NGI UC for Determine Allocation Availability

**AVAIL.26**

Approvals

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# Brief Description

This Use Case describes the process to determine Allocation Availability within HIAS environment on host flights.

## Background

Allocation availability is determined by leg or by segment with the minimum seats available value over all allocation controlled legs and segments for each RBD.

Financial availability, where applicable, is determined after all of the financial legs have been analysed and the allocation availability calculation is performed. Therefore, during the examination of the legs of a routing, the allocation availability is calculated while the financial availability information is accumulated for calculation at the conclusion.

Allocation seat available is first determined based on the Inventory Control Record (ICR) of the host flight segments, which contains information about nesting buckets and booking limits for each RBD.

## Developer Notes

Currently, HIAS caches availability data for every RBD of a flight instance in the FlightAvailability[[1]](#footnote-1) space within the grid. Availability information is maintained at Leg, Segment[[2]](#footnote-2) & POS level. This space is refreshed whenever inventory adjustment and/or ICR change occurs.

Going forward, instead of caching both leg and segment availability into this space, we suggest system determines the most restricted availability between the two and cache it, before-hand. This will improve response time and do away with the processing that HIAS currently does when it receives an availability request.

The use case flows are written from the perspective of the availability transaction, however if HIAS were to follow this process HIAS would have to evaluate availability on every availability request. Availability is static for a given POS, and only needs to be evaluated when inventory is updated. For HIAS to meet its NFR targets it must do most of determine availability at the point of inventory adjustment.

HIAS must pre-calculate (determines) availability as much as possible immediately after an ICR update, and cache availability **constraints** in the flight availability space for all RBDs.

The elaboration presents a summary of the determine availability post ICR update and the availability processing (section §**15.1**).

### Glossary

The UC uses the following terms

|  |  |
| --- | --- |
| Term | Definition |
| Internal HOST request | When the request was originated by the host carrier user[[3]](#footnote-3) |
| External request | Other than Internal HOST (mentioned above). When request originated from OA, GDS or OA carrier (non-SITA) user. |
| Protected | ICR status of leg or segment is set to 'Protected' during schedule change |
| Suspended | ICR status is set to 'suspended', when ASM CNL is processed for that flight date |
| Protective Cover\* | When ICR status is 'protective cover' (\*TBD) |
| Determine Availability for Sell | This is an internal availability request made within HIAS, when it receives a sell request to determine whether seats are available to Sell. |
| Determine Availability for Waitlist Sell | This is another internal availability request made within HIAS, when it receives a waitlist sell to determine whether waitlist seats are available to Sell. |
| Determine First Availability for Type-B Sell Failure | Again an internal availability request within HIAS, when it receives a Sell request. When seats are not available HIAS makes a First Availability request and returns the response accordingly. |

## References

|  |  |  |
| --- | --- | --- |
| **Ref. ID** | **Reference** | **Document/ Reference Version** |
| [1] | NGI UC for Availability Orchestration | v1.3 |
| [2] | NGI UC for Full Inventory Adjustment | v3.4 |
| [3] | NGI BDD for Inventory Control Records (ICR) | v1.3 |
| [4] | BDD for Simulate Availability | v1.3 |
| [5] | System BDD for Availability Request - Response | v0.0d |

# Actors

**Primary Actor:**

The primary actor is Inventory Enquirer which sends transactions to be evaluated.

# General Preconditions

* The Subscription Type is Financial or Segment Allocation.

# Basic Flow of Events

## Basic Flow 1 – Determine Allocation Availability for Host Flight Segments

### Specific Preconditions

* Allocation availability is requested for one determined set of routings that contain at least a Subscriber actionable flight segment over a market, as determined and informed by the NGI UC for Availability Orchestration.

*Note: The UC for Availability Orchestration has determined one or many sets of routings over a requested market. This Flow determines Allocation Availability for each set of routings. For each host actionable segment in a routing, the NGI UC for Availability Orchestration has also determined the RBD's that need to get availability for a particular availability request.*

Story Avail.24x would add Availability Orchestration process, which will eventually trigger this UC with the preferred routings & flight numbers for the city-pair requested or only flights when request is flight specific.

To deliver this story development can continue to use HIAS InventoryEnquirer / ConnectionEnquirer functionality to determine best connections and thereby identify host flights for which availability is required. Hence, the flow can start from Step 3.

### Steps

The system has already identified the requestor details viz., Internal/External, POS, Point-of-origin (POO) and up-line / down-line stations from the incoming request prior to start of this flow.

1. System locates the next routing that contains at least a host actionable segment.
2. System selects the next host actionable flight segment from the routing.
3. System validates the host flight segment date against the User Parameters: Open For Sell Date and the Maximum Sell Date.
4. System calculates Booking Seat Available (BSA) and Waitlist Seat Available (WSA) for the RBD's on the segment using **Sub Flow 1 – Determine Seat Available (SA) by RBD.**
   * RBD's on the segment are determined in the UC for Availability Orchestration.

HIAS maintains availability for all constrained RBDs as a grid object in the flight availability space and it will return availability for all RBDs of a flight instance in one go.

Note: All RBDs, which are governed by Hide/Inhibit RBD rule, are removed or dressed once they are fetched from flight availability space and only then returned to requestor. This is addressed by AVAIL.24f story.

1. When system receives an error for a host segment from the Sub Flow 1, system returns the error message for the segment and joins Step 10.
2. When the Search Type of the request is "Determine Availability for Waitlist Sell", system returns availability information for the RBD's. If availability status "C" or "R" or "Q" exists for an RBD, the availability status is returned for that RBD; if a numeric Segment Waitlist Seat Available (Seg WSA) value exists for an RBD, the Seg WSA is returned for that RBD. System joins Step 10.

The element *SearchType* in the canonical for *InventoryEnquirer* is updated to support additional search request types.

For 'Determine Availability for Waitlist Sell', the RBD (*TravelPreference/ BookingClassPreference/ ResBookDesigCode*) is included in the request and system will need to return waitlist availability for that RBD.

1. When the request is not for Group Booking, system returns availability information for the RBD's: if availability status exists for an RBD, the availability status is returned for that RBD; if availability status does not exist for an RBD, the numeric Segment Booking Seat Available (Seg BSA) value is returned for that RBD.
2. When the request is for Group booking, system calculates Group Seat Available (GSA) for RBD's on the segment using Sub Flow 2 – Determine Group Seat Available (GSA)
   * System returns availability information for the RBD's: if availability status exists for an RBD, availability status is returned for that RBD; if availability status does not exist for an RBD, the numeric Segment Group Seat Available (Seg GSA) value is returned for that RBD.

For Group availability request, system will calculate and fetch the availability information directly from the ICR, since this information is not maintained in the Flight Availability space

1. When it is a Simulate Availability request, system returns all availability information assigned for the RBD's: the numeric Segment Booking Seat Available (Seg BSA) value, if exists, and Segment Waitlist Seat Available (Seg WSA), if exists, and availability status for the RBD's, if exists, and Segment Group Seat Available (Seg GSA), if exists.

Availability requests triggered from Simulate Availability GUI (except numeric) are actioned directly from ICR and not pre-calculated.

1. When the routing has more host actionable segment(s), system rejoins Step 2.
2. When there is more routing, system rejoins Step 1.
3. System resumes in the invoking Flow/Step.

### Specific Post Conditions

* Allocation availability has been determined for the RBD's on host segments

# Alternate Flows

## Alternate Flow 1 – Request Date Beyond Open For Sell Date

This functionality already exists as delivered by INV.30b - Handle out of range availability request. However, this has to be tested as part of this task.

