CDM MEMORANDUM

To: CDM Workgroup

From: Ken Howard/Arcon

Subject: Requirements for Simplified Subs – Rev 13~~2~~

Date: 7/6/04~~11/21/00~~

The attached document is another update of the Simplified Subs Specification. It includes changes to the ETMS user interfaces related to simplified subs.

Following is a summary of the changes that were made in rev 13:

- The default value of the hold flag was changed to "released"; that is, if a flight is cancelled and the airline does not explicitly hold the slot, the slot will not be held.

Following is a summary of the changes that were made in rev 12:

- Several minor corrections and clarifications.

Following is a summary of the changes that were made in rev 11:

- A new requirement was added to limit the total change in ETE to 50% on a simplified sub FM message. (item 4.15)

- New sections were added to describe the packeting of simplified subs report requests when submitted over ARINC (items 5.13 to 5.15)

Following is a summary of the changes that were made in rev 10:

- New requirements were added to cover miscellaneous user interface changes to ETMS related to simplified subs. (items 5.51 to 5.60)

Following is a summary of the changes that were made in rev 9:

- The "Slot Modify (SM)" message has been removed. Instead, an airline can change the hold flag for an already cancelled by using the "Flight Modify (FM)" message. (items 4.6, 5.31)

- The requirement to allow an airline to create a flight and assign it to an open slot was deleted. This has been overcome by other agreements regarding the handling of pop-up flights. (item 4.14)

- The specifications for using FC messages for subbing have been removed. The FC cannot be used for subbing per the change to requirement 4.14. (items 5.16 to 5.20 plus various references)

- An airline will be allowed to swap a flight delayed beyond the end of a GDP with a flight scheduled after the GDP by voluntarily controlling the non-controlled flight, then using the normal sub messages. (items 4.14, 4.16)

- A new "Slot Create" message was added to support an airlines ability to do swapping after a GDP per reqs. 4.14 and 4.16. (item 5.16)

- A requirement was added to the error checking that limits the use of slots belonging to pop-up flights during substitutions. (item 4.16.7)
- Specifications were added for the new message to allow the FAA traffic management specialist to hold or release slots. (items 5.39 and 5.40)

Following is a summary of the changes that were made in rev 8:

- The traffic manager will also be allowed to hold or release all slots for an airline with a single command. This provides a backup mechanism in case an airline has lost all of its communications with ETMS. (Items 4.8, 5.37, 5.38)
- ETMS will accept a hold flag on an FM message if the referenced flight is already cancelled. (Item 5.40)
- Item 5.41 and its sub-items have been deleted. These should have deleted along with item 5.23, which was deleted in rev 7 (in reference to eliminating the automatic subbing for cancelled flights).
- An item was added to clarify what ETMS will do with a hold flag if a swap is made involving the corresponding open slot. (Item 5.42)
- An item was added to clarify what ETMS will do with a hold flag if the cancelled flight currently occupying the open slot is re-instated. (Item 5.43)

Following is a summary of the changes that were made in rev 7:

- The Scope and Summary sections were updated to reflect current thinking (Sections 1 and 2).
- The content of the slot list was changed to reflect the latest agreed upon format. (Items 4.2, 5.2)
- The requirement to allow an airline to sub a controlled flight into a cancelled slot without sending the corresponding sub for the cancelled flight has been eliminated. (NOTE: There is still a requirement that allows an airline to create a new flight and put it into an open slot.) (Item 5.23)
- Requests were added to allow the airline to get a list of the current GDPs and the current status of the subbing (Items 4.29 and 4.30).
- Messages were added to notify an airline when a controlled flight is manually updated or an FA delay is applied (Items 4.31, 4.32, 5.8, 5.9). I assumed this is something useful.
- SS messages for airline clients on CDMNET will no longer be queued if the client is not connected (Item 5.28.6). Instead, the client will "re-synch" itself whenever it starts up.
- Descriptions were added for the report requests and replies (Items 5.42 to 5.49)
- A requirement was added to support the airline's ability to fall back to their old sub tools during a GDP. (Item 4.33)
- Appendix B, which talked about speeding up the compression cycle, was removed as those changes have long since been implemented.

