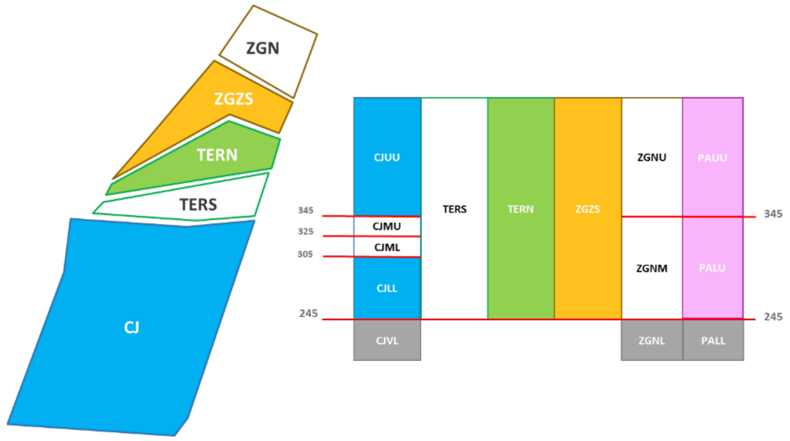


Fig. 1.3: Vertical and horizontal views of the airspace design in the validation scenarios of PJ08-W1-EXE03.

Overall, DAC was found to be beneficial to improve the management of ACC resources. The airspace redesign was reported to be convenient to allocate demand, although balconies –configured sectors with more than one upper or lower level– were found to be a risk for situational awareness. However, the sectorization algorithm was deemed as not efficient as it did not take into account the workload implied by a sectorization change.

1.1.2.2. PJ09-W2-S44-EXE01

PJ09-W2-S44-EXE01 [9] consists on Real Time Simulation (RTS) of the tactical DCB processes integrating DAC and DCB to validate its operational feasibility. These RTS are based on a Free Route Airspace (FRA) environment over Flight Level 245 in Enroute Madrid ACC, and so the airspace structure is defined according to the traffic flows within the DAC design principles.

In this case, the sectorization and the airspace design of the validation scenarios were based on the airspace elements defined in the previous section, as well as the refinement of the current horizontal boundaries to accommodate FRA traffic. The resulting airspace was the one shown in Fig. 1.4 and Fig. 1.5, but the validation was only performed using the central part of Madrid ACC (BL, ZMN, ZMS, DG, PAN, PAS, TL, and associated SABs).

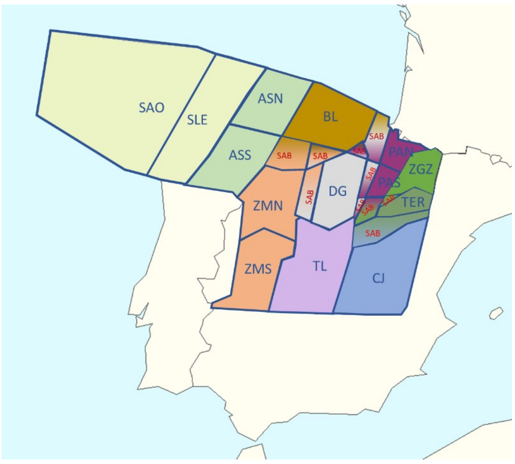


Fig. 1.4: Madrid ACC horizontal design in the validation scenarios of PJ09-W2-S44-EXE01.

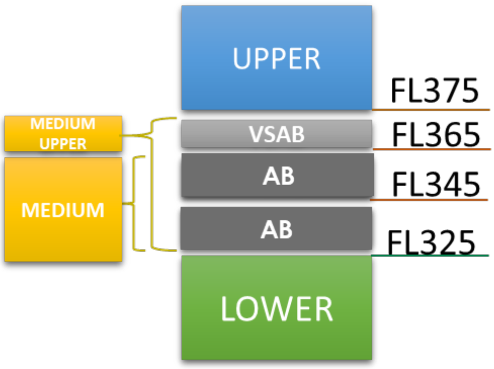


Fig. 1.5: Madrid ACC vertical design in the validation scenarios of PJ09-W2-S44-EXE01.

For the validation of the solution concept, CRIDA developed an automatic support tool for the Local Traffic Manager (LTM) role –HEIMDAL- including different visual aids. One of these is a configuration optimizer which proposes the optimal configuration according to the new declared capacity thresholds. This optimizer is named SECTORIA and will be described in chapter 2.

1.2. Airspace Allocation Optimization

Optimization methods have been broadly used to solve a wide range of problems. Throughout the last decade many authors have applied many optimization techniques to airspace allocation to approach the DAC issue and airspace modelling.

Airspace sectorization was first confronted by the combination of small volumes. In this way, *Jagare, et al.* [12] proposed a free-form static airspace sectorization starting from a regular mesh of cells, and defined how to use constraints in the sectorization process. *Chen and Zhang* [13] described the airspace configuration as a weighted graph partitioning problem, where edges represented air routes and the vertices represented key points –such as airports and waypoints. The problem was solved with a combination of a graph partitioning algorithm, an optimal dynamic load balancing algorithm, and a heuristic algorithm. This airspace analysis as a weighted graph has been broadly used in DAC research, such as *Sergeeva et al.* In 2015 [14], they combined graph technique with the use of horizontal airspace blocks to represent airspace, and applied a stochastic optimization algorithm to generate a sequence of sector configurations for one day of operation while minimizing the ATCo workload. Then, in 2017 [15], they experimented with starting from 3D airspace blocks and creating different configurations also by graph partitioning, but eventually solved the problem with a genetic algorithm.

Other researchers have presented multi-objective approaches for solving the sectorization problem. *Wong et al.* [16] created airspace sectors with a Voronoi diagram and proposed a multi-objective formulation to obtain a range of solutions with a varying trade-off among the objectives. The number of available ATCo has been an important issue for sectorization too. *Treimuth et al.* [17] tried to optimally reduce the number of controllers by applying a branch-and-prince method to a unique weighted objective function. A recent trend in the ATM field is to move towards flight-centric operations. In this regard, *Gerdes et al.* [18] developed the idea of AutoSec (automatic sectorization), which is a combination of fuzzy logic for clustering traffic flows, Voronoi diagrams for creating new sectors, and evolutionary algorithms to find the optimal sectorization, combining the multi-criteria optimization and flight-centric operations. One of the most recent works in DAC, also presented by *Wong et al.* [19], modifies the shape of the sectors but, this time, based on future traffic demand. However, this innovative approach must necessarily be developed in parallel with the training of controllers, which is closely dependent on the shape of the sectors.

Besides all these approaches on airspace optimization, some tools have been developed to obtain optimal sector configuration plans given a determined traffic demand.

1.2.1. ICO

The Improved Configuration Optimizer (ICO) [20] is an opening scheme optimisation algorithm developed and refined by the EUROCONTROL Experimental Centre. It is capable of generating an opening scheme which minimizes overloads and the number of controller positions whilst maintaining a sustainable workload in the selected sectors according to their declared capacities, all for a given level of traffic and controller availability. For the formulation of the problem, ICO applies the following constraints:

- The maximum number of available ATCo at each moment.
- The minimum sector and configuration opening duration.
- The maximum configuration step size.

After that, and in order to choose between the competing solutions, the algorithm tries to minimise overload, number of control positions used and number of configuration changes, in that order of priority. A result from this tool is presented in Fig. 1.6.

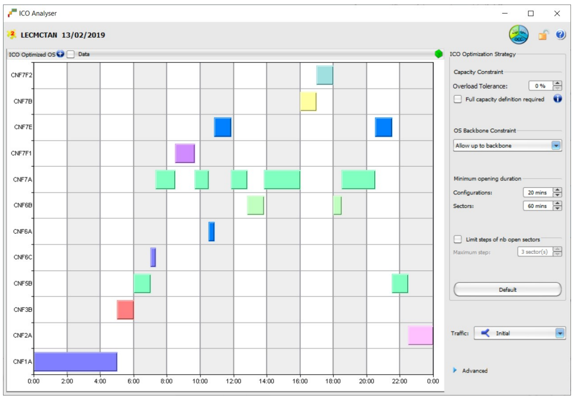


Fig. 1.6: ICO results of Madrid Route 1 for the date 13/02/2019

Nevertheless, the EUROCONTROL-developed tool still uses Hourly Entry Counts (HEC) as the solo parameter to evaluate the load of a sector. The current trend is to select sectorization based on the values of occupancy, and the associated sustained and peak capacity thresholds for each configured sector.

1.2.2. SECTORIA

Aside from ICO, CRIDA developed a configuration plan optimizer to complement the PJ.09-S44 SESAR project's aim of applying the DAC concept to Madrid ACC [2]. This tool –named SECTORIA– was used to obtain the optimal configuration plan for this airspace by modelling the problem of merging and interchangeability of DAC. Next chapter makes a thorough description of the framework around this optimizer.

CHAPTER 2. SECTORIA

SECTORIA is a R&D project created and developed at CRIDA A.I.E [21]. The ultimate goal is to create a service that supports the execution of validation or research projects related to DAC, Airspace Management (ASM) and airspace configuration (at strategic and tactical level).

SECTORIA is an optimization service that provides optimal configuration for a given airspace based on traffic demand. This service gives the possibility to solve a complex sectorization problem, specially within a DAC context, by analysing the traffic demand in a defined region and finding the optimal configuration to be opened in that region.

The problem is defined using the State-Task Networks (STN) methodology[22], where each specific air traffic demand is represented by a "state" and each operational sector is represented by a "task", composed of "units" that correspond to the elementary sectors. The choice of the configuration that best fits the demand is based on a series of metrics that provide a quantitative representation of the complexity for each operational sector. Once these metrics are computed and allocated to each of the possible operational sectors, SECTORIA formulates the problem as a Mixed Integer Programming Problem (MIP) and uses the Coin-or Branch and Cut Optimizer (CBC) to solve it.

The metrics used by SECTORIA for each operational sector are the following:

- Hourly-Entry Counts (HEC)
- 5-minute Occupancy Counts (OCC)
- HEC threshold
- Sustained OCC threshold [1]

These metrics are combined to calculate cost and to assign it to each operational sector. An optimal combination of sectors is obtained based on the combination of operational sector the lowest possible cost while respecting all the imposed constraints.

2.1. Cost Calculation

In order to classify the possible configurations, SECTORIA computes an associated cost to each one of them, according to the occupancy of their operational sectors. The optimizer searches for the configuration with a minimum cost that complies with the proposed set of constraints. This cost is computed based on the following occupancy metrics provided as inputs:

[1] There are two types of Occupancy thresholds:

- **Peak OCC threshold**. This is the absolute maximum number of flights that can be managed at any given time in a sector. This threshold cannot be surpassed.
- **Sustained OCC threshold**. This is the number of flights that can be managed on a sustained basis over time in a given sector during a time interval. This threshold can be surpassed but only for a small amount of time.

– 5-minute Occupancy Counts (OCC) by operational sector for the given time interval

– Occupancy Sustained Threshold for each operational sector

The cost of each operational sector is computed based on the area over sustained and area under sustained.

2.1.1. Area Over Sustained (AOS)

Area over sustained is computed as the excess of occupancy with respect to the sustained occupancy threshold. The AOS represents the combination of two important aspects: the peaks of occupancy and the duration of them. This is why it is important to quantify the total surface of this area in the given time interval for each operational sector. Fig. 2.1 represents the concept behind area over sustained, including the occupancy values for an operational sector for one hour from 16:00 to 17:00 as well as its occupancy threshold, also defined as overload threshold. The resulting area of occupancy peaks above the threshold is marked in red and corresponds to the area over sustained used for the cost calculation.

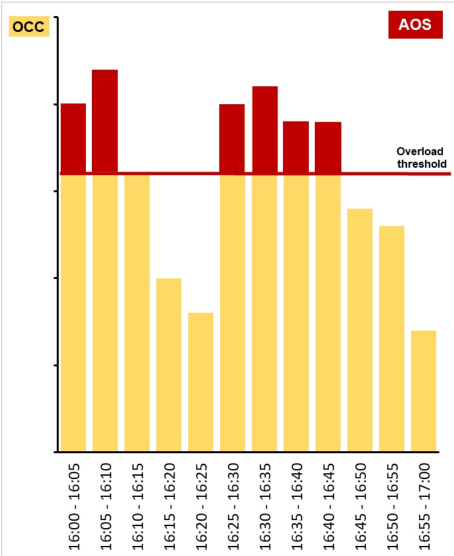


Fig. 2.1: Area Over Sustained

2.1.2. Area Under Sustained (AUS)

Area under sustained represents the region below a defined underload occupancy threshold and over the occupancy values. This area, although it is not as critical as the previous one, is included in the optimization problem to avoid underloaded sectors. In this case, the underload occupancy threshold is a percentage by default 40% of the sustained threshold previously mentioned. This parameter can be modified according to user preferences. Fig. 2.2 represents in red the area under sustained used to compute the cost in the relevant operational sector.

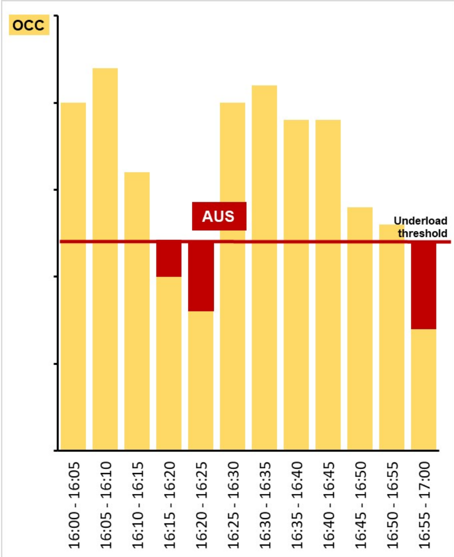


Fig. 2.2: Area Under Sustained

2.1.3. Weights

SECTORIA computes the cost as a proportional combination of area over sustained and area under sustained. These proportions manifest the different importance that each area has on the complexity of a sector and are represented by weights that can be adjusted according to user preferences. Area over sustained is more critical in occupancy as it might be highly correlated with high ATCo workload and so the proportion AOS/AUS is by default 70/30, respectively.

The formula used to calculate the cost of an operational sector *i* for a given time interval is shown in Equation 2.1.

$$Cost_i = AOS_i \cdot W_{AOS} + AUS_i \cdot W_{AUS} \tag{2.1}$$

For a given configuration, the total cost is computed as the addition of the costs of its operational sectors, as shown in Equation 2.2.

$$\textit{Cost of a configuration} = \sum_{i=0}^{N} Cost_i \tag{2.2}$$

where N=number of operational sectors forming the configuration

The algorithm then ranks all the configurations assigning a cost to each of them and *n* optimal configurations are obtained, depending on the number of solutions specified as an input to the optimizer. To obtain the rank of configurations, the algorithm obtains the optimal one and is executed again excluding this first optimization from the possible solutions for the next execution.

2.2. State-Tasks Networks (STN) methodology

In order to represent the optimization problem, SECTORIA uses State-Task Networks (STN), developed in Python. This is an approach presented by *Kondili et al.* in 1993 [22] to model multipurpose batch process for the purpose of short-term scheduling. This methodology allows a simple representation of the elements contained in the DAC concept and enables the definition of more flexible sector configurations capable to adapt the airspace design to the air traffic demand. State-Task Networks include three different elements:

- “States”, representing the air traffic demand.
- “Tasks”, corresponding to the operational sectors contained in the solution configuration.
- “Units”, which are the elementary sectors that compose the operational sectors.

The aim of the optimization is to obtain the optimal allocation of all units/building blocks to the tasks/configured sectors for passing the traffic demand from its initial state (uncontrolled) to its final state. Fig. 2.3 illustrates how the elements are distributed in the modelled problem.

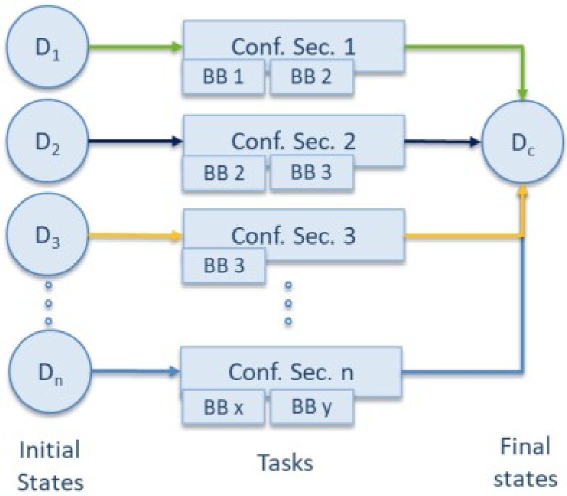


Fig. 2.3: State-Task Network modelling the optimal configuration problem

The parameter that determines the optimal path through the STN is the cost associated with the configured sectors. The optimizer proposes the configuration whose combination of configured sectors has the minimum cost.

2.3. Boundary Conditions and Constraints

In order to define correctly the problem of airspace sectorization, it is necessary to impose a series of constraints to be met by the chosen configuration. These constraints try to adapt the formulated problem as close as possible to real operation and avoid inconsistencies in the solution.

2.3.1. Building Blocks Simultaneity

The Building Blocks Simultaneity constraint guarantees that the same building block is not allocated to two different configured sectors at the same time in the same configuration. If there is a configured sector containing one building block, there cannot be another configured sector in the same configuration that contains the same building block. Fig. 2.4 represents the overlaps this constraint avoids from happening.

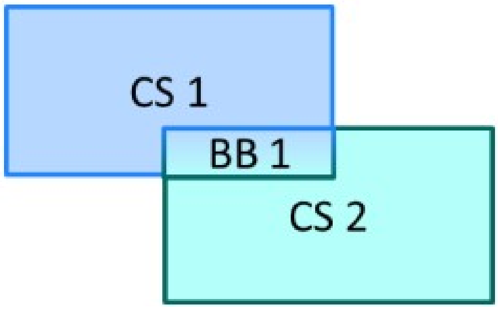


Fig. 2.4: Building blocks simultaneity constraint

Equations 2.3 and 2.4 are the mathematical representation of this constraint, included in the algorithm.

$$W_{(i,j)} - W_{(i,k)} = 0 \qquad \forall m_i = 1, \quad i \in N, \quad j \neq k, \quad (j,k) \in B \tag{2.3}$$

$$\sum_{i=0}^{|N|} W_{(i,j)} \begin{cases} = 1 & \mathit{if}\ m_i = 1 \\ \leq 1 & \mathit{if}\ m_i \neq 1 \end{cases} \qquad \forall j \in B \tag{2.4}$$

Where:

- $W_{i,\ j/k}$ is a binary variable with value 1 if building block *j/k* is assigned to configured sector *i*. Otherwise, it equals 0.
- B is the set of all building blocks.
- N is the set of all configured sectors.
- m_i is a binary variable with value 1 if configured sector *i* contains more than one building block. Otherwise, it equals 0.

2.3.2. Building Blocks Allocation

The Building Blocks Allocation constraint ensures that all building blocks are assigned to one configured sector. All building blocks, which divide the airspace, need to be allocated to at least one configured sector, ensuring the absence of gaps in that airspace. Fig. 2.5 represents the gap situation this constraint excludes from the possible configurations.

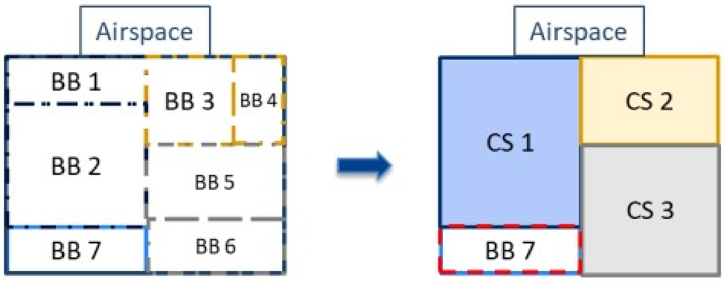


Fig. 2.5: Building blocks allocation constraint

Equation 2.5 contains the mathematical expression included in the algorithm to represent this constraint:

$$\sum_{i=0}^{|N|} \sum_{j=0}^{|B|} W_{(i,j)} = |B| \tag{2.5}$$

Where:

- $W_{i,j}$ is a binary variable with value 1 if building block *j* is assigned to configured sector *i*. Otherwise, it equals 0.
- B is the set of all building blocks.
- N is the set of all configured sectors.

2.3.3. Maximum Number of Configured Sectors

The Maximum Number of Configured Sectors constraint limits the number of configured sectors that can be opened at the same time. It is associated with ATC staff limitations, which are common in real operating situations. The parameter defined in this constraint is set as an input value and excludes all possible configurations formed by a number of sectors greater than the parameter.

In Spain ATC organization, ATCos are always grouped in teams of two, one executive ATCo and one Planner ATCo. This means that if there are 12 ATCos available for a determined time interval, the maximum number of sectors that could be part of the configuration is 6. This is the reason why the algorithm takes this parameter as the total ATCos teams, so the parameter should be set to 6.

Equation 2.6 is the mathematical definition of this constraint:

$$\sum_{i=0}^{|N|} \sum_{j=0}^{|B|} \frac{W_{(i,j)}}{E_i} \leq ATCo_{max} \tag{2.6}$$

Where:

- $W_{i,j}$ is a binary variable with value 1 if building block *j* is assigned to configured sector *i*. Otherwise, it equals 0.
- B is the set of all building blocks.
- N is the set of all configured sectors.
- E_i is the number of building blocks forming configured sector *i*.
- $ATCo_{max}$ is the maximum number of Controller Working Positions (CWP).

2.3.4. Capacity Threshold Limits

The Capacity Threshold Limits constraint limits the use of configured sectors that exceed their capacity threshold in terms of hourly entry-counts (HEC). HEC represents the number of flights entering a sector during one hour. For example, if an operational sector has a capacity threshold defined at 45 flights per hour and the HEC for a given time interval of one hour is 46 flights, this operational sector will not be part of the solution configuration.

Equation 2.7 is included in the algorithm to represent this constraint:

$$(W_{(i,j)}C_{i_{max}}) - (W_{(i,j)}HEC_i) \geq 0 \qquad \forall i \in N, \quad j \in B \tag{2.7}$$

Where:

- $W_{i,j}$ is a binary variable with value 1 if building block *j* is assigned to configured sector *i*. Otherwise, it equals 0.
- B is the set of all building blocks.
- N is the set of all configured sectors.
- $C_{i_{max}}$ is the capacity threshold in terms of HEC for the configured sector *i*.
- HEC_i are the hourly entry-counts registered for the configured sector *i* during the time interval under study.

This last constraint is the only one that could be violated in case the algorithm does not find any configuration in which all configured sectors respect the constraint. Therefore, if this situation arises, the algorithm searches for a solution not considering the capacity thresholds defined. This exception is considered because in real life this metric's relevance is currently declining. From an operational perspective, occupancy thresholds are considered more significant in terms of ATCo workload. This is the reason why sometimes capacity thresholds can be exceeded depending on the amount and complexity of traffic, and so this constraint can be violated aligning with that trend.

2.4. Optimizer

Once the model is defined and the constraints imposed, SECTORIA uses a Mixed Integer Programming (MIP) solver to obtain the optimal configuration. Particularly, the solver used is CBC (Coin-or branch and cut) [23], which is an open-source mixed integer linear programming solver written in C++. The solver can be used either as a callable library or using a standalone executable, being this last option the one used to integrate it into the Python code.

2.5. Output

Once the optimizer is executed, SECTORIA provides an output file containing information on all the obtained solutions ordered according to their cost: *Solution number 1* is the optimal one, *Solution number 2* is the second optimal one, and so on. Each solution contains the following information:

– **General data**: it contains a sequential identifier of the solution number, the solution/configuration final cost and the operational sectors that compose the selected configuration.

– **Solver results**: it contains information about the optimizer results. It includes a statement indicating whether the algorithm obtained an optimal or infeasible solution, a parameter that indicates if the selected configuration contains a capacity constraint violation and the solver execution time.

– **Solution details**: it provides relevant information (building blocks used, cost, maximum capacity, entry counts, overload. . .) about the operational sectors contained in the selected configuration.

This output allows to understand the solution proposed by SECTORIA and can be used to compare different solutions classified by their cost.

2.6. Formulation of the Problem

As SECTORIA is still in a development phase, further improvement is still needed regarding the violation of the capacity constraint and the realism of the provided output.

In those cases where the capacity constraint needs to be violated in order to provide a solution, SECTORIA completely disregards the HEC threshold and takes whichever solution has a minimum cost. This leads to solutions with configured sectors having hourly entry-count (HEC) values twice the amount of their thresholds.

On the other hand, SECTORIA provides an optimal configuration for a given time interval with the corresponding traffic demand. When executed repeatedly to find the opening scheme of a longer period, SECTORIA tends to propose too many changes in configuration. This is because information about previous time intervals is still not used to find the optimal configuration, and so the cost of transition between configurations is not taken into consideration. It could also be occurring due to the presence of recurrent traffic peaks observed in short periods.

The aim of this project is to further develop SECTORIA so as to tackle all these issues in order to adapt the optimizer results to the operational needs. For that purpose, the following chapter focuses on the implementation of additional features.

CHAPTER 3. PROPOSED CHANGES

This chapter describes the proposed changes to the configuration optimizer SECTORIA in order to bring it closer to real-life operations. These modifications include a feature that gradually increases the capacity constraint parameter and a post-processing tool that refines the obtained output.

3.1. Capacity Constraint Improvement

In days with conditions of high amount of traffic, and without considering demand measures, some excess of capacity can be accepted in a specific sector. For that reason, SECTORIA needs to include the feature of increasing the parameters of its capacity constraint. With this modification, SECTORIA still provides an optimal solution even with a small excess of traffic demand.

First, three new inputs have been added to the algorithm, corresponding to the three percentages of HEC capacity SECTORIA should consider before completely disregarding the capacity constraint. These percentages represent the factor to which all capacity threshold values will be multiplied and they can be modified by the user.

Using these inputs, the algorithm gradually increases the capacity constraint multiplying these factors. SECTORIA first tries to find an optimal solution using the threshold capacity value multiplied by the first factor. If no optimal solution is found, then the algorithm uses the second factor –and then the third one- to try to find an optimal solution, still using the capacity constraint. This constraint is only ignored in case there is no possible configuration found using the last capacity factor, so the algorithm tries to find a solution that complies with all the other constraints.

After several validation test runs of the new implementation and considering the amount of excess traffic allowed in real-life operation, the input default percentages were decided to be 100%, 110% and 120%. Using these values, if an operational sector has a capacity threshold defined as 45 flights per hour, its new capacity thresholds will be the following:

$$45\ {}^{flights}/_{hour} \times 100\% = 45\ {}^{flights}/_{hour}$$
$$45\ {}^{flights}/_{hour} \times 110\% = 49.5 \cong 49\ {}^{flights}/_{hour}$$
$$45\ {}^{flights}/_{hour} \times 120\% = 54\ {}^{flights}/_{hour}$$

Initially, the algorithm can only include this operational sector if its traffic demand does not exceed 45 flights. However, if no optimal solution is found, the new capacity constraint for this sector is set at 49 flights/hour. In case the algorithm were still not able to obtain a solution, up to 54 flights an hour are permitted in the sector. Eventually, provided that no optimal configuration is found using this last capacity factor, SECTORIA searches for a solution not considering any HEC capacity thresholds defined.

3.2. Post-processing Tool

As it was stated in the previous chapter, one of the main inconveniences in SECTORIA is its independence from previous time intervals. This independence along with the presence of recurrent traffic peaks in short periods can lead to proposed configurations with recurrent changes.

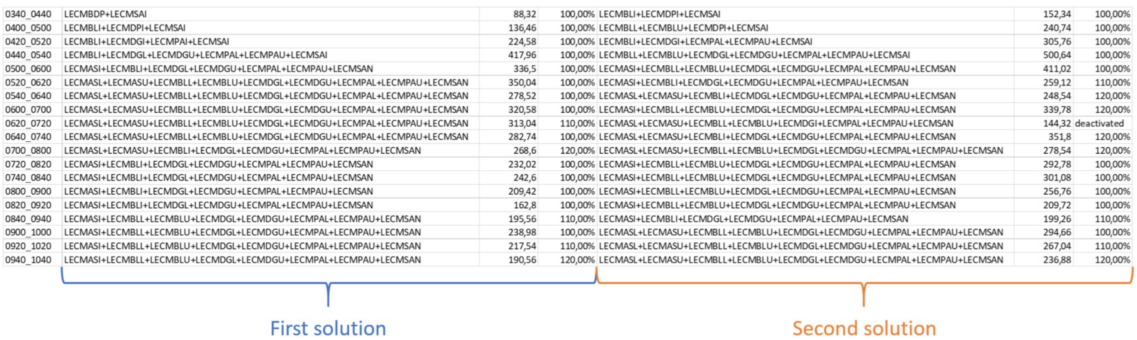
Additionally, SECTORIA provides as many solutions as defined in its input for each time interval. These times are usually one-hour periods every 10 or 20 minutes, depending on the provided HEC input data. Therefore, looking at a specific time instant, SECTORIA might deliver more than one configuration.

In the context of supporting the LTM tool developed in SESAR Wave 2 Solution 44, the incorporation of expert judgement helped deal with both these inconveniences. This way, more realistic configuration schemes were obtained to carry out the validation.

However, SECTORIA should be able to offer outputs that are more practical for LTM decision making. For that reason, a post-processing tool has been developed to refine SECTORIA outputs.[1]

3.2.1. Input Data

First, the output of SECTORIA needs to be analysed, as it will be the input data of the new algorithm. SECTORIA provides with a csv file containing the set of solutions. Each row represents a one-hour interval with its optimal solutions ranked by their cost. For each solution, there is a column of the proposed configuration, a second column with its cost and a final column indicating the percentage of HEC capacity used or whether the capacity constraint has been deactivated. Fig. 3.1 depicts an example of a two-solution output of SECTORIA.



0340_0440	LECMBDP+LECMSAI	88,32	100,00%	LECMBLI+LECMDPI+LECMSAI	152,34	100,00%
0400_0500	LECMBLI+LECMDPI+LECMSAI	136,46	100,00%	LECMBLL+LECMBLU+LECMDPI+LECMSAI	240,74	100,00%
0420_0520	LECMBLI+LECMDGI+LECMPAI+LECMSAI	224,58	100,00%	LECMBLI+LECMDGI+LECMPAL+LECMPAU+LECMSAI	305,76	100,00%
0440_0540	LECMBLI+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAI	417,96	100,00%	LECMBLL+LECMBLU+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAI	500,64	100,00%
0500_0600	LECMASI+LECMBLI+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	336,5	100,00%	LECMASI+LECMBLL+LECMBLU+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	411,02	100,00%
0520_0620	LECMASL+LECMASU+LECMBLL+LECMBLU+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	350,04	100,00%	LECMASI+LECMBLI+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	259,12	110,00%
0540_0640	LECMASL+LECMASU+LECMBLL+LECMBLU+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	278,52	100,00%	LECMASL+LECMASU+LECMBLI+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	248,54	120,00%
0600_0700	LECMASL+LECMASU+LECMBLL+LECMBLU+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	320,58	100,00%	LECMASI+LECMBLL+LECMBLU+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	339,78	120,00%
0620_0720	LECMASL+LECMASU+LECMBLL+LECMBLU+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	313,04	110,00%	LECMASL+LECMASU+LECMBLL+LECMBLU+LECMDGI+LECMPAL+LECMPAU+LECMSAN	144,32	deactivated
0640_0740	LECMASL+LECMASU+LECMBLL+LECMBLU+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	282,74	100,00%	LECMASL+LECMASU+LECMBLI+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	351,8	120,00%
0700_0800	LECMASL+LECMASU+LECMBLI+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	268,6	120,00%	LECMASL+LECMASU+LECMBLL+LECMBLU+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	278,54	120,00%
0720_0820	LECMASI+LECMBLI+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	232,02	100,00%	LECMASI+LECMBLL+LECMBLU+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	292,78	100,00%
0740_0840	LECMASI+LECMBLI+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	242,6	100,00%	LECMASI+LECMBLL+LECMBLU+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	301,08	100,00%
0800_0900	LECMASI+LECMBLI+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	209,42	100,00%	LECMASI+LECMBLL+LECMBLU+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	256,76	100,00%
0820_0920	LECMASI+LECMBLI+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	162,8	100,00%	LECMASI+LECMBLL+LECMBLU+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	209,72	100,00%
0840_0940	LECMASI+LECMBLL+LECMBLU+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	195,56	110,00%	LECMASI+LECMBLI+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	199,26	110,00%
0900_1000	LECMASI+LECMBLL+LECMBLU+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	238,98	100,00%	LECMASL+LECMASU+LECMBLL+LECMBLU+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	294,66	100,00%
0920_1020	LECMASI+LECMBLL+LECMBLU+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	217,54	110,00%	LECMASL+LECMASU+LECMBLL+LECMBLU+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	267,04	110,00%
0940_1040	LECMASI+LECMBLL+LECMBLU+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	190,56	120,00%	LECMASL+LECMASU+LECMBLL+LECMBLU+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	236,88	120,00%

Fig. 3.1: Usual output of SECTORIA for Madrid Ruta1, including the capacity feature added in the previous section.

The aim of the post processing tool is to take this output csv file and obtain the scheme of configurations along the day. For that, the user enters two more inputs:

- Window_Time: how often a configuration is selected

[1]The complete code developed for the post-processing tool is included in the following link: https://github.com/sararuano/SECTORIA_postprocess

– Minimum_NoChange_Time: the amount of time a configuration should remain unchanged

Using these inputs, the post-processing algorithm proposes one configuration from a set of optimal solutions given by SECTORIA for every window time. After some calibration, the default values of these inputs were defined at 20 minutes and 60 minutes, respectively.

3.2.2. Configuration Scheme Algorithm

For every window time, the post-processing algorithm selects all SECTORIA-proposed configurations including that time interval. Following the example SECTORIA output depicted in Fig. 3.1, when the post-process aims at selecting the configuration for the period between 08:00 and 08:20, the algorithm would set apart solutions starting before 08:20 and ending after 08:00, highlighted in Fig. 3.2 and listed in Table 3.1.

0520_0620	LECMASL+LECMASU+LECMBLL+LECMBLU+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	350	100,00%	LECMASI+LECMBLI+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	259	110,00%
0540_0640	LECMASL+LECMASU+LECMBLL+LECMBLU+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	278,5	100,00%	LECMASL+LECMASU+LECMBLI+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	249	120,00%
0600_0700	LECMASL+LECMASU+LECMBLL+LECMBLU+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	320,6	100,00%	LECMASI+LECMBLL+LECMBLU+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	340	120,00%
0620_0720	LECMASL+LECMASU+LECMBLL+LECMBLU+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	313	110,00%	LECMASL+LECMASU+LECMBLL+LECMBLU+LECMDGI+LECMPAL+LECMPAU+LECMSAN	144	deactivated
0640_0740	LECMASL+LECMASU+LECMBLL+LECMBLU+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	282,7	100,00%	LECMASL+LECMASU+LECMBLI+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	352	120,00%
0700_0800	LECMASL+LECMASU+LECMBLI+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	268,6	120,00%	LECMASL+LECMASU+LECMBLL+LECMBLU+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	279	120,00%
0720_0820	LECMASI+LECMBLI+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	232	100,00%	LECMASI+LECMBLL+LECMBLU+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	293	100,00%
0740_0840	LECMASI+LECMBLI+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	242,6	100,00%	LECMASI+LECMBLL+LECMBLU+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	301	100,00%
0800_0900	LECMASI+LECMBLI+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	209,4	100,00%	LECMASI+LECMBLL+LECMBLU+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	257	100,00%
0820_0920	LECMASI+LECMBLI+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	162,8	100,00%	LECMASI+LECMBLL+LECMBLU+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	210	100,00%
0840_0940	LECMASI+LECMBLL+LECMBLU+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	195,6	110,00%	LECMASI+LECMBLI+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	199	110,00%
0900_1000	LECMASI+LECMBLL+LECMBLU+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	239	100,00%	LECMASL+LECMASU+LECMBLL+LECMBLU+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	295	100,00%
0910_1010	LECMASI+LECMBLL+LECMBLU+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	216,6	100,00%	LECMASL+LECMASU+LECMBLL+LECMBLU+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	266	100,00%
0920_1020	LECMASI+LECMBLL+LECMBLU+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	217,5	110,00%	LECMASL+LECMASU+LECMBLL+LECMBLU+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	267	110,00%
0930_1030	LECMASI+LECMBLL+LECMBLU+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	219,5	110,00%	LECMASL+LECMASU+LECMBLL+LECMBLU+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	262	110,00%
0940_1040	LECMASI+LECMBLL+LECMBLU+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	190,6	120,00%	LECMASL+LECMASU+LECMBLL+LECMBLU+LECMDGL+LECMDGU+LECMPAL+LECMPAU+LECMSAN	237	120,00%

Fig. 3.2: Madrid Ruta1 configurations including the time interval 08:00-08:20. !!! cambiar a table que no se ve

Configuration ID	Suggested Configuration	Number Sectors
Conf1	LECMASL + LECMASU + LECMBLI + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAN	8
Conf2	LECMASI + LECMBLI + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAN	7
Conf3	LECMASL + LECMASU + LECMBLL + LECMBLU + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAN	9
Conf4	LECMASI + LECMBLL + LECMBLU + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAN	8

Table 3.1: List of selected configurations included in the time interval 08:00 - 08:20

The process of choosing a configuration from the set of SECTORIA-proposed outputs follows a set of criteria defined from subject matter experts' feedback.