### Specific Preconditions

* System has performed Step 3 of Basic Flow 1 – Determine Allocation Availability for Host Flight Segments

AND

* System has determined that the flight segment date is later than the Open For Sell Date but is earlier or equal to the Maximum Sell Date.

### Steps

1. System assigns availability status "R" (Request) for every RBD of all the host segments in the routing.
2. System joins Step 11 for Basic Flow 1 – Determine Allocation Availability for Host Flight Segments.

### Specific Post Conditions

* None.

# Exception Flows

## Exception Flow 1 – No online segments

### Specific Preconditions

System has performed Step 1 of Basic Flow 1 – Determine Allocation Availability for Host Flight Segments,

AND

* System is unable to locate a host segment in the routings.

### Steps

1. System return the response indicating "No Host Availability on requested market"
2. Flow ends.

### Specific Post Conditions

* System has no work to do on the routings for the requested market.

# Sub Flows

## Sub Flow 1 – Determine Seat Available (SA) by RBD

### This Sub Flow determines Booking Seat Available (BSA) and Waitlist Seat Available (WSA) for RBD's on a host segment

**This flow will be triggered whenever there is an ICR update or for a new ICR**. It will not be trigged during an availability request[[4]](#footnote-4) (except for step.1a). As such, the availability for every RBD are pre-determined and pushed to flight availability space for every flight instance. The data maintained are at a POS group level based on the most restricted value between the segment and its legs (refer to elaborations section §**15.1** for implementation details).

Where there are more than 'n' number of legs for a flight then legs, POS and constrained segment(s) data is maintained in flight availability space. Value of 'n' is defined by Subscriber Parameter 'Leg/Segment\_Availability\_Threshold' with a default value set to 2. Availability for such flights will need to be determined only at the time of receipt of request as per this flow and not pre-determined during ICR change.

### Specific Preconditions

System has performed one of the following steps:

* Step 4 for Basic Flow 1 – Determine Allocation Availability for Host Flight Segments.

### Steps

1. System references the ICR record for the host flight instance
   1. When the ICR is non-existent, system logs and returns error indicating "ICR non-existence" and resumes in the Flow/Step where it was invoked.
   2. When the ICR Status is Protected or Suspended, system returns error indicating "Flight is locked for schedule change" and resumes in the Flow/Step where it was invoked.
   3. When the ICR is under Protective Cover AND the request Search Type is "Determine Availability for Sell" (Refer to **System BDD for Availability Request – Response (Ref[9])**), system returns error indicating "ICR under Protective Cover " and resumes in the Flow/Step where it was invoked.
   4. When the ICR is under Emergency Lock, system returns error indicating "ICR under Emergency Lock and resumes in the Flow/Step where it was invoked.
   5. ~~When the current local time of the origin station of the segment is after the departure time for the flight segment, the system returns error indicating “Flight departed” and resumes in the Flow/Step where it was invoked.~~
   6. When the segment has been “Closed Out” (departed), the system returns error indicating “Flight Closed” and resumes in the Flow/Step where it was invoked

Apart from step.1a above, all other steps is pre-determined and pushed to flight availability space at the end of ICR change / inventory adjustment.

HIAS will use error code and warning messages as per Industry Standards. Implementation must follow section §**15.1.3.6** for the EDIFACT code and messages to return. For availability, errors are **not logged** but only returned to the requestor.

System joins Step 26

1. System selects the first or next RBD on the segment.
2. When the value of the Stop Sale Indicator (SSI) either for the nested bucket / RBD or cabin or Tree Top is "Y" (Yes) for the segment or any leg of the segment, system assigns the availability status "C" for the RBD and joins Step 25.
3. When the value of the External Stop Sale Indicator (ESSI) either for the nested bucket / RBD or cabin or Tree Top bucket is "Y" (Yes) on the segment or any leg of the segment, AND the request originator is NOT Internal Host, system assigns the availability status "C" for the RBD and joins Step 25.
4. When the value of the Permanent Request Indicator either for the nested bucket / RBD or the cabin or Tree Top bucket is "Y" (Yes) or "Absolute" on the flight segment or on any leg of the segment,
5. When the request originator is Internal Host and the Subscriber Parameter Internal\_Response\_for\_Permanent\_Request is set to "Seats Available" (Refer to Special Requirement section) system joins Step 6.
6. When the request originator is Internal Host and the Subscriber Parameter Internal\_Response\_for\_Permanent\_Request is set to "Queue Request" (Refer to Special Requirement section), system assigns the availability status "Q" for the RBD
7. When the request originator is NOT Internal Host, system assigns the availability status "R" for the RBD

System joins Step 25.

1. The Segment Booking Seat Available ( Seg BSA ) and Segment Waitlist Seat Available ( Seg WSA ) is assigned the value of the segment nested bucket of the RBD.
2. System determines Segment Booking Limit Booking Seats Available ( Seg BL BSA ) and Segment Booking Limit Waitlist Seats Available ( Seg BL WSA ) from all the Segment Booking Limit buckets in the cabin that the request is based on given:

* Cabin code
* RBD
* POS values of the request originator,
* Code Share Free Sell partner agreement
* POO of the Online routing if the Subscriber Parameter POO\_routing is set to “Online” (Refer to Special Requirement section)
* POO of the Trip routing if the Subscriber Parameter POO\_routing is set to “Trip (Refer to Special Requirement section)
* Stations up line in the routing if the Subscriber Parameter UpLine\_Downline\_Station is “Routing” (Refer to Special Requirement section)
* Stations up line in the flight if the Subscriber Parameter UpLine\_Downline\_Station is “Flight” (Refer to Special Requirement section)

When at more than one Booking Limit bucket is located for the RBD, AND

* 1. The Subscriber Parameter Booking\_Limit\_Booking\_Seat\_Available\_Selection is set to "Most Restrictive" (Refer to Special Requirement section) , the lowest Segment Booking Limit Booking Seats available ( Seg BL BSA ) and Segment Booking Limit Waitlist Seats Available ( Seg BL WSA ) is assigned
  2. The Subscriber Parameter Booking\_Limit\_Booking\_Seat\_Available\_Selection is set to "Least Restrictive" (Refer to Special Requirement section):, the highest Segment Booking Limit Booking Seats available ( Seg BL BSA ) and Segment Booking Limit Waitlist Seats Available ( Seg BL WSA ) is assigned.

1. System determines Segment Booking Limit Minimum Available Seats ( Seg BL Min ) from all the Segment Booking Limit buckets in the cabin if the segment is not Host Marketed / OA operated free sell agreement based on given:

* Cabin Code
* RBD
* POS values of the request originator,
* Code Share Free Sell partner agreement
* POO of the Online routing if the Subscriber Parameter POO\_routing is set to “Online” (Refer to Special Requirement section)
* POO of the Trip routing if the Subscriber Parameter POO\_routing is set to “Trip (Refer to Special Requirement section)
* Stations up line in the routing if the Subscriber Parameter UpLine\_Downline\_Station is “Routing” (Refer to Special Requirement section)
* Stations up line in the flight if the Subscriber Parameter UpLine\_Downline\_Station is “Flight” (Refer to Special Requirement section)

When more than one Booking Limit bucket is located for the RBD, the largest Segment Booking Limit Minimum Availability ( Seg BL MIN ) is assigned