Open questions, issues, etc.

- Should headers be added to the airline message? Right now there are no column headers. With the new message there are many columns and headers might be useful.

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- Should we modify the way a slot list is sent so that all your flights, including your sub-carriers, are sent in a single report as they are in a re-synch request?

- Should we add the sub status to the EDCT LIST report so that these can be gleaned from one request? Also, there is a request to put the rate in the EDCT LIST, and to make the program type more meaningful.

- Should the sub authorization checking be made airport specific so that majors are only allowed to sub flights they should be subbing?

- I still owe a list of the error messages. I hope to have our initial list shortly.

- Should we send an update out when a slot is re-assigned to a diversion recovery flight?

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System Specification for Simplified Subs

1. Scope

This document is a draft system specification for the Simplified Subs work item of the CDM Ground Delay Program Enhancements (GDPE) task. Simplified Subs started as a better way for airlines to do substitutions, but has grown into a re-engineering of all GDP data exchange between the ATCSCC, the ETMS hub, and the airlines. The purpose of the system specification is to define the functional requirements and the interface specifications for both the airlines and the FAA to implement Simplified Subs.

There are two companion documents to this document:

- *CDM Message Formats Version ~~1.3~~2.0*, dated ~~December 20, 1996~~January 9, 2004, defines the general message formats for CDM airline-FAA data exchange.

- *CDM Protocol for CDMNET Version 2.0*, dated ~~August 15, 2000~~May 27, 2004, defines the protocol for message exchange over the CDMNET, including the protocol for Simplified Subs client-server sessions.

2. Summary

The airline community has long complained that the current messages and processing for substituting flights during a GDP are cumbersome and restrictive. The CDM work group is proposing significant changes that will simplify the process for both FAA and the airlines.

The operational requirements for simplified subs are summarized as follows:

- Slot IDs will be computed and sent to the airlines when EDCTs are issued.

- Airline substitutions will be sent to FAA as a simple message assigning flights to slots.

- The old pair-wise sub messages will be no longer needed.

- Cancelling flights and swapping slots will no longer be coupled.

- EDCT lists and "re-synch" replies will be sent in a consistent format.

- A Hold Flag will be used to indicate whether an open slot is available for compression.

- A mechanism will be implemented to automatically release open slots for compression after the airline has had an opportunity to use them.

- Slot IDs, earliest runway times of arrival, cancel flags, and slot hold flags will be added to the EDCT list and "re-synch" format so that all GDP-related data is in one message.

- Error checking will be added to ensure that only one flight is assigned to any slot.

- Pop-ups will be handled as in the current system; that is, the FA delay process will be preserved.

The interface requirements for simplified subs are summarized as follows:

- The simplified sub message will be based on the existing CDM flight data message formats.

- New fields will be created for sending in slot assignments.

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- A new packet header will be used for the simplified sub messages.

- A new data field will be used for modifying the value of the Hold Flag for an open slot.

- The new messages will be accepted over the CDMNET or over ARINC.

- The message format will be enhanced to simplify processing and error checking. (For example, dates will be added to the time fields.)

Since Simplified Subs was first defined, there has been increasing evidence that the data exchange during a GDP is unreliable. This has been an increasing problem as GDPs have gotten longer, and delays have gotten longer. Two problems plague the current ETMS:

- There are situations where ETMS does not know what flight in its database to apply an EDCT or substitution to.

- There are times when ETMS cannot correctly guess the date associated with a revised controlled departure time.

In order to resolve these problems, simplified subs will incorporate the following principles:

- Every message about a flight that is passed between FSM, the ETMS hub, and the airlines will include the original departure date and time of the flight. This will allow positive, unique identification of flight legs.