3.2.3. Selection Criteria

Once all suggested configurations included in the studied time interval are selected, the following set of criteria is used to pick one configuration for that period.

3.2.3.1. Minimum Time Before Change

One of the main inconveniences in SECTORIA is its sensitivity to short-time demand peaks, sometimes leading to the proposal of too many changes in the configuration. This is because SECTORIA does not consider the optimal solutions found in previous time intervals. For that reason, the post-processing algorithm takes into account the previous selected configuration when deciding the configuration for each time window.

As it was said in a previous section, the user enters how much time the selected configuration should remain unchanged as an input. Using this input, if the amount of time since the previous change in configuration is smaller than the input minimum time before change, the algorithm should pick the configuration selected in the previous time window. However, this criterion is only considered in case this previous configuration is amongst the SECTORIA-proposed configurations for that period.

3.2.3.2. Minimum Number of Sectors

In the real-life decision-making process, the LTM usually tries to open a number of sectors as small as possible. This is the reason why the post-processing tool should take into account the number of sectors of the suggested configuration.

This criterion follows the one defined in the previous section. So, if the input minimum time before a change of configuration has passed without a configuration change or the previous configuration is not part of the SECTORIA output included in that time window, then those solutions with the minimum number of sectors are considered.

3.2.3.3. Cost in Change

If a configuration change is inevitable and there is more than one proposed configuration with the minimum number of sectors, the algorithm considers how much the configuration varies from the one selected in the previous time window.

As the tool will be mainly validated in a DAC context with the sole addition of vertical cuts, the post-processing algorithm considers the change in the sector vertical cuts to quantify the cost of a configuration change. The cost function is computed as the number of horizontal sectors with a change in their vertical profile. An example of the cost functions of different configuration changes is shown in Fig. 3.2:

previous configuration → LECMASI + LECMBLI + LECMDGI + LECMPAL + LECMPAU + LECMSAN			
Configuration ID	**Suggested Configuration**	**Number Sectors**	**Cost in Change**
Conf1	LECMASI + LECMBLL + LECMBLU + LECMDGI + LECMPAL + LECMPAU + LECMSAN	7	2
Conf2	LECMASI + LECMBLI + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAN	7	2
Conf3	LECMBLL + LECMBLU + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAI	7	4

Table 3.2: From a previous configuration, the algorithm proposes three different 7-sector configurations, with an associated cost in change. In red, the sectors with a change in their vertical profile.

For each suggested configuration with the minimum number of sectors, the algorithm computes the cost of the associated change from the previous configuration and selects the one with the minimum value. In case there is a tie in cost, the algorithm selects one of them indistinctively.

3.2.4. Output

The final post-processed output provides a csv file containing the selected configuration for each time window, represented as its initial time. Table 3.3 shows an example of a post-processed output.

04:20	LECMBDP + LECMSAI
04:40	LECMBLI + LECMDPI + LECMSAI
05:00	LECMBLI + LECMDGI + LECMPAI + LECMSAI
05:20	LECMBLI + LEMCDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAI
05:40	LECMASI + LECMBLI + LECMDGI + LECMPAL + LECMPAU + LECMSAN
06:00	LECMASI + LECMBLI + LECMDGI + LECMPAL + LECMPAU + LECMSAN
06:20	LECMASI + LECMBLI + LECMDGI + LECMPAL + LECMPAU + LECMSAN
06:40	LECMASL + LECMASU + LECMBLI + LECMDGI + LECMPAL + LECMPAU + LECMSAN
07:00	LECMASL + LECMASU + LECMBLI + LECMDGI + LECMPAL + LECMPAU + LECMSAN
07:20	LECMASI + LECMBLI + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAN
07:40	LECMASI + LECMBLI + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAN
08:00	LECMASI + LECMBLI + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAN
08:20	LECMASI + LECMBLI + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAN
08:40	LECMASI + LECMBLI + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAN
09:00	LECMASI + LECMBLI + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAN
09:20	LECMASI + LECMBLI + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAN
09:40	LECMASI + LECMBLL + LECMBLU + LECMDGI + LECMPAL + LECMPAU + LECMSAN
10:00	LECMASI + LECMBLL + LECMBLU + LECMDGI + LECMPAL + LECMPAU + LECMSAN
10:20	LECMASI + LECMBLL + LECMBLU + LECMDGI + LECMPAL + LECMPAU + LECMSAN
10:40	LECMASI + LECMBLL + LECMBLU + LECMDGI + LECMPAL + LECMPAU + LECMSAN

Table 3.3: Post-processed output

The examples used in this chapter to define the post-processing tool were based on the use case of the current Madrid ACC Route 1 sectors. However, SECTORIA was designed to provide optimal configurations in a Dynamic Airspace Configuration context. For that reason, the validation of the developed post-processing tool will be carried out mostly in the DAC scenario described in the following chapter.

CHAPTER 4. VALIDATION SCENARIOS

In order to fully validate the benefits that the application of the developed post-processing tool would have in the management of a complex airspace like Madrid ACC, a particular use case to define its optimal configuration scheme needs to be determined.

Nevertheless, the current sectorization of Madrid ACC is not as flexible as it could be. Dynamic Airspace Configuration presents more sector combinations to exploit the airspace's capacity. It allows a more flexible configuration definition capable to adapt to fluctuations on air traffic demand. For that reason, the selected validation airspace scenario is Madrid ACC redesigned in a DAC context.

4.1. Airspace Redesign

Madrid ACC UIR is one Air Traffic Service Unit (ATSUs) formed by two cores: Route 1 (North) and Route 2 (South), as shown in Fig. 4.1. The configuration plan for these two airspaces nowadays is established separately. As Madrid Route 1 has more elementary sectors than Madrid Route 2 in the current sectorization –ten and nine, respectively–, it was considered to be more interesting in terms of number of possible combinations in DAC.

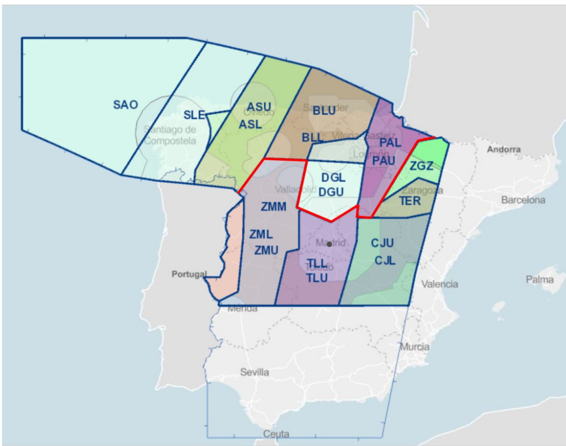


Fig. 4.1: Madrid ACC horizontal sectors. The boundary between Route 1 and Route 2 marked in red.

The DAC redesign for this validation scenario is based on the addition of vertical cuts, rather than the modification of horizontal boundaries. The reason for that is that ANSPs will implement DAC concept in the near future, by incorporating new vertical cuts to existing sectors (see [24]).

Similar to the sectorization proposed in SESAR PJ.09-W2-S44 [9], three vertical cuts were added in Madrid Route 1, obtaining three Vertical Shareable Airspace Blocks (VSAB). These cuts would substitute the single fixed cut at FL345 present in current sectorization. This new approach allows for a more equitable share of traffic between upper and lower sectors. Usually, the upper sectors in Madrid ACC are more loaded than lower sectors in terms of air traffic demand. These new cuts enable the readjust of some of this traffic from the upper to the lower sector, balancing the loads between them.

For the decision of which flight level division would be the most desirable, an analysis of the RFL distribution of the flights crossing Madrid ACC was carried out. As shown in Fig. 4.2, the percentage of flights that cross the current lower sectors is around 20% of the total number of flights, while for the upper sectors is around 80%.

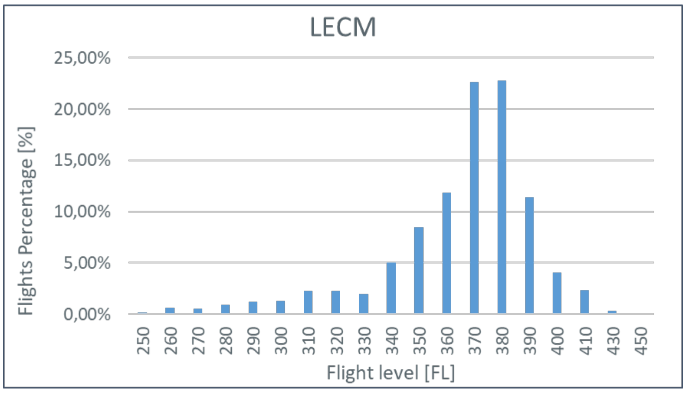


Fig. 4.2: Percentage of total number of flights per RFL.

Using this analysis, the percentage of the total number of flights for each flight level is considered and three different VSAB are proposed. The final vertical cuts are defined at FL325, FL345, FL365 and FL385, creating three 2000-feet VSAB, as defined in Fig. 4.3.

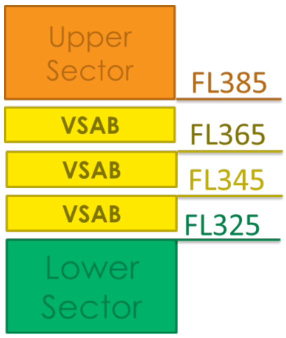


Fig. 4.3: Validation DAC scenario vertical design.

As exposed in Table 4.1, the amount of elementary sectors for the sectorization with vertical cuts –the solution sectorization– is considerably higher than the number of elementary sectors in reference sectorization. This difference leads to a greater number of combinations, hence a higher amount of potential configured sectors –and consequently configurations– that can be part of the configuration plan.

	Reference Sectorization	**DAC Sectorization**
Elementary sectors	10	27
Configured sectors	21	95

Table 4.1: Sectorization figures for Reference and DAC scenarios.

Given the change in the airspace's vertical cuts, and the fact that the number of configured sectors has increased significantly, a new nomenclature has been devised. The name of the sector is composed of three parts: ACC, horizontal sector and vertical boundaries. The first part indicates the ACC which the sector is part of. The second portion refers to the horizontal sector similarly to the current sectorization. The third part describes the vertical limits of the sector. If the sector is integrated –the vertical boundaries correspond to the En-route airspace–, it is designated with an "I". Otherwise, the last two characters designate the lower and upper boundaries, respectively:

– "L" determines that the lower boundary is at FL245

– "U" indicates that the upper boundary is at the maximum level of En-route airspace

– A number indicates the middle digit of the flight level of boundary (i.e., 6 if the boundary is at FL365) and depending on its position can indicate the lower or the upper boundary.

So, for example, the configured lower Bilbao sector that is divided at FL385 is designated as LECMBLL8.

The new configured sectors were also given capacity thresholds, both in terms of hourly entry-counts and occupancy. These values were extrapolated from the ones used in PJ09-W2-S44-EXE01. The complete list of configured sectors with their capacity values is included in Appendix C.

4.2. Use Cases

For the developed post-processing tool validation, two different use cases are defined. The first use case consists of the computation of the configuration plans for three days of traffic in the Madrid Route 1 Reference scenario –using the current sectorization. On the other hand, the second use case establishes the configuration plan for the same days of traffic in the Madrid Route 1 DAC scenario, defined in the previous section. Both use cases will be validated in two parts: real-life comparison and expert blind test.

In the first leg of the validation, results are compared with the configuration plans opened on the corresponding day of study for Madrid Route 1. Consequently, there are three scenarios. The reference scenario represents the real configuration plan set on that date with the current sectorization of Madrid Route 1. The first solution scenario is obtained from the SECTORIA post-processed results using the current sectorization of Madrid Route 1. The second solution scenario represents the configuration plan obtained by the optimizer and its post-processing tool considering the implementation of the vertical-cut DAC concept to Madrid Route 1 sectorization.

The second part of the validation consists of the comparison between the configuration plans computed both in the first and second solution scenarios and the ones provided by a Subject Matter Expert (SME). The SME is given an output from SECTORIA for 24 hours of traffic containing three possible one-hour solutions every 20 minutes. Finally, the resulting configuration plans are compared to the ones computed by the post-processing algorithm.

4.3. Traffic Scenarios

To select the days for which the optimal configuration plans are computed, a few days of 2019 are selected. The summer season is a particular period of high air traffic demand for Madrid ACC airspace. For this reason, high peaks of complexity and overloads sectors are common during June, July and August. This situation is ideal for testing the framework's ability to find an optimal solution capable of respecting all constraints and trying to balance the workload between controllers. For that reason, two days from the summer season of 2019 are selected. However, in order to contrast the high-complexity traffic of the summer season, a low-traffic day from the winter season of 2019 is also chosen.

To choose the most suitable days to optimize, occupancy (OCC) values of three AIRAC cycles are evaluated. These AIRAC cycles are 1902 (January-February 2019), 1907 (June-July 2019) and 1908 (July-August 2019). Fig. 4.4, Fig. 4.5, and Fig. 4.6 represent the peak and standard deviation OCC values of the entire Madrid Route1 ACC for each day of the AIRAC cycles analysed.

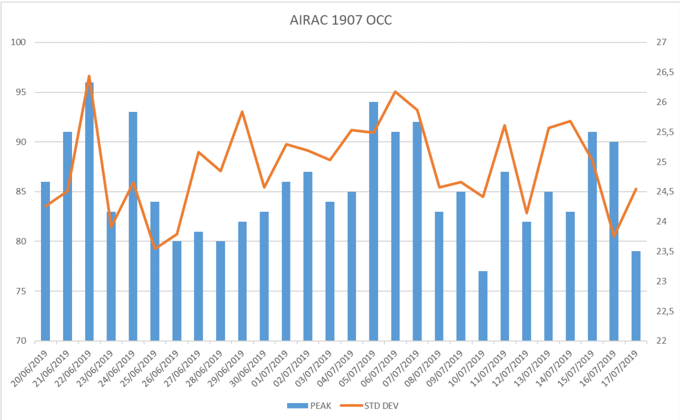


Fig. 4.4: AIRAC 1907 Madrid Route 1 OCC peak and standard deviation values.

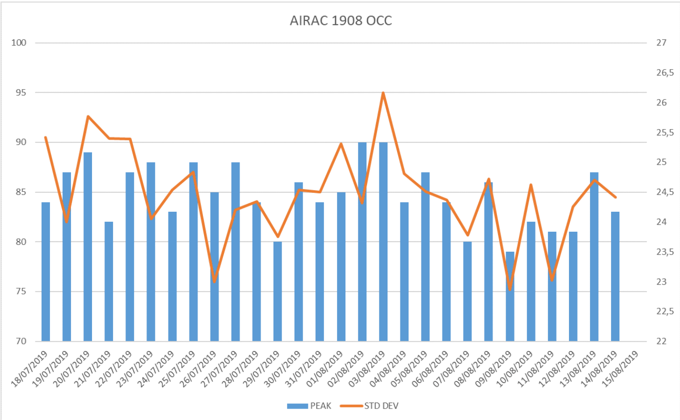


Fig. 4.5: AIRAC 1908 Madrid Route 1 OCC peak and standard deviation values.

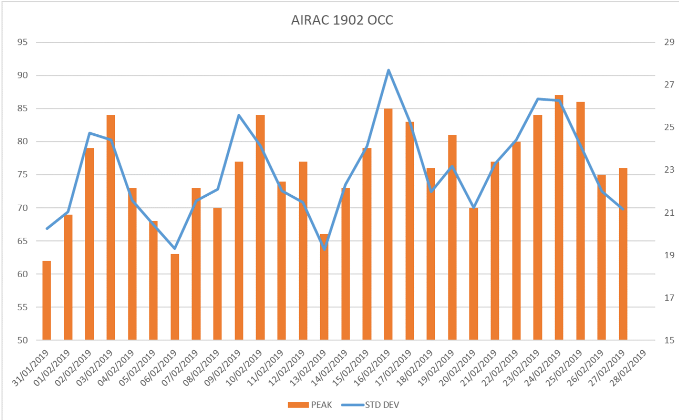


Fig. 4.6: AIRAC 1902 Madrid Route 1 OCC peak and standard deviation values.

In the case of summer 2019, the most interesting days from a complexity perspective are June 22nd and August 3rd, for their high complexity in terms of occupancy. Still, considering winter 2019, a day with a particularly low air traffic amount is February 13th 2019. These three days are the ones selected for the validation by real-life comparison. However, for the validation by expert comparison July 3rd 2019 was selected as it is a day with an average amount of traffic .

CHAPTER 5. VALIDATION RESULTS

This chapter contains the representation and analysis of the results obtained from the application of the proposed changes in the configuration optimizer SECTORIA for the use cases described in the previous chapter.

For both use cases –DAC sectorization and Reference sectorization–, the configuration plans for Madrid Route 1 in the days of study are obtained from the SECTORIA optimizer and the developed post-processing tool. The obtained configuration plans are then used to validate both the capacity constraint improvement and the post-processing tool described in chapter 3 of this project. These comparisons serve as the basis for the analysis of the results and the extraction of conclusions.

The parameters used in the framework for the optimization previous to the validation are the following:

- **Maximum number of ATCo**: this limitation is set to 10, as it is a close value to the usual number of available ATCo in Madrid Route 1 for high demand.
- **Lower occupancy threshold**: is set by default at 40% of the upper threshold.
- **Overload and Underload Areas weights**: are set by default at 0.7 and 0.3, respectively.
- **Number of solutions**: For the post-processing validation, the optimizer must provide 3 solutions for each time period, as it allows more flexibility in the configuration selection during post-processing.

5.1. Capacity Constraint Improvement Validation

The results presented in this section focus on the comparison between the configuration plans obtained from the optimizer including the capacity constraint improvement and the ones obtained from a previous version of SECTORIA. The objective is to compare the behaviour of the optimizer in a peak of demand, in which its previous version would disregard the capacity constraint, whereas the new feature would gradually increase the capacity threshold values.

The day of study for this validation is among those chosen in the previous chapter: August 3rd 2019. The validation is carried out within the reference use case, as it provides fewer possible configurations to choose and so the capacity constraint improvement can be more useful.

Both outputs –the one from the previous version of SECTORIA, and that from its current version– are included in APPENDIX A. The previous version output includes some intervals in which a non-optimal solution is found. In order to validate the effect of the capacity constraint improvement, a couple of intervals from that day will be analysed. Those intervals are 16:00 – 17:00 and 20:00 – 21:00, as they are both deemed to be infeasible by the previous version of SECTORIA.

For the first interval –from 16:00 to 17:00–, the previous version of the optimizer provides a 6-sector configuration with a particularly overloaded sector (LECMDGI), as it can be seen in Table 5.1.

Sector	HEC	HEC Threshold	%Overload
LECMASI	33	36	
LECMBLI	38	43	
LECMDGI	53	40	133%
LECMPAL	25	37	
LECMPAU	48	47	102%
LECMSAN	33	34	

Table 5.1: Hourly-Entry Counts for each configured sector in the reference configuration for 16:00 – 17:00.

Using the version of the optimizer including the capacity constraint improvement, the suggested configuration is determined with a capacity constraint of 110% the initial capacity. The resulting configured sectors are listed in Table 5.2.

Sector	HEC	HEC Threshold	%Overload
LECMASI	33	36	
LECMBLI	38	43	
LECMDGL	14	39	
LECMDGU	42	45	
LECMPAL	25	37	
LECMPAU	48	47	102%
LECMSAN	33	34	

Table 5.2: Hourly-Entry Counts for each configured sector in the solution configuration for 16:00 – 17:00.

The reference configuration is obtained without any capacity constraint, as no optimal solution was found using it. This results in the minimum-cost configuration having some overloaded sectors. The solution configuration overcomes the overload by opening one more sector in Domingo. As in the reference configuration the Domingo sector was integrated (LECMDGI) but totally overloaded, the solution divides it in an upper and a lower sector (LECMDGU and LECMDGL), removing the overload completely.

In the case of the period between 20:00 – 21:00, the sectorization found in the previous version of SECTORIA includes the sectors listed in Table 5.3.

Sector	HEC	HEC Threshold	%Overload
LECMASI	33	36	
LECMBLI	40	43	
LECMDGI	42	40	105%
LECMPAL	22	37	
LECMPAU	26	47	
LECMSAN	48	34	141%

Table 5.3: Hourly Entry-Counts for each configured sector in the reference configuration for 20:00 - 21:00

This configuration is then compared to the one obtained using the new version of SECTORIA. In this case, the capacity thresholds must be increased by 120% in order to obtain an optimal solution. The list of sectors contained in the solution configuration is shown in Table 5.4.

Sector	HEC	HEC Threshold	%Overload
LECMASU	28	38	
LECMBLI	40	43	
LECMDGI	42	40	105%
LECMPAL	22	37	
LECMPAU	26	47	
LECMSAO	40	36	111%
LECMSAS	16	34	

Table 5.4: Hourly Entry-Counts for each configured sector in the solution configuration for 20:00 - 21:00

The solution configuration suggests opening more sectors than the reference scenario. The main change is the redistribution of the Santiago – Asturias sectors, which in the reference scenario had one sector heavily overloaded (LECMSAN). The solution configuration still lets some overload on one of the Santiago sectors (LECMSAO) but operationally it is more feasible to manage.

With the removal of the capacity constraint, the optimizer tries to find configurations with a minimum cost associated, which tends to be those with fewer configured sectors. However, those configurations can include heavily overloaded sectors. The gradual increase of the capacity thresholds incorporated to the optimizer allows finding configurations with as few overloads as possible.

5.2. Post-processing Tool Validation

This section contains the validation of the developed post-processing tool for the configuration plan optimizer SECTORIA. The validation is carried out in two parts. The first one consists on the comparison between the configuration plans obtained with the post-processing tool in both use cases and the configuration plan used in the reference scenario, that is, the actual configuration plans opened in the days of study. The second part of the validation involves a blind test with an LTM/EAP role for the post-processing of SECTORIA and its later comparison with the results obtained from the developed tool.

5.2.1. Real-life Comparison

The first leg of the post-processing tool validation is based on the comparison between the configuration plans obtained for both DAC and Reference use cases and the actual configuration plan used in real-life for each of the days of study.

5.2.1.1. June 22nd 2019

For the date June 22nd 2019, the obtained configuration plan for the first solution scenario –corresponding to the use case of the current sectorization– is the one shown in Table 5.5.

Time Interval	Configuration	ID
00:00 - 04:40	LECMR1I	1A
04:40 - 05:00	LECMDPI + LECMSAB	2A
05:00 - 05:20	LECMBLI + LECMDGI + LECMPAI + LECMSAI	4A
05:20 - 05:40	LECMBLI + LEMCDGI + LECMPAL + LECMPAU + LECMSAI	5B
05:40 - 06:00	LECMBLI + LECMDGL+ LECMDGU + LECMPAL + LECMPAU + LECMSAI	6C
06:00 - 09:40	LECMASI + LECMBLI + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAN	7A
09:40 - 13:00	LECMASI + LECMBLL + LECMBLU + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAN	8A
13:00 - 16:40	LECMASL + LECMASU + LECMBLI + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAN	8B1
16:40 - 18:40	LECMASI + LECMBLI + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAN	7A
18:40 - 19:40	LECMBLI + LECMDGL+ LECMDGU + LECMPAL + LECMPAU + LECMSAI	6C
19:40 - 20:40	LECMASI + LECMBLI + LECMDGI + LECMPAL + LECMPAU + LECMSAN	6B
20:40 - 22:20	LECMASI + LECMBLI + LEMCDGI + LECMPAI + LECMSAN	5A
22:20 - 00:00	LECMDPI + LECMSAB	2A

Table 5.5: First solution scenario configuration plan obtained from the post-processing tool for June 22nd 2019

There are a total of 11 different configurations throughout the day ranging from 1 configured sector to 8 configured sectors. Even though the minimum change time was defined as 60 minutes, there are configurations lasting twenty or forty minutes. That is because the traffic demand is gradually increasing or decreasing making the previously selected configuration infeasible to that time interval in terms of HEC.

For the same day of study, the configuration plan computed by the post-processing tool for the second solution scenario –corresponding to the use case of the DAC sectorization– is the one listed in Table 5.6.

Time Interval	Configuration	ID
00:00 - 05:00	LECMR1I	1A
05:00 - 05:20	LECMDP4U+LECMDPL4+LECMSABI	3A
05:20 - 05:40	LECMDGI+LECMPAI+LECMSAB4U+LECMSABL4	4A
05:40 - 06:00	LECMBLI+LECMDG6U+LECMDGL6+LECMPA6U+LECMPAL6+LECMSAI	6A
06:00 - 06:40	LECMBLI+LECMDG6U+LECMDGL6+LECMPA4U+LECMPAL4+LECMSAS4U+LECMSASL4	7A
06:40 - 07:00	LECMASI+LECMBLI+LECMDG6U+LECMDGL6+LECMPA4U+LECMPAL4+LECMSAN	7B
07:00 - 08:00	LECMASI+LECMBD6U+LECMBLL6+LECMDGL6+LECMPA4U+LECMPAL4+LECMSAN	7C
08:00 - 08:20	LECMASI+LECMBD6U+LECMBLL6+LECMDGL6+LECMPAI+LECMSAN	6B
08:20 - 08:40	LECMASI+LECMBLI+LECMDG6U+LECMDGL6+LECMPA2U+LECMPAL2+LECMSAN	7D
08:40 - 09:00	LECMASI+LECMBLI+LECMDG6U+LECMDGL6+LECMPA4U+LECMPAL4+LECMSAN	7B
09:00 - 09:20	LECMASI+LECMBLI+LECMDG4U+LECMDGL4+LECMPA4U+LECMPAL4+LECMSAN	7E
09:20 - 12:20	LECMASI+LECMBL6U+LECMBLL6+LECMDG4U+LECMDGL4+LECMPA4U+LECMPAL4+LECMSAN	8A
12:20 - 13:00	LECMASI+LECMBDL4+LECMBL4U+LECMDG4U+LECMPA4U+LECMPAL4+LECMSAN	7F
13:00 - 15:40	LECMAS6U+LECMASL6+LECMBLI+LECMDG4U+LECMDGL4+LECMPA4U+LECMPAL4+LECMSAN	8B
15:40 - 16:00	LECMAS6U+LECMASL6+LECMBLI+LECMDG6U+LECMDGL6+LECMPA6U+LECMPAL6+LECMSAN	8C
16:00 - 16:20	LECMAS6U+LECMASL6+LECMBLI+LECMDG6U+LECMDGL6+LECMPA6U+LECMPAL6+LECMSA4U+LECMSAL4	9A
16:20 - 17:40	LECMASI+LECMBDL4+LECMBL4U+LECMDG4U+LECMPA6U+LECMPAL6+LECMSAN	7G
17:40 - 18:40	LECMASI+LECMBDPL2+LECMBL2U+LECMDG2U+LECMPA2U+LECMSAN	6C
18:40 - 19:20	LECMASI+LECMBLI+LECMDG6U+LECMDGL6+LECMPA4U+LECMPAL4+LECMSAN	7B
19:20 - 20:20	LECMASI+LECMBLI+LECMDG6U+LECMDGL6+LECMPA6U+LECMPAL6+LECMSAN	7H
20:20 - 20:40	LECMASI+LECMBL6U+LECMBLL6+LECMDG6U+LECMDGL6+LECMPA6U+LECMPAL6+LECMSAN	8D
20:40 - 21:40	LECMAS6U+LECMASL6+LECMBLI+LECMDGI+LECMPAI+LECMSA6U+LECMSAL6	7I
21:40 - 23:00	LECMBDI+LECMPAI+LECMSAS6U+LECMSASL6	4B
23:00 - 00:00	LECMBDP+LECMSAI	2A

Table 5.6: Second solution scenario configuration plan obtained from the post-processing tool for June 22nd 2019

In this case, there are a total of 24 different configurations throughout the day, spanning from 1 to 9 sectors. However, it is important to note that the sectorization for the DAC use case offers greater flexibility with more possibilities to create configurations.

The results of both use cases are then compared to the reference scenario, that is, the configuration plan used in real-life on the day of study. Table 5.7 shows this configuration plan for June 22nd 2019.

Time Interval	Configuration	ID
00:00 - 03:30	LECMR1I	1A
03:30 - 05:00	LECMBLI + LECMDGI + LECMPAI + LECMSAI	4A
05:00 - 05:30	LECMASI + LECMBLI + LEMCDGL + LECMDGU + LECMPAI + LECMSAN	6A
05:30 - 06:30	LECMASI + LECMBLI + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAN	7A
06:30 - 07:20	LECMASU + LECMBLI + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAO + LECMSAS	8B2
07:20 - 09:10	LECMASI + LECMBLI + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAN	7A
09:10 - 11:10	LECMASI + LECMBLL + LECMBLU + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAN	8A
11:10 - 11:40	LECMASI + LECMBLI + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAN	7A
11:40 - 13:00	LECMASI + LECMBLL + LECMBLU + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAN	8A
13:00 - 20:30	LECMASU + LECMBLI + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAO + LECMSAS	8B2
20:30 - 21:30	LECMASU + LECMBLL + LECMBLU + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAO + LECMSAS	9A2
21:30 - 22:30	LECMASI + LECMBDI + LECMPAI + LECMSAN	4C
22:20 - 00:00	LECMASI + LECMBDP + LECMSAN	3D

Table 5.7: Reference scenario configuration plan for June 22nd 2019

In the real day of operation, there were a total of 10 different configurations along the day –almost the same amount as the first solution scenario.

Regarding the number of configured sectors, there are considerable differences between the solution and reference scenarios. The first solution configuration plan has fewer sectors than the reference scenario for 10 hours and 20 minutes along the day, but suggests to open one more sector during 1 hour and 20 minutes. The rest of the time, the configurations proposed in the first solution scenario have the same amount of sectors as the ones used in the selected day of study. In the case of the second solution configuration plan, it suggests fewer sectors during 10.5 hours and more sectors for 1.5 hour.

All these differences on the number of suggested open sectors reflect on the amount of controlled hours, which is compared in Table 5.8.

Scenario	ATC hours/day	$\Delta\%$
Reference scenario	145.167	
First solution scenario	128.667	-11.37%
Second solution scenario	131.000	-9.76%

Table 5.8: ATC hours per scenario on June 22nd 2019.

To further compare the reference and solution scenarios, a few intervals are chosen to determine if the suggested configurations improve the situation in terms of sector occupancies. These intervals reflect both situations –increasing and decreasing the number of sectors- and are 20:30 – 21:30 and 11:10 – 11:40.

In the 20:30 – 21:30 interval, the optimizer with a post-processed output provides a solution with 6-5 sectors with the reference sectorization and 8-7 sectors in the DAC sectorization. This varies significantly from the 9-sector configuration selected in real-life for this period. Fig. 5.1, Fig. 5.2, and Fig. 5.3 represent the occupancy values for the reference scenario, the first solution scenario and the second solution scenario, respectively.

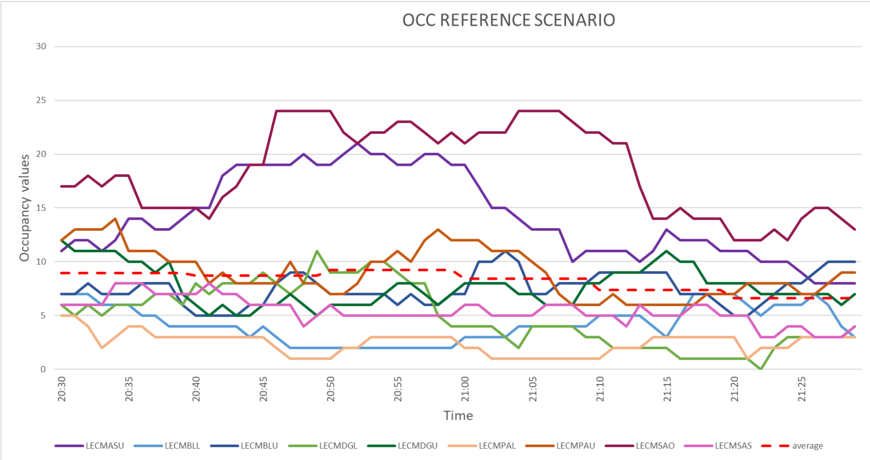


Fig. 5.1: Reference scenario configuration occupancy values (June 22nd 2019, from 20:30 to 21:30).

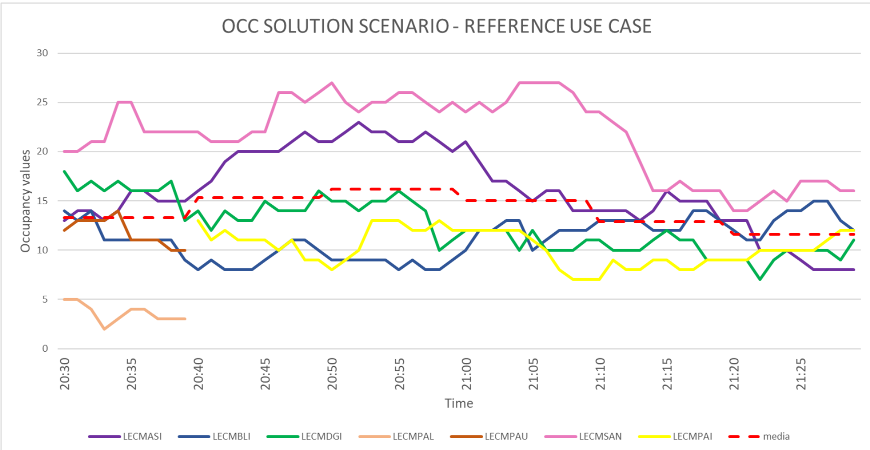


Fig. 5.2: First solution scenario configuration occupancy values (June 22nd 2019, from 20:30 to 21:30).

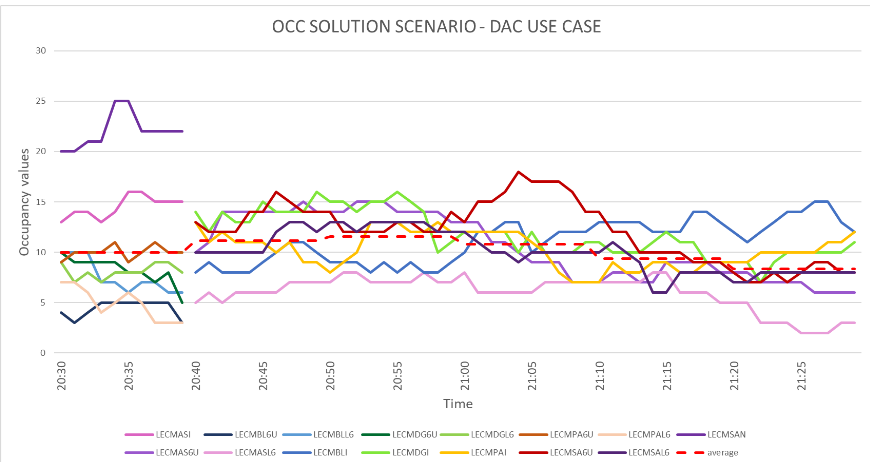


Fig. 5.3: Second solution scenario configuration occupancy values (June 22nd 2019, from 20:30 to 21:30).