1. The lowest of the Segment Booking Seats Available ( Seg BSA ) and the Segment Booking Limits Booking Seats Available ( Seg BL BSA ) is assigned Segment Booking Seats Available ( Seg BSA )
2. The highest of the Segment Booking Seats Available ( Seg BSA ) and the Segment Booking Limits Minimum Available Seats ( Seg BL MIN ) is assigned Segment Booking Seats Available ( Seg BSA )
3. The lowest of the Segment Waitlist Seats Available ( Seg WSA ) and the Segment Booking Limits Waitlist Seats Available ( Seg BL WSA ) is assigned to Segment Waitlist Seats Available ( Seg WSA )
4. System selects the first or next leg in the segment.
5. System sets the Leg Booking Seat Available ( Leg BSA ) and Leg Waitlist Seat Available ( Leg WSA ) with the value from the leg nested bucket of the RBD
6. System determines Leg Booking Limit Booking Seats Available ( Leg BL BSA ) and Leg Booking Limit Waitlist Seats Available ( Leg BL WSA ) from all the Leg Booking Limit buckets in the cabin that the request is based on given:

* Cabin code
* RBD
* POS values of the request originator,
* Code Share Free Sell partner agreement
* POO of the Online routing if the Subscriber Parameter POO\_routing is set to “Online” (Refer to Special Requirement section)
* POO of the Trip routing if the Subscriber Parameter POO\_routing is set to “Trip (Refer to Special Requirement section)
* Stations up line in the routing if the Subscriber Parameter UpLine\_Downline\_Station is “Routing” (Refer to Special Requirement section)
* Stations up line in the flight if the Subscriber Parameter UpLine\_Downline\_Station is “Flight” (Refer to Special Requirement section)

When more than one Booking Limit bucket is located for the RBD, AND

1. The Subscriber Parameter Booking\_Limit\_Booking\_Seat\_Available\_Selection is set to "Most Restrictive" (Refer to Special Requirement section) the lowest Leg Booking Limit Booking Seats available ( Leg BL BSA ) and Leg Booking Limit Waitlist Seats Available ( Leg BL WSA ) is assigned
2. The Subscriber Parameter Booking\_Limit\_Booking\_Seat\_Available\_Selection is set to "Least Restrictive" (Refer to Special Requirement section) the highest Leg Booking Limit Booking Seats available ( Leg BL BSA ) and Leg Booking Limit Waitlist Seats Available ( Leg BL WSA ) is assigned.
3. System determines Leg Booking Limit Minimum Available Seats ( Leg BL Min ) from all the Leg Booking Limit buckets in the cabin if the leg is not Host Marketed / OA operated free sell agreement based on given:

* Cabin Code
* RBD
* POS values of the request originator,
* Code Share Free Sell partner agreement
* POO of the Online routing if the Subscriber Parameter POO\_routing is set to “Online” (Refer to Special Requirement section)
* POO of the Trip routing if the Subscriber Parameter POO\_routing is set to “Trip (Refer to Special Requirement section)
* Stations up line in the routing if the Subscriber Parameter UpLine\_Downline\_Station is “Routing” (Refer to Special Requirement section)
* Stations up line in the flight if the Subscriber Parameter UpLine\_Downline\_Station is “Flight” (Refer to Special Requirement section)

When more than one Booking Limit bucket is located for the RBD, the largest Leg Booking Limit Minimum Available Seats ( Leg BL MIN ) is assigned

1. The lowest of the Leg Booking Seats Available ( Leg BSA ) and the Leg Booking Limits Booking Seats Available ( Leg BL BSA ) is assigned Leg Booking Seats Available ( Leg BSA)
2. The highest of the Leg Booking Seats Available ( Leg BSA ) and the Leg Booking Limits Minimum Available Seats ( Leg BL MIN ) is assigned Leg Booking Seats Available (Leg BSA)
3. The lowest of the Leg Waitlist Seats Available ( Leg WSA ) and the Leg Booking Limits Waitlist Seats Available ( Leg BL WSA ) is assigned to Leg Waitlist Seats Available ( Leg WSA )
4. The lowest of the Segment Booking Seats Available ( Seg BSA ) and the Leg Booking Seat Available ( Leg SA ) is assigned Segment Booking Seats Available ( Seg BSA )
5. The lowest of the Segment Waitlist Seats Available ( Seg WSA ) and the Leg Waitlist Seats Available ( Leg WSA ) is assigned to Segment Waitlist Seats Available ( Seg WSA )
6. If this is not the last leg of the segment the system joins the flow at Step 12
7. When the Segment Booking Seats Available ( Seg BSA ) is less than or equal to zero (0) AND the Segment Waitlist Seats Available ( Seg WSA ) is greater than zero (0), system assigns the availability status "L" for the RBD and joins Step 25.
8. When both the Seg BSA and Seg WSA are less than or equal to zero (0), system assigns the availability status "C" for the RBD and joins Step 25.
9. When Search Type is 'Determine First Availability for Type-B Sell Failure', system determines the current most restrictive leg and segment RBD AVS status that applies for the Request Originator system by referencing the AVS buckets for the RBD on the flight leg and segment.

When the most restrictive AVS status for the RBD is a closure status, system returns that AVS status and joins Step 25.

*Note: in this step, the RBD BSA is greater than zero (0) however an AVS closure status has been sent out as per the AVS trigger level controls. If the RBD BSA is 0 or less (handled in Step 22) then the RBD gets a closure status L or C for all Search Types.*

*Note: At time of writing, it is assumed that AVS statuses for RBD's are stored in the AVS Buckets. The process to determine AVS status for an RBD will be detailed in the UC for Determine AVS Status.*

Processing availability by 'Determine First Availability for Type-B Sell Failure' to be addressed as part of Availability Orchestration and a future task.

1. *When there is more RBD on the segment, system rejoins Step 2.*
2. *System returns to the Flow/Step whe*r*e it was invoked.*

### *Specific Post C*o*nditions*

* *System has determined RBD av*a*ilabi*lity status and Segment Booking Seat Available ( Seg BSA ) and Segment Waitlist Seats Available ( Seg WSA ) for every RBD in the segment
* System has pushed availability constraints to flight availability space.
* ~~Or an error has been logged.~~

## Sub Flow 2 – Determine Group Seat Available (GSA)

This flow is triggered by an incoming availability request and not after ICR update (unlike Sub Flow 1)

### Specific Preconditions

System has performed one of the following steps:

* Step 8 for Basic Flow 1 – Determine Allocation Availability for Host Flight Segments.

### Steps

1. System references the ICR record for the host flight instance
2. System selects the first or next RBD on the segment.
3. The Segment Group Seat Available ( Seg GSA ) is assigned the value of the segment nested bucket of the RBD
4. System determines Segment Booking Limit Group Seats Available ( Seg BL GSA ) from all the Segment Booking Limit buckets in the cabin that the request is based on the given:

* Cabin code
* RBD
* POS values of the request originator,
* Code Share Free Sell partner agreement
* POO of the Online routing if the Subscriber Parameter POO\_routing is set to “Online” (Refer to Special Requirement section)
* POO of the Trip routing if the Subscriber Parameter POO\_routing is set to “Trip (Refer to Special Requirement section)
* Stations up line in the routing if the Subscriber Parameter UpLine\_Downline\_Station is “Routing” (Refer to Special Requirement section)
* Stations up line in the flight if the Subscriber Parameter UpLine\_Downline\_Station is “Flight” (Refer to Special Requirement section)

When at more than one Booking Limit bucket is located for the RBD, AND

* 1. The Subscriber Parameter Booking\_Limit\_Booking\_Seat\_Available\_Selection is set to "Most Restrictive" (Refer to Special Requirement section) , the lowest Segment Booking Limit Group Seats available ( Seg BL GSA ) is assigned
  2. The Subscriber Parameter Booking\_Limit\_Booking\_Seat\_Available\_Selection is set to "Least Restrictive" (Refer to Special Requirement section):, the highest Segment Booking Limit Group Seats Available ( Seg BL GSA ) is assigned.