- Every time will have a date associated with it.

3. Background

When FAA anticipates an airport arrival demand greatly exceeding the arrival capacity, it can manage the problem by issuing a Ground Delay Program (GDP). A GDP consists of a set of Estimated Departure Clearance Times (EDCTs) for the flights predicted to arrive at the airport during the problem time interval. The purpose of the EDCTs is to cause flights to land at allocated arrival times that have been rationed out according to the expected airport acceptance rate (AAR). The EDCTs - along with the Controlled Times of Arrival (CTAs) - are sent to the airlines and controlling facilities indicating to the operators and controllers of the flights when those flights should depart.

Airlines typically have a number of flights that are assigned EDCTs as part of a GDP. Airlines have some flexibility in how they use their assigned times. An airline can:

1. cancel a flight and move another flight into that flight's arrival time

2. move a flight into an arrival time vacated by a previous move

3. exchange two flights arrival times

4. modify the ETE - and thus the EDCT - that was assigned to the flight

The process of adjusting the EDCTs and CTAs for an airline's flights is commonly referred to as *subbing* or *swapping*.

An airline currently indicates its changes through a series of messages sent through ARINC to the FAA. The messages operate in a pair-wise or single flight fashion. The messages currently used for each of the above changes are:

1. CNX-SUB: The CNX message identifies a flight being cancelled; the SUB message identifies the flight that is being moved into its arrival time.

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2. RPL-SUB: The RPL message identifies a flight that has previously been subbed and thus has vacated an arrival time; the SUB message identifies the flight that is being moved into its arrival time.

3. EXC-EXC: The EXC messages identify two flights whose arrival times are being swapped.

4. ADJ: The ADJ message provides a new EDCT and ETE for a flight that has previously been assigned an EDCT and CTA.

The messages are subject to the following error checking and constraints.

- A flight cannot be assigned an EDCT earlier than the time it was predicted to depart before the GDP was issued.

- A flight cannot be assigned a CTA earlier than the current time.

- A flight cannot be swapped if it is already completed.

- A new CTA for a flight must be no earlier than the CTA for the flight being swapped with, and no more than 20 minutes later (this slack is referred to as the 20-minute window)

- Two flights cannot be exchanged if either is already SI cancelled.

When the FAA is revising a GDP that has already been issued, there is the possibility that an airline will send subs at the same time that the FAA is computing or sending the revision. Without any special intervention, the hub site would process the subs, but they would not be accounted for in the revision. To avoid this situation the FAA issues a *SUB OFF* command before computing and sending a revision. This freezes the EDCT database until the new EDCTs get out to all the users, thus helping to keep the FAA and airline databases synchronized. Once the revision is issued, a *SUB ON* command is used to enable the subbing process again.

Flights that appear after a GDP is issued and that are predicted to arrive during the GDP time interval are referred to as pop-ups. Pop-ups may be handled by using FA delays. When a GDP is computed, the average delay assigned to flights in each 15-minute interval (according to original predicted arrival time) is computed and saved. When the GDP is issued, FAA has the option of issuing the FA delays as well. When FA delays have been issued and a pop-up appears, the FAA assigns to that flight the FA delay for its predicted arrival interval. This assures that all flights receive equitable delays, but does not help achieve the desired AAR.

The current system for swapping flights has the following problems.

- A convoluted and confusing set of messages may be required for an airline to get its flights into a desired arrival sequence. This is due to two main factors:

  - flights can only be moved in pairs

  - the CTA is used both to refer to the time a flight is expected to arrive and the "slot" that the airline was originally given for a flight

- An open slot can be used only by knowing the call sign of the last flight that was in that slot, an approach that is cumbersome and error-prone.

- Situations can arise where an airline is forced either to not move a flight up or to relinquish an open slot.

- Through multiple substitutions and the 20-minute window, the arrival demand can become quite different from the desired AAR.

- Pop-ups can cause the arrival demand to significantly exceed the AAR.