Generally, the solution configurations smooth the peaks and troughs of occupancy, specially the one with a DAC configuration. The reason for this is that this interval has a particular peak in the Santiago and Asturias sectors (in the reference sectorizations, LECMSAS and LECMSAO). In the reference use case, the optimizer can only try to minimize the number of open sectors, removing the underload of many sectors. However, using the DAC sectorization, which allows the overloaded sectors to modify their vertical cuts, the occupancy peaks in the Santiago and Asturias sectors are flattened.

The second interval 11:10 – 11:40 is one of the few in which the post-processing suggests opening more sectors than the ones opened in real-life. The reference scenario decreases the number of sectors from 8 to 7, whereas the solution scenarios pretend to maintain their 8-sector configurations throughout the interval. Fig. 5.4, Fig. 5.5, and Fig. 5.6 represent the occupancy values for the reference scenario, the first solution scenario and the second solution scenario, respectively.

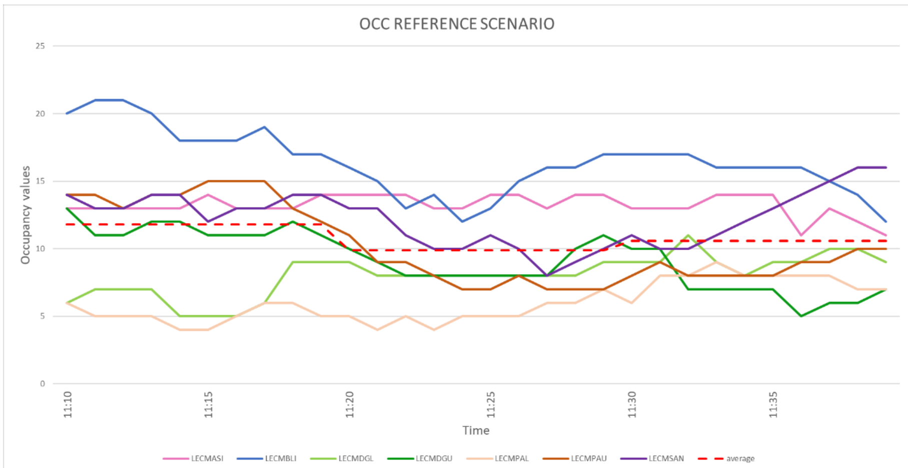


Fig. 5.4: Reference scenario configuration occupancy values (June 22nd 2019, from 11:10 to 11:40)

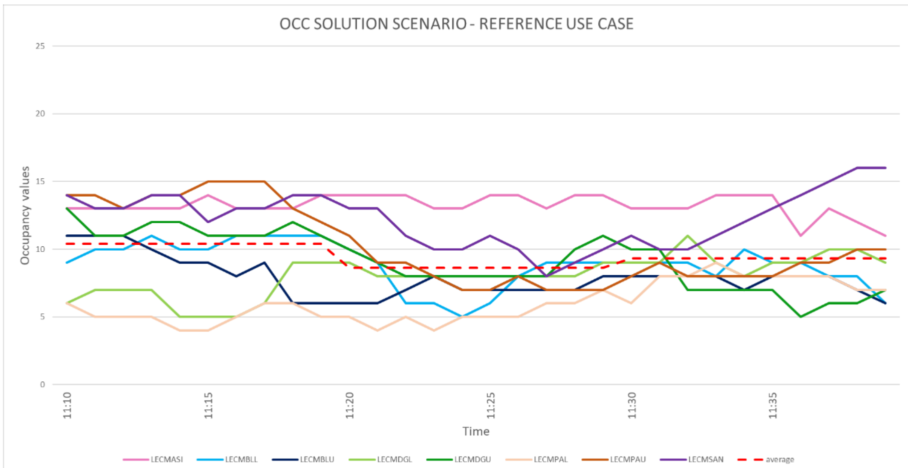


Fig. 5.5: First solution scenario configuration occupancy values (June 22nd 2019, from 11:10 to 11:40)

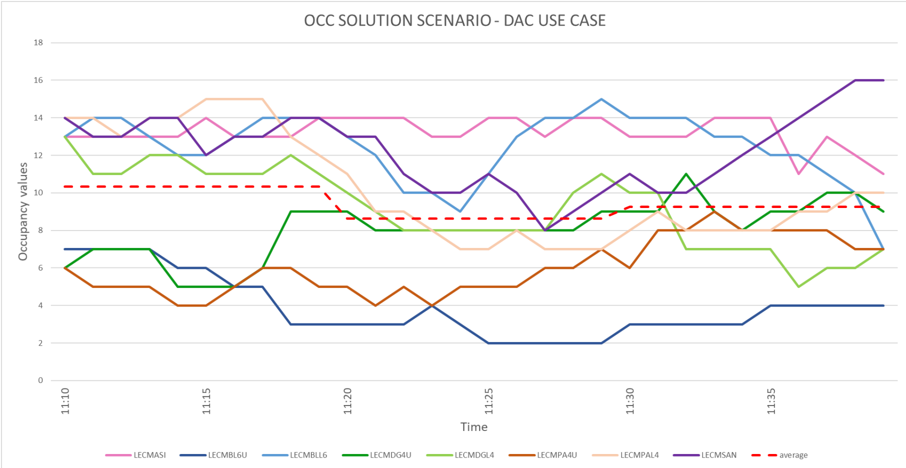


Fig. 5.6: Second solution scenario configuration occupancy values (June 22nd 2019, from 11:10 to 11:40)

In this case, the configurations in all scenarios are pretty similar. The only difference lies in the Bilbao sector. The reference configuration integrated this sector, but the occupancy values resented it, as most of the time they are over the peak occupancy threshold for this sector (the integrated Bilbao sector has a peak and sustained thresholds at 16 and 14, respectively). Both solution scenarios suggest dividing the Bilbao sector to eliminate overload. The main difference between the reference and DAC use cases is the level at which this division is made: the first solution scenario divides it as the current sectorization does, at FL345, while the second solution scenario divides Bilbao at FL365 to better accommodate the traffic demand.

5.2.1.2. August 3rd 2019

For the date August 3rd 2019, the obtained configuration plan for the first solution scenario –corresponding to the use case of the current sectorization– is shown in Table 5.9.

Time Interval	Configuration	ID
00:00 - 04:40	LECMR1I	1A
04:40 - 05:00	LECMDPI + LECMSAB	2A
05:00 - 05:20	LECMBLI + LECMDPI + LECMSAI	3B
05:20 - 05:40	LECMBLI + LEMCDGI + LECMPAI + LECMSAI	4A
05:40 - 06:00	LECMBLI + LECMDGL+ LECMDGU + LECMPAL + LECMPAU + LECMSAI	6C
06:00 - 06:40	LECMASI + LECMBLI + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAN	7A
06:40 - 07:20	LECMASI + LECMBLL + LECMBLU + LECMDGI + LECMPAL + LECMPAU + LECMSAN	7C
07:20 - 09:40	LECMASI + LECMBLI + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAN	7A
09:40 - 12:00	LECMASI + LECMBLL + LECMBLU + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAN	8A
12:00 - 14:00	LECMASI + LECMBLI + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAN	7A
14:00 - 16:00	LECMASL + LECMASU + LECMBLI + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAN	8B1
16:00 - 20:40	LECMASI + LECMBLI + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAN	7A
20:40 - 22:00	LECMASU + LECMBLI + LEMCDGI + LECMPAI + LECMSAO + LECMSAS	6F2
22:00 - 23:20	LECMBDI + LECMPAI + LECMSAI	3C
23:20 - 00:00	LECMR1I	1A

Table 5.9: First solution scenario configuration plan obtained from the post-processing tool for August 3rd 2019

For this day, 11 different configurations are proposed for its configuration plan, ranging from 1 to 8 sectors. As it was said in the previous studied day, there are some configurations which only last 20 minutes, which is the input window of time for selection in the post-processing tool.

For the same day of study, the configuration plan computed by the post-processing tool for the use case corresponding to a DAC context –the second solution scenario– is the one listed in Table 5.10.

Time Interval	Configuration	ID
00:00 - 04:40	LECMR1I	1A
04:40 - 05:00	LECMDPI+LECMSABI	2A
05:00 - 05:20	LECMBDP2U+LECMBDPL2+LECMSASI	3A
05:20 - 05:40	LECMBLI+LECMDGI+LECMPAI+LECMSASI	4A
05:40 - 06:00	LECMBDP6U+LECMBLL6+LECMDGL6+LECMPAL6+LECMSASI	5A
06:00 - 06:20	LECMBLI+LECMDG4U+LECMDGL4+LECMPA4U+LECMPAL4+LECMSAS4U+LECMSASL4	7A
06:20 - 06:40	LECMBLI+LECMDG4U+LECMDGL4+LECMPA4U+LECMPAL4+LECMSAS6U+LECMSASL6	7B
06:40 - 07:00	LECMAS4U+LECMBDL4+LECMBL4U+LECMDG4U+LECMPA4U+LECMPAL4+LECMSA4U+LECMSASL4	8A
07:00 - 08:00	LECMASI+LECMBL6U+LECMBLL6+LECMDG6U+LECMDGL6+LECMPA4U+LECMPAL4+LECMSAN	8B
08:00 - 08:40	LECMASI+LECMBD6U+LECMBLL6+LECMDGL6+LECMPA4U+LECMPAL4+LECMSAN	7C
08:40 - 09:40	LECMASI+LECMBLI+LECMDG4U+LECMDGL4+LECMPA4U+LECMPAL4+LECMSAN	7D
09:40 - 10:20	LECMASI+LECMBL6U+LECMBLL6+LECMDG4U+LECMDGL4+LECMPA4U+LECMPAL4+LECMSAN	8C
10:20 - 10:40	LECMASI+LECMBL4U+LECMBLL4+LECMDG4U+LECMDGL4+LECMPA4U+LECMPAL4+LECMSAN	8D
10:40 - 11:40	LECMAS2U+LECMBL2U+LECMDG4U+LECMDGL4+LECMPA4U+LECMPAL4+LECMSA2U+LECMSABL2	8E
11:40 - 12:40	LECMASI+LECMBL2U+LECMBLL2+LECMDG4U+LECMDGL4+LECMPA4U+LECMPAL4+LECMSAN	8F
12:40 - 13:00	LECMAS2U+LECMBL2U+LECMDG4U+LECMDGL4+LECMPA4U+LECMPAL4+LECMSA2U+LECMSABL2	8E
13:00 - 14:20	LECMAS4U+LECMBLI+LECMDG6U+LECMDGL6+LECMPA4U+LECMPAL4+LECMSA4U+LECMSASL4	8G
14:20 - 15:00	LECMAS4U+LECMBLI+LECMDG4U+LECMDGL4+LECMPA4U+LECMPAL4+LECMSA4U+LECMSASL4	8H
15:00 - 16:40	LECMAS4U+LECMBLI+LECMDG6U+LECMDGL6+LECMPA4U+LECMPAL4+LECMSA4U+LECMSASL4	8G
16:40 - 18:00	LECMASI+LECMBLI+LECMDGI+LECMPA6U+LECMPAL6+LECMSAN	6A
18:00 - 18:20	LECMASI+LECMBDPL2+LECMBL2U+LECMDG2U+LECMPA2U+LECMSAN	6B
18:20 - 19:20	LECMBLI+LECMDG6U+LECMDGL6+LECMPA6U+LECMPAL6+LECMSAS6U+LECMSASL6	7E
19:20 - 19:40	LECMBL6U+LECMBLL6+LECMDG4U+LECMDGL4+LECMPA6U+LECMPAL6+LECMSAS6U+LECMSASL6	8I
19:40 - 20:00	LECMASI+LECMBL6U+LECMBLL6+LECMDG4U+LECMDGL4+LECMPA6U+LECMPAL6+LECMSAN	8J
20:00 - 21:00	LECMASI+LECMBDL4+LECMBL4U+LECMDG4U+LECMPA6U+LECMPAL6+LECMSA6U+LECMSAL6	8K
21:00 - 22:00	LECMASI+LECMBLI+LECMDGI+LECMPAI+LECMSAN	5B
22:00 - 23:20	LECMBDI+LECMPAI+LECMSASI	3B
23:20 - 00:00	LECMBDP+LECMSASI	2B

Table 5.10: Second solution scenario configuration plan obtained from the post-processing tool for August 3rd 2019

There are 26 different proposed configurations along the day of study, ranging from 1 to 8 sectors. As in the case of the previous day of study, the variability of configurations is higher for the DAC use case than the reference use case.

The results of both use cases are then compared to the reference scenario, that is, the configuration plan used in real-life on the day of study. Table 5.11 shows this configuration plan for August 3rd 2019.

Time Interval	Configuration	ID
00:00 - 03:30	LECMR1I	1A
03:30 - 05:00	LECMBLI + LEMCDGI + LECMPAI + LECMSAI	4A
05:00 - 05:30	LECMASI + LECMBLI + LECMDGI + LECMPAL + LECMPAU + LECMSAN	6B
05:30 - 13:00	LECMASU + LECMBLL + LECMBLU + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAO + LECMSAS	9A2
13:00 - 21:30	LECMASU + LECMBLI + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAO + LECMSAS	8B2
21:30 - 22:30	LECMASI + LECMBDI + LECMPAI + LECMSAN	4C
22:30 - 00:00	LECMASI + LECMBDP + LECMSAN	3D

Table 5.11: Reference scenario configuration plan obtained from the post-processing tool for August 3rd 2019

On the date August 3rd 2019, the real configuration plan selected contained 7 different configurations, ranging from 1 to 9 sectors. It is surprising how it opened 9 sectors for 7.5 hours, while the configuration plans obtained in the solution scenarios don't open that many sectors at any time of the day.

With respect to the number of opened sectors throughout the day, the differences between reference and solution scenarios are still present. For the first solution scenario, there are 17 hours and 10 minutes in which the configuration plan proposed by the post-processing tool suggests opening fewer sectors than the ones opened in real-life, and just half an hour proposing more. The remaining 6 hours and 20 minutes have the same number of sectors between the solution and reference scenarios. In the case of the second solution scenario, the DAC sectorization proposes opening fewer sectors than the reference scenario for almost 14 hours. The remaining of the day has the same number of sectors in both scenarios –with the exception of a half an hour, in which one more sector is proposed to be opened.

The staggering differences in this day of study lead to believe that the number of controlled hours between the reference and solution scenarios will vary considerably. These differences are shown in Table 5.12.

Scenario	ATC hours/day	$\Delta\%$
Reference scenario	155.000	
First solution scenario	129.333	-16.56%
Second solution scenario	133.000	-14.19%

Table 5.12: ATC hours per scenario on August 3rd 2019.

With the objective to further analyse if the proposed configurations are better than the 9-sector configuration opened in the day of study, an interval of time from that day will be studied. The occupancy values for each scenario will be compared for this interval, which is 8:40 – 9:40.

This interval is one in which both solution scenarios propose 7-sector configurations, reducing by 2 the number of opened sectors. Fig. 5.7, Fig. 5.8, and Fig. 5.9 represent the occupancy values for the reference scenario, the first solution scenario and the second solution scenario, respectively.

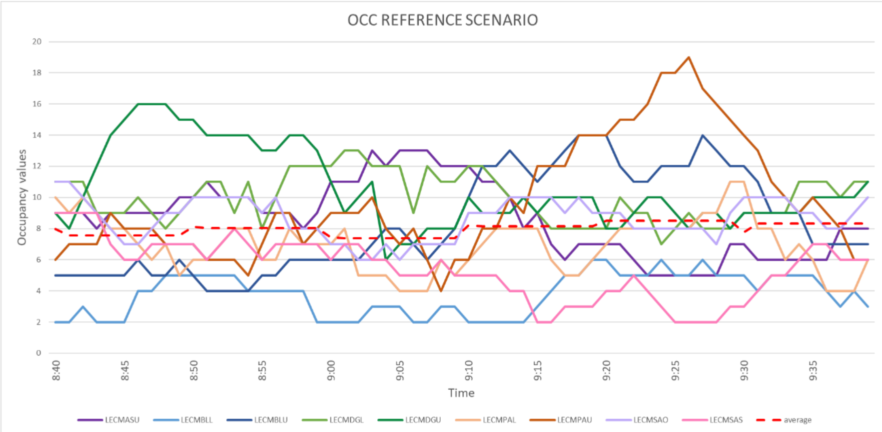


Fig. 5.7: Reference scenario configuration occupancy values (August 3rd 2019, from 08:40 to 09:40).

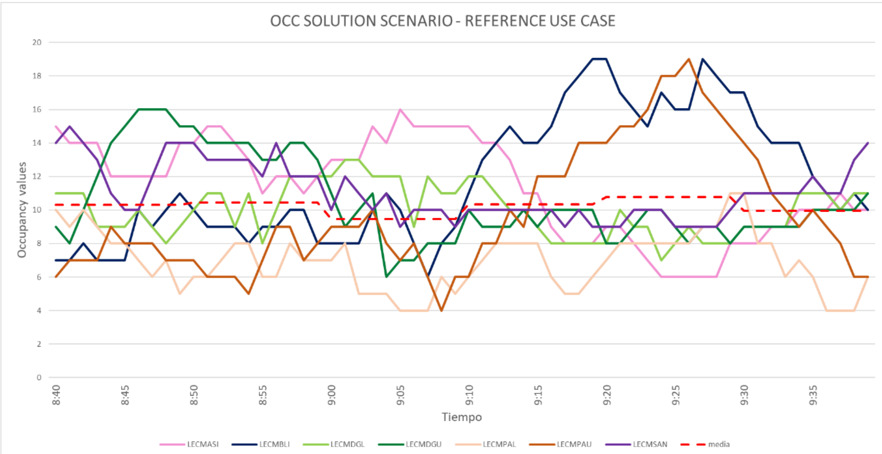


Fig. 5.8: First solution scenario configuration occupancy values (August 3rd 2019, from 08:40 to 09:40).

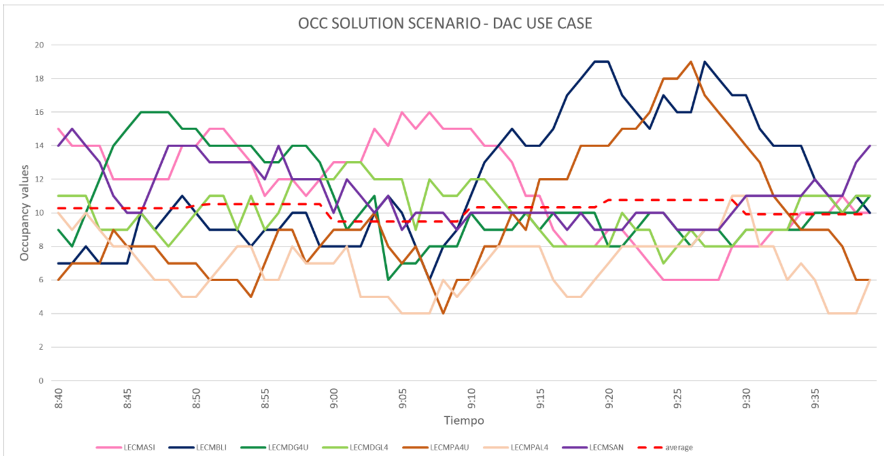


Fig. 5.9: Second solution scenario configuration occupancy values (August 3rd 2019, from 08:40 to 09:40).

Both solution scenarios suggest the same configuration for this interval. This solution configuration –compared to the reference configuration– integrates the Bilbao sector and redistributes the Asturias and Santiago sectors. In that way, the underloaded lower Bilbao sector (LECMBLL) and Santiago-Asturias sector (LECMSAS) are reconfigured in the solution configuration. In spite of that, the solution scenarios do not eliminate the occupancy peak related to the upper Pamplona sector (LECMPAU), and they include an integrated Bilbao sector (LECMBLI) with a couple of occupancy peaks. These peaks represent 126% of the occupancy threshold in the LECMPAU sector, and 135% in the case of the LECMBLI sector. However, considering that these peaks don't last too long and that the occupancy threshold values are sustained capacities, the situation is not too concerning.

5.2.1.3. February 13th 2019

For the date February 13th 2019, the obtained configuration plan for the first solution scenario –corresponding to the use case of the current sectorization– is shown in Table 5.13.

Time Interval	Configuration	ID
00:00 - 06:00	LECMR1I	1A
06:00 - 06:20	LECMDPI + LECMSAB	2A
06:20 - 06:40	LECMBLI + LECMDPI + LECMSAI	3B
06:40 - 08:20	LECMBLI + LEMCDGI + LECMPAI + LECMSAI	4A
08:20 - 11:40	LECMASI + LECMBLI + LEMCDGI + LECMPAI + LECMSAN	5A
11:40 - 12:40	LECMASI + LECMBLI + LEMCDGL + LECMDGU + LECMPAI + LECMSAN	6A
12:40 - 14:20	LECMASI + LECMBLI + LEMCDGI + LECMPAI + LECMSAN	5A
14:20 - 15:20	LECMBLI + LEMCDGI + LECMPAL + LECMPAU + LECMSAI	5B
15:20 - 15:40	LECMBLI + LECMDGL+ LECMDGU + LECMPAL + LECMPAU + LECMSAI	6C
15:40 - 19:00	LECMASI + LECMBLI + LEMCDGI + LECMPAI + LECMSAN	5A
19:00 - 19:20	LECMASI + LECMBLI + LEMCDGL + LECMDGU + LECMPAI + LECMSAN	6A
19:20 - 21:00	LECMASI + LECMBLI + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAN	7A
21:00 - 21:20	LECMBLI + LEMCDGI + LECMPAI + LECMSAI	4A
21:20 - 22:40	LECMASI + LECMBDI + LECMPAI + LECMSAN	4C
22:40 - 00:00	LECMR1I	1A

Table 5.13: First solution scenario configuration plan obtained from the post-processing tool for February 13th 2019

A total of 10 different configurations are suggested along the day, spanning from 1 to 7 sectors. The maximum amount of proposed sectors is smaller compared with the previous days of study as expected for a day with a lower traffic demand. Even so, the post-processing tool still proposes configurations for 20-minute periods, probably adapting the sectorization to peaks of traffic.

In the case of the DAC use case, Table 5.14 shows the proposed configuration plan by the post-processing tool for the date February 13th 2019.

Time Interval	Configuration	ID
00:00 - 06:00	LECMR1I	1A
06:00 - 06:20	LECMBDP+LECMSASI	2A
06:20 - 06:40	LECMBDP2U+LECMBDPL2+LECMSASI	3A
06:40 - 07:00	LECMBDL2+LECMBDP2U+LECMPAL2+LECMSASI	4A
07:00 - 07:20	LECMBD2U+LECMBDL2+LECMPAI+LECMSASI	4B
07:20 - 08:20	LECMBLI+LECMDGI+LECMPAI+LECMSASI	4C
08:20 - 09:20	LECMBD6U+LECMBDL6+LECMPAI+LECMSAS6U+LECMSASL6	5A
09:20 - 09:40	LECMASI+LECMBD6U+LECMBDL6+LECMPAI+LECMSAN	5B
09:40 - 11:40	LECMASI+LECMBLI+LECMDGI+LECMPAI+LECMSAN	5C
11:40 - 12:40	LECMASI+LECMBLI+LECMDG6U+LECMDGL6+LECMPAI+LECMSAN	6A
12:40 - 14:00	LECMASI+LECMBLI+LECMDGI+LECMPAI+LECMSAN	5C
14:00 - 14:20	LECMBLI+LECMDGI+LECMPAI+LECMSASI	4C
14:20 - 15:20	LECMBLI+LECMDGI+LECMPA4U+LECMPAL4+LECMSASI	5D
15:20 - 15:40	LECMBDP6U+LECMBLL6+LECMDGL6+LECMPAL6+LECMSASI	5E
15:40 - 16:40	LECMASI+LECMBLI+LECMDGI+LECMPAI+LECMSAN	5C
16:40 - 17:20	LECMASI+LECMBDL4+LECMBL4U+LECMDG4U+LECMPAI+LECMSAN	6B
17:20 - 19:00	LECMASI+LECMBLI+LECMDGI+LECMPAI+LECMSAN	5C
19:00 - 19:40	LECMASI+LECMBDP6U+LECMBLL6+LECMDGL6+LECMPAL6+LECMSAN	6C
19:40 - 20:20	LECMASI+LECMBLI+LECMDG6U+LECMDGL6+LECMPA2U+LECMPAL2+LECMSAN	7A
20:20 - 21:20	LECMBLI+LECMDGI+LECMPAI+LECMSASI	4C
21:20 - 22:40	LECMDGI+LECMPAI+LECMSAB4U+LECMSABL4	4D
22:40 - 00:00	LECMR1I	1A

Table 5.14: Second solution scenario configuration plan obtained from the post-processing tool for February 13th 2019

The DAC sectorization provides 16 different configurations throughout the day, following the concept of DAC flexibility mentioned in the previous days of study, and ranging from 1 to 7 sectors.

The comparison of the two solution scenarios for February 13th 2019 will be carried out with the configuration plan selected in real life for that date. This configuration plan is listed in Table 5.15.

Time Interval	Configuration	ID
00:00 - 01:00	LECMDPI + LECMSAB	2A
01:00 - 04:30	LECMR1I	1A
04:30 - 06:00	LECMBDI + LECMPAI + LECMSAI	3C
06:00 - 06:30	LECMBLI + LEMCDGI + LECMPAL + LECMPAU + LECMSAI	5B
06:30 - 21:30	LECMASI + LECMBLI + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAN	7A
21:30 - 22:30	LECMASI + LECMBLI + LEMCDGI + LECMPAI + LECMSAN	5A
22:30 - 00:00	LECMBDP + LECMSAI	2B

Table 5.15: Reference scenario configuration plan obtained from the post-processing tool for February 13th 2019

On the 13th of February 2019, 7 different configurations were operated in Madrid Route 1. The maximum number of sectors opened –7 sectors– was opened during 15 hours, while the proposed configuration plans decrease the number of sectors during some intervals within this period.

As for the number of sectors opened, the long number of hours in which the reference scenario opened 7 sectors affects significantly the difference with the solution scenarios. For the first solution scenario, the proposed configuration plan suggests opening less sectors during more than 18 hours. In the case of the second solution scenario, using the DAC sectorization, 19 hours were proposed to open fewer sectors in comparison with the reference scenario.

Considering this, the number of ATC hours is expected to differ significantly between the reference and solution scenarios. The amount of ATC hours for each scenario is shown in Table 5.16.

Scenario	ATC hours/day	$\Delta\%$
Reference scenario	125.500	
First solution scenario	90.667	-27.76%
Second solution scenario	88.333	-29.62%

Table 5.16: ATC hours per scenario on February 13th 2019.

As in the previous day of study, an interval of time is chosen to determine if the 7-sector configuration used in the reference scenario during 15 hours is justified at all times. The selected interval is 08:20 – 09:20, in which both solution configurations propose a reduction of 2 sectors with two different configurations. Fig. 5.10, Fig. 5.11, and Fig. 5.12 represent the occupancy values for the reference scenario, the first solution scenario and the second solution scenario, respectively.

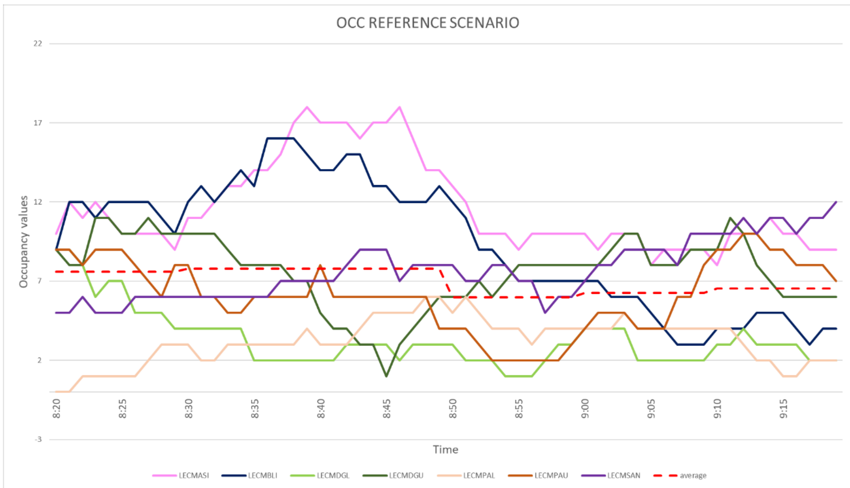


Fig. 5.10: Reference scenario configuration occupancy values (February 13th 2019, from 08:20 to 09:20).

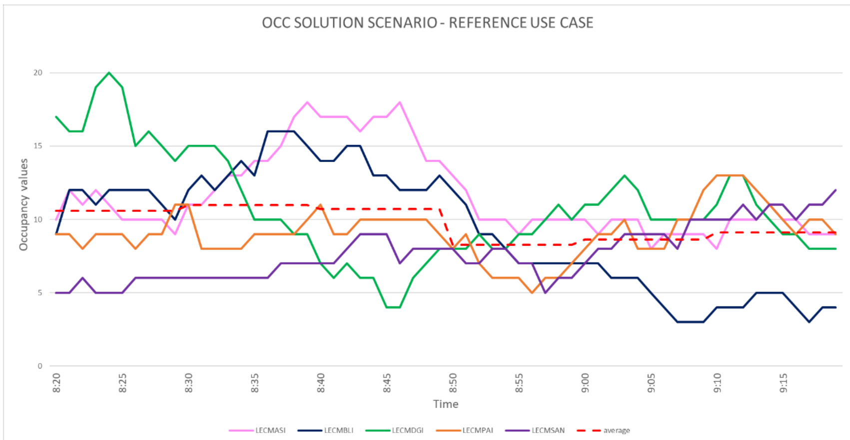


Fig. 5.11: First solution scenario configuration occupancy values (February 13th 2019, from 08:20 to 09:20).

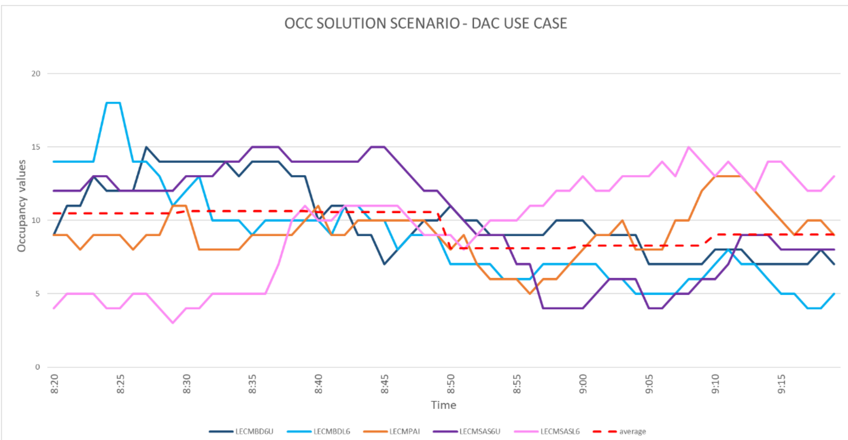


Fig. 5.12: Second solution scenario configuration occupancy values (February 13th 2019, from 08:20 to 09:20).

The reference configuration is heavily underloaded in this interval, especially in the Domingo and Pamplona sectors (LECMDGL, LECMDGU, LECMPAL, LECMPAU). For that reason, both solution scenarios suggest integrating those sectors in one way or the other. The first solution scenario integrates the two Domingo sectors forming LECMDGI and the two Pamplona sectors forming LECMPAI. The resulting configuration removes underload without generating any overload. On the other hand, the second solution scenario, within the DAC context, modifies the whole sectorization from the reference scenario so that Bilbao and Domingo sectors are integrated but divided at FL365 (LECMBD6U and LECMBDL6), Pamplona sectors are also integrated (LECMPAI) and so are the Santiago and Asturias sectors, though divided at FL365 as well. The outcome is also a well-balanced configuration, without overload or underload.

5.2.2. Expert Blind Test

After the real-life comparisons, the post-processing tool's results are further validated by comparing them with what an operational expert would do given the output from the optimizer. For that, a Subject Matter Expert (SME) has been asked to create an opening scheme for the date July 3rd 2019. The resulting opening scheme is listed in Table 5.17.

Time Interval	Configuration	ID
00:00 - 03:20	LECMR1I	1A
03:20 - 04:40	LECMBDP + LECMSAI	2B
04:40 - 05:40	LECMBLI + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAI	6C
05:40 - 07:20	LECMASL + LECMASU + LECMBLL + LECMBLU + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAN	9A1
07:20 - 09:20	LECMASI + LECMBLI + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAN	7A
09:20 - 11:40	LECMASI + LECMBLL + LECMBLU + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAN	8A
11:40 - 13:00	LECMASI + LECMBLL + LECMBLU + LECMDGI + LECMPAL + LECMPAU + LECMSAN	7C
13:00 - 13:30	LECMASI + LECMBLL + LECMBLU + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAN	8A
13:30 - 16:20	LECMASI + LECMBLI + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAN	7A
16:20 - 17:20	LECMASI + LECMBLI + LECMDGI + LECMPAL + LECMPAU + LECMSAN	6B
17:20 - 20:40	LECMASI + LECMBLL + LECMBLU + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAN	8A
20:40 - 21:00	LECMASI + LECMBLI + LECMDGI + LECMPAL + LECMPAU + LECMSAN	6B
21:00 - 21:20	LECMASI + LECMBLI + LECMDGI + LECMPAI + LECMSAN	5A
21:20 - 22:00	LECMBDI + LECMPAI + LECMSAI	3C
22:00 - 23:00	LECMBDP + LECMSAI	2B
23:00 - 00:00	LECMR1I	1A

Table 5.17: Opening scheme blind test, reference scenario, July 3rd 2019.

This opening scheme is then compared to the one obtained from the post-processing tool, using the current sectorization scenario. The results are shown in Table 5.18.

Time Interval	Configuration	ID
00:00 - 03:20	LECMR1I	1A
03:20 - 04:40	LECMBDP + LECMSAI	2B
04:40 - 05:00	LECMBLI + LECMDPI + LECMSAI	3B
05:00 - 05:20	LECMBLI + LECMDGI + LECMPAI + LECMSAI	4A
05:20 - 05:40	LECMBLI + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAI	6C
05:40 - 06:40	LECMASI + LECMBLI + LECMDGI + LECMPAL + LECMPAU + LECMSAN	6B
06:40 - 07:20	LECMASL + LECMASU + LECMBLI + LECMDGI + LECMPAL + LECMPAU + LECMSAN	7F1
07:20 - 09:40	LECMASI + LECMBLI + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAN	7A
09:40 - 12:00	LECMASI + LECMBLL + LECMBLU + LECMDGI + LECMPAL + LECMPAU + LECMSAN	7C
12:00 - 13:20	LECMASI + LECMBLI + LECMDGI + LECMPAL + LECMPAU + LECMSAN	6B
13:20 - 16:20	LECMASI + LECMBLI + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAN	7A
16:20 - 17:20	LECMASI + LECMBLI + LECMDGI + LECMPAL + LECMPAU + LECMSAN	6B
17:20 - 17:40	LECMASI + LECMBLL + LECMBLU + LECMDGI + LECMPAL + LECMPAU + LECMSAN	7C
17:40 - 18:00	LECMASI + LECMBLI + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAN	7A
18:00 - 19:20	LECMBLL + LECMBLU + LECMDGI + LECMPAL + LECMPAU + LECMSAI	6E
19:20 - 20:40	LECMASI + LECMBLI + LECMDGL + LECMDGU + LECMPAL + LECMPAU + LECMSAN	7A
20:40 - 22:00	LECMASI + LECMBLI + LECMDGI + LECMPAL + LECMPAU + LECMSAN	6B
22:00 - 23:20	LECMBDP + LECMSAI	2B
23:20 - 00:00	LECMR1I	1A

Table 5.18: Opening scheme blind test, solution scenario, July 3rd 2019.

As it had been expected, the results obtained in the post-processing tool differ from the ones obtained in the expert blind test, especially in terms of how many sectors are opened.

During the morning period, both schemes propose configuration 6C until 05:40. However, the reference scenario opens this configuration much before than what the post-processing tool suggests. The reason for this is that the solution scenario proposes 2 more 20-minute configurations, which offer a good transition from the previous 2-sector configuration (2B) to the final 6-sector configuration (6C).