1. The lowest of the Segment Group Seats Available ( Seg GSA ) and the Segment Booking Limits Group Seats Available ( Seg BL GSA ) and the Segment Seats Available ( Seg BSA defined in step 9 in Sub Flow 1 ) is assigned Segment Group Seats Available ( Seg GSA )
2. System selects the first or next leg in the segment.
3. System sets the Leg Group Seat Available ( Leg GSA ) with the value from the leg nested bucket of the RBD
4. System determines Leg Booking Limit Group Seats Available ( Leg BL GSA ) from all the Leg Booking Limit buckets in the cabin that the request is based on the given:

* Cabin code
* RBD
* POS values of the request originator,
* Code Share Free Sell partner agreement
* POO of the Online routing if the Subscriber Parameter POO\_routing is set to “Online” (Refer to Special Requirement section)
* POO of the Trip routing if the Subscriber Parameter POO\_routing is set to “Trip (Refer to Special Requirement section)
* Stations up line in the routing if the Subscriber Parameter UpLine\_Downline\_Station is “Routing” (Refer to Special Requirement section)
* Stations up line in the flight if the Subscriber Parameter UpLine\_Downline\_Station is “Flight” (Refer to Special Requirement section)

When more than one Booking Limit bucket is located for the RBD, AND

1. The Subscriber Parameter Booking\_Limit\_Group\_Seat\_Available\_Selection is set to "Most Restrictive" (Refer to Special Requirement section) the lowest Leg Booking Limit Group Seats available ( Leg BL GSA ) is assigned
2. The Subscriber Parameter Booking\_Limit\_Group\_Seat\_Available\_Selection is set to "Least Restrictive" (Refer to Special Requirement section) the highest Leg Booking Limit Group Seats available ( Leg BL GSA ) is assigned.
3. The lowest of the Leg Group Seats Available ( Leg GSA ) and the Leg Booking Limits Group Seats Available ( Leg BL GSA ) and the Leg Booking Seats Available ( Leg BSA defined in step 17 in Sub Flow 1 for the same leg ) is assigned to Leg Group Seats Available ( Leg GSA )
4. The lowest of the Segment Group Seats Available ( Seg GSA ) and the Leg Group Seat Available ( Leg GSA ) is assigned to Segment Group Seats Available ( Seg GSA )
5. If this is not the last leg of the segment the syste*m* joins the flow at Step 7.
6. The lowest of the Segment Booking Seats Available ( Seg BSA ) as returned in Sub Flow 1 and the Segment Group Seats Available ( Seg GSA ) is assigned to Segment Group Seats Available ( Seg GSA )
7. When the Seg GSA for the RBD is less than or equal to zero (0), system returns the availability status "R" and joins Step 14.

*Note: When Group Seat Available is less than or equal to 0 and Booking Seat Available is greater than 0, group bookings must be requested, regardless of Waitlist Seat Available count for the RBD.*

1. When there is more RBD on the segment, system rejoins Step 2.
2. System returns to the Flow/Step where it was invoked.

### Specific Post Conditions

* System has determined availability status and Group Seat Available (GSA) count for every RBD on the segment.

# General Post Conditions

None

# Extension Points

This UC is an include of the UC for Get Availability.

# Special Requirements

## Navigation Requirements

None

## Usability Requirements

None

## New Subscriber Parameter(s)

A new Subscriber Parameter shall be introduced as below.

| **Parameter Name** | **Voyager Description** | **Format** | **Voyager Parameter  Range** | **Voyager Default** | **Category** | **Note** |
| --- | --- | --- | --- | --- | --- | --- |
| Booking\_Limit\_Booking\_Seat\_Available\_Selection | Parameter that controls which Booking Seats Available value among multiple booking limits that meet the conditions of a availability or sell request.  When the setting is "Most Restrictive", system uses the lowest Seats Available value in determine allocation availability. When the setting is "Least Restrictive", system uses the highest Seats Available value | List | Most Restrictive,  Least Restrictive | Most Restrictive | Inventory and Schedules | This parameter provides a nesting hierarchy for booking limits within a cabin. |
| Booking\_Limit\_Group\_Seat\_Available\_Selection | Parameter that controls which Group Seats Available value among multiple booking limits that meet the conditions of a availability or sell request.  When the setting is "Most Restrictive", system uses the lowest Seats Available value in determine allocation availability. When the setting is "Least Restrictive", system uses the highest Seats Available value | List | Most Restrictive,  Least Restrictive | Most Restrictive | Inventory and Schedules | This parameter provides a nesting hierarchy for booking limits within a cabin. |
| Internal\_Response\_for\_Permanent\_Request | The response to internal booking sources when flight is on permanent request return. | List | Queue Request, Seat Available | Queue Request | Inventory and Schedules |  |
| POO\_Routing | Defines the routing type that the POO station is compared to and routing the Upline and down line station will be searched for. | List | On-line Routing, Trip Routing | On-line Routing | Inventory and Schedules | **On-line:** Origin is determine from contiguous segments that is marketed by the host  **Trip**: Origin is determined from contiguous segments of both host and OA. |
| UpLine\_Downline\_Station | Defines the stations for up or down line on the "flight" or stations up or down line on the routing to be used in Booking Limits | List | Flight, Routing | Flight | Inventory and Schedules | **Flight:** Upline/Downline are determined from stations in the segment (incl.legs that make up the segment) **Routing**: Upline/Downline are determined from stations in any segment of the routing (incl.legs of entire journey) |
| Leg/Segment\_Availability\_Threshold | Defines the maximum number of legs up to which pre-determined Segment availability (based on most restrictive seg & legs) are maintained in Flight Availability Space | Numeric | 1 – 9 | 2 | Inventory and Schedules |  |

## Availability for Host Marketing Free-Sell Code Share (Future)

A new Use Case needs to be defined in HIAS for processing incoming AVS messages (standard AVS and numeric AVS (AVA)) received from OA operating carriers for host marketing free-sell code share flights. Alternatively, a new Basis Flow shall be added to the existing UC for Full Inventory Adjustment to cover the availability adjustments for host free sale marketing code share flights.

The below requirements shall need to be covered in that UC:

* 1. Partner code share AVS/AVA received from the OA must be captured in ICR and reflected in nested buckets.
  2. A history item must be generated for every Partner AVS/AVA information captured in the ICR.
  3. System determines the Final nested bucket Booking Seat Available, Group Seat Available and Waitlist Seat Available counts from the nested bucket numeric Adjusted BSA, Adjusted GSA, Adjusted WSA (as calculated for nested buckets in host prime flights), the OA Partner AVS/AVA status and the applicable quota sale value, by referencing the Code Share Agreement Template for the host marketing flight, for the RBD.
  4. When Waitlist is not allowed in the Code Share agreement, the Final nested bucket Waitlist Seat Available count for all nested buckets/RBD's are set to Zero (0). Otherwise, the Final nested bucket Waitlist Seat Available count for nested buckets/RBD's are calculated as per the Steps (e) and (f) below.
  5. When the Code Share AVS/AVA Messaging Option for the host marketing flight is "Standard AVS",

If the OA Partner AVS status is an open status (AS or LA) for a RBD on leg/segment:

The Final nested bucket Booking Seat Available count for that RBD on the leg/segment is the lowest of the Adjusted BSA for the nested bucket and the Code Share quota sale for the cabin.

The Final nested bucket Waitlist Seat Available count for that RBD on the leg/segment is the lowest of the Adjusted WSA for the nested bucket and the Code Share quota sale for the cabin.