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- Due to the many messages required, an airline's database can easily get "out-of-synch" with the FAA's database.

- The ARINC message size limitation means that an airline's changes may have to be sent in a number of separate messages. If any of these becomes lost or out of order, the messages will not be processed correctly.

- The current ARINC network - through costing and message size restrictions - discourages the modification of the swapping process.

- It can at times be ambiguous which day's flight is referred in an EDCT list or substitution request.

4. Functional Requirements

Following are the operational requirements for simplified subs. Each is accompanied by an explanation.

[NOTE: For the purposes of these requirements, ETMS is used to refer to the FAA's traffic management automation system, including FSM.]

4.1.   When a GDP is computed, ETMS shall allocate arrival slots for each flight. ETMS shall identify arrival slots by a unique name that indicates the time of the slot.

A cornerstone to the simplified subs is the concept of the arrival slot. Rather than deal only with CTAs assigned to flights, FAA will assign a set of arrival slots to each airline. The airline can use these arrival slots flexibly to schedule its flights. The arrival slot computation and naming are already provided by FSM and are included in the EDCT lists that are sent to the hub site. Simplified substitutions require that the airline also know the arrival slot assignments, which leads to the next requirement.

4.2.   When a GDP is issued for any reason (initial, compression, revision, extension, etc.), ETMS shall send the slot IDs and all other GDP-related fields to the airlines along with the initial flight-slot assignments determined by ETMS. This list of flights and slots shall be referred to as a slot list. The slot list shall include the following information for each flight-slot assignment:

- **Flight identifier**
- **Slot identifier**
- **Departure airport**
- **CTD (EDCT)**
- **CTA**
- **Control Type**
- **Exempt Flag**
- **Cancel Flag**
- **Hold Flag**
- **ERTA**
- **Initial departure date/time**

NOTES:

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- The time fields will be expanded to include dates (as they do in the ADL files) to make processing easier for everyone involved.

- The Cancelled flag indicates the current status of the flight in the FAA database.

- The Cancelled flag indicates a slot is open, and thus replaces the OPEN field in the CTALIST request.

- The ERTA and Hold fields will indicate the current values as sent by the airlines. These fields will be null if no airline data has been received.

There was some discussion of sending only the arrival slots to the airlines without the initial flight assignments. It is important for FAA to always have a valid demand prediction; therefore FAA must always have flights assigned to slots, even if the airlines are going to change them. The slot assignments shown in the list are the ones FAA will assume unless it hears from the airlines, and it seems worthwhile to let the airlines know what the FAA is assuming. Also, the airline should know which of its flights the FAA included in the GDP for determining slots. The airline can extract the slots and flights and ignore the FAA assignments if it so wishes.

4.3.   An airline shall notify FAA of any re-assignment of flights to arrival slots by sending a message assigning any affected flights to their new slots.

Given the set of slots that an airline receives, it can assign its flights to those slots in whatever manner it sees best. Once the assignments are complete, they can be sent back to FAA in a single slot list. The format is still under discussion. The slot list may include all flights for the airline or only those which have been changed (sending all flights will help keep the airline and FAA databases in synch).

4.4.   An airline may limit the amount that a slot can be moved up by compression by specifying the Earliest Runway Time of Arrival (ERTA) in the slot list.

If an airline is using the ERTAs to constrain the way compression moves its flights, it may also send in new ERTAs as it subs flights into new slots.

4.5.   An airline may exempt a slot from being filled by the next iteration of compression by setting the "Hold Flag" for that slot.

If an airline wishes to hold a slot - that is, make it unavailable for compression - it may do so by setting the Hold flag for that slot. This should be done only in that circumstance when an airline did not have sufficient time to get its flight ordering set before a compression cycle. A Hold flag is being used rather than a Release flag because the default condition is that slots are available for compression.