Another shocking difference is the 05:40-07:20 period, in which the SME suggests a 9-sector configuration, while the developed post-processing tool only opens 6 or 7 sectors. In this case, the SME emphasized the lack of information about the sector occupancy in the output from the optimizer. For that reason, the occupancy values for the configurations selected by the post-processing tool have been analysed from Fig. 5.13 and 5.14.

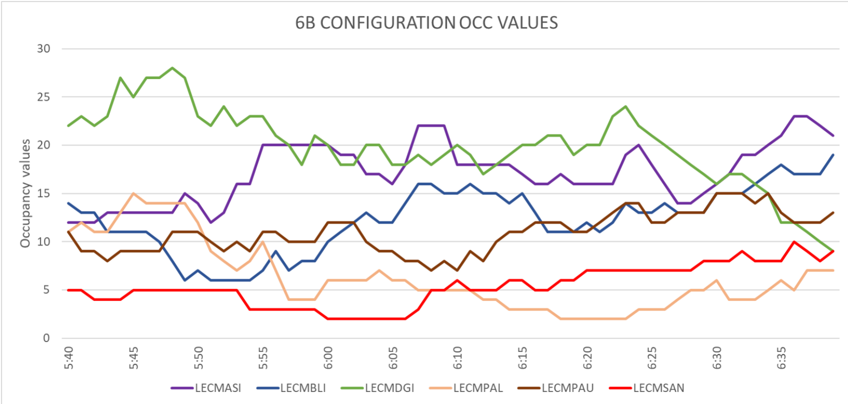


Fig. 5.13: Configuration 6B occupancy values, July 3rd 2019 (05:40 - 06:40)

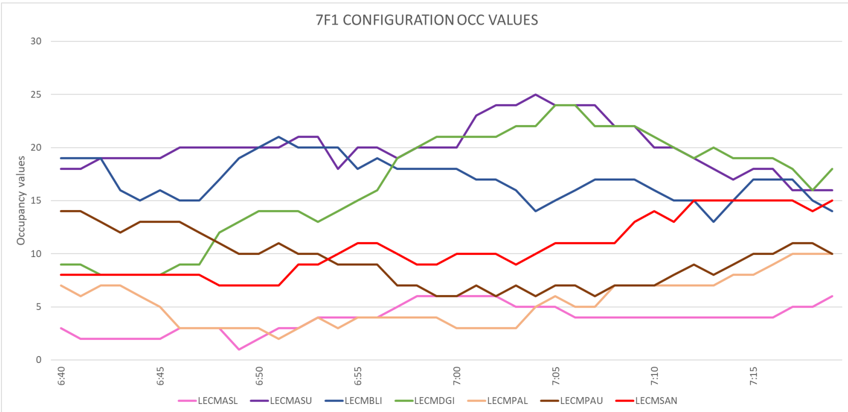


Fig. 5.14: Configuration 7F1 occupancy values, July 3rd 2019 (06:40 - 07:20)

In both configurations there are some overload peaks. In particular, a couple of small peaks in the integrated ASTURIAS sector (LECMASI) in the first period, and some more in the integrated BILBAO sector (LECMBLI). These peaks should be further analysed to determine whether they could be an issue. On the other hand, the integrated DOMINGO sector could appear to be extremely overloaded throughout both configurations, but the thresholds for this sector seem to be bigger than the others'. All occupancy thresholds are listed in APPENDIX C.

Finally, the SME mentioned that a configuration opened for only 20 minutes is perhaps not feasible, unless a transition is needed between two much different configurations. This can be seen in the 21:00-21:20 period in Table 5.17, in which configuration 5A is opened only for 20 minutes.

CONCLUSIONS AND FURTHER WORK

This project introduces several improvements to SECTORIA, an airspace allocation optimizer developed in CRIDA within the context of Dynamic Airspace Configuration. The first added feature implements the gradual increase of capacity thresholds to obtain feasible solutions in case no optimal solution is found using the input capacity threshold values. A post-processing tool is then added to refine the optimizer results and obtain a more accurate configuration plan.

To validate these improvements, two different use cases are defined in Madrid ACC Route 1: reference sectorization and DAC sectorization. Reference sectorization uses the current set of configured sectors in Madrid Route 1, whereas DAC sectorization introduces two more vertical cuts to the already defined horizontal sectors. The validations are carried out using 3 days of 2019 traffic: two summer days (high amount of traffic) and one winter day (low amount of traffic).

The validation of the capacity constraint improvement is performed comparing the results with those from a previous version of the optimizer with one containing the developed feature. The scenario used for this validation corresponds to the reference sectorization and the traffic of August 3rd 2019. For the intervals in which the previous version provided a solution without using the capacity constraint, the new results suggest more feasible configurations, that is, with the inevitable overload severely reduced. Two of these intervals (16:00 – 17:00 and 20:00 – 21:00) are analysed and results show that heavily overloaded sectors (133%/141% the HEC threshold) tend to be removed once the capacity thresholds are gradually increased.

The post-processing tool is then validated comparing both use cases to the configuration plan used in real-life operation for the three days of study. Results of both use cases show that the number of configured sectors used in real-life is usually higher than the one obtained in the solution configurations.

This difference in the number of opened sectors is reflected in the total amount of ATC hours/day. In the first day of study, June 22nd 2019, there is a decrease of 11.37% using the reference sectorization and 9.76% with the DAC sectorization. This trend is also reflected in the second day of study, August 3rd 2019, which presents a decrease in the number of ATC hours of 16.56% for the reference sectorization and 14.19% for the DAC sectorization. And finally, in the case of the day of study with a low amount of traffic, this difference is quite significant, with a decrease of 27.76% and 29.62% for the reference and DAC sectorizations, respectively. It is interesting to highlight that solutions in the DAC use case offer a slightly smaller decrease in ATCo hours, which could be a result of its flexibility in terms of allocating traffic demand. All in all, this general trend of decreasing the amount of ATC hours could very possibly translate in an improvement of cost efficiency.

Results are further analysed in terms of occupancy counts. For those intervals in which the solution configuration proposes a decrease in the number of opened sectors with respect to the real-life operation configuration, the solutions tend to also reduce the amount of overload, especially in the DAC use case. This trend is also reflected in the cases in which the solutions suggest an increase in the number of opened sectors. Therefore, the post-processing tool succeeds in proposing configuration plans that diminish overload.

The final part of the validation consists on a blind test with a Subject Matter Expert (SME), who is given an output from SECTORIA and is asked to complete a opening scheme. The resulting scheme is then compared to the one provided by the post-processing tool. One of the main conclusions drawn from this part of the validation is the need to include the amount of overload of the sectors in the optimizer output. On the other hand, the 20-minute time step used in the post-process to select a new configuration is validated as the minimum permitted in real-life operation.

One of the main drawbacks found in the developed post-processing tool is those situations where it proposes too many configuration changes, failing to deliver the minimum time a configuration must be used. This happens especially in the first peak of traffic of the day, when configurations can go from 1 sector to 8 or 9 in a matter of a couple of hours. To tackle this problem, future work will be focused in refining this output so as to provide configuration plans with feasible transitions between configurations, bringing the optimizer closer to reality. Further work will also focus on considering both peak and sustained occupancy thresholds to compute the cost of configured sectors, while relying less and less on hourly-entry counts, as will be done in real-life operation within the following months.

BIBLIOGRAPHY

[1] EUROCONTROL, "Forecast Update 2021 - 2024 European Flight Movements and Service Units" , (2021). 3

[2] Lema-Esposto, M. F., Amaro-Carmona, M. Á., Valle-Fernández, N., Iglesias-Martínez, E., Fabio-Bracero, A., "Optimal Dynamic Airspace Configuration (DAC) based on State-Task Networks (STN)". *11th SESAR Innovation Days (SIDs)*, (2021). 3, 11

[3] Bertsimas, D., Lulli, G. Odoni, A., "An integer optimization approach to large-scale air traffic flow management". *Operations Research*. **59**(1), 211–227, (2011). 5

[4] Xu, Y., Prats, X. and Delahaye, D., "Synchronization of Traffic Flow and Sector Opening for Collaborative Demand and Capacity Balancing". *IEEE/AIAA 37th Digital Avionics Systems Conference (DASC). IEEE.* , 1–10, (2018). 5

[5] Zhang Zheng, D., Puntero Parla, E. and Cidoncha Sánchez, M., "Probabilistic Complexity in support or Airspace Capacity Management Optimisation". *ATM Seminar*. (2021). 5

[6] SESAR JU, "COTTON - Capacity Optimisation in Trajectory-based Operations" , (2019). 5

[7] SESAR JU, "PJ08 Advanced Airspace Management" , (2019). 5, 7

[8] SESAR JU, "PJ09 Advanced DCB" , (2019). 5

[9] SESAR JU, "PJ09-W2-44 W2 Digital Network Management Services. Dynamic Airspace Configurations (DAC)" , (2021). 5, 8, 29

[10] SESAR JU, "PJ32 Virtual Centre" , (2021). 5

[11] SESAR, "Methodology for the Performance Planning and Master Plan Maintenance" , (2017). 6

[12] Jagare, P., Flener, P. Pearson, J., "Airspace sectorization using constraint-based local search". *Proceedings of the 10th USA/Europe Air Traffic Management Research and Development Seminar*. (2013). 9

[13] Chen, Y. Zhang, D., "Dynamic airspace configuration method based on a weighted graph model". *Chinese Journal of Aeronautics*. **27**(4), 903–912, (2013). 9

[14] Sergeeva, M., Delahaye, D., Zerrouki, L., Schede, N., "Dynamic airspace configurations generated by evolutionary algorithms". *AIAA/IEEE Digital Avionics Systems Conference – Proceedings*. 1F21–1F215, (2015). 10

[15] Sergeeva, M., Delahaye, D., Mancel, C., Vidosavljevic, A., "Dynamic airspace configuration by genetic algorithm". *Journal of Traffic and Transportation Engineering*. **4**(3), 300–314, (2017). 10

[16] Wong, C. S., Venugopalan, T. K. and Suresh, S., “A multi-objective approach for 3D airspace sectorization: A study on Singapore regional airspace”. *2016 IEEE Symposium Series on Computational Intelligence, SSCI 2016*. (2016). 10

[17] Treimuth, T., Delahaye, D. and Ngueveu, S. U., “A branch-and-piece algorithm for dynamic sector configuration”. *ICAOR 2016, 8th International Conference on Applied Operational Research*. **8**, 47–53, (2016). 10

[18] Gerdes, I., Temme, A. and Schultz, M., “Dynamic airspace sectorization for flight-centric operations”. *Transportation Research Part C: Emerging Technologies*. **95**(July), 460–480, (2018). 10

[19] Wong, C. S. Y., Suresh, S. and Sundararajan, N., “A rolling horizon optimization approach for dynamic airspace sectorization”. *IFAC Journal of Systems and Control*. **11** 100076, (2020). 10

[20] EUROCONTROL, “Improved Configuration Optimiser ICO Technical Documentation” , (2005). 10

[21] CRIDA, “SECTORIA Airspace Optimization Service Documentation” , (2022). 13

[22] Kondili, E., Pantelides, C. C. and Sargent, R. W. H., “A general algorithm for short-term scheduling of batch operations-I. MILP formulation”. *Computers and Chemical Engineering*. **17**(22), 211–227, (1993). 13, 16

[23] Forrest, J., “Coin-or Branch and Cut Solver” , (2000). 20

[24] EUROCONTROL, “European ATM Master Plan Implementation View” , (2021). 29

APPENDICES

APPENDIX A. SECTORIA OUTPUTS

Previous SECTORIA output

0000.0100	R1I	33.96	100.0%
0020.0120	R1I	26.46	100.0%
0040.0140	R1I	19.26	100.0%
0100.0200	R1I	29.46	100.0%
0120.0220	R1I	54.42	100.0%
0140.0240	R1I	87.06	100.0%
0200.0300	R1I	84.36	100.0%
0220.0320	R1I	59.46	100.0%
0240.0340	R1I	32.64	100.0%
0300.0400	R1I	21	100.0%
0320.0420	R1I	14.4	100.0%
0340.0440	R1I	5.88	100.0%
0400.0500	DPI+ SAB	55.26	100.0%
0420.0520	BDI+ PAI+ SAI	85.08	100.0%
0440.0540	BLI+ DGI+ PAI+ SAI	187.28	100.0%
0500.0600	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	399.34	100.0%
0520.0620	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	245.16	100.0%
0540.0640	ASI+ BLI+ DGI+ PAL+ PAU+ SAN	82.54	deactivated
0600.0700	ASU+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAO+ SAS	387.78	100.0%
0620.0720	ASU+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAO+ SAS	446	100.0%
0640.0740	ASU+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAO+ SAS	389.34	100.0%
0700.0800	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	301.02	100.0%
0720.0820	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	248.1	100.0%
0740.0840	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	232.06	100.0%
0800.0900	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	178.54	100.0%
0820.0920	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	147.62	100.0%
0840.0940	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	173.54	100.0%
0900.1000	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	203.3	100.0%
0920.1020	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	222.98	100.0%
0940.1040	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	197.22	100.0%
1000.1100	ASU+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAO+ SAS	218.04	100.0%
1020.1120	ASU+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAO+ SAS	223.3	100.0%
1040.1140	ASU+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAO+ SAS	265.34	100.0%
1100.1200	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	242.64	100.0%
1120.1220	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	254.02	100.0%
1140.1240	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	246.76	100.0%
1200.1300	ASU+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAO+ SAS	270.92	100.0%
1220.1320	ASU+ BLI+ DGI+ PAL+ PAU+ SAO+ SAS	150.9	deactivated
1240.1340	ASU+ BLI+ DGL+ DGU+ PAL+ PAU+ SAO+ SAS	406.46	100.0%
1300.1400	ASU+ BLI+ DGL+ DGU+ PAL+ PAU+ SAO+ SAS	365.54	100.0%
1320.1420	ASL+ ASU+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	225.62	100.0%
1340.1440	ASU+ BLI+ DGL+ DGU+ PAL+ PAU+ SAO+ SAS	191.12	100.0%
1400.1500	ASU+ BLI+ DGL+ DGU+ PAL+ PAU+ SAO+ SAS	199.64	100.0%
1420.1520	ASU+ BLI+ DGL+ DGU+ PAL+ PAU+ SAO+ SAS	260.12	100.0%
1440.1540	ASU+ BLI+ DGL+ DGU+ PAL+ PAU+ SAO+ SAS	299.44	100.0%
1500.1600	ASU+ BLI+ DGL+ DGU+ PAL+ PAU+ SAO+ SAS	304.54	100.0%
1520.1620	ASU+ BLI+ DGL+ DGU+ PAL+ PAU+ SAO+ SAS	229.54	100.0%
1540.1640	ASU+ BLI+ DGI+ PAL+ PAU+ SAO+ SAS	70.16	deactivated
1600.1700	ASI+ BLI+ DGI+ PAL+ PAU+ SAN	95.72	deactivated
1620.1720	ASU+ BLI+ DGL+ DGU+ PAL+ PAU+ SAO+ SAS	380.56	100.0%
1640.1740	ASI+ BLI+ DGI+ PAL+ PAU+ SAN	87.52	100.0%
1700.1800	ASI+ BLI+ DGI+ PAL+ PAU+ SAN	96.06	100.0%
1720.1820	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	348.52	100.0%
1740.1840	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	296.52	100.0%
1800.1900	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	233.36	100.0%
1820.1920	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	233.14	100.0%
1840.1940	ASI+ BLI+ DGI+ PAL+ PAU+ SAN	90.18	deactivated
1900.2000	ASI+ BLL+ BLU+ DGI+ PAL+ PAU+ SAN	144.64	deactivated
1920.2020	ASI+ BLL+ BLU+ DGI+ PAL+ PAU+ SAN	174.06	deactivated
1940.2040	ASI+ BLL+ BLU+ DGI+ PAL+ PAU+ SAN	142.52	deactivated
2000.2100	ASI+ BLI+ DGI+ PAL+ PAU+ SAN	147.18	deactivated
2020.2120	ASU+ BLI+ DGI+ PAL+ PAU+ SAO+ SAS	108.74	deactivated
2040.2140	ASU+ BLI+ DGI+ PAI+ SAO+ SAS	116.24	100.0%
2100.2200	ASI+ BLI+ DGI+ PAI+ SAN	110.6	100.0%
2120.2220	ASI+ BDI+ PAI+ SAN	14.26	100.0%
2140.2240	ASI+ BDI+ PAI+ SAN	45.48	100.0%
2200.2300	BDI+ PAI+ SAI	23.26	100.0%
2220.2320	BDP+ SAI	19.72	100.0%
2240.2340	BDP+ SAI	15.64	100.0%
2300.0000	BDP+ SAI	50.26	100.0%
2320.0020	BDP+ SAI	49.58	100.0%
2340.0040	R1I	14.04	100.0%

August 3rd 2019, current SECTORIA version output, reference sectorization

0000_0100	R1I	33.96	100.0%	DPI+SAB	123.54	100.0%	BDP+SAI	131.76	100.0%
0020_0120	R1I	26.46	100.0%	DPI+SAB	117.84	100.0%	BDP+SAI	127.44	100.0%
0040_0140	R1I	19.26	100.0%	DPI+SAB	110.64	100.0%	BDP+SAI	119.1	100.0%
0100_0200	R1I	29.46	100.0%	DPI+SAB	122.34	100.0%	BDP+SAI	129.3	100.0%
0120_0220	R1I	54.42	100.0%	DPI+SAB	146.04	100.0%	BDP+SAI	154.26	100.0%
0140_0240	R1I	87.06	100.0%	DPI+SAB	179.64	100.0%	BDP+SAI	187.86	100.0%
0200_0300	R1I	84.36	100.0%	DPI+SAB	178.14	100.0%	BDP+SAI	185.16	100.0%
0220_0320	R1I	59.46	100.0%	DPI+SAB	153.54	100.0%	BDP+SAI	160.26	100.0%
0240_0340	R1I	32.64	100.0%	DPI+SAB	123.24	100.0%	BDP+SAI	131.46	100.0%
0300_0400	R1I	21	100.0%	DPI+SAB	110.64	100.0%	BDP+SAI	118.86	100.0%
0320_0420	R1I	14.4	100.0%	DPI+SAB	97.74	100.0%	BDP+SAI	107.46	100.0%
0340_0440	R1I	5.88	100.0%	DPI+SAB	78.18	100.0%	BDP+SAI	84.78	100.0%
0400_0500	DPI+SAB	55.26	100.0%	BDP+SAI	68.94	100.0%	BDI+PAI+SAI	136.62	100.0%
0420_0520	BDI+PAI+SAI	85.08	100.0%	BLI+DPI+SAI	97.48	100.0%	BDI+PAL+PAU+SAI	167.7	100.0%
0440_0540	BLI+DGI+PAI+SAI	187.28	100.0%	BLI+DGI+PAL+PAU+SAI	254.34	100.0%	ASI+BLI+DGI+PAI+SAN	281.42	100.0%
0500_0600	BLI+DGL+DGU+PAL+PAU+SAI	341.62	100.0%	ASI+BLI+DGL+DGU+PAL+PAU+SAN	399.34	100.0%	BLL+BLU+DGL+DGU+PAL+PAU+SAI	434.56	100.0%
0520_0620	ASI+BLI+DGL+DGU+PAL+PAU+SAN	245.16	100.0%	ASL+ASU+BLI+DGL+DGU+PAL+PAU+SAN	316.32	100.0%	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	319.32	100.0%
0540_0640	ASI+BLI+DGL+DGU+PAL+PAU+SAN	233.62	120.0%	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	283.48	120.0%	ASL+ASU+BLI+DGL+DGU+PAL+PAU+SAN	285.94	120.0%
0600_0700	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	387.78	100.0%	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	347.56	110.0%	ASU+BLI+DGI+PAL+PAU+SAO+SAS	149.92	120.0%
0620_0720	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	446	100.0%	ASU+BLL+BLU+DGI+PAL+PAU+SAO+SAS	221.9	110.0%	ASI+BLL+BLU+DGI+PAL+PAU+SAN	225.16	110.0%
0640_0740	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	389.34	100.0%	ASL+ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAN	423.46	100.0%	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	384.06	110.0%
0700_0800	ASI+BLI+DGL+DGU+PAL+PAU+SAN	301.02	100.0%	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	306.04	100.0%	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	360.72	100.0%
0720_0820	ASI+BLI+DGL+DGU+PAL+PAU+SAN	248.1	100.0%	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	300.66	100.0%	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	317.16	100.0%
0740_0840	ASI+BLI+DGL+DGU+PAL+PAU+SAN	232.06	100.0%	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	291.4	100.0%	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	294.48	100.0%
0800_0900	ASI+BLI+DGL+DGU+PAL+PAU+SAN	178.54	100.0%	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	218.52	100.0%	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	234.28	100.0%
0820_0920	ASI+BLI+DGL+DGU+PAL+PAU+SAN	147.62	100.0%	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	173.92	100.0%	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	200.62	100.0%
0840_0940	ASI+BLI+DGL+DGU+PAL+PAU+SAN	173.54	100.0%	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	179.18	100.0%	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	216.02	100.0%
0900_1000	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	203.3	100.0%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	252.8	100.0%	ASL+ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAN	276.08	100.0%
0920_1020	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	222.98	100.0%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	267.86	100.0%	ASL+ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAN	298.34	100.0%
0940_1040	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	197.22	100.0%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	220.14	100.0%	ASL+ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAN	249.48	100.0%
1000_1100	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	218.04	100.0%	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	185.04	110.0%	ASL+ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAN	244.98	110.0%
1020_1120	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	223.3	100.0%	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	181.28	110.0%	ASL+ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAN	240.74	110.0%
1040_1140	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	265.34	100.0%	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	203.64	110.0%	ASL+ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAN	286.56	110.0%
1100_1200	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	242.64	100.0%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	303.46	100.0%	ASL+ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAN	328.14	100.0%
1120_1220	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	254.02	100.0%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	307.12	100.0%	ASL+ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAN	339.94	100.0%
1140_1240	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	246.76	100.0%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	293.5	100.0%	ASL+ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAN	328.72	100.0%
1200_1300	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	270.92	100.0%	ASL+ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAN	302.78	100.0%	ASI+BLI+DGL+DGU+PAL+PAU+SAN	213.9	120.0%
1220_1320	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	332.1	110.0%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	369.92	110.0%	ASI+BLI+DGL+DGU+PAL+PAU+SAN	342.54	120.0%
1240_1340	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	406.46	100.0%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	458.4	100.0%	ASL+ASU+BLI+DGL+DGU+PAL+PAU+SAN	416.52	110.0%
1300_1400	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	365.54	100.0%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	426.84	100.0%	ASI+BLI+DGL+DGU+PAL+PAU+SAN	344.88	110.0%
1320_1420	ASL+ASU+BLI+DGL+DGU+PAL+PAU+SAN	225.62	100.0%	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	229.74	100.0%	ASL+ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAN	304.58	100.0%
1340_1440	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	191.12	100.0%	ASL+ASU+BLI+DGL+DGU+PAL+PAU+SAN	195.98	100.0%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	272.66	100.0%
1400_1500	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	199.64	100.0%	ASL+ASU+BLI+DGL+DGU+PAL+PAU+SAN	209.42	100.0%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	277.4	100.0%
1420_1520	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	260.12	100.0%	ASL+ASU+BLI+DGL+DGU+PAL+PAU+SAN	283.22	100.0%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	343.94	100.0%
1440_1540	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	299.44	100.0%	ASL+ASU+BLI+DGL+DGU+PAL+PAU+SAN	337.52	100.0%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	388.24	100.0%
1500_1600	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	304.54	100.0%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	394.36	100.0%	ASI+BLI+DGL+DGU+PAL+PAU+SAN	295	110.0%
1520_1620	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	229.54	100.0%	ASL+ASU+BLI+DGL+DGU+PAL+PAU+SAN	260.74	100.0%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	313.9	100.0%
1540_1640	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	242	120.0%	ASI+BLI+DGL+DGU+PAL+PAU+SAN	258.78	120.0%	ASL+ASU+BLI+DGL+DGU+PAL+PAU+SAN	272.6	120.0%
1600_1700	ASI+BLI+DGL+DGU+PAL+PAU+SAN	276.08	110.0%	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	287.8	110.0%	ASL+ASU+BLI+DGL+DGU+PAL+PAU+SAN	319.3	110.0%
1620_1720	ASI+BLI+DGL+DGU+PAL+PAU+SAN	332.6	100.0%	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	380.56	100.0%	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	388.58	100.0%
1640_1740	ASI+BLI+DGI+PAL+PAU+SAN	87.52	100.0%	ASI+BLL+BLU+DGI+PAL+PAU+SAN	153.4	100.0%	ASU+BLI+DGI+PAL+PAU+SAO+SAS	155.08	100.0%
1700_1800	ASI+BLI+DGI+PAL+PAU+SAN	96.06	100.0%	ASU+BLI+DGI+PAL+PAU+SAO+SAS	158.88	100.0%	ASI+BLL+BLU+DGI+PAL+PAU+SAN	160.68	100.0%
1720_1820	ASI+BLI+DGL+DGU+PAL+PAU+SAN	348.52	100.0%	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	375.42	100.0%	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	410.44	100.0%

1740_1840	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	296.52	100.0%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	364.14	100.0%	ASL+ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAN	374.28	100.0%
1800_1900	ASI+BLI+DGL+DGU+PAL+PAU+SAN	233.36	100.0%	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	242.04	100.0%	ASL+ASU+BLI+DGL+DGU+PAL+PAU+SAN	312.92	100.0%
1820_1920	ASI+BLI+DGL+DGU+PAL+PAU+SAN	203.3	100.0%	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	233.14	100.0%	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	271.94	100.0%
1840_1940	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	268.9	110.0%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	329.38	110.0%	ASL+ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAN	345.28	110.0%
1900_2000	ASI+BLL+BLU+DGI+PAL+PAU+SAN	144.64	deactivated	ASU+BLL+BLU+DGI+PAL+PAU+SAO+SAS	197.58	deactivated	ASL+ASU+BLL+BLU+DGI+PAL+PAU+SAN	214.72	deactivated
1920_2020	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	361.68	110.0%	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	309.18	120.0%	ASL+ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAN	385.44	120.0%
1940_2040	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	378.74	120.0%	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	438.72	120.0%	ASI+BLL+BLU+DGI+PAL+PAU+SAN	142.52	deactivated
2000_2100	ASU+BLI+DGI+PAL+PAU+SAO+SAS	151.96	120.0%	ASU+BLL+BLU+DGI+PAL+PAU+SAO+SAS	173.64	120.0%	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	369.46	120.0%
2020_2120	ASU+BLI+DGI+PAL+PAU+SAO+SAS	108.74	110.0%	ASU+BLL+BLU+DGI+PAL+PAU+SAO+SAS	122.88	110.0%	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	336.44	110.0%
2040_2140	ASU+BLI+DGI+PAI+SAO+SAS	116.24	100.0%	ASU+BLL+BLU+DGI+PAI+SAO+SAS	148.68	100.0%	ASU+BLI+DGI+PAL+PAU+SAO+SAS	156.62	100.0%
2100_2200	ASI+BLI+DGI+PAI+SAN	110.6	100.0%	ASU+BLI+DGI+PAI+SAO+SAS	153.94	100.0%	ASI+BLI+DGI+PAL+PAU+SAN	172.4	100.0%
2120_2220	ASI+BDI+PAI+SAN	14.26	100.0%	ASI+BDI+PAL+PAU+SAN	85.66	100.0%	ASU+BDI+PAI+SAO+SAS	92.74	100.0%
2140_2240	ASI+BDI+PAI+SAN	45.48	100.0%	BDI+PAI+SAI	69.2	100.0%	ASI+BDI+PAL+PAU+SAN	111.9	100.0%
2200_2300	BDI+PAI+SAI	23.26	100.0%	BLI+DPI+SAI	27.12	100.0%	ASI+BDI+PAI+SAN	93.42	100.0%
2220_2320	BDP+SAI	19.72	100.0%	BLI+DPI+SAI	34.72	100.0%	BDI+PAI+SAI	53.74	100.0%
2240_2340	BDP+SAI	15.64	100.0%	BLI+DPI+SAI	50.8	100.0%	ASI+BDP+SAN	81.54	100.0%
2300_0000	BDP+SAI	50.26	100.0%	BLI+DPI+SAI	104.44	100.0%	ASI+BDP+SAN	123.78	100.0%
2320_0020	BDP+SAI	49.58	100.0%	R1I	76.34	100.0%	DPI+SAB	93.26	100.0%
2340_0040	R1I	14.04	100.0%	DPI+SAB	45.96	100.0%	BDP+SAI	46.08	100.0%

August 3rd 2019, current SECTORIA version output, DAC sectorization

0000_0100	R1I	33.96	100.0%	DPI+SABI	63.06	100.0%	DP2U+DP4U+DPL2+DPL4+SABI	140.16	100.0%
0020_0120	R1I	26.46	100.0%	DPI+SABI	57.36	100.0%	DP6U+DPL6+SABI	90.6	100.0%
0040_0140	R1I	19.26	100.0%	DPI+SABI	52.26	100.0%	DP6U+DPL6+SABI	83.76	100.0%
0100_0200	R1I	29.46	100.0%	DPI+SABI	65.46	100.0%	DP6U+DPL6+SABI	95.46	100.0%
0120_0220	R1I	54.42	100.0%	DPI+SABI	89.16	100.0%	DP6U+DPL6+SABI	119.16	100.0%
0140_0240	R1I	87.06	100.0%	DPI+SABI	119.46	100.0%	DP6U+DPL6+SABI	151.26	100.0%
0200_0300	R1I	84.36	100.0%	DPI+SABI	117.66	100.0%	DP6U+DPL6+SABI	149.76	100.0%
0220_0320	R1I	59.16	100.0%	DPI+SABI	94.86	100.0%	DP6U+DPL6+SABI	124.86	100.0%
0240_0340	R1I	32.34	100.0%	DPI+SABI	69.36	100.0%	DP2U+DPL2+SABI	96.06	100.0%
0300_0400	R1I	20.7	100.0%	DPI+SABI	57.96	100.0%	DP2U+DPL2+SABI	84.18	100.0%
0320_0420	R1I	14.4	100.0%	DPI+SABI	42.66	100.0%	DP2U+DPL2+SABI	72.42	100.0%
0340_0440	R1I	5.88	100.0%	DPI+SABI	32.4	100.0%	DP2U+DPL2+SABI	56.04	100.0%
0400_0500	DP4U+DPL4+SABI	49.36	100.0%	DPI+SABI	56.56	100.0%	DP2U+DPL2+SABI	57.2	100.0%
0420_0520	BDI+PAI+SASI	81.24	100.0%	BDP2U+BDPL2+SASI	99.66	100.0%	BDP4U+BDPL4+SASI	100.62	100.0%
0440_0540	BLI+DGI+PAI+SASI	86.04	100.0%	DGI+PAI+SAB2U+SABL2	90.12	100.0%	BLI+DGL6+DP6U+PAL6+SASI	105.38	100.0%
0500_0600	BDP6U+BLL6+DGL6+PAL6+SASI	107.42	100.0%	BLI+DG4U+DGL4+PA4U+PAL4+SASI	134.6	100.0%	BDP6U+BLL6+DGL6+PAL6+SAS4U+SASL4	142.28	100.0%
0520_0620	BLI+DG4U+DGL4+PA4U+PAL4+SAS4U+SASL4	89.12	100.0%	BLI+DG4U+DGL4+PA4U+PAL4+SAS6U+SASL6	93.18	100.0%	BLL6+DG4U+DGL4+PA4U+PAL4+SAB6U+SASL6	99.06	100.0%
0540_0640	ASI+BLI+DG4U+DGL4+PA4U+PAL4+SAN	84.06	120.0%	BLI+DG4U+DGL4+PA4U+PAL4+SAS6U+SASL6	87.28	120.0%	ASI+BLI+DG6U+DGL6+PA4U+PAL4+SAN	103.74	120.0%
0600_0700	AS4U+BD6U+BLL6+DGL6+PA4U+PAL4+SA4U+SASL4	87.46	110.00%	AS4U+BD6U+BLL6+DGL6+PA6U+PAL6+SA4U+SASL4	90	110.00%	AS4U+BDL4+BL4U+DG4U+PA4U+PAL4+SA4U+SASL4	95.38	110.00%
0620_0720	AS4U+BL6U+BLL6+DG6U+DGL6+PA6U+PAL6+SA4U+SASL4	70.4	100.0%	AS4U+BL6U+BLL6+DG4U+DGL4+PA6U+PAL6+SA4U+SASL4	76.76	100.0%	AS6U+ASL6+BL6U+BLL6+DG6U+DGL6+PA6U+PAL6+SA6U+SAL6	79.32	100.0%
0640_0740	AS4U+BL6U+BLL6+DG6U+DGL6+PA6U+PAL6+SA4U+SASL4	50.6	100.0%	AS4U+BL6U+BLL6+DG4U+DGL4+PA6U+PAL6+SA4U+SASL4	58.46	100.0%	AS4U+BL4U+BLL4+DG6U+DGL6+PA6U+PAL6+SA4U+SASL4	61.22	100.0%
0700_0800	AS6U+BL6U+BLL6+DG6U+DGL6+PA4U+PAL4+SA6U+SASL6	61.14	100.0%	ASI+BL6U+BLL6+DG6U+DGL6+PA4U+PAL4+SAN	62.74	100.0%	AS6U+BL6U+BLL6+DG6U+DGL6+PA6U+PAL6+SA6U+SASL6	63.54	100.0%
0720_0820	ASI+BD6U+BLL6+DGL6+PA4U+PAL4+SAN	31.8	100.0%	BD6U+BLL6+DGL6+PA4U+PAL4+SAS6U+SASL6	32.22	100.0%	ASI+BLI+DG6U+DGL6+PA4U+PAL4+SAN	33.3	100.0%
0740_0840	ASI+BLI+DG6U+DGL6+PA4U+PAL4+SAN	46.32	100.0%	ASI+BD6U+BLL6+DGL6+PA4U+PAL4+SAN	47.64	100.0%	ASI+BLI+DG4U+DGL4+PA4U+PAL4+SAN	49.46	100.0%
0800_0900	ASI+BLI+DG4U+DGL4+PA4U+PAL4+SAN	26.3	100.0%	BLI+DG4U+DGL4+PA4U+PAL4+SAS4U+SASL4	31.16	100.0%	ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SAL6+SAS6U	38.08	100.0%
0820_0920	ASI+BLI+DG4U+DGL4+PA4U+PAL4+SAN	16.38	100.0%	BLI+DG4U+DGL4+PA4U+PAL4+SAS4U+SASL4	27.44	100.0%	AS4U+BLI+DG4U+DGL4+PA4U+PAL4+SA4U+SASL4	40.4	100.0%
0840_0940	ASI+BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAN	40.7	110.00%	ASI+BLI+DG4U+DGL4+PA4U+PAL4+SAN	46.64	110.00%	ASI+BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAN	52.28	110.00%
0900_1000	ASI+BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAN	37.12	100.0%	BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAS6U+SASL6	40.42	100.0%	ASI+BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAN	41.54	100.0%
0920_1020	ASI+BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAN	43.64	100.0%	BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAS6U+SASL6	46.94	100.0%	ASI+BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAN	47.94	100.0%