If the OA Partner AVS status is "CC", "CN" or "LC", "LN" for a RBD on leg/segment:

Both the Final nested bucket Booking Seat Available count and the Final nested bucket Waitlist Seat Available count for that RBD on the leg/segment are set to Zero (0).

If the OA Partner AVS status is "CR", "LR" or "CL", "LL" for a RBD on leg/segment:

The Final nested bucket Booking Seat Available count for the RBD is set to Zero (0).

The Final nested bucket Waitlist Seat Available count for that RBD on the leg/segment is the lowest of the Adjusted WSA for the nested bucket and the Code Share quota sale for the cabin.

* 1. When the Code Share AVS/AVA Messaging Option for the host marketing flight is "AVA" (Code Share Numeric AVS),

If the OA Partner AVS status is "CN" or "LN" for a RBD on leg/segment:

Both the Final nested bucket Booking Seat Available count and the Final nested bucket Waitlist Seat Available count for that RBD on the leg/segment are set to Zero (0).

If the OA Partner AVS status is a numeric value for a RBD on leg/segment:

The Final nested bucket Booking Seat Available count for that RBD on the leg/segment is the lowest of the Adjusted BSA for the nested bucket, the Code Share quota sale for the cabin and the OA Partner AVA numeric value for the RBD.

The Final nested bucket Waitlist Seat Available count for that RBD on the leg/segment is the lowest of the Adjusted WSA for the nested bucket and the Code Share quota sale for the cabin *(Note: additional research will be needed to verify if waitlist must also be closed when OA AVA value is 0, if yes then WSA should be set to 0)*.

* 1. When Group is not allowed in the Code Share agreement, the Final nested bucket Group Seat Available count for all nested buckets/RBD's are set to Zero (0). Otherwise, the Final nested bucket Group Seat Available count for nested buckets/RBD's are calculated as per the Steps (h) below.
  2. The Final nested bucket Group Seat Available count for all RBD's on the leg/segment shall be set to Zero (0) to denote all groups must be requested on host marketing free-sale code share flights.

*Note: The "Group Booking" option in the Code Share agreement will control whether group CJ's are allowed to create or not on host marketing flights*

## Definition of Protective Cover condition

The Protective Cover condition must be defined for HIAS 2.0 and reflected in the System BDD for ICR.

## Stop Sale Indicator (SSI) in MICT rules for Tree Top buckets

For HIAS 2.0 the below must be updated for Tree Top buckets:

- The Tree Top Control MICT rule needs updated to include an SSI

- The Flight Close Control MICT rule needs to have the control "Tree Top" added

# Additional Information

* 1. This Use Case determines allocation availability only for host segments. Availability for OA segments is determined by another HIAS Use Case.
  2. Allocation Availability is determined upon availability request, Sell request, or Cancel\* request.

*\*Note: For a Cancel, determination for Allocation Availability is limited to request for cancel part of a set of married segments*

* 1. This Use Case determines seat available (SA) counts for RBD's on host segments, regardless of the number of seats requested. HIAS Use Case for Availability Orchestration will determine the final availability status to return, based on the SA counts and the number of seat requested.
  2. HIAS needs to identify whether a request is for group booking or for non-group, with an indication in the request. In the absence of such an indication, HIAS considers any request for more than 9 seats is for group booking and any request for less than.

# Changes to Reviewed Use Cases

None

# Future Use Case Considerations

None

# Assumptions & Issues

The NGI UC for Availability Orchestration provides all details of the availability request, as per the System BDD for Availability Request – Response, to this UC.

When the availability request date is beyond the Maximum Sell Date (defined by Subscriber Parameter) the NGI UC for Availability Orchestration returns error response without invoking this UC.

AVS statuses for RBD's are stored in the AVS Buckets. The process to determine AVS status for an RBD on leg and segment will be detailed in the UC for Determine AVS Status (TBD).

Outbound AVS statuses for Subscriber's flights are determined by another Use Case.

For host marketing flight operated by OA, partner AVS status has been applied to nested seats available and current availability status.

# Use Case Elaboration

### AVAIL.26 – Determine Host Availability (Booking, Groups & Waitlist)

### Summary

This task involves enhancing the existing availability determination process by pre-calculating the availability for each request and caching it in availability space of the grid. The task also delivers the capability to handle group & waitlist availability requests.

### Scope

Apart from adding new functionality as mentioned below, the scope includes retesting what is already developed:

1. Enhance processing of existing basic & numeric availability
2. Handling additional subscriber parameters
   * Booking\_Limit\_Booking\_Seat\_Available\_Selection
   * Booking\_Limit\_Group\_Seat\_Available\_Selection
   * Internal\_Response\_for\_Permanent\_Request
   * Leg/Segment\_Availability\_Threshold
3. Processing Group & Waitlist request/response
4. Processing availability during flight close, stop sale, permanent request etc
5. Extend groups & waitlist in 'Simulate Availability' GUI
6. New Search Types

All flows of this use case are in scope of this task.

The task is limited to processing availability request received via Inventory Enquirer interface.

**Note**: Availability processing due subscriber parameters 'POO\_Routing' and 'UpLine\_Downline\_Station' are addressed in task Avail.24b, Avail.24c respectively. But, how their availability is pre-determined and their subsequent processing as a result of this enhancement is addressed here.

### Details

After an ICR is updated due to inventory adjustment or create/update activity, system will trigger sub-flow 1 of this UC to pre-determine availability for each RBD.

The summary of what needs to be done is explained below:

1. System will determine availability for every RBD, based on most restricted value between the segment and its legs, for every POS group[[5]](#footnote-5) existing in the ICR (as per Sub-Flow 1).
2. The availability data is pushed into the availability space only when constraints apply, else no data for the ICR would exist in the space. System would return availability from schedule segment data available in the grid in such case.
3. Only minimal calculation or processing will take place while returning an availability response. System will just read through the data in availability space & return it 'as is' (unless additional restrictions apply to the request).
4. When more restrictions apply such as per Hide/Inhibit rule, Quota sales[[6]](#footnote-6), POO & upline/downline restriction[[7]](#footnote-7) or multiple POS, system will modify availability further prior to sending out the response for such requests.
5. The below collaboration diagram briefly illustrates how availability is determined and cached.



The actual architectural changes required to enhance availability processing is addressed as a separate task within NFR.07a.

#### Process flow for determine availability

The manner, in which availability data is pre-determined and cached in the FlightAvailabilityState space maintained in grid, as per the sub-flow 1 is shown below:



#### Important aspects to consider during development

Following are some of the important aspects that development team should take note of during delivery.

**Processing Basic & Numeric availability**

1. Once inventory adjust or ICR update is complete, system should commence determining availability starting lowest RBD[[8]](#footnote-8) (nested bucket) in each cabin of the ICR.
2. Availability constraints are cached in flight availability space only when numeric availability for any of its RBD drops to 9 seats or less (since it is considered as a constraint), else discarded.
3. Availability is cached as numeric value (when Seg BSA >0), 'L'-Waitlist (when Seg BSA<=0 & Seg WSA >0) or 'C'-Closed (when Seg WSA<=0) or 'R'-Request or 'Q'-Queue.
4. In simulate availability (GUI); response is displayed in numeric availability format by default up to a max of 9 seats, even when BSA>9 (i.e., 1-9 or L or C).
5. Adjusted booking limit seat availability (ADJ BL BSA) value of limit buckets is taken for determining POS availability.
6. Only after the entire availability determination process is completed, should the system unlock the ICR. The availability transaction must not lock the ICR.