0940_1040	ASI+BL4U+BLL4+DG4U+DGL4+PA2U+PAL2+SAN	28.74	100.0%	ASI+BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAN	29.22	100.0%	AS4U+BL4U+BLL4+DG4U+DGL4+PA2U+PAL2+SA4U+SASL4	40.62	100.0%
1000_1100	AS4U+BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SA4U+SASL4	46.2	100.0%	ASI+BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SA6U+SAL6	55.08	100.0%	AS4U+BL4U+BLL4+DG6U+DGL6+PA4U+PAL4+SA4U+SASL4	55.6	100.0%
1020_1120	ASI+BL4U+BLL4+DG6U+DGL6+PA4U+PAL4+SA6U+SAL6	35.38	100.0%	AS4U+BL4U+BLL4+DG6U+DGL6+PA4U+PAL4+SA4U+SASL4	40.18	100.0%	ASI+BL6U+BLL6+DG6U+DGL6+PA4U+PAL4+SA6U+SAL6	45.36	100.0%
1040_1140	AS2U+BL2U+DG4U+DGL4+PA4U+PAL4+SA2U+SABL2	41.4	100.0%	AS2U+BL2U+DG6U+DGL6+PA4U+PAL4+SA2U+SABL2	43.22	100.0%	ASI+BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SA6U+SAL6	44.38	100.0%
1100_1200	ASI+BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAN	75.18	100.0%	AS4U+BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SA4U+SASL4	78.4	100.0%	ASI+BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SA6U+SAL6	82.48	100.0%
1120_1220	ASI+BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAN	40.36	100.0%	BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAS4U+SASL4	59.86	100.0%	ASI+BL2U+BLL2+DG4U+DGL4+PA4U+PAL4+SAN	71.74	100.0%
1140_1240	ASI+BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAN	58.78	100.0%	ASL6+BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAL6+SAS6U	78.94	100.0%	ASI+BL2U+BLL2+DG4U+DGL4+PA4U+PAL4+SAN	87.92	100.0%
1200_1300	AS2U+BL2U+DG4U+DGL4+PA4U+PAL4+SA2U+SABL2	46.46	100.0%	ASL6+BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAL6+SAS6U	68.28	100.0%	AS4U+BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SA4U+SASL4	73.36	100.0%
1220_1320	AS6U+BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SA6U+SASL6	77.36	100.0%	AS6U+ASL6+BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SA6U+SAL6	102.64	100.0%	AS6U+BL6U+BLL6+DG6U+DGL6+PA4U+PAL4+SA6U+SASL6	104.68	100.0%
1240_1340	AS6U+ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SA6U+SAL6	81.02	100.0%	AS6U+ASL6+BLI+DG6U+DGL6+PA4U+PAL4+SA6U+SAL6	97.86	100.0%	AS6U+ASL6+BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SA6U+SAL6	110.64	100.0%
1300_1400	AS6U+ASL6+BLI+DG6U+DGL6+PA4U+PAL4+SA6U+SAL6	69.54	100.0%	AS6U+ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SA6U+SAL6	78.54	100.0%	AS4U+BLI+DG6U+DGL6+PA4U+PAL4+SA4U+SASL4	110.5	100.0%
1320_1420	AS6U+ASL6+BLI+DG6U+DGL6+PA4U+PAL4+SAN	34.02	100.0%	AS4U+BLI+DG6U+DGL6+PA4U+PAL4+SA4U+SASL4	35	100.0%	AS6U+ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SAN	39.48	100.0%
1340_1440	AS6U+ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SAN	14.1	100.0%	ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SAL6+SAS6U	26.62	100.0%	AS4U+BLI+DG4U+DGL4+PA4U+PAL4+SAOI+SEASL4	28.16	100.0%
1400_1500	AS6U+ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SAN	27.54	100.0%	AS6U+ASL6+BLI+DG6U+DGL6+PA4U+PAL4+SAN	35.46	100.0%	AS4U+BLI+DG4U+DGL4+PA4U+PAL4+SA4U+SASL4	43.28	100.0%
1420_1520	AS6U+ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SAN	48.6	100.0%	AS6U+ASL6+BLI+DG6U+DGL6+PA4U+PAL4+SAN	49.92	100.0%	AS6U+ASL6+BD6U+BLL6+DGL6+PA4U+PAL4+SAN	53.64	100.0%
1440_1540	AS4U+BLI+DG6U+DGL6+PA6U+PAL6+SA4U+SASL4	49.6	100.0%	AS4U+BD6U+BLL6+DGL6+PA6U+PAL6+SA4U+SASL4	51.76	100.0%	AS6U+ASL6+BLI+DG6U+DGL6+PA6U+PAL6+SAN	53.86	100.0%
1500_1600	AS4U+BLI+DG6U+DGL6+PA6U+PAL6+SA4U+SASL4	40	100.0%	AS4U+BLI+DG6U+DGL6+PA4U+PAL4+SA4U+SASL4	50.2	100.0%	AS4U+BLI+DG4U+DGL4+PA6U+PAL6+SA4U+SASL4	58.72	100.0%
1520_1620	AS4U+BLI+DG6U+DGL6+PA4U+PAL4+SA4U+SASL4	22.18	100.0%	AS4U+BLI+DG6U+DGL6+PA6U+PAL6+SA4U+SASL4	22.9	100.0%	AS4U+BLI+DG6U+DGL6+PA4U+PAL4+SAOI+SEASL4	32.5	100.0%
1540_1640	AS4U+BLI+DG6U+DGL6+PA4U+PAL4+SA4U+SASL4	58.76	110.00%	AS6U+ASL6+BLI+DG6U+DGL6+PA4U+PAL4+SAN	61.82	110.00%	AS4U+BLI+DG6U+DGL6+PA4U+PAL4+SAOI+SEASL4	65.66	110.00%
1600_1700	ASI+BLI+DG6U+DGL6+PA6U+PAL6+SAN	46.4	110.00%	AS4U+BLI+DG6U+DGL6+PA6U+PAL6+SA4U+SASL4	47.02	110.00%	AS6U+ASL6+BLI+DG6U+DGL6+PA6U+PAL6+SAN	49.54	110.00%
1620_1720	ASI+BDL6+BL6U+DG6U+PA6U+PAL6+SAN	36.66	100.0%	AS6U+BDL6+BL6U+DG6U+PA6U+PAL6+SA6U+SASL6	43.16	100.0%	ASI+BLI+DG6U+DGL6+PA6U+PAL6+SAN	49.32	100.0%
1640_1740	ASI+BDPL2+BL2U+DG2U+PA2U+SAN	17.18	100.0%	ASI+BLI+DGI+PA6U+PAL6+SAN	17.32	100.0%	ASI+BLI+DGI+PA4U+PAL4+SAN	25.94	100.0%
1700_1800	ASI+BDPL4+BL4U+DG4U+PA4U+SAN	10.02	100.0%	ASI+BLI+DGI+PA6U+PAL6+SAN	11.82	100.0%	ASI+BLI+DGI+PA2U+PAL2+SAN	20.76	100.0%
1720_1820	ASI+BDPL2+BL2U+DG2U+PA2U+SAN	28.08	100.0%	BDPL2+BL2U+DG2U+PA2U+SAS6U+SASL6	41.06	100.0%	ASI+BDL4+BL4U+DG4U+PA6U+PAL6+SAN	65.04	100.0%
1740_1840	BL6U+BLL6+DG6U+DGL6+PA6U+PAL6+SAS6U+SASL6	76.94	100.0%	ASI+BL6U+BLL6+DG6U+DGL6+PA6U+PAL6+SAN	81.38	100.0%	BL6U+BLL6+DG6U+DGL6+PA4U+PAL4+SAS6U+SASL6	82.98	100.0%
1800_1900	BL6U+BLL6+DG6U+DGL6+PA4U+PAL4+SAS6U+SASL6	47.88	100.0%	BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAS6U+SASL6	50.04	100.0%	BL4U+DG6U+DGL6+PA4U+PAL4+SABL4+SAS4U	51.72	100.0%
1820_1920	BL6U+BLL6+DG6U+DGL6+PA6U+PAL6+SAS6U+SASL6	29.94	100.0%	BLI+DG6U+DGL6+PA6U+PAL6+SAS6U+SASL6	30.82	100.0%	BL6U+BLL6+DG4U+DGL4+PA6U+PAL6+SAS6U+SASL6	32.62	100.0%
1840_1940	BL6U+BLL6+DG4U+DGL4+PA6U+PAL6+SAS6U+SASL6	29.7	100.0%	ASI+BL6U+BLL6+DG4U+DGL4+PA6U+PAL6+SAN	35.28	100.0%	BL6U+BLL6+DG4U+DGL4+PA6U+PAL6+SAS4U+SASL4	57.6	100.0%
1900_2000	ASI+BL6U+BLL6+DG4U+DGL4+PA6U+PAL6+SAN	22.94	100.0%	AS4U+BL6U+BLL6+DG4U+DGL4+PA6U+PAL6+SA4U+SASL4	71.26	100.0%	AS6U+ASL6+BL6U+BLL6+DG4U+DGL4+PA6U+PAL6+SAN	72.74	100.0%
1920_2020	AS6U+BL6U+BLL6+DG4U+DGL4+PA6U+PAL6+SA6U+SASL6	59.22	110.00%	ASI+BL6U+BLL6+DG4U+DGL4+PA6U+PAL6+SA6U+SAL6	77.4	110.00%	AS4U+BL6U+BLL6+DG4U+DGL4+PA6U+PAL6+SA4U+SASL4	82.66	110.00%
1940_2040	AS6U+ASL6+BL6U+BLL6+DG6U+DGL6+PA6U+PAL6+SA6U+SAL6	81.8	100.0%	AS6U+ASL6+BDL4+BL4U+DG4U+PA6U+PAL6+SA6U+SAL6	84.2	100.0%	AS6U+ASL6+BL6U+BLL6+DG4U+DGL4+PA6U+PAL6+SA6U+SAL6	95.8	100.0%
2000_2100	AS4U+BDL4+BL4U+DG4U+PA6U+PAL6+SA4U+SASL4	60.76	100.0%	AS4U+BDL4+BL4U+DG4U+PA4U+PAL4+SA4U+SASL4	65.02	100.0%	ASI+BDL4+BL4U+DG4U+PA6U+PAL6+SA6U+SAL6	68.02	100.0%
2020_2120	AS4U+BDPL2+BL2U+DG2U+PA2U+SA4U+SASL4	42.24	100.0%	AS4U+BDL4+BL4U+DG4U+PA6U+PAL6+SA4U+SASL4	49.74	100.0%	AS4U+BL6U+BLL6+DGI+PA6U+PAL6+SA4U+SASL4	49.88	100.0%
2040_2140	AS4U+BLI+DGI+PAI+SA4U+SASL4	35.46	100.0%	AS4U+BL6U+BLL6+DGI+PAI+SA4U+SASL4	41.68	100.0%	AS4U+BLI+DGL8+DP8U+PAL8+SA4U+SASL4	43.82	100.0%
2100_2200	ASI+BLI+DGI+PAI+SAN	22.14	100.0%	BLI+DGI+PAI+SAS6U+SASL6	27.12	100.0%	ASI+BLI+DGL8+DP8U+PAL8+SAN	38.7	100.0%
2120_2220	ASI+BDI+PAI+SAN	14.18	100.0%	ASI+BDI+BDP6U+BDPL6+PAI+SAN+SAS6U+SASL6	55.74	100.0%	BDI+PAI+SAS6U+SASL6	16.74	100.0%
2140_2240	BDI+PAI+SAS6U+SASL6	30.48	100.0%	DGI+PAI+SAB6U+SABL6	35.4	100.0%	ASI+BDI+PAI+SAN	45	100.0%
2200_2300	BDI+PAI+SASI	22.48	100.0%	BDP6U+BDPL6+SASI	26.56	100.0%	BDP4U+BDPL4+SASI	52	100.0%
2220_2320	BDP+SASI	30.1	100.0%	BDI+PAI+SASI	53.92	100.0%	BDP6U+BDPL6+SASI	56.92	100.0%
2240_2340	BDP+SASI	15.4	100.0%	BDP+SAS4U+SASL4	33.48	100.0%	BDP+SAS6U+SASL6	35.04	100.0%
2300_0000	BDP+SASI	47.62	100.0%	DPI+SAB4U+SABL4	54	100.0%	DPI+SAB6U+SABL6	58.26	100.0%
2320_0020	BDP+SASI	46.58	100.0%	DPI+SABI	59.66	100.0%	BLI+DPI+SASI	60.5	100.0%
2340_0040	R1I	14.04	100.0%	DPI+SABI	24.36	100.0%	DP4U+DP6U+DPL4+DPL6+SABI	58.56	100.0%

June 22nd 2019, current SECTORIA version output, reference sectorization

0000_0100	R1I	67.86	100.0%	DPI+SAB	158.94	100.0%	BDP+SAI	167.16	100.0%
0020_0120	R1I	74.76	100.0%	DPI+SAB	164.34	100.0%	BDP+SAI	173.46	100.0%
0040_0140	R1I	46.26	100.0%	DPI+SAB	137.34	100.0%	BDP+SAI	145.56	100.0%
0100_0200	R1I	46.86	100.0%	DPI+SAB	139.44	100.0%	BDP+SAI	147.36	100.0%
0120_0220	R1I	53.16	100.0%	DPI+SAB	147.24	100.0%	BDP+SAI	153.96	100.0%
0140_0240	R1I	46.38	100.0%	DPI+SAB	139.74	100.0%	BDP+SAI	146.46	100.0%
0200_0300	R1I	27.78	100.0%	DPI+SAB	121.14	100.0%	BDP+SAI	126.96	100.0%

0220_0320	R1I	32.58	100.0%	DPI+SAB	122.94	100.0%	BDP+SAI	129.66	100.0%
0240_0340	R1I	57.06	100.0%	DPI+SAB	148.14	100.0%	BDP+SAI	154.86	100.0%
0300_0400	R1I	55.86	100.0%	DPI+SAB	145.74	100.0%	BDP+SAI	155.16	100.0%
0320_0420	R1I	55.26	100.0%	DPI+SAB	147.84	100.0%	BDP+SAI	156.06	100.0%
0340_0440	R1I	38.46	100.0%	DPI+SAB	129.54	100.0%	BDP+SAI	137.76	100.0%
0400_0500	DPI+SAB	100.86	100.0%	BDP+SAI	111.66	100.0%	BDI+PAI+SAI	172.62	100.0%
0420_0520	BLI+DGI+PAI+SAI	264.84	100.0%	BLI+DGI+PAL+PAU+SAI	342.48	100.0%	BLL+BLU+DGI+PAI+SAI	366.66	100.0%
0440_0540	BLI+DGI+PAL+PAU+SAI	198.9	100.0%	ASI+BLI+DGI+PAL+PAU+SAN	286.56	100.0%	BLL+BLU+DGI+PAL+PAU+SAI	297.72	100.0%
0500_0600	BLI+DGL+DGU+PAL+PAU+SAI	274.74	100.0%	ASI+BLI+DGL+DGU+PAL+PAU+SAN	337.86	100.0%	BLL+BLU+DGL+DGU+PAL+PAU+SAI	362.28	100.0%
0520_0620	ASI+BLI+DGL+DGU+PAL+PAU+SAN	220.4	110.00%	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	288.92	110.00%	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	309.02	110.00%
0540_0640	ASI+BLI+DGL+DGU+PAL+PAU+SAN	191.98	110.00%	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	242.8	110.00%	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	248.86	110.00%
0600_0700	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	290.48	100.0%	ASL+ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAN	314.14	100.0%	ASI+BLI+DGL+DGU+PAL+PAU+SAN	248.26	110.00%
0620_0720	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	295.14	100.0%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	329.9	100.0%	ASL+ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAN	339.16	100.0%
0640_0740	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	282.46	100.0%	ASL+ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAN	330.26	100.0%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	341	100.0%
0700_0800	ASI+BLI+DGL+DGU+PAL+PAU+SAN	286.32	100.0%	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	294.12	100.0%	ASL+ASU+BLI+DGL+DGU+PAL+PAU+SAN	357.18	100.0%
0720_0820	ASI+BLI+DGL+DGU+PAL+PAU+SAN	302.68	100.0%	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	350.38	100.0%	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	361.32	100.0%
0740_0840	ASI+BLI+DGL+DGU+PAL+PAU+SAN	285.84	100.0%	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	329.04	100.0%	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	337.38	100.0%
0800_0900	ASI+BLI+DGL+DGU+PAL+PAU+SAN	210.78	110.00%	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	232.26	110.00%	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	264.62	110.00%
0820_0920	ASI+BLI+DGL+DGU+PAL+PAU+SAN	148.74	110.00%	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	155.84	110.00%	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	181.96	110.00%
0840_0940	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	124.92	120.0%	ASI+BLI+DGL+DGU+PAL+PAU+SAN	139.22	120.0%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	182.82	120.0%
0900_1000	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	165.52	110.00%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	242.32	110.00%	ASL+ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAN	266.5	110.00%
0920_1020	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	210.68	100.0%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	275	100.0%	ASL+ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAN	297.92	100.0%
0940_1040	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	233.96	110.00%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	268.4	110.00%	ASL+ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAN	291.02	110.00%
1000_1100	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	230.74	100.0%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	253.42	100.0%	ASL+ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAN	276.76	100.0%
1020_1120	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	229.74	100.0%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	277.06	100.0%	ASL+ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAN	297	100.0%
1040_1140	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	215.36	100.0%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	274.8	100.0%	ASL+ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAN	287.48	100.0%
1100_1200	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	185.94	100.0%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	243.24	100.0%	ASL+ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAN	258.54	100.0%
1120_1220	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	211.62	100.0%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	264.78	100.0%	ASL+ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAN	294.18	100.0%
1140_1240	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	236.46	100.0%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	286.44	100.0%	ASL+ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAN	325.92	100.0%
1200_1300	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	262.1	100.0%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	269.76	100.0%	ASL+ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAN	305.16	100.0%
1220_1320	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	248.66	100.0%	ASL+ASU+BLI+DGL+DGU+PAL+PAU+SAN	274.64	100.0%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	280.56	100.0%
1240_1340	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	226.68	100.0%	ASL+ASU+BLI+DGL+DGU+PAL+PAU+SAN	240.66	100.0%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	282.48	100.0%
1300_1400	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	261.56	100.0%	ASL+ASU+BLI+DGL+DGU+PAL+PAU+SAN	268.52	100.0%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	310.7	100.0%
1320_1420	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	250.84	100.0%	ASL+ASU+BLI+DGL+DGU+PAL+PAU+SAN	255.58	100.0%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	303.04	100.0%
1340_1440	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	255.16	100.0%	ASL+ASU+BLI+DGL+DGU+PAL+PAU+SAN	267.4	100.0%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	304.3	100.0%
1400_1500	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	220.04	100.0%	ASL+ASU+BLI+DGL+DGU+PAL+PAU+SAN	232.46	100.0%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	268.06	100.0%
1420_1520	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	228.3	110.00%	ASL+ASU+BLI+DGL+DGU+PAL+PAU+SAN	242.04	110.00%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	271.52	110.00%
1440_1540	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	236.04	100.0%	ASL+ASU+BLI+DGL+DGU+PAL+PAU+SAN	251.7	100.0%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	298.7	100.0%
1500_1600	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	234.1	100.0%	ASL+ASU+BLI+DGL+DGU+PAL+PAU+SAN	260.32	100.0%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	310.36	100.0%
1520_1620	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	281.84	100.0%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	356.3	100.0%	ASL+ASU+BLI+DGL+DGU+PAL+PAU+SAN	343.48	120.0%
1540_1640	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	311.16	100.0%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	341.68	100.0%	ASL+ASU+BLI+DGL+DGU+PAL+PAU+SAN	388.4	120.0%
1600_1700	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	350.58	100.0%	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	378.48	100.0%	ASL+ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAN	412.94	100.0%
1620_1720	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	281.94	100.0%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	352.24	100.0%	ASL+ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAN	377.2	100.0%
1640_1740	ASI+BLI+DGL+DGU+PAL+PAU+SAN	367.84	100.0%	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	388.42	100.0%	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	397.98	100.0%
1700_1800	ASU+BLI+DGI+PAL+PAU+SAO+SAS	135.54	100.0%	ASL+ASU+BLI+DGI+PAL+PAU+SAN	170.32	100.0%	ASU+BLL+BLU+DGI+PAL+PAU+SAO+SAS	197.58	100.0%
1720_1820	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	352.84	100.0%	ASI+BLI+DGL+DGU+PAL+PAU+SAN	368.18	100.0%	ASL+ASU+BLI+DGL+DGU+PAL+PAU+SAN	384.2	100.0%
1740_1840	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	295.62	100.0%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	339.72	100.0%	ASL+ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAN	348.38	100.0%
1800_1900	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	227.6	100.0%	ASL+ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAN	302.48	100.0%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	307.58	100.0%
1820_1920	ASI+BLI+DGL+DGU+PAL+PAU+SAN	193.82	110.00%	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	195.76	110.00%	ASL+ASU+BLI+DGL+DGU+PAL+PAU+SAN	266.24	110.00%
1840_1940	ASI+BLI+DGL+DGU+PAL+PAU+SAN	184.28	120.0%	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	221.48	120.0%	BLI+DGL+DGU+PAL+PAU+SAI	244.58	120.0%
1900_2000	ASI+BLI+DGL+DGU+PAL+PAU+SAN	219.1	110.00%	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	261.68	110.00%	ASU+BLI+DGL+DGU+PAL+PAU+SAO+SAS	294.64	110.00%
1920_2020	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN	265.94	100.0%	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	362.36	100.0%	ASL+ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAN	365.84	100.0%
1940_2040	ASU+BLL+BLU+DGL+DGU+PAL+PAU+SAO+SAS	328.6	100.0%	ASI+BLL+BLU+DGI+PAL+PAU+SAN	77.42	120.0%	ASI+BLI+DGI+PAL+PAU+SAN	112.24	120.0%
2000_2100	ASU+BLL+BLU+DGI+PAL+PAU+SAO+SAS	162.46	120.0%	ASU+BLI+DGI+PAL+PAU+SAO+SAS	176.34	120.0%	ASU+BLL+BLU+DGI+PAI+SAO+SAS	179.64	120.0%
2020_2120	ASU+BLI+DGI+PAL+PAU+SAO+SAS	190.58	120.0%	ASU+BLI+DGI+PAI+SAO+SAS	198.82	120.0%	ASU+BLL+BLU+DGI+PAL+PAU+SAO+SAS	207.68	120.0%
2040_2140	ASU+BLI+DGI+PAI+SAO+SAS	181.08	120.0%	ASI+BLI+DGI+PAI+SAN	216.1	120.0%	ASU+BLL+BLU+DGI+PAI+SAO+SAS	217.42	120.0%

2100.2200	ASI+BLI+DGI+PAI+SAN	126.24	100.0%	ASU+BLI+DGI+PAI+SAO+SAS	164.4	100.0%	ASI+BLI+DGI+PAL+PAU+SAN	166.44	100.0%
2120.2220	ASI+BLI+DGI+PAI+SAN	123.92	100.0%	ASI+BLI+DGI+PAL+PAU+SAN	175.16	100.0%	ASI+BLL+BLU+DGI+PAI+SAN	199.02	100.0%
2140.2240	ASI+BDI+PAI+SAN	34.9	100.0%	ASI+BLI+DPI+SAN	86.08	100.0%	ASI+BDI+PAL+PAU+SAN	107.44	100.0%
2200.2300	ASI+BDP+SAN	33.34	100.0%	ASI+BDI+PAI+SAN	75.54	100.0%	ASI+BLI+DPI+SAN	86.1	100.0%
2220.2320	BDP+SAI	51.78	100.0%	ASI+BDP+SAN	66.84	100.0%	BLI+DPI+SAI	100.5	100.0%
2240.2340	BDP+SAI	11.06	100.0%	BLI+DPI+SAI	50.72	100.0%	BDI+PAI+SAI	73.76	100.0%
2300.0000	BDP+SAI	12.54	100.0%	BLI+DPI+SAI	55.38	100.0%	BDI+PAI+SAI	75.54	100.0%
2320.0020	BDP+SAI	13.26	100.0%	DPI+SAB	42.6	100.0%	BLI+DPI+SAI	57.06	100.0%
2340.0040	R1I	0	100.0%	BDP+SAI	13.26	100.0%	DPI+SAB	26.7	100.0%

June 22nd 2019, current SECTORIA version output, DAC sectorization

0000.0100	R1I	67.86	100.0%	DPI+SABI	103.86	100.0%	DP6U+DPL6+SABI	131.28	100.0%
0010.0110	R1I	75.36	100.0%	DPI+SABI	108.06	100.0%	DP2U+DP6U+DPL2+DPL6+SABI	189.66	100.0%
0020.0120	R1I	74.76	100.0%	DPI+SABI	104.16	100.0%	DP2U+DPL2+SABI	137.46	100.0%
0030.0130	R1I	60.06	100.0%	DPI+SABI	95.46	100.0%	DP4U+DPL4+SABI	124.56	100.0%
0040.0140	R1I	46.26	100.0%	DPI+SABI	88.86	100.0%	DP4U+DPL4+SABI	114.06	100.0%
0050.0150	R1I	43.86	100.0%	DPI+SABI	87.66	100.0%	DP4U+DPL4+SABI	112.5	100.0%
0100.0200	R1I	46.86	100.0%	DPI+SABI	91.86	100.0%	DP4U+DPL4+SABI	116.7	100.0%
0110.0210	R1I	49.86	100.0%	DPI+SABI	94.86	100.0%	DP4U+DPL4+SABI	118.2	100.0%
0120.0220	R1I	53.16	100.0%	DPI+SABI	99.66	100.0%	DP6U+DPL6+SABI	121.62	100.0%
0130.0230	R1I	52.56	100.0%	DPI+SABI	97.56	100.0%	DP6U+DPL6+SABI	120.9	100.0%
0140.0240	R1I	46.38	100.0%	DPI+SABI	91.26	100.0%	DP8U+DPL8+SABI	113.04	100.0%
0150.0250	R1I	36.48	100.0%	DPI+SABI	83.16	100.0%	DP6U+DPL6+SABI	103.44	100.0%
0200.0300	R1I	27.78	100.0%	DPI+SABI	75.06	100.0%	DP6U+DPL6+SABI	95.04	100.0%
0210.0310	R1I	25.98	100.0%	DPI+SABI	70.86	100.0%	DP6U+DPL6+SABI	92.94	100.0%
0220.0320	R1I	32.58	100.0%	DPI+SABI	74.16	100.0%	DP6U+DPL6+SABI	97.86	100.0%
0230.0330	R1I	48.24	100.0%	DPI+SABI	85.26	100.0%	DP6U+DPL6+SABI	112.68	100.0%
0240.0340	R1I	57.06	100.0%	DPI+SABI	90.36	100.0%	DP6U+DPL6+SABI	121.26	100.0%
0250.0350	R1I	56.76	100.0%	DPI+SABI	89.46	100.0%	DP6U+DPL6+SABI	120.36	100.0%
0300.0400	R1I	55.86	100.0%	DPI+SABI	90.36	100.0%	DP6U+DPL6+SABI	118.86	100.0%
0310.0410	R1I	56.46	100.0%	DPI+SABI	93.96	100.0%	DP6U+DPL6+SABI	120.96	100.0%
0320.0420	R1I	55.26	100.0%	DPI+SABI	92.76	100.0%	DP4U+DP6U+DPL4+DPL6+SABI	161.16	100.0%
0330.0430	R1I	45.36	100.0%	DPI+SABI	83.46	100.0%	DP2U+DP4U+DPL2+DPL4+SABI	148.38	100.0%
0340.0440	R1I	38.46	100.0%	DPI+SABI	77.76	100.0%	DP4U+DPL4+SABI	101.76	100.0%
0350.0450	R1I	35.22	100.0%	DPI+SABI	99.26	100.0%	DP4U+DPL4+SABI	104.36	100.0%
0400.0500	DP4U+DPL4+SABI	95.5	100.0%	DP2U+DPL2+SABI	100.04	100.0%	DP6U+DPL6+SABI	105.46	100.0%
0410.0510	DP4U+DPL4+SABI	99.3	100.0%	DP2U+DPL2+SABI	110.84	100.0%	DP6U+DPL6+SABI	113.46	100.0%
0420.0520	BDP4U+BDPL4+SAI	108.6	100.0%	BDP2U+BDPL2+SAI	117.92	100.0%	BDP6U+BDPL6+SAI	120.66	100.0%
0430.0530	DGI+PAI+SAB4U+SABL4	98.58	100.0%	DGI+PAI+SAB2U+SABL2	100.08	100.0%	BLI+DGI+PAI+SAI	106.86	100.0%
0440.0540	DGL8+DP8U+PAL8+SAB2U+SABL2	109.04	100.0%	BLI+DGL8+DP8U+PAL8+SAI	114.62	100.0%	DGI+PA6U+PAL6+SAB2U+SABL2	127.2	100.0%
0450.0550	BLI+DG6U+DGL6+PA6U+PAL6+SAI	107.7	100.0%	BD6U+BLL6+DGL6+PA6U+PAL6+SAI	109.44	100.0%	BLI+DG4U+DGL4+PA6U+PAL6+SAI	118.02	100.0%
0500.0600	BLI+DG6U+DGL6+PA6U+PAL6+SAI	89	100.0%	BLI+DG6U+DGL6+PA4U+PAL4+SAI	96.84	100.0%	BLI+DG4U+DGL4+PA6U+PAL6+SAI	116.06	100.0%
0510.0610	BLL6+DG6U+DGL6+PA4U+PAL4+SAB6U+SASL6	107.86	110.00%	BLI+DG6U+DGL6+PA4U+PAL4+SAS4U+SASL4	113.2	110.00%	BLI+DG6U+DGL6+PA4U+PAL4+SAS6U+SASL6	117.52	110.00%
0520.0620	BLI+DG6U+DGL6+PA4U+PAL4+SAS4U+SASL4	81.72	120.0%	BLI+DG6U+DGL6+PA4U+PAL4+SAS6U+SASL6	83.04	120.0%	ASI+BLI+DG6U+DGL6+PA4U+PAL4+SAN	95.46	120.0%
0530.0630	BLI+DG6U+DGL6+PA4U+PAL4+SAS6U+SASL6	62.58	120.0%	ASI+BLI+DG6U+DGL6+PA4U+PAL4+SAN	76.92	120.0%	BLI+DG6U+DGL6+PA4U+PAL4+SAS4U+SASL4	84.56	120.0%
0540.0640	ASI+BLI+DG6U+DGL6+PA4U+PAL4+SAN	70.96	110.00%	BLI+DG6U+DGL6+PA4U+PAL4+SAS6U+SASL6	82.62	110.00%	ASI+BLI+DG4U+DGL4+PA4U+PAL4+SAN	98.68	110.00%
0550.0650	ASI+BLI+DG6U+DGL6+PA4U+PAL4+SAN	67.72	100.0%	AS6U+ASL6+BLI+DG6U+DGL6+PA4U+PAL4+SAN	77.58	100.0%	AS4U+BLI+DG6U+DGL6+PA4U+PAL4+SA4U+SASL4	82.48	100.0%
0600.0700	AS6U+ASL6+BL6U+BLL6+DG6U+DGL6+PA4U+PAL4+SAN	58.48	100.0%	AS6U+ASL6+BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAN	63.5	100.0%	AS4U+BL6U+BLL6+DG6U+DGL6+PA4U+PAL4+SA4U+SASL4	69.88	100.0%
0610.0710	AS6U+ASL6+BL6U+BLL6+DG6U+DGL6+PA4U+PAL4+SAN	52.44	100.0%	AS6U+ASL6+BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAN	58.38	100.0%	AS4U+BL6U+BLL6+DG6U+DGL6+PA4U+PAL4+SA4U+SASL4	63	100.0%
0620.0720	AS6U+ASL6+BL6U+BLL6+DG6U+DGL6+PA4U+PAL4+SAN	52.92	100.0%	AS6U+BL6U+BLL6+DG6U+DGL6+PA4U+PAL4+SA6U+SASL6	54.24	100.0%	AS6U+ASL6+BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAN	55.8	100.0%
0630.0730	AS6U+ASL6+BL6U+BLL6+DG6U+DGL6+PA4U+PAL4+SAN	55.8	100.0%	AS6U+ASL6+BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAN	57.9	100.0%	AS6U+BL6U+BLL6+DG6U+DGL6+PA4U+PAL4+SA6U+SASL6	61.32	100.0%
0640.0740	ASI+BL6U+BLL6+DG6U+DGL6+PA4U+PAL4+SAN	52.9	100.0%	ASI+BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAN	55.72	100.0%	AS6U+ASL6+BL6U+BLL6+DG6U+DGL6+PA4U+PAL4+SAN	62.66	100.0%