**Processing Waitlist availability**

1. Waitlist availability is returned for every request by default when no booking seats are available, irrespective of request originator.
2. For eg: waitlist response returned is RBD followed by 'L' (eg YL, BL, ML etc), or 'C' (eg YC, BC, MC etc).
3. In simulate availability (GUI); value is displayed in full numeric waitlist availability (001-999 or C) format based on Seg WSA values only, regardless of WLA status (Note*:SearchForFlightAvailability/SearchInfo/WaitlistAvailabilityInd* or *SearchForFlightSpecificAvailability/ SearchInfo/WaitlistAvailabilityInd* = Truein the request for simulate).

When WLA is 'Yes', response is 3 digit availability followed by 'L' and when WLA is 'No' response is 3 digit availability followed by 'C' in simulate availability results. (Eg: Y015L B013L M000C H000L)

**Processing Flight closed / Stop Sale / Permanent-request availability**

1. While determining availability for each RBD, if it is closed or under stop sale or under permanent request, then it is a constraint and data cached in availability space.
2. However as response could be different depending on request originator (internal or external), it is suggested to cache two levels of data – one each for internal and external.
3. Store 'C' against RBDs when it is closed and/or under stop sale.
4. Store 'R' against RBDs for permanent request for external requests only. For internal Host cache 'Q' or actual availability depending on subscriber parameter 'Internal\_Response\_for\_Permanent\_Request'.

**Processing other availability states**

1. When flight status is 'Protected'/'Suspended'/'Emergency Lock'/'Closed[[9]](#footnote-9)'/'Protective Cover[[10]](#footnote-10)', no availability by RBD is returned. System stores the constraint in the availability space, which is returned 'as is'. This must be populated in segment warning (*ShowFlightAvailability/ResponseWarning/SegmentWarning)*

**Processing Group availability**

Group availability is a special category availability request and infrequent. Hence it is not pre-determined or cached unlike others.

1. Group availability request is honoured only when *GroupBookingInd* is set to 'true' in InventoryEnquirer, irrespective of request originator.
2. Since request for group availability is rare, its availability is not pre-determined. The response is generated by retrieving the information (**Seg GSA**) from the ICR as per sub-flow 2 / basic flow 1.
3. When group availability exists, response is returned in full-numeric format ie RBD followed by seats (eg Y050, B040, M030 etc).
4. When Seg GSA is less than requested seats or zero (0), but booking seats are available (ie Seg BSA=>0) and/or WL seats are available (ie Seg WSA>0), then **'R'** is returned for corresponding RBDs (eg Y050, BR, MR etc).
5. If no seats are available in both Seg BSA & WSA, then return 'C' against the respective RBDs (eg YR, BC, MC etc). 'C' is also returned when under 'flight closed' or 'stop sale'.
6. When RBD is under permanent request 'R'-Request or 'Q'-Queue is returned just as in step 13.
7. In simulate availability (GUI), when request is for group availability; response is displayed in full numeric group availability (001-999 or L or C) format based on Seg GSA values only.

#### Handling POO & Up-line / Downline

Whether POO and/or Up-line / Downline restrictions apply, can only be known based on the itinerary of the incoming request. However for the purpose of availability determination, these are considered as a separate POS group and their availability pre-determined and cached.

* **Point of Origin (POO)** is defined within a POS group and therefore can be identified by their POS group (name and number), hence not an issue. When the system receives an availability request, it identifies the POO from the itinerary and based on that information identifies the POS group and returns availability response accordingly (Avail.24b has addressed this functionality).
* **Up-line / downline** restriction can apply to specific POS groups, in case they are defined in the booking limit template, else they could apply to all POS when not mentioned in BL template. When this restriction is limited by POS group, system can identify that POS whose availability is already pre-determined and cached. But when POS is not specified, it implies that the restriction will apply to all POS requests when their itinerary includes the up-line / downline stations.

In such case, system must identify such BL templates (where POS group is not defined) and consider them as separate POS entities. Eg: if a BL Template exist with an Up-line restriction say JFK, then system should pre-determine availability for any request where Up-line station JFK could apply and cache it.

#### Representation of Data in Availability Space

An example of data cached in FlightAvailabilityState for a flight instance for different request originators.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | F | C | Y | B | M | H | Q | T |
| POS (All) | F10 | C10 | Y50 | B40 | M30 | H10 | QL | TC |
| POS (External) | F10 | C10 | Y50 | BR | MC | HC | QL | TC |
| POS1 | F10 | C10 | Y50 | BR | M30 | H10 | Q10 | T10 |
| POS2 | F10 | C10 | Y50 | BR | MR | H10 | Q10 | T10 |
| POS3 (POO) | F10 | C10 | Y7 | BR | MC | HC | QC | TC |
| POS4 (Up-line) | F10 | C10 | Y5 | B3 | MC | HC | QC | TC |
| POS5\* | No data since more than 9 seats are available in all buckets for it | | | | | | | |

\*If no data exists in the availability space, then system must return RBDs from schedule and display '9' against every RBD (eg: F9 C9 Y9 B9 M9 H9 Q9 T9)

**If multiple POS apply to a request, then the system must return the most constrained availability response for it.** Eg: Assume system receives an availability request from an External originator with upline restriction, then in such case both POS (External) and POS4 (up-line) would apply. The system must return availability as follows for this request – F10 C10 Y5 BR MC HC QC TC (where most constrained availability for RBDs Y, B & Q are returned)

#### Search Types

Search type includes following additional values (canonical)

|  |  |  |
| --- | --- | --- |
|  | List | Remarks |
| New | Standard Availability Request (Default) | This would be the default search type and system will return availability for the date of request only |
| Existing | First Availability Request | No change (As delivered by Avail.22) |
| New | Determine Availability for Sell | System will return availability for requested RBD only (remove other RBD while returning response) |
| New | Determine Availability for Waitlist Sell | System will return **numeric** waitlist availability (Seg WSA) for requested RBD only (remove other RBD while returning response) |
| New | Determine First Availability for Type-B Sell Failure | System will process it as a First Availability Request and return response accordingly |
| New | More Availability | TBD (future) |
| Existing | Return Availability | TBD (future) |

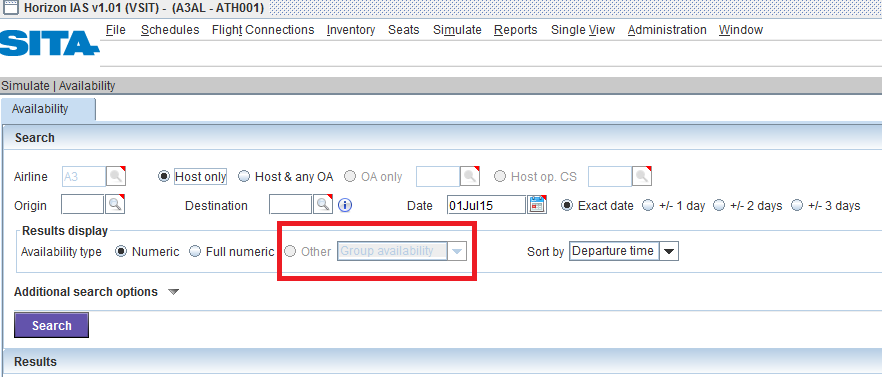
#### List of Error Codes / messages (pending)

The following are the list of error codes and warning message that need to be returned.