0650_0750	ASI+BL6U+BLL6+DG6U+DGL6+PA4U+PAL4+SAN	34.64	100.0%	ASI+BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAN	41.12	100.0%	ASI+BL6U+BLL6+DG6U+DGL6+PA6U+PAL6+SAN	46.18	100.0%
0700_0800	ASI+BD6U+BLL6+DGL6+PA4U+PAL4+SAN	30.24	100.0%	ASI+BD6U+BLL6+DGL6+PA2U+PAL2+SAN	34.62	100.0%	ASI+BD6U+BLL6+DGL6+PA6U+PAL6+SAN	45.56	100.0%
0710_0810	ASI+BD6U+BLL6+DGL6+PAI+SAN	34.58	100.0%	ASI+BLI+DG6U+DGL6+PAI+SAN	37.46	100.0%	ASI+BLI+DG4U+DGL4+PAI+SAN	43.76	100.0%
0720_0820	BLI+DG6U+DGL6+PA2U+PAL2+SAS6U+SASL6	59.82	100.0%	BD6U+BLL6+DGL6+PA2U+PAL2+SAS6U+SASL6	60.36	100.0%	BDL4+BL4U+DG4U+PA2U+PAL2+SAS6U+SASL6	61.32	100.0%
0730_0830	BLI+DG6U+DGL6+PA2U+PAL2+SAS6U+SASL6	62.42	100.0%	BD6U+BLL6+DGL6+PA2U+PAL2+SAS6U+SASL6	63.74	100.0%	BLI+DG6U+DGL6+PA4U+PAL4+SAS6U+SASL6	64.94	100.0%
0740_0840	ASI+BLI+DG6U+DGL6+PA2U+PAL2+SAN	75.9	100.0%	BLI+DG6U+DGL6+PA2U+PAL2+SAS4U+SASL4	77.12	100.0%	ASI+BLI+DG6U+DGL6+PA4U+PAL4+SAN	79.5	100.0%
0750_0850	ASI+BLI+DG6U+DGL6+PA4U+PAL4+SAN	78.36	100.0%	ASI+BLI+DG4U+DGL4+PA4U+PAL4+SAN	79.68	100.0%	ASI+BLI+DG6U+DGL6+PA4U+PAL4+SA6U+SAL6	85.92	100.0%
0800_0900	BLI+DG4U+DGL4+PA4U+PAL4+SAS4U+SASL4	68.14	110.00%	BLI+DG6U+DGL6+PA4U+PAL4+SAS4U+SASL4	71.42	110.00%	ASI+BLI+DG4U+DGL4+PA4U+PAL4+SAN	76.66	110.00%
0810_0910	ASI+BLI+DG4U+DGL4+PA4U+PAL4+SAN	79.82	110.00%	ASI+BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAN	80.76	110.00%	BLI+DG4U+DGL4+PA4U+PAL4+SAS4U+SASL4	83.4	110.00%
0820_0920	ASI+BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAN	47.66	110.00%	BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAS6U+SASL6	55.06	110.00%	AS2U+BL2U+DG4U+DGL4+PA4U+PAL4+SA2U+SABL2	56.82	110.00%
0830_0930	ASI+BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAN	44.68	120.0%	BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAS6U+SASL6	47.26	120.0%	AS2U+ASI+BL2U+BLI+DG4U+DGL4+PA4U+PAL4+SA2U+SABL2+SAN	108.88	120.0%
0840_0940	ASI+BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAN	45.54	120.0%	BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAS6U+SASL6	47.64	120.0%	BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAS4U+SASL4	70.54	120.0%
0850_0950	ASI+BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAN	33.12	110.00%	BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAS6U+SASL6	35.88	110.00%	BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAS4U+SASL4	45.98	110.00%
0900_1000	ASI+BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAN	29.36	100.0%	BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAS6U+SASL6	32	100.0%	BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAS4U+SASL4	42.52	100.0%
0910_1010	ASI+BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAN	45.06	100.0%	BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAS6U+SASL6	49.1	100.0%	BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAS4U+SASL4	54.72	100.0%
0920_1020	ASI+BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAN	66.32	100.0%	BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAS4U+SASL4	69.54	100.0%	ASI+BL4U+BLL4+DG4U+DGL4+PA2U+PAL2+SAN	78.06	100.0%
0930_1030	ASI+BL4U+BLL4+DG4U+DGL4+PA2U+PAL2+SAN	53.58	100.0%	BL4U+BLL4+DG4U+DGL4+PA2U+PAL2+SAS4U+SASL4	59.2	100.0%	ASI+BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAN	64.56	100.0%
0940_1040	ASI+BL4U+BLL4+DG4U+DGL4+PA2U+PAL2+SAN	62.44	110.00%	ASI+BL6U+BLL6+DG4U+DGL4+PA2U+PAL2+SAN	63.82	110.00%	BL4U+BLL4+DG4U+DGL4+PA2U+PAL2+SAS4U+SASL4	70.94	110.00%
0950_1050	ASI+BL2U+BLL2+DG4U+DGL4+PA2U+PAL2+SAN	132.3	100.0%	ASI+BL2U+BLL2+DG4U+DGL4+PA4U+PAL4+SAN	137.98	100.0%	ASI+BL2U+BLL2+DG4U+DGL4+PA6U+PAL6+SAN	143.76	100.0%
1000_1100	BL4U+BLL4+DG4U+DGL4+PA2U+PAL2+SAS4U+SASL4	75.82	100.0%	ASI+BL4U+BLL4+DG4U+DGL4+PA2U+PAL2+SAN	77.1	100.0%	BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAS4U+SASL4	78.3	100.0%
1010_1110	ASI+BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAN	70.6	100.0%	ASI+BL4U+BLL4+DG6U+DGL6+PA4U+PAL4+SAN	86.82	100.0%	AS4U+BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SA4U+SASL4	90.92	100.0%
1020_1120	ASI+BL4U+BLL4+DG6U+DGL6+PA4U+PAL4+SAN	59.66	100.0%	ASI+BL6U+BLL6+DG6U+DGL6+PA4U+PAL4+SAN	59.78	100.0%	ASI+BL4U+BLL4+DG6U+DGL6+PA6U+PAL6+SAN	59.88	100.0%
1030_1130	BL4U+BLL4+DG6U+DGL6+PA6U+PAL6+SAS6U+SASL6	42.7	100.0%	ASI+BL4U+BLL4+DG6U+DGL6+PA6U+PAL6+SAN	44.06	100.0%	BL4U+BLL4+DG6U+DGL6+PA4U+PAL4+SAS6U+SASL6	44.94	100.0%
1040_1140	BL4U+BLL4+DG4U+DGL4+PA6U+PAL6+SAS6U+SASL6	32.58	100.0%	BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAS6U+SASL6	36.5	100.0%	BL4U+BLL4+DG6U+DGL6+PA6U+PAL6+SAS6U+SASL6	36.58	100.0%
1050_1150	BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAS6U+SASL6	26.76	100.0%	ASI+BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAN	35.78	100.0%	AS2U+BL2U+DG4U+DGL4+PA4U+PAL4+SA2U+SABL2	36.56	100.0%
1100_1200	BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAS6U+SASL6	16.32	100.0%	ASI+BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAN	21.54	100.0%	BL2U+BLL2+DG4U+DGL4+PA4U+PAL4+SAS6U+SASL6	37.7	100.0%
1110_1210	BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAS6U+SASL6	14.82	100.0%	ASI+BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAN	20.4	100.0%	BL2U+BLL2+DG4U+DGL4+PA4U+PAL4+SAS6U+SASL6	30.08	100.0%
1120_1220	BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAS6U+SASL6	21.96	100.0%	ASI+BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAN	28.8	100.0%	BL2U+BLL2+DG4U+DGL4+PA4U+PAL4+SAS6U+SASL6	36.6	100.0%
1130_1230	ASI+BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAN	31.92	100.0%	BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAS4U+SASL4	38.66	100.0%	ASI+BL2U+BLL2+DG4U+DGL4+PA4U+PAL4+SAN	51.24	100.0%
1140_1240	ASI+BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAN	46.2	100.0%	ASI+BL4U+BLL4+DG6U+DGL6+PA4U+PAL4+SAN	58.64	100.0%	ASI+BL2U+BLL2+DG4U+DGL4+PA4U+PAL4+SAN	70.92	100.0%
1150_1250	ASI+BL4U+BLL4+DG6U+DGL6+PA4U+PAL4+SAN	52.82	100.0%	ASI+BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAN	55.7	100.0%	ASI+BL4U+BLL4+DG6U+DGL6+PA6U+PAL6+SAN	65.76	100.0%
1200_1300	AS4U+BDL4+BL4U+DG4U+PA4U+PAL4+SA4U+SASL4	36.24	100.0%	ASI+BDL4+BL4U+DG4U+PA4U+PAL4+SAN	38.12	100.0%	AS4U+BDL4+BL4U+DG4U+PA4U+PAL4+SAOI+SEASL4	45.78	100.0%
1210_1310	AS4U+BDL4+BL4U+DG4U+PA4U+PAL4+SA4U+SASL4	42.22	100.0%	ASL6+BDL4+BL4U+DG4U+PA4U+PAL4+SAL6+SAS6U	47.82	100.0%	AS4U+BDL4+BL4U+DG4U+PA4U+PAL4+SAOI+SEASL4	52.42	100.0%
1220_1320	AS6U+ASL6+BL6U+BLL6+DG6U+DGL6+PA4U+PAL4+SAN	51.84	100.0%	AS6U+ASL6+BLI+DG6U+DGL6+PA4U+PAL4+SAN	54.06	100.0%	AS4U+BL6U+BLL6+DG6U+DGL6+PA4U+PAL4+SA4U+SASL4	55.2	100.0%
1230_1330	AS6U+ASL6+BLI+DG6U+DGL6+PA4U+PAL4+SAN	41.56	100.0%	AS6U+ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SAN	54.48	100.0%	AS6U+ASL6+BLI+DG6U+DGL6+PA6U+PAL6+SAN	55.48	100.0%
1240_1340	AS6U+ASL6+BLI+DG6U+DGL6+PA4U+PAL4+SAN	27.22	100.0%	AS6U+ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SAN	34.5	100.0%	AS4U+BLI+DG6U+DGL6+PA4U+PAL4+SA4U+SASL4	49.42	100.0%
1250_1350	AS6U+ASL6+BLI+DG6U+DGL6+PA4U+PAL4+SAN	24.22	100.0%	AS6U+ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SAN	31.32	100.0%	AS4U+BLI+DG6U+DGL6+PA4U+PAL4+SA4U+SASL4	51.52	100.0%
1300_1400	AS6U+ASL6+BLI+DG6U+DGL6+PA4U+PAL4+SAN	34.32	100.0%	AS6U+ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SAN	40.04	100.0%	AS6U+ASL6+BLI+DG6U+DGL6+PA6U+PAL6+SAN	40.06	100.0%
1310_1410	AS6U+ASL6+BLI+DG6U+DGL6+PA4U+PAL4+SAN	38.1	100.0%	AS6U+ASL6+BLI+DG6U+DGL6+PA6U+PAL6+SAN	39.04	100.0%	AS6U+ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SAN	43.82	100.0%
1320_1420	AS6U+ASL6+BLI+DG6U+DGL6+PA4U+PAL4+SAN	39.84	100.0%	AS6U+ASL6+BLI+DG6U+DGL6+PA6U+PAL6+SAN	43.24	100.0%	AS6U+ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SAN	46.88	100.0%
1330_1430	AS6U+ASL6+BLI+DG6U+DGL6+PA4U+PAL4+SAN	42.34	100.0%	AS6U+ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SAN	48.08	100.0%	AS4U+BLI+DG6U+DGL6+PA4U+PAL4+SA4U+SASL4	52.36	100.0%
1340_1440	AS6U+ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SAN	49.46	100.0%	AS6U+ASL6+BLI+DG6U+DGL6+PA4U+PAL4+SAN	57.84	100.0%	ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SAL6+SAS6U	64.64	100.0%
1350_1450	AS6U+ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SAN	49.02	110.00%	ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SAL6+SAS6U	57.54	110.00%	AS6U+ASL6+BLI+DG6U+DGL6+PA4U+PAL4+SAN	63.56	110.00%
1400_1500	ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SAL6+SAS6U	37.58	100.0%	AS6U+ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SAN	38.66	100.0%	AS2U+BL2U+DG4U+DGL4+PA4U+PAL4+SA2U+SABL2	53.44	100.0%
1410_1510	ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SAL6+SAS6U	28.62	100.0%	AS6U+ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SAN	36.06	100.0%	ASL6+BLI+DG6U+DGL6+PA4U+PAL4+SAL6+SAS6U	46.76	100.0%
1420_1520	ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SAL6+SAS6U	39.52	110.00%	AS6U+ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SAN	43.3	110.00%	ASL6+BLI+DG6U+DGL6+PA4U+PAL4+SAL6+SAS6U	46.68	110.00%
1430_1530	AS6U+ASL6+BDL4+BL4U+DG4U+PA4U+PAL4+SAN	41.04	110.00%	ASL6+BDL4+BL4U+DG4U+PA4U+PAL4+SAL6+SAS6U	41.1	110.00%	AS6U+ASL6+BLI+DG6U+DGL6+PA4U+PAL4+SAN	42.4	110.00%
1440_1540	ASL6+BLI+DG6U+DGL6+PA6U+PAL6+SAL6+SAS6U	27	100.0%	AS6U+ASL6+BLI+DG6U+DGL6+PA6U+PAL6+SAN	27.9	100.0%	AS4U+BLI+DG6U+DGL6+PA6U+PAL6+SA4U+SASL4	29.4	100.0%
1450_1550	AS4U+BLI+DG6U+DGL6+PA6U+PAL6+SA4U+SASL4	16.62	100.0%	ASL6+BLI+DG6U+DGL6+PA6U+PAL6+SAL6+SAS6U	17.82	100.0%	AS6U+ASL6+BLI+DG6U+DGL6+PA6U+PAL6+SAN	18.72	100.0%
1500_1600	ASL6+BLI+DG6U+DGL6+PA6U+PAL6+SAL6+SAS6U	15.3	100.0%	AS6U+ASL6+BLI+DG6U+DGL6+PA6U+PAL6+SAN	16.2	100.0%	AS4U+BLI+DG6U+DGL6+PA6U+PAL6+SA4U+SASL4	18.7	100.0%
1510_1610	AS6U+ASL6+BLI+DG6U+DGL6+PA6U+PAL6+SA4U+SAL4	64.12	100.0%	AS6U+ASL6+BLI+DG6U+DGL6+PA6U+PAL6+SAOI+SEL4	64.54	100.0%	AS6U+ASL6+BLI+DG6U+DGL6+PA4U+PAL4+SA4U+SAL4	76.74	100.0%
1520_1620	AS6U+ASL6+BLI+DG4U+DGL4+PA6U+PAL6+SAOI+SEL4	50.7	100.0%	AS6U+ASL6+BLI+DG4U+DGL4+PA6U+PAL6+SA4U+SAL4	51	100.0%	AS6U+ASL6+BLI+DG6U+DGL6+PA6U+PAL6+SAOI+SEL4	51.04	100.0%
1530_1630	AS6U+ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SAOI+SEL4	40.82	100.0%	AS6U+ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SA4U+SAL4	42.14	100.0%	AS6U+ASL6+BLI+DG6U+DGL6+PA4U+PAL4+SAOI+SEL4	44.76	100.0%
1540_1640	AS6U+ASL6+BLI+DG4U+DGL4+PA6U+PAL6+SAOI+SEL4	60.64	110.00%	AS6U+ASL6+BLI+DG6U+DGL6+PA6U+PAL6+SAOI+SEL4	61.58	110.00%	AS6U+ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SAOI+SEL4	64.84	110.00%
1550_1650	AS6U+ASL6+BL4U+BLL4+DG6U+DGL6+PA4U+PAL4+SAN	106.9	100.0%	AS6U+ASL6+BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAN	111.66	100.0%	AS6U+ASL6+BL4U+BLL4+DG6U+DGL6+PA4U+PAL4+SAOI+SEL4	114.02	100.0%
1600_1700	AS6U+ASL6+BL4U+BLL4+DG6U+DGL6+PA4U+PAL4+SAN	111.92	100.0%	AS6U+ASL6+BL6U+BLL6+DG6U+DGL6+PA4U+PAL4+SAN	113.84	100.0%	AS6U+ASL6+BL4U+BLL4+DG6U+DGL6+PA4U+PAL4+SAOI+SEL4	131.16	100.0%

1610_1710	ASI+BDL4+BL4U+DG4U+PA4U+PAL4+SAN	92.06	100.0%	AS6U+ASL6+BDL4+BL4U+DG4U+PA4U+PAL4+SAN	96.06	100.0%	ASI+BL6U+BLL6+DG6U+DGL6+PA4U+PAL4+SAN	101.58	100.0%
1620_1720	ASI+BDL4+BL4U+DG4U+PA6U+PAL6+SAN	55.28	100.0%	ASI+BDL4+BL4U+DG4U+PA4U+PAL4+SAN	57.02	100.0%	ASI+BL6U+BLL6+DG6U+DGL6+PA6U+PAL6+SAN	60.26	100.0%
1630_1730	AS6U+BDL4+BL4U+DG4U+PA6U+PAL6+SA6U+SASL6	85.36	100.0%	AS6U+BDL4+BL4U+DG4U+PA4U+PAL4+SA6U+SASL6	86.02	100.0%	ASI+BDL4+BL4U+DG4U+PA6U+PAL6+SAN	87.5	100.0%
1640_1740	AS6U+BDL6+BL6U+DG6U+PA6U+PAL6+SA6U+SASL6	62.9	100.0%	AS6U+BDL6+BL6U+DG6U+PA4U+PAL4+SA6U+SASL6	66.74	100.0%	AS6U+ASL6+BDL6+BL6U+DG6U+PA6U+PAL6+SAN	79.1	100.0%
1650_1750	AS4U+BDPL4+BL4U+DG4U+PA4U+SA4U+SASL4	63.28	100.0%	AS4U+BDPL4+BL4U+DG4U+PA4U+SAOI+SEASL4	81.22	100.0%	AS4U+BDL6+BL6U+DG6U+PA6U+PAL6+SA4U+SASL4	90.74	100.0%
1700_1800	AS6U+ASL6+BDPL4+BL4U+DG4U+PA4U+SAN	34.36	100.0%	AS4U+BDPL4+BL4U+DG4U+PA4U+SA4U+SASL4	41.7	100.0%	AS4U+BDPL4+BL4U+DG4U+PA4U+SAOI+SEASL4	54.54	100.0%
1710_1810	AS4U+BDPL2+BL2U+DG2U+PA2U+SA4U+SASL4	50.16	100.0%	AS4U+BLI+DG2U+DPL2+PA2U+SA4U+SASL4	51.54	100.0%	AS4U+BDPL2+BL2U+DG2U+PA2U+SAOI+SEASL4	61.86	100.0%
1720_1820	AS6U+ASL6+BDPL2+BL2U+DG2U+PA2U+SAN	48.18	100.0%	AS4U+BDPL2+BL2U+DG2U+PA2U+SA4U+SASL4	60.44	100.0%	AS4U+BDPL2+BL2U+DG2U+PA2U+SAOI+SEASL4	68.18	100.0%
1730_1830	ASI+BDPL2+BL2U+DG2U+PA2U+SAN	55.42	100.0%	AS6U+ASL6+BDPL2+BL2U+DG2U+PA2U+SAN	57.74	100.0%	AS4U+BDPL2+BL2U+DG2U+PA2U+SA4U+SASL4	62.68	100.0%
1740_1840	ASI+BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAN	79.68	100.0%	ASI+BL6U+BLL6+DG6U+DGL6+PA4U+PAL4+SAN	81.06	100.0%	ASI+BL6U+BLL6+DG4U+DGL4+PA6U+PAL6+SAN	82.2	100.0%
1750_1850	ASI+BL6U+BLL6+DG6U+DGL6+PA4U+PAL4+SAN	62.1	100.0%	ASI+BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAN	63.12	100.0%	ASI+BL6U+BLL6+DG6U+DGL6+PA6U+PAL6+SAN	64.82	100.0%
1800_1900	ASI+BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAN	47.18	100.0%	ASI+BL6U+BLL6+DG6U+DGL6+PA4U+PAL4+SAN	49.78	100.0%	ASI+BL6U+BLL6+DG4U+DGL4+PA6U+PAL6+SAN	51.9	100.0%
1810_1910	ASI+BLI+DG6U+DGL6+PA4U+PAL4+SAN	32.54	100.0%	ASI+BLI+DG4U+DGL4+PA4U+PAL4+SAN	36.84	100.0%	ASI+BL6U+BLL6+DG6U+DGL6+PA4U+PAL4+SAN	37.18	100.0%
1820_1920	ASI+BL6U+BLL6+DG6U+DGL6+PA6U+PAL6+SAN	29.12	100.0%	ASI+BL4U+BLL4+DG6U+DGL6+PA6U+PAL6+SAN	29.9	100.0%	BL6U+BLL6+DG6U+DGL6+PA6U+PAL6+SAS6U+SASL6	38.78	100.0%
1830_1930	ASI+BLI+DG6U+DGL6+PA6U+PAL6+SAN	23.08	110.00%	BLI+DG6U+DGL6+PA6U+PAL6+SAS6U+SASL6	32.8	110.00%	ASI+BLI+DG4U+DGL4+PA6U+PAL6+SAN	32.96	110.00%
1840_1940	ASI+BLI+DG6U+DGL6+PA6U+PAL6+SAN	22.3	100.0%	BLI+DG6U+DGL6+PA6U+PAL6+SAS6U+SASL6	28.84	100.0%	ASI+BL6U+BLL6+DG6U+DGL6+PA6U+PAL6+SAN	52.12	100.0%
1850_1950	ASI+BLI+DG4U+DGL4+PA6U+PAL6+SAN	20.04	100.0%	BLI+DG4U+DGL4+PA6U+PAL6+SAS6U+SASL6	20.58	100.0%	ASI+BLI+DG6U+DGL6+PA6U+PAL6+SAN	26.74	100.0%
1900_2000	ASI+BLI+DG4U+DGL4+PA6U+PAL6+SAN	31.1	100.0%	BLI+DG4U+DGL4+PA6U+PAL6+SAS6U+SASL6	32.9	100.0%	ASI+BLI+DG6U+DGL6+PA6U+PAL6+SAN	37.62	100.0%
1910_2010	ASI+BLI+DG4U+DGL4+PA6U+PAL6+SAN	65.4	100.0%	ASI+BLI+DG6U+DGL6+PA6U+PAL6+SAN	67.36	100.0%	BLI+DG4U+DGL4+PA6U+PAL6+SAS6U+SASL6	69.78	100.0%
1920_2020	ASI+BL6U+BLL6+DG6U+DGL6+PA6U+PAL6+SAN	81.74	100.0%	ASI+BL6U+BLL6+DG4U+DGL4+PA6U+PAL6+SAN	85.12	100.0%	ASI+BL4U+BLL4+DG6U+DGL6+PA6U+PAL6+SAN	88.06	100.0%
1930_2030	ASI+BL6U+BLL6+DG6U+DGL6+PA6U+PAL6+SAN	65.14	100.0%	ASI+BL6U+BLL6+DG4U+DGL4+PA6U+PAL6+SAN	66.06	100.0%	ASI+BL4U+BLL4+DG6U+DGL6+PA6U+PAL6+SAN	68.46	100.0%
1940_2040	AS6U+BL4U+BLL4+DG6U+DGL6+PA6U+PAL6+SA6U+SASL6	75.52	100.0%	AS6U+BL4U+BLL4+DG4U+DGL4+PA6U+PAL6+SA6U+SASL6	81.18	100.0%	AS6U+BL6U+BLL6+DG6U+DGL6+PA6U+PAL6+SA6U+SASL6	81.8	100.0%
1950_2050	ASI+BL4U+BLL4+DG6U+DGL6+PA6U+PAL6+SA6U+SAL6	82.24	100.0%	ASI+BL4U+BLL4+DG6U+DGL6+PA4U+PAL4+SA6U+SAL6	82.6	100.0%	ASI+BL4U+BLL4+DG4U+DGL4+PA6U+PAL6+SA6U+SAL6	89.5	100.0%
2000_2100	AS4U+BD6U+BLL6+DGL6+PA6U+PAL6+SA4U+SASL4	99.4	100.0%	AS4U+BD6U+BLL6+DGL6+PA4U+PAL4+SA4U+SASL4	103.18	100.0%	AS4U+BL4U+BLL4+DG4U+DGL4+PA6U+PAL6+SA4U+SASL4	104.04	100.0%
2010_2110	AS6U+ASL6+BD6U+BLL6+DGL6+PA6U+PAL6+SA6U+SAL6	80.38	100.0%	ASI+BD6U+BLL6+DGL6+PA6U+PAL6+SA6U+SAL6	85.1	100.0%	AS6U+ASL6+BD6U+BLL6+DGL6+PA4U+PAL4+SA6U+SAL6	87.64	100.0%
2020_2120	AS6U+ASL6+BDL4+BL4U+DG4U+PA6U+PAL6+SA6U+SAL6	49.38	100.0%	AS6U+ASL6+BDPL2+BL2U+DG2U+PA2U+SA6U+SAL6	56.64	100.0%	AS6U+ASL6+BDL4+BL4U+DG4U+PA4U+PAL4+SA6U+SAL6	57.48	100.0%
2030_2130	AS6U+ASL6+BDPL2+BL2U+DG2U+PA2U+SA6U+SAL6	36.14	100.0%	AS6U+ASL6+BDL4+BL4U+DG4U+PA6U+PAL6+SA6U+SAL6	48.6	100.0%	AS6U+ASL6+BDL4+BL4U+DG4U+PAI+SA6U+SAL6	48.88	100.0%
2040_2140	AS6U+ASL6+BDPL4+BL4U+DG4U+PA4U+SA6U+SAL6	40.86	100.0%	AS6U+ASL6+BLI+DGL8+DP8U+PAL8+SA6U+SAL6	45.14	100.0%	AS6U+ASL6+BLI+DGI+PAI+SA6U+SAL6	45.62	100.0%
2050_2150	AS4U+BDPL4+BL4U+DG4U+PA4U+SA4U+SASL4	49.3	100.0%	AS4U+BLI+DGI+PAI+SA4U+SASL4	53.18	100.0%	AS4U+BLI+DGL8+DP8U+PAL8+SA4U+SASL4	54.8	100.0%
2100_2200	ASI+BLI+DGI+PAI+SA6U+SAL6	46.38	100.0%	ASI+BD6U+BDL6+PAI+SA6U+SAL6	49	100.0%	ASI+BLI+DGL8+DP8U+PAL8+SA6U+SAL6	50.4	100.0%
2110_2210	BLI+DGI+PAI+SAS6U+SASL6	14.24	100.0%	BLI+DGL8+DP8U+PAL8+SAS6U+SASL6	20.84	100.0%	ASI+BLI+DGI+PAI+SAN	24.2	100.0%
2120_2220	BDP6U+BDPL6+SAS6U+SASL6	20.24	100.0%	BLI+DGI+PAI+SAS6U+SASL6	23.9	100.0%	ASI+BDP6U+BDPL6+SAN	29.9	100.0%
2130_2230	BDP6U+BDPL6+SAS6U+SASL6	29.84	100.0%	ASI+BDP6U+BDPL6+SAN	41.54	100.0%	BLI+DGI+PAI+SAS6U+SASL6	42.24	100.0%
2140_2240	BDI+PAI+SAS6U+SASL6	25.76	100.0%	BDP6U+BDPL6+SAS6U+SASL6	34.92	100.0%	ASI+BDI+PAI+SAN	41.18	100.0%
2150_2250	BDI+PAI+SAS6U+SASL6	31.38	100.0%	BDP+SAS6U+SASL6	39.4	100.0%	ASI+BDI+PAI+SAN	45.3	100.0%
2200_2300	BDP+SAS6U+SASL6	7.12	100.0%	ASI+BDP+SAN	32.02	100.0%	BDPL6+DP6U+SAB6U+SASL6	41.48	100.0%
2210_2310	BDP+SAS6U+SASL6	18.42	100.0%	ASI+BDP+SAN	44.52	100.0%	BDPL6+DP6U+SAB6U+SASL6	49.56	100.0%
2220_2320	DP4U+DPL4+SAB6U+SABL6	36.02	100.0%	BDP+SAS6U+SASL6	37.62	100.0%	DP2U+DPL2+SAB6U+SABL6	38.56	100.0%
2230_2330	BDP+SAI	15.36	100.0%	DP6U+DPL6+SAB6U+SABL6	42.24	100.0%	DP4U+DPL4+SAB6U+SABL6	44.62	100.0%
2240_2340	BDP+SAI	7.66	100.0%	BLI+DP6U+DPL6+SAI	37.42	100.0%	BLI+DP4U+DPL4+SAI	39.7	100.0%
2250_2350	BDP+SAI	4.26	100.0%	BLI+DP6U+DPL6+SAI	33.06	100.0%	BLI+DP4U+DPL4+SAI	35.34	100.0%
2300_0000	BDP+SAI	11.46	100.0%	BLI+DPI+SAI	39.22	100.0%	BLI+DP6U+DPL6+SAI	40.86	100.0%
2310_0010	BDP+SAI	11.34	100.0%	BLI+DPI+SAI	26.94	100.0%	BLI+DP6U+DPL6+SAI	41.4	100.0%
2320_0020	DPI+SABI	5.4	100.0%	BDP+SAI	11.22	100.0%	BLI+DPI+SAI	19.98	100.0%
2330_0030	R1I	4.2	100.0%	DPI+SABI	5.4	100.0%	BDP+SAI	11.22	100.0%
2340_0040	R1I	0	100.0%	DPI+SABI	5.4	100.0%	BDP+SAI	11.22	100.0%
2350_0050	R1I	0	100.0%	DPI+SABI	2.4	100.0%	BDP+SAI	5.82	100.0%

February 13th 2019, current SECTORIA version output, reference sectorization

0000_0100	R1I	67.86	100.0%	DPI+SABI	103.86	100.0%	DP6U+DPL6+SABI	131.28	100.0%
0020_0120	R1I	74.76	100.0%	DPI+SABI	104.16	100.0%	DP2U+DPL2+SABI	137.46	100.0%
0040_0140	R1I	46.26	100.0%	DPI+SABI	88.86	100.0%	DP4U+DPL4+SABI	114.06	100.0%

0100.0200	R1I	46.86	100.0%	DPI+SABI	91.86	100.0%	DP4U+DPL4+SABI	116.7	100.0%
0120.0220	R1I	53.16	100.0%	DPI+SABI	99.66	100.0%	DP6U+DPL6+SABI	121.62	100.0%
0140.0240	R1I	46.38	100.0%	DPI+SABI	91.26	100.0%	DP8U+DPL8+SABI	113.04	100.0%
0200.0300	R1I	27.78	100.0%	DPI+SABI	75.06	100.0%	DP6U+DPL6+SABI	95.04	100.0%
0220.0320	R1I	32.58	100.0%	DPI+SABI	74.16	100.0%	DP6U+DPL6+SABI	97.86	100.0%
0240.0340	R1I	57.06	100.0%	DPI+SABI	90.36	100.0%	DP6U+DPL6+SABI	121.26	100.0%
0300.0400	R1I	55.86	100.0%	DPI+SABI	90.36	100.0%	DP6U+DPL6+SABI	118.86	100.0%
0320.0420	R1I	55.26	100.0%	DPI+SABI	92.76	100.0%	DP6U+DPL6+SABI	120.96	100.0%
0340.0440	R1I	38.46	100.0%	DPI+SABI	77.76	100.0%	DP4U+DPL4+SABI	101.76	100.0%
0400.0500	DP4U+DPL4+SABI	95.5	100.0%	DP2U+DPL2+SABI	100.04	100.0%	DP6U+DPL6+SABI	105.46	100.0%
0420.0520	BDP4U+BDPL4+SAI	108.6	100.0%	BDP2U+BDPL2+SAI	117.92	100.0%	BDP6U+BDPL6+SAI	120.66	100.0%
0440.0540	DGL8+DP8U+PAL8+SAB2U+SABL2	109.04	100.0%	BLI+DGL8+DP8U+PAL8+SAI	114.62	100.0%	DGI+PA6U+PAL6+SAB2U+SABL2	127.2	100.0%
0500.0600	BLI+DG6U+DGL6+PA6U+PAL6+SAI	89	100.0%	BLI+DG6U+DGL6+PA4U+PAL4+SAI	96.84	100.0%	BLI+DG4U+DGL4+PA6U+PAL6+SAI	116.06	100.0%
0520.0620	BLI+DG6U+DGL6+PA4U+PAL4+SAS4U+SASL4	81.72	120.0%	BLI+DG6U+DGL6+PA4U+PAL4+SAS6U+SASL6	83.04	120.0%	ASI+BLI+DG6U+DGL6+PA4U+PAL4+SAN	95.46	120.0%
0540.0640	ASI+BLI+DG6U+DGL6+PA4U+PAL4+SAN	70.96	110.00%	BLI+DG6U+DGL6+PA4U+PAL4+SAS6U+SASL6	82.62	110.00%	ASI+BLI+DG4U+DGL4+PA4U+PAL4+SAN	98.68	110.00%
0600.0700	AS6U+ASL6+BL6U+BLL6+DG6U+DGL6+PA4U+PAL4+SAN	58.48	100.0%	AS6U+ASL6+BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAN	63.5	100.0%	AS4U+BL6U+BLL6+DG6U+DGL6+PA4U+PAL4+SA4U+SASL4	69.88	100.0%
0620.0720	AS6U+ASL6+BL6U+BLL6+DG6U+DGL6+PA4U+PAL4+SAN	52.92	100.0%	AS6U+BL6U+BLL6+DG6U+DGL6+PA4U+PAL4+SA6U+SASL6	54.24	100.0%	AS6U+ASL6+BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAN	55.8	100.0%
0640.0740	ASI+BL6U+BLL6+DG6U+DGL6+PA4U+PAL4+SAN	52.9	100.0%	ASI+BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAN	55.72	100.0%	AS6U+ASL6+BL6U+BLL6+DG6U+DGL6+PA4U+PAL4+SAN	62.66	100.0%
0700.0800	ASI+BD6U+BLL6+DGL6+PA4U+PAL4+SAN	30.24	100.0%	ASI+BD6U+BLL6+DGL6+PA2U+PAL2+SAN	34.62	100.0%	ASI+BD6U+BLL6+DGL6+PA6U+PAL6+SAN	45.56	100.0%
0720.0820	BLI+DG6U+DGL6+PA2U+PAL2+SAS6U+SASL6	59.82	100.0%	BD6U+BLL6+DGL6+PA2U+PAL2+SAS6U+SASL6	60.36	100.0%	BDL4+BL4U+DG4U+PA2U+PAL2+SAS6U+SASL6	61.32	100.0%
0740.0840	ASI+BLI+DG6U+DGL6+PA2U+PAL2+SAN	75.9	100.0%	BLI+DG6U+DGL6+PA2U+PAL2+SAS4U+SASL4	77.12	100.0%	ASI+BLI+DG6U+DGL6+PA4U+PAL4+SAN	79.5	100.0%
0800.0900	BLI+DG4U+DGL4+PA4U+PAL4+SAS4U+SASL4	68.14	110.00%	BLI+DG6U+DGL6+PA4U+PAL4+SAS4U+SASL4	71.42	110.00%	ASI+BLI+DG4U+DGL4+PA4U+PAL4+SAN	76.66	110.00%
0820.0920	ASI+BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAN	47.66	110.00%	BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAS6U+SASL6	55.06	110.00%	AS2U+BL2U+DG4U+DGL4+PA4U+PAL4+SA2U+SABL2	56.82	110.00%
0840.0940	ASI+BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAN	45.54	120.0%	BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAS6U+SASL6	47.64	120.0%	BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAS4U+SASL4	70.54	120.0%
0900.1000	ASI+BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAN	29.36	100.0%	BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAS6U+SASL6	32	100.0%	BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAS4U+SASL4	42.52	100.0%
0920.1020	ASI+BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAN	66.32	100.0%	BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAS4U+SASL4	69.54	100.0%	ASI+BL4U+BLL4+DG4U+DGL4+PA2U+PAL2+SAN	78.06	100.0%
0940.1040	ASI+BL4U+BLL4+DG4U+DGL4+PA2U+PAL2+SAN	62.44	110.00%	ASI+BL6U+BLL6+DG4U+DGL4+PA2U+PAL2+SAN	63.82	110.00%	BL4U+BLL4+DG4U+DGL4+PA2U+PAL2+SAS4U+SASL4	70.94	110.00%
1000.1100	BL4U+BLL4+DG4U+DGL4+PA2U+PAL2+SAS4U+SASL4	75.82	100.0%	ASI+BL4U+BLL4+DG4U+DGL4+PA2U+PAL2+SAN	77.1	100.0%	BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAS4U+SASL4	78.3	100.0%
1020.1120	ASI+BL4U+BLL4+DG6U+DGL6+PA4U+PAL4+SAN	59.66	100.0%	ASI+BL6U+BLL6+DG6U+DGL6+PA4U+PAL4+SAN	59.78	100.0%	ASI+BL4U+BLL4+DG6U+DGL6+PA6U+PAL6+SAN	59.88	100.0%
1040.1140	BL4U+BLL4+DG4U+DGL4+PA6U+PAL6+SAS6U+SASL6	32.58	100.0%	BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAS6U+SASL6	36.5	100.0%	BL4U+BLL4+DG6U+DGL6+PA6U+PAL6+SAS6U+SASL6	36.58	100.0%
1100.1200	BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAS6U+SASL6	16.32	100.0%	ASI+BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAN	21.54	100.0%	BL2U+BLL2+DG4U+DGL4+PA4U+PAL4+SAS6U+SASL6	37.7	100.0%
1120.1220	BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAS6U+SASL6	21.96	100.0%	ASI+BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAN	28.8	100.0%	BL2U+BLL2+DG4U+DGL4+PA4U+PAL4+SAS6U+SASL6	36.6	100.0%
1140.1240	ASI+BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAN	46.2	100.0%	ASI+BL4U+BLL4+DG6U+DGL6+PA4U+PAL4+SAN	58.64	100.0%	ASI+BL2U+BLL2+DG4U+DGL4+PA4U+PAL4+SAN	70.92	100.0%
1200.1300	AS4U+BDL4+BL4U+DG4U+PA4U+PAL4+SA4U+SASL4	36.24	100.0%	ASI+BDL4+BL4U+DG4U+PA4U+PAL4+SAN	38.12	100.0%	AS4U+BDL4+BL4U+DG4U+PA4U+PAL4+SAOI+SEASL4	45.78	100.0%
1220.1320	AS6U+ASL6+BL6U+BLL6+DG6U+DGL6+PA4U+PAL4+SAN	51.84	100.0%	AS6U+ASL6+BLI+DG6U+DGL6+PA4U+PAL4+SAN	54.06	100.0%	AS4U+BL6U+BLL6+DG6U+DGL6+PA4U+PAL4+SA4U+SASL4	55.2	100.0%
1240.1340	AS6U+ASL6+BLI+DG6U+DGL6+PA4U+PAL4+SAN	27.22	100.0%	AS6U+ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SAN	34.5	100.0%	AS4U+BLI+DG6U+DGL6+PA4U+PAL4+SA4U+SASL4	49.42	100.0%
1300.1400	AS6U+ASL6+BLI+DG6U+DGL6+PA4U+PAL4+SAN	34.32	100.0%	AS6U+ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SAN	40.04	100.0%	AS6U+ASL6+BLI+DG6U+DGL6+PA6U+PAL6+SAN	40.06	100.0%
1320.1420	AS6U+ASL6+BLI+DG6U+DGL6+PA4U+PAL4+SAN	39.84	100.0%	AS6U+ASL6+BLI+DG6U+DGL6+PA6U+PAL6+SAN	43.24	100.0%	AS6U+ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SAN	46.88	100.0%
1340.1440	AS6U+ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SAN	49.46	100.0%	AS6U+ASL6+BLI+DG6U+DGL6+PA4U+PAL4+SAN	57.84	100.0%	ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SAL6+SAS6U	64.64	100.0%
1400.1500	ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SAL6+SAS6U	37.58	100.0%	AS6U+ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SAN	38.66	100.0%	AS2U+BL2U+DG4U+DGL4+PA4U+PAL4+SA2U+SABL2	53.44	100.0%
1420.1520	ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SAL6+SAS6U	39.52	110.00%	AS6U+ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SAN	43.3	110.00%	ASL6+BLI+DG6U+DGL6+PA4U+PAL4+SAL6+SAS6U	46.68	110.00%
1440.1540	ASL6+BLI+DG6U+DGL6+PA6U+PAL6+SAL6+SAS6U	27	100.0%	AS6U+ASL6+BLI+DG6U+DGL6+PA6U+PAL6+SAN	27.9	100.0%	AS4U+BLI+DG6U+DGL6+PA6U+PAL6+SA4U+SASL4	29.4	100.0%
1500.1600	ASL6+BLI+DG6U+DGL6+PA6U+PAL6+SAL6+SAS6U	15.3	100.0%	AS6U+ASL6+BLI+DG6U+DGL6+PA6U+PAL6+SAN	16.2	100.0%	AS4U+BLI+DG6U+DGL6+PA6U+PAL6+SA4U+SASL4	18.7	100.0%
1520.1620	AS6U+ASL6+BLI+DG4U+DGL4+PA6U+PAL6+SAOI+SEL4	50.7	100.0%	AS6U+ASL6+BLI+DG4U+DGL4+PA6U+PAL6+SA4U+SAL4	51	100.0%	AS6U+ASL6+BLI+DG6U+DGL6+PA6U+PAL6+SAOI+SEL4	51.04	100.0%
1540.1640	AS6U+ASL6+BLI+DG4U+DGL4+PA6U+PAL6+SAOI+SEL4	60.64	110.00%	AS6U+ASL6+BLI+DG6U+DGL6+PA6U+PAL6+SAOI+SEL4	61.58	110.00%	AS6U+ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SAOI+SEL4	64.84	110.00%
1600.1700	AS6U+ASL6+BL4U+BLL4+DG6U+DGL6+PA4U+PAL4+SAN	111.92	100.0%	AS6U+ASL6+BL6U+BLL6+DG6U+DGL6+PA4U+PAL4+SAN	113.84	100.0%	AS6U+ASL6+BL4U+BLL4+DG6U+DGL6+PA4U+PAL4+SAOI+SEL4	131.16	100.0%
1620.1720	ASI+BDL4+BL4U+DG4U+PA6U+PAL6+SAN	55.28	100.0%	ASI+BDL4+BL4U+DG4U+PA4U+PAL4+SAN	57.02	100.0%	ASI+BL6U+BLL6+DG6U+DGL6+PA6U+PAL6+SAN	60.26	100.0%
1640.1740	AS6U+BDL6+BL6U+DG6U+PA6U+PAL6+SA6U+SASL6	62.9	100.0%	AS6U+BDL6+BL6U+DG6U+PA4U+PAL4+SA6U+SASL6	66.74	100.0%	AS6U+ASL6+BDL6+BL6U+DG6U+PA6U+PAL6+SAN	79.1	100.0%
1700.1800	AS6U+ASL6+BDPL4+BL4U+DG4U+PA4U+SAN	34.36	100.0%	AS4U+BDPL4+BL4U+DG4U+PA4U+SA4U+SASL4	41.7	100.0%	AS4U+BDPL4+BL4U+DG4U+PA4U+SAOI+SEASL4	54.54	100.0%
1720.1820	AS6U+ASL6+BDPL2+BL2U+DG2U+PA2U+SAN	48.18	100.0%	AS4U+BDPL2+BL2U+DG2U+PA2U+SA4U+SASL4	60.44	100.0%	AS4U+BDPL2+BL2U+DG2U+PA2U+SAOI+SEASL4	68.18	100.0%
1740.1840	ASI+BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAN	79.68	100.0%	ASI+BL6U+BLL6+DG6U+DGL6+PA4U+PAL4+SAN	81.06	100.0%	ASI+BL6U+BLL6+DG4U+DGL4+PA6U+PAL6+SAN	82.2	100.0%
1800.1900	ASI+BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAN	47.18	100.0%	ASI+BL6U+BLL6+DG6U+DGL6+PA4U+PAL4+SAN	49.78	100.0%	ASI+BL6U+BLL6+DG4U+DGL4+PA6U+PAL6+SAN	51.9	100.0%
1820.1920	ASI+BL6U+BLL6+DG6U+DGL6+PA6U+PAL6+SAN	29.12	100.0%	ASI+BL4U+BLL4+DG6U+DGL6+PA6U+PAL6+SAN	29.9	100.0%	BL6U+BLL6+DG6U+DGL6+PA6U+PAL6+SAS6U+SASL6	38.78	100.0%
1840.1940	ASI+BLI+DG6U+DGL6+PA6U+PAL6+SAN	22.3	100.0%	BLI+DG6U+DGL6+PA6U+PAL6+SAS6U+SASL6	28.84	100.0%	ASI+BL6U+BLL6+DG6U+DGL6+PA6U+PAL6+SAN	52.12	100.0%
1900.2000	ASI+BLI+DG4U+DGL4+PA6U+PAL6+SAN	31.1	100.0%	BLI+DG4U+DGL4+PA6U+PAL6+SAS6U+SASL6	32.9	100.0%	ASI+BLI+DG6U+DGL6+PA6U+PAL6+SAN	37.62	100.0%
1920.2020	ASI+BL6U+BLL6+DG6U+DGL6+PA6U+PAL6+SAN	81.74	100.0%	ASI+BL6U+BLL6+DG4U+DGL4+PA6U+PAL6+SAN	85.12	100.0%	ASI+BL4U+BLL4+DG6U+DGL6+PA6U+PAL6+SAN	88.06	100.0%

1940_2040	AS6U+BL4U+BLL4+DG6U+DGL6+PA6U+PAL6+SA6U+SASL6	75.52	100.0%	AS6U+BL4U+BLL4+DG4U+DGL4+PA6U+PAL6+SA6U+SASL6	81.18	100.0%	AS6U+BL6U+BLL6+DG6U+DGL6+PA6U+PAL6+SA6U+SASL6	81.8	100.0%
2000_2100	AS4U+BD6U+BLL6+DGL6+PA6U+PAL6+SA4U+SASL4	99.4	100.0%	AS4U+BD6U+BLL6+DGL6+PA4U+PAL4+SA4U+SASL4	103.18	100.0%	AS4U+BL4U+BLL4+DG4U+DGL4+PA6U+PAL6+SA4U+SASL4	104.04	100.0%
2020_2120	AS6U+ASL6+BDL4+BL4U+DG4U+PA6U+PAL6+SA6U+SAL6	49.38	100.0%	AS6U+ASL6+BDPL2+BL2U+DG2U+PA2U+SA6U+SAL6	56.64	100.0%	AS6U+ASL6+BDL4+BL4U+DG4U+PA4U+PAL4+SA6U+SAL6	57.48	100.0%
2040_2140	AS6U+ASL6+BDPL4+BL4U+DG4U+PA4U+SA6U+SAL6	40.86	100.0%	AS6U+ASL6+BLI+DGL8+DP8U+PAL8+SA6U+SAL6	45.14	100.0%	AS6U+ASL6+BLI+DGI+PAI+SA6U+SAL6	45.62	100.0%
2100_2200	ASI+BLI+DGI+PAI+SA6U+SAL6	46.38	100.0%	ASI+BD6U+BDL6+PAI+SA6U+SAL6	49	100.0%	ASI+BLI+DGL8+DP8U+PAL8+SA6U+SAL6	50.4	100.0%
2120_2220	BDP6U+BDPL6+SAS6U+SASL6	20.24	100.0%	BLI+DGI+PAI+SAS6U+SASL6	23.9	100.0%	ASI+BDP6U+BDPL6+SAN	29.9	100.0%
2140_2240	BDI+PAI+SAS6U+SASL6	25.76	100.0%	BDP6U+BDPL6+SAS6U+SASL6	34.92	100.0%	ASI+BDI+PAI+SAN	41.18	100.0%
2200_2300	BDP+SAS6U+SASL6	7.12	100.0%	ASI+BDP+SAN	32.02	100.0%	BDPL6+DP6U+SAB6U+SASL6	41.48	100.0%
2220_2320	DP4U+DPL4+SAB6U+SABL6	36.02	100.0%	BDP+SAS6U+SASL6	37.62	100.0%	DP2U+DPL2+SAB6U+SABL6	38.56	100.0%
2240_2340	BDP+SAI	7.66	100.0%	BLI+DP6U+DPL6+SAI	37.42	100.0%	BLI+DP4U+DPL4+SAI	39.7	100.0%
2300_0000	BDP+SAI	11.46	100.0%	BLI+DPI+SAI	39.22	100.0%	BLI+DP6U+DPL6+SAI	40.86	100.0%
2320_0020	DPI+SABI	5.4	100.0%	BDP+SAI	11.22	100.0%	BLI+DPI+SAI	19.98	100.0%
2340_0040	R1I	0	100.0%	DPI+SABI	5.4	100.0%	BDP+SAI	11.22	100.0%

February 13th 2019, current SECTORIA version output, DAC sectorization

0000_0100	R1I	84.36	100.0%	DPI+SABI	117.96	100.0%	DP2U+DP4U+DPL2+DPL4+SABI	207.72	100.0%
0020_0120	R1I	111.36	100.0%	DPI+SABI	144.96	100.0%	DP2U+DPL2+SABI	178.56	100.0%
0040_0140	R1I	116.76	100.0%	DPI+SABI	150.36	100.0%	DP4U+DPL4+SABI	182.46	100.0%
0100_0200	R1I	104.76	100.0%	DPI+SABI	136.86	100.0%	DP4U+DPL4+SABI	168.96	100.0%
0120_0220	R1I	95.16	100.0%	DPI+SABI	127.26	100.0%	DP2U+DP4U+DPL2+DPL4+SABI	219.36	100.0%
0140_0240	R1I	96.66	100.0%	DPI+SABI	129.96	100.0%	DP2U+DP8U+DPL2+DPL8+SABI	228.36	100.0%
0200_0300	R1I	94.26	100.0%	DPI+SABI	129.36	100.0%	DP2U+DP4U+DPL2+DPL4+SABI	215.16	100.0%
0220_0320	R1I	85.26	100.0%	DPI+SABI	118.56	100.0%	DP4U+DP6U+DPL4+DPL6+SABI	192.54	100.0%
0240_0340	R1I	85.26	100.0%	DPI+SABI	118.26	100.0%	DP6U+DPL6+SABI	150.6	100.0%
0300_0400	R1I	88.26	100.0%	DPI+SABI	119.76	100.0%	DP2U+DPL2+SABI	151.5	100.0%
0320_0420	R1I	91.86	100.0%	DPI+SABI	123.96	100.0%	DP2U+DPL2+SABI	155.76	100.0%
0340_0440	R1I	73.26	100.0%	DPI+SABI	107.46	100.0%	DP2U+DPL2+SABI	135.78	100.0%
0400_0500	R1I	54.96	100.0%	DPI+SABI	93.36	100.0%	DP2U+DPL2+SABI	119.88	100.0%
0420_0520	R1I	54.36	100.0%	DPI+SABI	94.56	100.0%	DP2U+DPL2+SABI	122.46	100.0%
0440_0540	R1I	65.16	100.0%	DPI+SABI	101.76	100.0%	DP2U+DPL2+SABI	130.44	100.0%
0500_0600	DP2U+DPL2+SABI	123.82	100.0%	DPI+SABI	124.28	100.0%	DP4U+DPL4+SABI	130.88	100.0%
0520_0620	DP2U+DPL2+SABI	106.32	100.0%	DP4U+DPL4+SABI	111.38	100.0%	DGI+PAI+SABI	122.82	100.0%
0540_0640	BDP2U+BDPL2+SASI	78	100.0%	BLI+DGI+PAI+SASI	119.46	100.0%	BDPL2+BL2U+DP2U+SASI	133	100.0%
0600_0700	BLI+DGI+PAI+SASI	75.86	100.0%	BDL2+BDP2U+PAL2+SASI	93.78	100.0%	BLI+DGL6+DP6U+PAL6+SASI	95.48	100.0%
0620_0720	BLI+DGI+PAI+SASI	59.5	100.0%	BD2U+BDL2+PAI+SASI	68.5	100.0%	BLI+DGL8+DP8U+PAL8+SASI	77.74	100.0%
0640_0740	BDP6U+BLL6+DGL6+PAL6+SASI	45.68	100.0%	BLI+DGI+PA2U+PAL2+SASI	47.16	100.0%	BLI+DGI+PA4U+PAL4+SASI	60.78	100.0%
0700_0800	BLI+DGL8+DP8U+PAL8+SAS6U+SASL6	90.2	100.0%	BL4U+DGL8+DP8U+PAL8+SABL4+SAS4U	98.78	100.0%	BLI+DGL8+DP8U+PAL8+SAS4U+SASL4	99.68	100.0%
0720_0820	BDPL2+BL2U+DG2U+PA2U+SASI	61.82	100.0%	BLI+DG6U+DGL6+PAI+SASI	63.66	100.0%	BDL4+BL4U+DG4U+PAI+SASI	67.02	100.0%
0740_0840	BDL4+BL4U+DG4U+PAI+SAS6U+SASL6	37.14	100.0%	BLI+DG6U+DGL6+PAI+SAS6U+SASL6	40.38	100.0%	BDPL2+BL2U+DG2U+PA2U+SAS6U+SASL6	45.74	100.0%
0800_0900	BDL4+BL4U+DG4U+PAI+SAS6U+SASL6	28.08	100.0%	BDPL2+BL2U+DG2U+PA2U+SAS6U+SASL6	32.3	100.0%	ASI+BDL4+BL4U+DG4U+PAI+SAN	36.78	100.0%
0820_0920	ASI+BD6U+BDL6+PAI+SAN	20.42	100.0%	BD6U+BDL6+PAI+SAS6U+SASL6	29	100.0%	ASI+BDPL2+BL2U+DG2U+PA2U+SAN	41.3	100.0%
0840_0940	ASI+BLI+DGI+PAI+SAN	16.76	100.0%	ASI+BDL6+BDP6U+PAL6+SAN	18.06	100.0%	ASI+BD6U+BDL6+PAI+SAN	29.52	100.0%
0900_1000	ASI+BLI+DG2U+DPL2+PA2U+SAN	38.68	100.0%	BLI+DG2U+DPL2+PA2U+SAS6U+SASL6	46.3	100.0%	ASI+BLI+DGL8+DP8U+PAL8+SAN	47.6	100.0%
0920_1020	ASI+BDP6U+BLL6+DGL6+PAL6+SAN	41.72	100.0%	ASI+BLI+DG2U+DPL2+PA2U+SAN	61.06	100.0%	ASI+BDPL2+BL2U+DG2U+PA2U+SAN	62.44	100.0%
0940_1040	ASI+BLI+DG4U+DGL4+PA4U+PAL4+SAN	54.36	100.0%	BLI+DG4U+DGL4+PA4U+PAL4+SAS4U+SASL4	62.82	100.0%	ASI+BLI+DG4U+DGL4+PA2U+PAL2+SAN	63.9	100.0%
1000_1100	ASI+BD4U+BDL4+PAI+SAN	21.2	100.0%	ASI+BLI+DGI+PAI+SAN	23.52	100.0%	BD4U+BDL4+PAI+SAS4U+SASL4	27.24	100.0%
1020_1120	ASI+BLI+DGI+PAI+SAN	9.32	100.0%	BLI+DGI+PAI+SAS6U+SASL6	9.38	100.0%	ASI+BD4U+BDL4+PAI+SAN	10.8	100.0%
1040_1140	BLI+DGI+PAI+SAS6U+SASL6	3.26	100.0%	ASI+BLI+DGI+PAI+SAN	5.18	100.0%	BLI+DGI+PAI+SAS4U+SASL4	8.36	100.0%
1100_1200	ASI+BDPL2+BL2U+DG2U+PA2U+SAN	21.48	100.0%	BDPL2+BL2U+DG2U+PA2U+SAS4U+SASL4	25.48	100.0%	AS4U+BDPL2+BL2U+DG2U+PA2U+SAOI+SEASL4	50.58	100.0%
1120_1220	BDPL2+BL2U+DG2U+PA2U+SAS6U+SASL6	21.84	100.0%	ASI+BDPL2+BL2U+DG2U+PA2U+SAN	25.74	100.0%	BDPL2+BL2U+DG2U+PA2U+SAS4U+SASL4	34.18	100.0%
1140_1240	BLI+DG6U+DGL6+PAI+SAS6U+SASL6	23.74	100.0%	ASI+BLI+DG6U+DGL6+PAI+SAN	25.54	100.0%	BLI+DG4U+DGL4+PAI+SAS6U+SASL6	29.42	100.0%
1200_1300	ASI+BLI+DGL8+DP8U+PAL8+SAN	22.12	100.0%	BLI+DGL8+DP8U+PAL8+SAS6U+SASL6	23.98	100.0%	BLL6+DGL8+DP8U+PAL8+SAB6U+SASL6	32.62	100.0%
1220_1320	ASI+BLI+DGL8+DP8U+PAL8+SAN	28.36	100.0%	ASI+BD6U+BDL6+PAI+SAN	28.44	100.0%	ASI+BLI+DGI+PAI+SAN	30.7	100.0%
1240_1340	BLI+DGI+PAI+SAS6U+SASL6	23.82	100.0%	ASI+BLI+DGI+PAI+SAN	27.36	100.0%	BLI+DGL8+DP8U+PAL8+SAS6U+SASL6	36.48	100.0%
1300_1400	BLI+DGI+PAI+SAS6U+SASL6	30.7	100.0%	ASI+BLI+DGI+PAI+SAN	36.94	100.0%	BDPL2+BL2U+DG2U+PA2U+SAS6U+SASL6	40.2	100.0%
1320_1420	BDPL2+BL2U+DG2U+PA2U+SASI	23.32	100.0%	BDPL2+BL2U+DG2U+PA2U+SAS6U+SASL6	33.54	100.0%	ASI+BDPL2+BL2U+DG2U+PA2U+SAN	43.2	100.0%
1340_1440	BDPL2+BL2U+DG2U+PA2U+SASI	13.04	100.0%	BDPL2+BL2U+DG2U+PA2U+SAS6U+SASL6	25.18	100.0%	ASI+BDPL2+BL2U+DG2U+PA2U+SAN	41.02	100.0%
1400_1500	BDPL2+BL2U+DG2U+PA2U+SASI	8.14	100.0%	BLI+DGL8+DP8U+PAL8+SASI	17.04	100.0%	BDPL4+BL4U+DG4U+PA4U+SASI	18.48	100.0%
1420_1520	BDP6U+BLL6+DGL6+PAL6+SASI	32.88	100.0%	BLI+DGI+PA4U+PAL4+SASI	38.34	100.0%	BLI+DGI+PA6U+PAL6+SASI	47.04	100.0%
1440_1540	BDPL2+BL2U+DG2U+PA2U+SAS6U+SASL6	52.56	100.0%	BDP6U+BLL6+DGL6+PAL6+SAS6U+SASL6	57.58	100.0%	ASI+BDPL2+BL2U+DG2U+PA2U+SAN	74.64	100.0%
1500_1600	ASI+BDP6U+BLL6+DGL6+PAL6+SAN	58.86	100.0%	ASI+BLI+DGI+PA4U+PAL4+SAN	71.62	100.0%	ASI+BLI+DGI+PA2U+PAL2+SAN	80.2	100.0%
1520_1620	ASI+BDP6U+BLL6+DGL6+PAL6+SAN	22.38	100.0%	ASI+BLI+DGL6+DP6U+PAL6+SAN	44.7	100.0%	ASI+BLI+DGI+PA4U+PAL4+SAN	54.1	100.0%
1540_1640	ASI+BLI+DGI+PAI+SAN	43.4	100.0%	ASI+BLI+DGL8+DP8U+PAL8+SAN	50.56	100.0%	ASI+BDP6U+BLL6+DGL6+PAL6+SAN	55.44	100.0%
1600_1700	BL4U+DGL8+DP8U+PAL8+SABL4+SAS4U	38.66	100.0%	ASI+BDL4+BL4U+DG4U+PAI+SAN	56.46	100.0%	BDL4+BL4U+DG4U+PAI+SAS6U+SASL6	61.2	100.0%
1620_1720	BDPL2+BL2U+DG2U+PA2U+SAS6U+SASL6	55.42	100.0%	ASI+BDPL2+BL2U+DG2U+PA2U+SAN	67.42	100.0%	BDL4+BL4U+DG4U+PAI+SAS6U+SASL6	70.82	100.0%
1640_1740	BDPL2+BL2U+DG2U+PA2U+SAS6U+SASL6	33.64	100.0%	ASI+BDPL2+BL2U+DG2U+PA2U+SAN	37.18	100.0%	BD6U+BLL6+DGL6+PA4U+PAL4+SAS6U+SASL6	61.14	100.0%
1700_1800	BLI+DGL8+DP8U+PAL8+SAS6U+SASL6	44.56	100.0%	ASI+BLI+DGL8+DP8U+PAL8+SAN	44.8	100.0%	BD4U+BDL4+PA4U+PAL4+SAS6U+SASL6	45.86	100.0%
1720_1820	BLI+DGI+PAI+SAS6U+SASL6	10.56	100.0%	ASI+BLI+DGI+PAI+SAN	12.3	100.0%	BD4U+BDL4+PAI+SAS6U+SASL6	17.22	100.0%

1740_1840	BLI+DGI+PAI+SAS6U+SASL6	10.18	100.0%	ASI+BLI+DGI+PAI+SAN	14.14	100.0%	BLI+DGL8+DP8U+PAL8+SAS6U+SASL6	26.96	100.0%
1800_1900	BLI+DGI+PAI+SAS6U+SASL6	20.84	100.0%	BLI+DGL8+DP8U+PAL8+SAS6U+SASL6	32.64	100.0%	ASI+BLI+DGI+PAI+SAN	36.14	100.0%
1820_1920	BLI+DG2U+DPL2+PA2U+SAS6U+SASL6	44.64	100.0%	BL4U+DG2U+DPL2+PA2U+SABL4+SAS4U	65.22	100.0%	BDL4+BL4U+DG4U+PA6U+PAL6+SAS6U+SASL6	66.42	100.0%
1840_1940	BDP6U+BLL6+DGL6+PAL6+SAS6U+SASL6	32.16	100.0%	ASI+BDP6U+BLL6+DGL6+PAL6+SAN	51.78	100.0%	BD6U+BLL6+DGL6+PA2U+PAL2+SAS6U+SASL6	59.88	100.0%
1900_2000	BLI+DG6U+DGL6+PA2U+PAL2+SAS6U+SASL6	59.78	100.0%	BLI+DG6U+DGL6+PA4U+PAL4+SAS6U+SASL6	61.88	100.0%	BLI+DG4U+DGL4+PA2U+PAL2+SAS6U+SASL6	63.56	100.0%
1920_2020	BLI+DG6U+DGL6+PA2U+PAL2+SAS6U+SASL6	50.86	100.0%	ASI+BLI+DG6U+DGL6+PA2U+PAL2+SAN	51.46	100.0%	BL2U+DG6U+DGL6+PA2U+PAL2+SABL2+SAS2U	54.88	100.0%
1940_2040	BL2U+DG6U+DGL6+PA6U+PAL6+SABL2+SAS2U	49.96	100.0%	BL2U+DG6U+DGL6+PA4U+PAL4+SABL2+SAS2U	50.92	100.0%	BL2U+DG6U+DGL6+PA2U+PAL2+SABL2+SAS2U	51.52	100.0%
2000_2100	BD6U+BLL6+DGL6+PA6U+PAL6+SASI	63.6	100.0%	BD6U+BLL6+DGL6+PA4U+PAL4+SASI	64.92	100.0%	BD6U+BLL6+DGL6+PA2U+PAL2+SASI	70.44	100.0%
2020_2120	BD4U+BDL4+PAI+SASI	18.7	100.0%	BLI+DGI+PAI+SASI	26.24	100.0%	BDP6U+BLL6+DGL6+PAL6+SASI	30	100.0%
2040_2140	BLI+DGI+PAI+SAS6U+SASL6	54.86	100.0%	BDL6+BDP6U+PAL6+SAS6U+SASL6	56.46	100.0%	BL2U+DGI+PAI+SABL2+SAS2U	61.82	100.0%
2100_2200	BDL4+BDP4U+PAL4+SAS6U+SASL6	41.28	100.0%	BDL6+BDP6U+PAL6+SAS6U+SASL6	43.26	100.0%	BLI+DGI+PAI+SAS6U+SASL6	50.06	100.0%
2120_2220	BDP2U+BDPL2+SAS6U+SASL6	46.44	100.0%	BDI+PAI+SAS6U+SASL6	47.84	100.0%	DGI+PAI+SAB4U+SABL4	51.56	100.0%
2140_2240	BDI+PAI+SASI	67.26	100.0%	BDP2U+BDPL2+SASI	80.7	100.0%	BDP+SASI	84.74	100.0%
2200_2300	DP2U+DPL2+SABI	36.46	100.0%	DP4U+DPL4+SABI	46.18	100.0%	DPI+SABI	48.14	100.0%
2220_2320	R1I	7.86	100.0%	DPI+SABI	47.06	100.0%	DP2U+DPL2+SABI	57.12	100.0%
2240_2340	R1I	39.24	100.0%	DPI+SABI	71.46	100.0%	DP2U+DPL2+SABI	97.68	100.0%
2300_0000	R1I	58.02	100.0%	DPI+SABI	89.46	100.0%	DP2U+DPL2+SABI	120.54	100.0%
2320_0020	R1I	50.4	100.0%	DPI+SABI	72.9	100.0%	DP2U+DPL2+SABI	96.36	100.0%
2340_0040	R1I	15	100.0%	DPI+SABI	25.5	100.0%	DP2U+DPL2+SABI	36.96	100.0%

July 3rd 2019, current SECTORIA version output, reference sectorization

0000_0100	R1I	50.7	100.00%	BDP+SAI	151.26	100.00%	BLI+DPI+SAI	230.4	100.00%
0020_0120	R1I	58.56	100.00%	BDP+ SAI	159.36	100.00%	BLI+ DPI+ SAI	238.5	100.00%
0040_0140	R1I	51.96	100.00%	BDP+ SAI	152.76	100.00%	BLI+ DPI+ SAI	230.4	100.00%
0100_0200	R1I	54.36	100.00%	BDP+ SAI	155.16	100.00%	BLI+ DPI+ SAI	232.8	100.00%
0120_0220	R1I	67.86	100.00%	BDP+ SAI	168.66	100.00%	BLI+ DPI+ SAI	247.8	100.00%
0140_0240	R1I	82.26	100.00%	BDP+ SAI	183.06	100.00%	BLI+ DPI+ SAI	263.7	100.00%
0200_0300	R1I	73.86	100.00%	BDP+ SAI	174.66	100.00%	BLI+ DPI+ SAI	253.8	100.00%
0220_0320	R1I	43.14	100.00%	BDP+ SAI	143.46	100.00%	BLI+ DPI+ SAI	221.1	100.00%
0240_0340	BDP+ SAI	110.7	100.00%	BLI+ DPI+ SAI	186.24	100.00%	BDI+ PAI+ SAI	187.56	100.00%
0300_0400	BDP+ SAI	87.42	100.00%	BLI+ DPI+ SAI	153.42	100.00%	BDI+ PAI+ SAI	158.28	100.00%
0320_0420	BDP+ SAI	92.82	100.00%	BLI+ DPI+ SAI	160.32	100.00%	BDI+ PAI+ SAI	163.38	100.00%
0340_0440	BDP+ SAI	88.32	100.00%	BLI+ DPI+ SAI	152.34	100.00%	BDI+ PAI+ SAI	157.14	100.00%
0400_0500	BLI+ DPI+ SAI	136.46	100.00%	BLL+ BLU+ DPI+ SAI	240.74	100.00%	ASI+ BLI+ DPI+ SAN	269.36	100.00%
0420_0520	BLI+ DGI+ PAI+ SAI	224.58	100.00%	BLI+ DGI+ PAL+ PAU+ SAI	305.76	100.00%	BLL+ BLU+ DGI+ PAI+ SAI	315.96	100.00%
0440_0540	BLI+ DGL+ DGU+ PAL+ PAU+ SAI	417.96	100.00%	BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAI	500.64	100.00%	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	526.8	100.00%
0500_0600	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	336.5	100.00%	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	411.02	100.00%	ASL+ ASU+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	432.42	100.00%
0520_0620	ASL+ ASU+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	350.04	100.00%	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	259.12	110.00%	ASL+ ASU+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	304.16	110.00%
0540_0640	ASL+ ASU+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	278.52	100.00%	ASL+ ASU+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	248.54	120.00%	ASI+ BLI+ DGI+ PAL+ PAU+ SAN	104	deactivated
0600_0700	ASL+ ASU+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	320.58	100.00%	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	339.78	120.00%	ASL+ ASU+ BLL+ BLU+ DGI+ PAL+ PAU+ SAN	139.26	deactivated
0620_0720	ASL+ ASU+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	313.04	110.00%	ASL+ ASU+ BLL+ BLU+ DGI+ PAL+ PAU+ SAN	144.32	deactivated	ASL+ ASU+ BLI+ DGI+ PAL+ PAU+ SAN	221.22	deactivated
0640_0740	ASL+ ASU+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	282.74	100.00%	ASL+ ASU+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	351.8	120.00%	ASL+ ASU+ BLL+ BLU+ DGI+ PAL+ PAU+ SAN	117.92	deactivated
0700_0800	ASL+ ASU+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	268.6	120.00%	ASL+ ASU+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	278.54	120.00%	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	300.56	120.00%
0720_0820	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	232.02	100.00%	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	292.78	100.00%	ASL+ ASU+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	294.86	100.00%
0740_0840	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	242.6	100.00%	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	301.08	100.00%	ASL+ ASU+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	330.92	100.00%
0800_0900	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	209.42	100.00%	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	256.76	100.00%	ASL+ ASU+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	289.94	100.00%
0820_0920	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	162.8	100.00%	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	209.72	100.00%	ASL+ ASU+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	226.52	100.00%
0840_0940	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	195.56	110.00%	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	199.26	110.00%	ASL+ ASU+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	260.78	110.00%
0900_1000	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	238.98	100.00%	ASL+ ASU+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	294.66	100.00%	ASI+ BLL+ BLU+ DGI+ PAL+ PAU+ SAN	54.9	deactivated
0920_1020	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	217.54	110.00%	ASL+ ASU+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	267.04	110.00%	ASI+ BLL+ BLU+ DGI+ PAL+ PAU+ SAN	48.64	deactivated
0940_1040	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	190.56	120.00%	ASL+ ASU+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	236.88	120.00%	ASI+ BLL+ BLU+ DGI+ PAL+ PAU+ SAN	48.24	deactivated
1000_1100	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	179.28	100.00%	ASL+ ASU+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	240.12	100.00%	ASI+ BLL+ BLU+ DGI+ PAL+ PAU+ SAN	30.18	deactivated
1020_1120	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	211.1	100.00%	ASL+ ASU+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	276.18	100.00%	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	239.16	110.00%
1040_1140	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	222.76	100.00%	ASL+ ASU+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	288.5	100.00%	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	251.5	120.00%
1100_1200	ASL+ ASU+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	252.72	100.00%	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	197.36	110.00%	ASI+ BLL+ BLU+ DGI+ PAL+ PAU+ SAN	30.86	deactivated
1120_1220	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	202.84	100.00%	ASL+ ASU+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	268.8	100.00%	ASI+ BLL+ BLU+ DGI+ PAL+ PAU+ SAN	26.74	deactivated
1140_1240	ASI+ BLL+ BLU+ DGI+ PAL+ PAU+ SAN	72.64	100.00%	ASL+ ASU+ BLL+ BLU+ DGI+ PAL+ PAU+ SAN	136.8	100.00%	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	282.64	100.00%
1200_1300	ASI+ BLI+ DGI+ PAL+ PAU+ SAN	65.92	100.00%	ASI+ BLL+ BLU+ DGI+ PAL+ PAU+ SAN	108.88	100.00%	ASL+ ASU+ BLI+ DGI+ PAL+ PAU+ SAN	140.94	100.00%
1220_1320	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	329.14	100.00%	ASL+ ASU+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	394.38	100.00%	ASI+ BLI+ DGI+ PAL+ PAU+ SAN	88.04	110.00%
1240_1340	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	274.38	100.00%	ASL+ ASU+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	329.1	100.00%	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	256.16	110.00%
1300_1400	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	247.78	100.00%	ASL+ ASU+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	291.3	100.00%	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	238.96	120.00%
1320_1420	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	197.68	100.00%	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	246	100.00%	ASL+ ASU+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	249.28	100.00%
1340_1440	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	227.3	100.00%	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	264.06	100.00%	ASL+ ASU+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	283.7	100.00%
1400_1500	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	195.28	100.00%	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	246.78	100.00%	ASL+ ASU+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	273.82	100.00%
1420_1520	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	229.48	100.00%	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	274.86	100.00%	ASL+ ASU+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	302.02	100.00%
1440_1540	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	187.44	100.00%	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	243.54	100.00%	ASL+ ASU+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	272.88	100.00%
1500_1600	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	205.62	100.00%	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	257.1	100.00%	ASL+ ASU+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	278.34	100.00%
1520_1620	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	193.68	100.00%	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	246.78	100.00%	ASL+ ASU+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	261	100.00%
1540_1640	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	246.68	100.00%	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	300.92	100.00%	ASL+ ASU+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	311.84	100.00%
1600_1700	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	287.48	100.00%	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	325.22	100.00%	ASL+ ASU+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	370.76	100.00%
1620_1720	ASI+ BLI+ DGI+ PAL+ PAU+ SAN	72.2	100.00%	ASI+ BLL+ BLU+ DGI+ PAL+ PAU+ SAN	97.82	100.00%	ASL+ ASU+ BLI+ DGI+ PAL+ PAU+ SAN	168.38	100.00%
1640_1740	ASI+ BLL+ BLU+ DGI+ PAL+ PAU+ SAN	59.56	100.00%	ASL+ ASU+ BLL+ BLU+ DGI+ PAL+ PAU+ SAN	147.1	100.00%	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	291.16	100.00%
1700_1800	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	236.04	100.00%	ASL+ ASU+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	323.4	100.00%	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	240.14	110.00%
1720_1820	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	200.34	100.00%	ASL+ ASU+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	291.96	100.00%	BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAI	235.7	120.00%

1740_1840	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	154.72	110.00%	ASL+ ASU+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	236.44	110.00%	BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAI	157.86	120.00%
1800_1900	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	162.92	120.00%	ASL+ ASU+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	234.32	120.00%	BLL+ BLU+ DGI+ PAL+ PAU+ SAI	36	deactivated
1820_1920	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	191.06	110.00%	ASL+ ASU+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	252.44	110.00%	BLL+ BLU+ DGI+ PAL+ PAU+ SAI	26.4	deactivated
1840_1940	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	212.94	100.00%	ASL+ ASU+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	291.96	100.00%	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	226.56	120.00%
1900_2000	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	238.56	100.00%	ASL+ ASU+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	312.24	100.00%	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	234.92	120.00%
1920_2020	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	250.2	100.00%	ASL+ ASU+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	327.54	100.00%	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	228.08	110.00%
1940_2040	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	259.62	100.00%	ASL+ ASU+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	328.08	100.00%	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	237.36	120.00%
2000_2100	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	237	100.00%	ASL+ ASU+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	295.02	100.00%	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN	232.64	120.00%
2020_2120	ASI+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	277.86	100.00%	ASL+ ASU+ BLL+ BLU+ DGL+ DGU+ PAL+ PAU+ SAN	343.32	100.00%	ASI+ BLI+ DGI+ PAL+ PAU+ SAN	68.76	110.00%
2040_2140	ASI+ BLI+ DGI+ PAL+ PAU+ SAN	136.06	100.00%	ASI+ BLL+ BLU+ DGI+ PAL+ PAU+ SAN	184.08	100.00%	ASL+ ASU+ BLI+ DGI+ PAL+ PAU+ SAN	193	100.00%
2100_2200	ASI+ BLI+ DGI+ PAI+ SAN	173.64	100.00%	ASI+ BLI+ DGI+ PAL+ PAU+ SAN	214.5	100.00%	ASL+ ASU+ BLI+ DGI+ PAI+ SAN	240.84	100.00%
2120_2220	BDI+ PAI+ SAI	56.6	100.00%	ASI+ BDI+ PAI+ SAN	67.56	100.00%	BDI+ PAL+ PAU+ SAI	113.84	100.00%
2140_2240	BDI+ PAI+ SAI	17.04	100.00%	BLI+ DPI+ SAI	46.26	100.00%	ASI+ BDI+ PAI+ SAN	70.62	100.00%
2200_2300	BDP+ SAI	11.52	100.00%	BDI+ PAI+ SAI	54.66	100.00%	BLI+ DPI+ SAI	82.14	100.00%
2220_2320	BDP+ SAI	34.32	100.00%	BDI+ PAI+ SAI	94.86	100.00%	BLI+ DPI+ SAI	106.14	100.00%
2240_2340	BDP+ SAI	58.02	100.00%	BLI+ DPI+ SAI	129.84	100.00%	BDI+ PAI+ SAI	141.72	100.00%
2300_0000	R1I	14.82	100.00%	BDP+ SAI	91.32	100.00%	BLI+ DPI+ SAI	162.3	100.00%
2320_0020	R1I	19.86	100.00%	BDP+ SAI	79.86	100.00%	BLI+ DPI+ SAI	129.6	100.00%
2340_0040	R1I	19.8	100.00%	BDP+ SAI	55.8	100.00%	BLI+ DPI+ SAI	83.1	100.00%