|  |  |  |  |
| --- | --- | --- | --- |
| **As per UC** | **As per PADIS manual** | | |
| **Code** | **Message** | **Section** |
| **ICR non-existence** | 130 | Invalid Origin and Destination Pair | 9321 Application error, coded |
| 5 | Invalid flight/Date | 9845 Error/warning message number |
| 11 | Departure/Arrival city pair is invalid | 9845 Error/warning message number |
| 14 | Airline code and/or flight number invalid | 9845 Error/warning message number |
| 404 | No Service Between Requested Cities/Airports | 9321 Application error, coded |
| **Flight is locked for schedule change** | 117 | Schedule Change in Progress | 9321 Application error, coded |
| 95 | Schedule change in progress | 9845 Error/warning message number |
| **ICR under Protective Cover** | 102 | Unable to process | 9845 Error/warning message number |
| 118 | System Unable to Process | 9321 Application error, coded |
| **ICR under Emergency Lock** | 772? | Emergency Lock? | 1225 Message function, coded? |
| **Flight departed** | 97 | Flight has departed | 9845 Error/warning message number |
| 418 | Flight has Departed | 9321 Application error, coded |
| **Flight Closed** | 35 | Flight closed | 9845 Error/warning message number |
| **No Host Availability on requested market** | 404 | No Service Between Requested Cities/Airports | 9321 Application error, coded |
| **Outside Max Sell Date (not in UC)** | 409 | Request is Outside System Date Range | 9321 Application error, coded |
| 438 | Request is outside system date range for this carrier within this system | 9321 Application error, coded |

#### Simulate Availability GUI

The task includes extending capability in the availability simulation screen to search availability by groups and waitlist as shown below.



#### Assumptions

* System will be able to differentiate between Internal & external requests
* Closed state for ICR can be achieved through SOAP GUI
* Avail.24b and Avail.24c are completed prior to this task
* INV.66a2 & INV.66c are completed.

### Acceptance Tests

Definition of done requires that all test scenarios are satisfied; furthermore it is expected that the development team will identify additional scenarios to add to the test pack. Demo has to be done through SOAP UI, Giga GUI and Simulate Availability GUI.

Note: The demo can be initiated either by making an inventory adjustment (Sell) or by re-dressing ICR

**Test Data**

Use test data provided in §**15.1.7**

| **Sr.** | **Test** | **Prerequisite** | **Scenario** | **Post Condition** |
| --- | --- | --- | --- | --- |
|  | Availability when seat constraints apply | ICR exists in the system  No Booking Limit exists | Make Inventory adjustment where seat availability on a RBD becomes 9 or less in one Segment or Leg  Make Availability request | Availability data gets cached in AV space for the entire flight and response is returned correctly  (Demonstrate through Grid GUI) |
|  | Availability when no seat constraints apply | As above | Make Inventory adjustment, but seat availability for RBDs in Seg/Leg > 9 seats  Make Availability request | No data is cached. Availability response is returned from schedule segments |
|  | Availability when seat constraints apply for POS | ICR exists in the system  Multiple Booking Limit exists  Subs.Parameter – 'Most restrictive' | Make Inventory adjustment, where seat availability for RBDs in BLB drops to < 9 seats.  However RBDs in Seg/Leg > 9 seats  Make Availability request through simulate GUI | Availability data **only** for POS is persisted.  - System displays availability correctly for POS (<9 seats)  - System displays availability correctly for non-POS from schedule segments |
|  | Availability when seat constraints apply for POS | ICR exists in the system  Multiple Booking Limit exists  Subs.Parameter – 'Least restrictive' | Make Inventory adjustment, where seat availability for RBDs in one BLB drops to < 9 seats.  However RBDs in Seg/Leg > 9 seats  Make Availability request through simulate GUI | No data is persisted.  - System displays availability correctly for POS (9 seats)  - System displays availability correctly for non-POS from schedule segments |
|  | Availability when only waitlist seats are available | ICR exists in the system  Multiple Booking Limit exists | Make Inventory adjustment, where seat availability for RBDs in BLB drops to 0 seats.  Make availability request as POS | System displays waitlist availability 'L' against respective RBDs for POS |
|  | Availability when both Booking & waitlist seats are not available | ICR exists in the system  Multiple Booking Limit exists | Make Inventory adjustment, where seat availability for RBDs in BLB (both booking/WL) drops to 0 seats.  Make availability request as POS | System displays closed availability 'C' against respective RBDs for POS |
|  | Group availability request (permitted) | ICR exists as above | System receives a valid group request (*GroupBookingInd=True)* | Systems returns full numeric group availability correctly |
|  | Group availability request (permitted) | GSA=0 for a RBD, but seats available in booking | System receives a valid group request (*GroupBookingInd=True)* | Systems returns 'R' for the corresponding RBD |
|  | Group availability request (not permitted) | ICR exists as above | System receives a valid group request (*GroupBookingInd=False)* | Systems returns error response |
|  | Flight closed for external request | ICR exists where cabin is closed for external, even though BSA>9  No Booking Limit | System receives a valid availability request from external party (GDS/OA) | System returns 'C' against the RBDs of the closed cabin |
|  | Flight re-opened for external request | As in A10 | User manually re-opens the cabin that is closed for external requests | System displays '9' against the RBDs that were previously closed in A10 post-condition. |
|  | Stop Sale availability | ICR exists where a RBD is under stop sale , even though BSA>9  No Booking Limit | System receives a valid availability request (both internal or external) | System returns 'C' against the RBDs under stop sale |
|  | Stop Sale availability | As in A12 | User manually re-opens the RBD that is under stop sale | System displays '9' against the RBDs that were previously closed in A12 post-condition. |
|  | Permanent Request availability | ICR exists where a RBD is under permanent request, even though BSA>9  No Booking Limit | System receives availability request from both External & Internal parties | - System displays 'R' against the RBD for external request.  - System displays 'Q' against the RBD for internal rqst when subs.parameter is 'Queue request'  - System displays '9' against the RBD for internal rqst when subs.parameter is 'Seats Available' |
|  | Availability for POO | ICRs exists in the system  Booking Limt exists | System receives a multi-segment availability request (Use test from Avail.24b) | System returns availability as per POO restrictions |
|  | Availability for Upline/Downline | ICRs exists in the system  Booking Limt exists | System receives a multi-segment availability request (Use test from Avail.24c) | System returns availability as per upline/downline restrictions |
|  | Availability for AVS partner (future) | ICRs exists in the system  Booking Limt exists | System receives a availability request from AVS partner | System returns availability as per AVS quota sales |
|  | Open for Sell / Maximum Sell Date | ICRs **don’t** exist | System receives availability request from both External & Internal parties for date later than Open for sale but <= Max sell date | System returns availability as 'R' against all RBDs from schedules |
|  | Flight is 'Protected'/ 'Suspended'/ 'Locked'/ 'Closed'/ 'Protective cover' | ICR exists in 'Protected'/ 'Suspended'/ 'Locked'/ 'Closed'/ 'Protective cover' state | System receives availability request from both External & Internal parties | System returns error response according to status. |
|  | ICR does not exist | None | System receives availability request for non-existing ICR/flight | System returns error response. |
|  | Availability by Search Type | Only Waitlist seats are available for an RBD. | System receives availability request where Search type= Determine Availability for Waitlist Sell | Numeric waitlist availability is returned for the RBD only. |
|  | Availability on flight where Leg/Segment\_Availability\_Threshold >2 legs | ICRs with more than 2 legs exist, where availability in not pre-determined | System receives availability request for this flight | System returns availability response.  (Demo the response time for such requests) |

### Non Functional Requirements

* The impact on availability performance should be less than 100 ms per single segment requests
* System is able to process 1000 availability requests per second

The availability response time must be recorded for demo purpose

### Future Stories

1. Availability for flights under protective cover
2. EDIFACT handling
3. Processing different Search types.
4. Host marketing Code Share availability processing

### Determine Availability Example

Assume following multi-leg flight BA100 operating as below with single-cabin configuration with RBDs- YBM



With below nesting dressed to all legs/segs

|  |  |  |  |
| --- | --- | --- | --- |
| Cabin/Tree/Bucket | BAU/BPL | GAU/GPL | WAU/WPL |
| Cabin Y | 30 | 20 | 15 |
| Tree Y01 | 30 | 20 | 15 |
| Y (Y01.01) | 10 | 5 | 5 |
| B (Y01.02) | 10 | 5 | 5 |
| M (Y01.03) | 10 | 10 | 5 |

And have following two booking limit buckets assigned to each of its legs and segs as below.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| BLB Template | Cabin | RBD | Applicable POS Group | BAU | GAU | WAU | Min AU |
| BLB 1 | **Y** | B, M | POS1 (US) | 20 | 10 | 5 | 10 |
| BLB 2 | **Y** | B | POS2 (ATL) | 15 | 10 | 0 | 5 |

**Note: ATL will fall under both the POS groups**

The ICR and Availability on **'B'** RBD is as follows for each leg and seg initially[[11]](#footnote-11).

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ICR – Seat Availability for RBD - B** | | | | | | | | | **Availability for RBD – B\*** | | |
|  | **BSA** | **WSA** | **BLB1 (US)** | | | **BLB2 (ATL)** | | | **POS (Normal)** | **POS (US)** | **POS (ATL)** |
| **BSA** | **WSA** | **Min.SA** | **BSA** | **WSA** | **Min.SA** |
| **Seg ATL-LHR** | **20** | **10** | **20** | **5** | **10** | **15** | **0** | **5** | **20** | **20** | **15** |
| **Seg LHR-DEL** | **20** | **10** | **20** | **5** | **10** | **15** | **0** | **5** | **20** | **20** | **15** |
| **Seg ATL-DEL** | **20** | **10** | **20** | **5** | **10** | **15** | **0** | **5** | **20** | **20** | **15** |
| **Leg ATL-LHR** | **20** | **10** | **20** | **5** | **10** | **15** | **0** | **5** |  |  |  |
| **Leg LHR -DEL** | **20** | **10** | **20** | **5** | **10** | **15** | **0** | **5** |  |  |  |

\* Availability is cached only when RBD is constrained

**1st Adjustment**: After POS (normal) sells 10 seats on ATL-LHR segment

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ICR – Seat Availability for RBD - B** | | | | | | | | | **Availability for RBD – B\*** | | |
|  | **BSA** | **WSA** | **BLB1 (US)** | | | **BLB2 (ATL)** | | | **POS (Normal)** | **POS (US)** | **POS (ATL)** |
| **BSA** | **WSA** | **Min.SA** | **BSA** | **WSA** | **Min.SA** |
| **Seg ATL-LHR** | **10** | **10** | **20** | **5** | **10** | **15** | **0** | **5** | **10** | **10** | **10** |
| **Seg LHR-DEL** | **20** | **10** | **20** | **5** | **10** | **15** | **0** | **5** | **20** | **20** | **15** |
| **Seg ATL-DEL** | **20** | **10** | **20** | **5** | **10** | **15** | **0** | **5** | **10** | **10** | **10** |
| **Leg ATL-LHR** | **10** | **10** | **20** | **5** | **10** | **15** | **0** | **5** |  |  |  |
| **Leg LHR -DEL** | **20** | **10** | **20** | **5** | **10** | **15** | **0** | **5** |  |  |  |

**2nd Adjustment:** After POS (US) sells 10 seats on ATL-LHR segment

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ICR – Seat Availability for RBD - B** | | | | | | | | | **Availability for RBD – B\*** | | |
|  | **BSA** | **WSA** | **BLB1 (US)** | | | **BLB2 (ATL)** | | | **POS (Normal)** | **POS (US)** | **POS (ATL)** |
| **BSA** | **WSA** | **Min.SA** | **BSA** | **WSA** | **Min.SA** |
| **Seg ATL-LHR** | **0** | **10** | **10** | **5** | **0** | **15** | **0** | **5** | **L** | **L** | **5** |
| **Seg LHR-DEL** | **20** | **10** | **20** | **5** | **10** | **15** | **0** | **5** | **20** | **20** | **15** |
| **Seg ATL-DEL** | **20** | **10** | **20** | **5** | **10** | **15** | **0** | **5** | **L** | **L** | **5** |
| **Leg ATL-LHR** | **0** | **10** | **10** | **5** | **0** | **15** | **0** | **5** |  |  |  |
| **Leg LHR -DEL** | **20** | **10** | **20** | **5** | **10** | **15** | **0** | **5** |  |  |  |

*Availability is cached since it is constrained*

**3rd Adjustment:** After POS (ATL) sells 15 seats on LHR-DEL segment

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ICR – Seat Availability for RBD - B** | | | | | | | | | **Availability for RBD – B\*** | | |
|  | **BSA** | **WSA** | **BLB1 (US)** | | | **BLB2 (ATL)** | | | **POS (Normal)** | **POS (US)** | **POS (ATL)** |
| **BSA** | **WSA** | **Min.SA** | **BSA** | **WSA** | **Min.SA** |
| **Seg ATL-LHR** | **0** | **10** | **10** | **5** | **0** | **15** | **0** | **5** | **L** | **L** | **5** |
| **Seg LHR-DEL** | **5** | **10** | **5** | **5** | **(-5)** | **0** | **0** | **(-10)** | **5** | **5** | **C** |
| **Seg ATL-DEL** | **20** | **10** | **20** | **5** | **10** | **15** | **0** | **5** | **L** | **L** | **C** |
| **Leg ATL-LHR** | **0** | **10** | **10** | **5** | **0** | **15** | **0** | **5** |  |  |  |
| **Leg LHR -DEL** | **5** | **10** | **5** | **5** | **(-5)** | **0** | **0** | **(-10)** |  |  |  |

Note: Negative BSA is rounded off to 0

The process of determining availability for POS (ATL) on ATL-DEL segment after 3rd adjustment is shown below.



1. The terminology could be different but NFR.07a task will communicate what nomenclature to adopt. [↑](#footnote-ref-1)
2. Segment availability is maintained only if is different from the legs ie when constraints are different from legs [↑](#footnote-ref-2)
3. When subscriber code matches marketing airline code (*MarketingAirline*) in the Inventory Enquirer request [↑](#footnote-ref-3)
4. Except when availability request is for full numeric and instances where the ICR has more than 'n' number of legs. [↑](#footnote-ref-4)
5. For all POS groups that can be explicitly & implicitly identified. Implicit are those which cannot be identified from ICR (such as Normal POS which are not constrained by any Booking Limit Bucket, etc). [↑](#footnote-ref-5)
6. Handling availability response for quota sales (whether numeric or A-available needs to be returned) is addressed by another story. [↑](#footnote-ref-6)
7. Whether POO & Up-line/Downline restrictions apply is known based on itinerary of incoming request. Therefore it cannot be determined prior to receipt of the request. Refer to section §**15.1.3.3** on how they need to be processed. [↑](#footnote-ref-7)
8. Since in majority of cases lowest RBD is most likely to be constrained first, which will help determine if other RBDs need to be cached too. However development team can adopt any criteria in case simultaneous threads to determine RBD availability is running. [↑](#footnote-ref-8)
9. System sets segment record to 'Closed' status when flight is departed [↑](#footnote-ref-9)
10. Protective Cover is addressed in another task in the future. [↑](#footnote-ref-10)
11. Same availability would exists for both 'Authorization' or 'Protection Limit' under subscriber parameter Inventory\_Bucket\_Control\_Type inventory adjustment. [↑](#footnote-ref-11)