APPENDIX B. POST-PROCESSING TOOL OUTPUTS

June 22nd 2019, post-processing tool output, reference sectorization

time	possibleConfig
01/01/1900 0:00	R1I
01/01/1900 0:20	R1I
01/01/1900 0:40	R1I
01/01/1900 1:00	R1I
01/01/1900 1:20	R1I
01/01/1900 1:40	R1I
01/01/1900 2:00	R1I
01/01/1900 2:20	R1I
01/01/1900 2:40	R1I
01/01/1900 3:00	R1I
01/01/1900 3:20	R1I
01/01/1900 3:40	R1I
01/01/1900 4:00	R1I
01/01/1900 4:20	R1I
01/01/1900 4:40	DPI+SAB
01/01/1900 5:00	BLI+DGI+PAI+SAI
01/01/1900 5:20	BLI+DGI+PAL+PAU+SAI
01/01/1900 5:40	BLI+DGL+DGU+PAL+PAU+SAI
01/01/1900 6:00	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 6:20	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 6:40	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 7:00	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 7:20	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 7:40	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 8:00	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 8:20	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 8:40	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 9:00	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 9:20	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 9:40	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN
01/01/1900 10:00	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN
01/01/1900 10:20	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN
01/01/1900 10:40	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN
01/01/1900 11:00	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN
01/01/1900 11:20	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN
01/01/1900 11:40	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN
01/01/1900 12:00	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN
01/01/1900 12:20	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN
01/01/1900 12:40	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN
01/01/1900 13:00	ASL+ASU+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 13:20	ASL+ASU+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 13:40	ASL+ASU+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 14:00	ASL+ASU+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 14:20	ASL+ASU+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 14:40	ASL+ASU+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 15:00	ASL+ASU+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 15:20	ASL+ASU+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 15:40	ASL+ASU+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 16:00	ASL+ASU+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 16:20	ASL+ASU+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 16:40	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 17:00	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 17:20	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 17:40	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 18:00	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 18:20	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 18:40	BLI+DGL+DGU+PAL+PAU+SAI
01/01/1900 19:00	BLI+DGL+DGU+PAL+PAU+SAI
01/01/1900 19:20	BLI+DGL+DGU+PAL+PAU+SAI
01/01/1900 19:40	ASI+BLI+DGI+PAL+PAU+SAN
01/01/1900 20:00	ASI+BLI+DGI+PAL+PAU+SAN
01/01/1900 20:20	ASI+BLI+DGI+PAL+PAU+SAN
01/01/1900 20:40	ASI+BLI+DGI+PAI+SAN
01/01/1900 21:00	ASI+BLI+DGI+PAI+SAN
01/01/1900 21:20	ASI+BLI+DGI+PAI+SAN
01/01/1900 21:40	ASI+BLI+DGI+PAI+SAN
01/01/1900 22:00	ASI+BLI+DGI+PAI+SAN
01/01/1900 22:20	BDP+SAI
01/01/1900 22:40	BDP+SAI
01/01/1900 23:00	BDP+SAI
01/01/1900 23:20	BDP+SAI
01/01/1900 23:40	BDP+SAI

June 22nd 2019, post-processing tool output, DAC sectorization

time	Configuration
01/01/1900 0:00	R1I
01/01/1900 0:20	R1I
01/01/1900 0:40	R1I
01/01/1900 1:00	R1I
01/01/1900 1:20	R1I
01/01/1900 1:40	R1I
01/01/1900 2:00	R1I
01/01/1900 2:20	R1I
01/01/1900 2:40	R1I
01/01/1900 3:00	R1I
01/01/1900 3:20	R1I
01/01/1900 3:40	R1I
01/01/1900 4:00	R1I
01/01/1900 4:20	R1I
01/01/1900 4:40	R1I
01/01/1900 5:00	DP4U+DPL4+SABI
01/01/1900 5:20	DGI+PAI+SAB4U+SABL4
01/01/1900 5:40	BLI+DG6U+DGL6+PA6U+PAL6+SAI
01/01/1900 6:00	BLI+DG6U+DGL6+PA4U+PAL4+SAS4U+SASL4
01/01/1900 6:20	BLI+DG6U+DGL6+PA4U+PAL4+SAS4U+SASL4
01/01/1900 6:40	ASI+BLI+DG6U+DGL6+PA4U+PAL4+SAN
01/01/1900 7:00	ASI+BD6U+BLL6+DGL6+PA4U+PAL4+SAN
01/01/1900 7:20	ASI+BD6U+BLL6+DGL6+PA4U+PAL4+SAN
01/01/1900 7:40	ASI+BD6U+BLL6+DGL6+PA4U+PAL4+SAN
01/01/1900 8:00	ASI+BD6U+BLL6+DGL6+PAI+SAN
01/01/1900 8:20	ASI+BLI+DG6U+DGL6+PA2U+PAL2+SAN
01/01/1900 8:40	ASI+BLI+DG6U+DGL6+PA4U+PAL4+SAN
01/01/1900 9:00	ASI+BLI+DG4U+DGL4+PA4U+PAL4+SAN
01/01/1900 9:20	ASI+BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAN
01/01/1900 9:40	ASI+BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAN
01/01/1900 10:00	ASI+BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAN
01/01/1900 10:20	ASI+BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAN
01/01/1900 10:40	ASI+BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAN
01/01/1900 11:00	ASI+BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAN
01/01/1900 11:20	ASI+BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAN
01/01/1900 11:40	ASI+BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAN
01/01/1900 12:00	ASI+BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAN
01/01/1900 12:20	ASI+BDL4+BL4U+DG4U+PA4U+PAL4+SAN
01/01/1900 12:40	ASI+BDL4+BL4U+DG4U+PA4U+PAL4+SAN
01/01/1900 13:00	AS6U+ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SAN
01/01/1900 13:20	AS6U+ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SAN
01/01/1900 13:40	AS6U+ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SAN
01/01/1900 14:00	AS6U+ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SAN
01/01/1900 14:20	AS6U+ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SAN
01/01/1900 14:40	AS6U+ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SAN
01/01/1900 15:00	AS6U+ASL6+BLI+DG4U+DGL4+PA4U+PAL4+SAN
01/01/1900 15:20	AS6U+ASL6+BLI+DG6U+DGL6+PA4U+PAL4+SAN
01/01/1900 15:40	AS6U+ASL6+BLI+DG6U+DGL6+PA6U+PAL6+SAN
01/01/1900 16:00	AS6U+ASL6+BLI+DG6U+DGL6+PA6U+PAL6+SA4U+SAL4
01/01/1900 16:20	ASI+BDL4+BL4U+DG4U+PA6U+PAL6+SAN
01/01/1900 16:40	ASI+BDL4+BL4U+DG4U+PA6U+PAL6+SAN
01/01/1900 17:00	ASI+BDL4+BL4U+DG4U+PA6U+PAL6+SAN
01/01/1900 17:20	ASI+BDL4+BL4U+DG4U+PA6U+PAL6+SAN
01/01/1900 17:40	ASI+BDPL2+BL2U+DG2U+PA2U+SAN
01/01/1900 18:00	ASI+BDPL2+BL2U+DG2U+PA2U+SAN
01/01/1900 18:20	ASI+BDPL2+BL2U+DG2U+PA2U+SAN
01/01/1900 18:40	ASI+BLI+DG6U+DGL6+PA4U+PAL4+SAN
01/01/1900 19:00	ASI+BLI+DG6U+DGL6+PA4U+PAL4+SAN
01/01/1900 19:20	ASI+BLI+DG6U+DGL6+PA6U+PAL6+SAN
01/01/1900 19:40	ASI+BLI+DG6U+DGL6+PA6U+PAL6+SAN
01/01/1900 20:00	ASI+BLI+DG6U+DGL6+PA6U+PAL6+SAN
01/01/1900 20:20	ASI+BL6U+BLL6+DG6U+DGL6+PA6U+PAL6+SAN
01/01/1900 20:40	AS6U+ASL6+BLI+DGI+PAI+SA6U+SAL6
01/01/1900 21:00	AS6U+ASL6+BLI+DGI+PAI+SA6U+SAL6
01/01/1900 21:20	AS6U+ASL6+BLI+DGI+PAI+SA6U+SAL6
01/01/1900 21:40	BDI+PAI+SAS6U+SASL6
01/01/1900 22:00	BDI+PAI+SAS6U+SASL6
01/01/1900 22:20	BDI+PAI+SAS6U+SASL6
01/01/1900 22:40	BDI+PAI+SAS6U+SASL6
01/01/1900 23:00	BDP+SAI
01/01/1900 23:20	BDP+SAI
01/01/1900 23:40	BDP+SAI

August 3rd 2019, post-processing tool output, reference sectorization

time	Configuration
01/01/1900 0:00	R1I
01/01/1900 0:20	R1I
01/01/1900 0:40	R1I
01/01/1900 1:00	R1I
01/01/1900 1:20	R1I
01/01/1900 1:40	R1I
01/01/1900 2:00	R1I
01/01/1900 2:20	R1I
01/01/1900 2:40	R1I
01/01/1900 3:00	R1I
01/01/1900 3:20	R1I
01/01/1900 3:40	R1I
01/01/1900 4:00	R1I
01/01/1900 4:20	R1I
01/01/1900 4:40	DPI+SAB
01/01/1900 5:00	BLI+DPI+SAI
01/01/1900 5:20	BLI+DGI+PAI+SAI
01/01/1900 5:40	BLI+DGL+DGU+PAL+PAU+SAI
01/01/1900 6:00	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 6:20	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 6:40	ASI+BLL+BLU+DGI+PAL+PAU+SAN
01/01/1900 7:00	ASI+BLL+BLU+DGI+PAL+PAU+SAN
01/01/1900 7:20	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 7:40	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 8:00	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 8:20	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 8:40	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 9:00	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 9:20	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 9:40	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN
01/01/1900 10:00	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN
01/01/1900 10:20	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN
01/01/1900 10:40	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN
01/01/1900 11:00	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN
01/01/1900 11:20	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN
01/01/1900 11:40	ASI+BLL+BLU+DGL+DGU+PAL+PAU+SAN
01/01/1900 12:00	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 12:20	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 12:40	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 13:00	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 13:20	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 13:40	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 14:00	ASL+ASU+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 14:20	ASL+ASU+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 14:40	ASL+ASU+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 15:00	ASL+ASU+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 15:20	ASL+ASU+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 15:40	ASL+ASU+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 16:00	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 16:20	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 16:40	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 17:00	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 17:20	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 17:40	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 18:00	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 18:20	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 18:40	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 19:00	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 19:20	ASI+BLL+BLU+DGI+PAL+PAU+SAN
01/01/1900 19:40	ASI+BLL+BLU+DGI+PAL+PAU+SAN
01/01/1900 20:00	ASI+BLL+BLU+DGI+PAL+PAU+SAN
01/01/1900 20:20	ASI+BLL+BLU+DGI+PAL+PAU+SAN
01/01/1900 20:40	ASU+BLI+DGI+PAI+SAO+SAS
01/01/1900 21:00	ASU+BLI+DGI+PAI+SAO+SAS
01/01/1900 21:20	ASU+BLI+DGI+PAI+SAO+SAS
01/01/1900 21:40	ASU+BLI+DGI+PAI+SAO+SAS
01/01/1900 22:00	BDI+PAI+SAI
01/01/1900 22:20	BDI+PAI+SAI
01/01/1900 22:40	BDI+PAI+SAI
01/01/1900 23:00	BDI+PAI+SAI
01/01/1900 23:20	R1I
01/01/1900 23:40	R1I

August 3rd 2019, post-processing tool output, DAC sectorization

time	Configuration
01/01/1900 0:00	R1I
01/01/1900 0:20	R1I
01/01/1900 0:40	R1I
01/01/1900 1:00	R1I
01/01/1900 1:20	R1I
01/01/1900 1:40	R1I
01/01/1900 2:00	R1I
01/01/1900 2:20	R1I
01/01/1900 2:40	R1I
01/01/1900 3:00	R1I
01/01/1900 3:20	R1I
01/01/1900 3:40	R1I
01/01/1900 4:00	R1I
01/01/1900 4:20	R1I
01/01/1900 4:40	DPI+SABI
01/01/1900 5:00	BDP2U+BDPL2+SASI
01/01/1900 5:20	BLI+DGI+PAI+SASI
01/01/1900 5:40	BDP6U+BLL6+DGL6+PAL6+SASI
01/01/1900 6:00	BLI+DG4U+DGL4+PA4U+PAL4+SAS4U+SASL4
01/01/1900 6:20	BLI+DG4U+DGL4+PA4U+PAL4+SAS6U+SASL6
01/01/1900 6:40	AS4U+BDL4+BL4U+DG4U+PA4U+PAL4+SA4U+SASL4
01/01/1900 7:00	ASI+BL6U+BLL6+DG6U+DGL6+PA4U+PAL4+SAN
01/01/1900 7:20	ASI+BL6U+BLL6+DG6U+DGL6+PA4U+PAL4+SAN
01/01/1900 7:40	ASI+BL6U+BLL6+DG6U+DGL6+PA4U+PAL4+SAN
01/01/1900 8:00	ASI+BD6U+BLL6+DGL6+PA4U+PAL4+SAN
01/01/1900 8:20	ASI+BD6U+BLL6+DGL6+PA4U+PAL4+SAN
01/01/1900 8:40	ASI+BLI+DG4U+DGL4+PA4U+PAL4+SAN
01/01/1900 9:00	ASI+BLI+DG4U+DGL4+PA4U+PAL4+SAN
01/01/1900 9:20	ASI+BLI+DG4U+DGL4+PA4U+PAL4+SAN
01/01/1900 9:40	ASI+BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAN
01/01/1900 10:00	ASI+BL6U+BLL6+DG4U+DGL4+PA4U+PAL4+SAN
01/01/1900 10:20	ASI+BL4U+BLL4+DG4U+DGL4+PA4U+PAL4+SAN
01/01/1900 10:40	AS2U+BL2U+DG4U+DGL4+PA4U+PAL4+SA2U+SABL2
01/01/1900 11:00	AS2U+BL2U+DG4U+DGL4+PA4U+PAL4+SA2U+SABL2
01/01/1900 11:20	AS2U+BL2U+DG4U+DGL4+PA4U+PAL4+SA2U+SABL2
01/01/1900 11:40	ASI+BL2U+BLL2+DG4U+DGL4+PA4U+PAL4+SAN
01/01/1900 12:00	ASI+BL2U+BLL2+DG4U+DGL4+PA4U+PAL4+SAN
01/01/1900 12:20	ASI+BL2U+BLL2+DG4U+DGL4+PA4U+PAL4+SAN
01/01/1900 12:40	AS2U+BL2U+DG4U+DGL4+PA4U+PAL4+SA2U+SABL2
01/01/1900 13:00	AS4U+BLI+DG6U+DGL6+PA4U+PAL4+SA4U+SASL4
01/01/1900 13:20	AS4U+BLI+DG6U+DGL6+PA4U+PAL4+SA4U+SASL4
01/01/1900 13:40	AS4U+BLI+DG6U+DGL6+PA4U+PAL4+SA4U+SASL4
01/01/1900 14:00	AS4U+BLI+DG6U+DGL6+PA4U+PAL4+SA4U+SASL4
01/01/1900 14:20	AS4U+BLI+DG4U+DGL4+PA4U+PAL4+SA4U+SASL4
01/01/1900 14:40	AS4U+BLI+DG4U+DGL4+PA4U+PAL4+SA4U+SASL4
01/01/1900 15:00	AS4U+BLI+DG6U+DGL6+PA4U+PAL4+SA4U+SASL4
01/01/1900 15:20	AS4U+BLI+DG6U+DGL6+PA4U+PAL4+SA4U+SASL4
01/01/1900 15:40	AS4U+BLI+DG6U+DGL6+PA4U+PAL4+SA4U+SASL4
01/01/1900 16:00	AS4U+BLI+DG6U+DGL6+PA4U+PAL4+SA4U+SASL4
01/01/1900 16:20	AS4U+BLI+DG6U+DGL6+PA4U+PAL4+SA4U+SASL4
01/01/1900 16:40	ASI+BLI+DGI+PA4U+PAL4+SAN
01/01/1900 17:00	ASI+BLI+DGI+PA4U+PAL4+SAN
01/01/1900 17:20	ASI+BLI+DGI+PA4U+PAL4+SAN
01/01/1900 17:40	ASI+BLI+DGI+PA6U+PAL6+SAN
01/01/1900 18:00	ASI+BDPL2+BL2U+DG2U+PA2U+SAN
01/01/1900 18:20	BLI+DG6U+DGL6+PA6U+PAL6+SAS6U+SASL6
01/01/1900 18:40	BLI+DG6U+DGL6+PA6U+PAL6+SAS6U+SASL6
01/01/1900 19:00	BLI+DG6U+DGL6+PA6U+PAL6+SAS6U+SASL6
01/01/1900 19:20	BL6U+BLL6+DG4U+DGL4+PA6U+PAL6+SAS6U+SASL6
01/01/1900 19:40	ASI+BL6U+BLL6+DG4U+DGL4+PA6U+PAL6+SAN
01/01/1900 20:00	ASI+BDL4+BL4U+DG4U+PA6U+PAL6+SA6U+SAL6
01/01/1900 20:20	ASI+BDL4+BL4U+DG4U+PA6U+PAL6+SA6U+SAL6
01/01/1900 20:40	ASI+BDL4+BL4U+DG4U+PA6U+PAL6+SA6U+SAL6
01/01/1900 21:00	ASI+BLI+DGI+PAI+SAN
01/01/1900 21:20	ASI+BLI+DGI+PAI+SAN
01/01/1900 21:40	ASI+BLI+DGI+PAI+SAN
01/01/1900 22:00	BDI+PAI+SASI
01/01/1900 22:20	BDI+PAI+SASI
01/01/1900 22:40	BDI+PAI+SASI
01/01/1900 23:00	BDI+PAI+SASI
01/01/1900 23:20	BDP+SASI
01/01/1900 23:40	BDP+SASI

February 13th 2019, post-processing tool output, reference sectorization

time	Configuration
01/01/1900 0:00	R1I
01/01/1900 0:20	R1I
01/01/1900 0:40	R1I
01/01/1900 1:00	R1I
01/01/1900 1:20	R1I
01/01/1900 1:40	R1I
01/01/1900 2:00	R1I
01/01/1900 2:20	R1I
01/01/1900 2:40	R1I
01/01/1900 3:00	R1I
01/01/1900 3:20	R1I
01/01/1900 3:40	R1I
01/01/1900 4:00	R1I
01/01/1900 4:20	R1I
01/01/1900 4:40	R1I
01/01/1900 5:00	R1I
01/01/1900 5:20	R1I
01/01/1900 5:40	R1I
01/01/1900 6:00	DPI+SAB
01/01/1900 6:20	BLI+DPI+SAI
01/01/1900 6:40	BLI+DGI+PAI+SAI
01/01/1900 7:00	BLI+DGI+PAI+SAI
01/01/1900 7:20	BLI+DGI+PAI+SAI
01/01/1900 7:40	BLI+DGI+PAI+SAI
01/01/1900 8:00	BLI+DGI+PAI+SAI
01/01/1900 8:20	ASI+BLI+DGI+PAI+SAN
01/01/1900 8:40	ASI+BLI+DGI+PAI+SAN
01/01/1900 9:00	ASI+BLI+DGI+PAI+SAN
01/01/1900 9:20	ASI+BLI+DGI+PAI+SAN
01/01/1900 9:40	ASI+BLI+DGI+PAI+SAN
01/01/1900 10:00	ASI+BLI+DGI+PAI+SAN
01/01/1900 10:20	ASI+BLI+DGI+PAI+SAN
01/01/1900 10:40	ASI+BLI+DGI+PAI+SAN
01/01/1900 11:00	ASI+BLI+DGI+PAI+SAN
01/01/1900 11:20	ASI+BLI+DGI+PAI+SAN
01/01/1900 11:40	ASI+BLI+DGL+DGU+PAI+SAN
01/01/1900 12:00	ASI+BLI+DGL+DGU+PAI+SAN
01/01/1900 12:20	ASI+BLI+DGL+DGU+PAI+SAN
01/01/1900 12:40	ASI+BLI+DGI+PAI+SAN
01/01/1900 13:00	ASI+BLI+DGI+PAI+SAN
01/01/1900 13:20	ASI+BLI+DGI+PAI+SAN
01/01/1900 13:40	ASI+BLI+DGI+PAI+SAN
01/01/1900 14:00	ASI+BLI+DGI+PAI+SAN
01/01/1900 14:20	BLI+DGI+PAL+PAU+SAI
01/01/1900 14:40	BLI+DGI+PAL+PAU+SAI
01/01/1900 15:00	BLI+DGI+PAL+PAU+SAI
01/01/1900 15:20	BLI+DGL+DGU+PAL+PAU+SAI
01/01/1900 15:40	ASI+BLI+DGI+PAI+SAN
01/01/1900 16:00	ASI+BLI+DGI+PAI+SAN
01/01/1900 16:20	ASI+BLI+DGI+PAI+SAN
01/01/1900 16:40	ASI+BLI+DGI+PAI+SAN
01/01/1900 17:00	ASI+BLI+DGI+PAI+SAN
01/01/1900 17:20	ASI+BLI+DGI+PAI+SAN
01/01/1900 17:40	ASI+BLI+DGI+PAI+SAN
01/01/1900 18:00	ASI+BLI+DGI+PAI+SAN
01/01/1900 18:20	ASI+BLI+DGI+PAI+SAN
01/01/1900 18:40	ASI+BLI+DGI+PAI+SAN
01/01/1900 19:00	ASI+BLI+DGL+DGU+PAI+SAN
01/01/1900 19:20	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 19:40	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 20:00	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 20:20	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 20:40	ASI+BLI+DGL+DGU+PAL+PAU+SAN
01/01/1900 21:00	BLI+DGI+PAI+SAI
01/01/1900 21:20	ASI+BDI+PAI+SAN
01/01/1900 21:40	ASI+BDI+PAI+SAN
01/01/1900 22:00	ASI+BDI+PAI+SAN
01/01/1900 22:20	ASI+BDI+PAI+SAN
01/01/1900 22:40	R1I
01/01/1900 23:00	R1I
01/01/1900 23:20	R1I
01/01/1900 23:40	R1I

February 13th 2019, post-processing tool output, DAC sectorization

time	Configuration
01/01/1900 0:00	R1I
01/01/1900 0:20	R1I
01/01/1900 0:40	R1I
01/01/1900 1:00	R1I
01/01/1900 1:20	R1I
01/01/1900 1:40	R1I
01/01/1900 2:00	R1I
01/01/1900 2:20	R1I
01/01/1900 2:40	R1I
01/01/1900 3:00	R1I
01/01/1900 3:20	R1I
01/01/1900 3:40	R1I
01/01/1900 4:00	R1I
01/01/1900 4:20	R1I
01/01/1900 4:40	R1I
01/01/1900 5:00	R1I
01/01/1900 5:20	R1I
01/01/1900 5:40	R1I
01/01/1900 6:00	BDP+SASI
01/01/1900 6:20	BDP2U+BDPL2+SASI
01/01/1900 6:40	BDL2+BDP2U+PAL2+SASI
01/01/1900 7:00	BD2U+BDL2+PAI+SASI
01/01/1900 7:20	BLI+DGI+PAI+SASI
01/01/1900 7:40	BLI+DGI+PAI+SASI
01/01/1900 8:00	BLI+DGI+PAI+SASI
01/01/1900 8:20	BD6U+BDL6+PAI+SAS6U+SASL6
01/01/1900 8:40	BD6U+BDL6+PAI+SAS6U+SASL6
01/01/1900 9:00	BD6U+BDL6+PAI+SAS6U+SASL6
01/01/1900 9:20	ASI+BD6U+BDL6+PAI+SAN
01/01/1900 9:40	ASI+BLI+DGI+PAI+SAN
01/01/1900 10:00	ASI+BLI+DGI+PAI+SAN
01/01/1900 10:20	ASI+BLI+DGI+PAI+SAN
01/01/1900 10:40	ASI+BLI+DGI+PAI+SAN
01/01/1900 11:00	ASI+BLI+DGI+PAI+SAN
01/01/1900 11:20	ASI+BLI+DGI+PAI+SAN
01/01/1900 11:40	ASI+BLI+DG6U+DGL6+PAI+SAN
01/01/1900 12:00	ASI+BLI+DG6U+DGL6+PAI+SAN
01/01/1900 12:20	ASI+BLI+DG6U+DGL6+PAI+SAN
01/01/1900 12:40	ASI+BLI+DGI+PAI+SAN
01/01/1900 13:00	ASI+BLI+DGI+PAI+SAN
01/01/1900 13:20	ASI+BLI+DGI+PAI+SAN
01/01/1900 13:40	ASI+BLI+DGI+PAI+SAN
01/01/1900 14:00	BLI+DGI+PAI+SASI
01/01/1900 14:20	BLI+DGI+PA4U+PAL4+SASI
01/01/1900 14:40	BLI+DGI+PA4U+PAL4+SASI
01/01/1900 15:00	BLI+DGI+PA4U+PAL4+SASI
01/01/1900 15:20	BDP6U+BLL6+DGL6+PAL6+SASI
01/01/1900 15:40	ASI+BLI+DGI+PAI+SAN
01/01/1900 16:00	ASI+BLI+DGI+PAI+SAN
01/01/1900 16:20	ASI+BLI+DGI+PAI+SAN
01/01/1900 16:40	ASI+BDL4+BL4U+DG4U+PAI+SAN
01/01/1900 17:00	ASI+BDL4+BL4U+DG4U+PAI+SAN
01/01/1900 17:20	ASI+BLI+DGI+PAI+SAN
01/01/1900 17:40	ASI+BLI+DGI+PAI+SAN
01/01/1900 18:00	ASI+BLI+DGI+PAI+SAN
01/01/1900 18:20	ASI+BLI+DGI+PAI+SAN
01/01/1900 18:40	ASI+BLI+DGI+PAI+SAN
01/01/1900 19:00	ASI+BDP6U+BLL6+DGL6+PAL6+SAN
01/01/1900 19:20	ASI+BDP6U+BLL6+DGL6+PAL6+SAN
01/01/1900 19:40	ASI+BLI+DG6U+DGL6+PA2U+PAL2+SAN
01/01/1900 20:00	ASI+BLI+DG6U+DGL6+PA2U+PAL2+SAN
01/01/1900 20:20	BLI+DGI+PAI+SASI
01/01/1900 20:40	BLI+DGI+PAI+SASI
01/01/1900 21:00	BLI+DGI+PAI+SASI
01/01/1900 21:20	DGI+PAI+SAB4U+SABL4
01/01/1900 21:40	DGI+PAI+SAB4U+SABL4
01/01/1900 22:00	DGI+PAI+SAB4U+SABL4
01/01/1900 22:20	DGI+PAI+SAB4U+SABL4
01/01/1900 22:40	R1I
01/01/1900 23:00	R1I
01/01/1900 23:20	R1I
01/01/1900 23:40	R1I

July 3rd 2019, post-processing tool output, reference sectorization

time	possibleConfig
01/01/1900 0:00	R1I
01/01/1900 0:20	R1I
01/01/1900 0:40	R1I
01/01/1900 1:00	R1I
01/01/1900 1:20	R1I
01/01/1900 1:40	R1I
01/01/1900 2:00	R1I
01/01/1900 2:20	R1I
01/01/1900 2:40	R1I
01/01/1900 3:00	R1I
01/01/1900 3:20	BDP+ SAI
01/01/1900 3:40	BDP+ SAI
01/01/1900 4:00	BDP+ SAI
01/01/1900 4:20	BDP+ SAI
01/01/1900 4:40	BLI+ DPI+ SAI
01/01/1900 5:00	BLI+ DGI+ PAI+ SAI
01/01/1900 5:20	BLI+ DGL+ DGU+ PAL+ PAU+ SAI
01/01/1900 5:40	ASI+ BLI+ DGI+ PAL+ PAU+ SAN
01/01/1900 6:00	ASI+ BLI+ DGI+ PAL+ PAU+ SAN
01/01/1900 6:20	ASI+ BLI+ DGI+ PAL+ PAU+ SAN
01/01/1900 6:40	ASL+ ASU+ BLI+ DGI+ PAL+ PAU+ SAN
01/01/1900 7:00	ASL+ ASU+ BLI+ DGI+ PAL+ PAU+ SAN
01/01/1900 7:20	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN
01/01/1900 7:40	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN
01/01/1900 8:00	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN
01/01/1900 8:20	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN
01/01/1900 8:40	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN
01/01/1900 9:00	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN
01/01/1900 9:20	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN
01/01/1900 9:40	ASI+ BLL+ BLU+ DGI+ PAL+ PAU+ SAN
01/01/1900 10:00	ASI+ BLL+ BLU+ DGI+ PAL+ PAU+ SAN
01/01/1900 10:20	ASI+ BLL+ BLU+ DGI+ PAL+ PAU+ SAN
01/01/1900 10:40	ASI+ BLL+ BLU+ DGI+ PAL+ PAU+ SAN
01/01/1900 11:00	ASI+ BLL+ BLU+ DGI+ PAL+ PAU+ SAN
01/01/1900 11:20	ASI+ BLL+ BLU+ DGI+ PAL+ PAU+ SAN
01/01/1900 11:40	ASI+ BLL+ BLU+ DGI+ PAL+ PAU+ SAN
01/01/1900 12:00	ASI+ BLI+ DGI+ PAL+ PAU+ SAN
01/01/1900 12:20	ASI+ BLI+ DGI+ PAL+ PAU+ SAN
01/01/1900 12:40	ASI+ BLI+ DGI+ PAL+ PAU+ SAN
01/01/1900 13:00	ASI+ BLI+ DGI+ PAL+ PAU+ SAN
01/01/1900 13:20	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN
01/01/1900 13:40	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN
01/01/1900 14:00	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN
01/01/1900 14:20	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN
01/01/1900 14:40	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN
01/01/1900 15:00	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN
01/01/1900 15:20	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN
01/01/1900 15:40	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN
01/01/1900 16:00	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN
01/01/1900 16:20	ASI+ BLI+ DGI+ PAL+ PAU+ SAN
01/01/1900 16:40	ASI+ BLI+ DGI+ PAL+ PAU+ SAN
01/01/1900 17:00	ASI+ BLI+ DGI+ PAL+ PAU+ SAN
01/01/1900 17:20	ASI+ BLL+ BLU+ DGI+ PAL+ PAU+ SAN
01/01/1900 17:40	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN
01/01/1900 18:00	BLL+ BLU+ DGI+ PAL+ PAU+ SAI
01/01/1900 18:20	BLL+ BLU+ DGI+ PAL+ PAU+ SAI
01/01/1900 18:40	BLL+ BLU+ DGI+ PAL+ PAU+ SAI
01/01/1900 19:00	BLL+ BLU+ DGI+ PAL+ PAU+ SAI
01/01/1900 19:20	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN
01/01/1900 19:40	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN
01/01/1900 20:00	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN
01/01/1900 20:20	ASI+ BLI+ DGL+ DGU+ PAL+ PAU+ SAN
01/01/1900 20:40	ASI+ BLI+ DGI+ PAL+ PAU+ SAN
01/01/1900 21:00	ASI+ BLI+ DGI+ PAL+ PAU+ SAN
01/01/1900 21:20	ASI+ BLI+ DGI+ PAL+ PAU+ SAN
01/01/1900 21:40	ASI+ BLI+ DGI+ PAL+ PAU+ SAN
01/01/1900 22:00	BDP+ SAI
01/01/1900 22:20	BDP+ SAI
01/01/1900 22:40	BDP+ SAI
01/01/1900 23:00	BDP+ SAI
01/01/1900 23:20	R1I

APPENDIX C. CONFIGURED SECTORS AND CAPACITIES

REFERENCE SECTORIZATION

Operational Sector	HEC Threshold	OCC Threshold
LECMASI	36	18
LECMASL	35	16
LECMASU	38	19
LECMBDI	26	17
LECMBDP	26	16
LECMBLI	43	14
LECMBLL	39	14
LECMBLU	40	16
LECMDGI	40	35
LECMDGL	39	33
LECMDGU	45	37
LECMDPI	28	14
LECMPAI	35	12
LECMPAL	37	12
LECMPAU	47	15
LECMR1I	17	18
LECMSAB	23	18
LECMSAI	31	17
LECMSAN	34	19
LECMSAO	36	18
LECMSAS	34	18

DAC SECTORIZATION

Operational Sector	HEC Threshold	OCC Threshold
LECMAS2U	**40**	**20**
LECMAS4U	**37**	**19**
LECMAS6U	**38**	**19**
LECMASI	**36**	**18**
LECMASL4	**35**	**16**
LECMASL6	**34**	**16**
LECMASL8	**34**	**15**
LECMBD2U	**30**	**19**
LECMBD4U	**29**	**19**
LECMBD6U	**30**	**19**
LECMBD8U	**30**	**19**
LECMBDI	**26**	**16**
LECMBDL2	**27**	**15**
LECMBDL4	**25**	**15**

LECMBDL6	24	17
LECMBDL8	24	14
LECMBDP	26	15
LECMBDP2U	30	17
LECMBDP4U	29	18
LECMBDP6U	30	18
LECMBDP8U	30	18
LECMBDPL2	27	14
LECMBDPL4	25	14
LECMBDPL6	24	16
LECMBDPL8	24	13
LECMBL2U	46	15
LECMBL4U	40	16
LECMBL6U	40	16
LECMBLI	43	14
LECMBLL4	39	14
LECMBLL6	35	11
LECMBLL8	34	13
LECMDG2U	44	16
LECMDG4U	42	16
LECMDG6U	44	16
LECMDGI	39	14
LECMDGL4	37	14
LECMDGL6	37	13
LECMDGL8	36	13
LECMDP2U	32	6
LECMDP4U	31	6
LECMDP6U	32	6
LECMDP8U	34	6
LECMDPI	27	5
LECMDPL4	28	4
LECMDPL2	30	4
LECMDPL6	26	4
LECMDPL8	25	4
LECMPA2U	40	14
LECMPA4U	46	15
LECMPA6U	47	15
LECMPAI	35	12
LECMPAL4	37	11
LECMPAL6	36	11
LECMPAL8	36	11
LECMR1I	17	18
LECMSA2U	41	21
LECMSA4U	40	22
LECMSA6U	41	22
LECMSAB2U	26	20

LECMSAB4U	25	20
LECMSAB6U	26	21
LECMSAB8U	27	21
LECMSABI	23	18
LECMSABL2	24	16
LECMSABL4	22	16
LECMSABL6	21	19
LECMSABL8	21	16
LECMSAI	23	18
LECMSAL2	35	17
LECMSAL4	33	17
LECMSAL6	32	17
LECMSAL8	32	16
LECMSAN	34	19
LECMSAOI	36	18
LECMSAS2U	36	19
LECMSAS4U	34	19
LECMSAS6U	35	19
LECMSAS8U	36	20
LECMSASI	31	17
LECMSASL2	32	15
LECMSEASL4	34	18
LECMSASL6	29	15
LECMSASL8	29	15
LECMSEL4	35	16
LECMSOL4	33	17
LECMAS8U	39	19
LECMASL2	36	16
LECMBL8U	40	16
LECMBLL2	41	13
LECMDG8U	44	17
LECMDGL2	38	14
LECMPA8U	48	15
LECMPAL2	39	11
LECMSA8U	41	22
LECMSASL4	30	15