4.6.   An airline may set the Hold Flag for a slot in the following ways:

- **When the slot is first created by a CDM flight cancel (FX) message.**

- **When an open slot is moved in a substitution message.**

- **Using a "flight modify" message.**

These options give the airline flexibility in how their software sets the hold flag values. If an airline wishes to always start with a particular value for the hold flag, they can program their systems to send that value on every FX. If they only wish to hold slots at airports where they are major players, they can do that as well. Once a flight is cancelled, the airline can modify the value of the hold flag by using a normal flight modify (FM) message.

4.7.   ETMS shall reset the value of a Hold flag to "release" following any application of the compression algorithm; that is, whether run alone or as part of RBS++.

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The concern is that an airline could build its software to always hold slots and then neglect to release them, causing slots to go unused. This approach gives the airline time between compression cycles to fill the slot themselves. If they do not, the slot will be filled by the next compression. If they wish to hold onto the slot but are not ready to sub into it, they can reset the hold flag before the next compression and keep the slot.

4.8.   An airline may set the value of the Hold flags for all currently cancelled flights in a GDP by a single message. The same command shall be made available to the traffic manager.

A "hold all" and "release all" message will be provided and will work as follows. An airline can send a message through either CDMNET or ARINC. A message must specify the airport where the GDP is in place. When a message is received, ETMS set the hold flag to the desired value for all flights that:

- belong to that airline and its sub-carriers
- are currently cancelled
- have controlled arrival slots

The "hold all" and "release all" messages will not affect the way any subsequent cancellations are processed.

The "hold all" will be useful if a mistake has occurred and an airline wants to have time to re-synch and re-evaluate its position before RBS++ re-assigns their slots. A "release all" will be useful if an airline wants to indicate that it is all done substituting for a particular GDP. Also, if an airline experiences a system failure preventing them from subbing, it could manually send a "release all" message that would allow RBS++ to do the best it could with that airline's slots. If an airline is unable to send any kind of message, a traffic manager at the ATCSCC will be allowed to enter the command via ETMS.

4.9.   If a flight is cancelled and no value for the hold flag is specified, the flag shall be set to "released" by a default; that is, the Hold flag will not be set. based on the cancellation method:

- **For an airline (FX) cancellation, the default shall be "release"**
- **For any other type of cancellation, the default shall be "hold"**

The motivation for this requirement is as followshas changed since simplified subs were first designed. If the airline sends an FX, it has the option to set the hold flag. If the airline chooses not to, we should set the value in the manner that most contributes to the benefits of CDM - this value is "release". However,The original thinking was that if a flight is cancelled for some reason that the airline is unaware of - let's say an ETMS time-out or a NAS cancellation - the airline deserves the opportunity to find out about the cancellation and check into it before RBS++ does something with the slot. The new thinking is that there are many flights that do not belong to CDM participants and these slots should not be held. Furthermore, the CDM participants should always cancel a flight using an FX message, in which case they can set the value of the hold flag to whatever they want. If a flight is cancelled due to some other means, the participant has failed in some respect and thus does not deserve this special consideration. It should also be noted that the releasing of a lsot does not mean that the participant loses the slot, it just means that there flights may be re-ordered in their slots.

4.10.   The Hold Flag shall be added to the ADL file format and displayed in the FSM flight information block.

This allows FAA and airlines to see the status of the held slots.

4.11.   The airline shall be able to re-assign flights to slots an indefinite number of times.

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An airline may send as many substitution messages as it wants. The only restrictions on re-assigning flights to slots are those mentioned explicitly in the following requirements.

4.12. **An airline may assign a flight to an arrival slot as long as its revised CTA is not earlier than the slot time and not more than 20 minutes later.**

There was a proposal on the table to eliminate the 20-minute window, as compression should make the same slot available that an airline would have gotten with the 20-minute window. However, there were several strong arguments for keeping it:

- There is no unfair advantage that an airline can gain by the 20-minute window. The slot that the airline wants is later than the one it already has. Once compression is run, other flights will be incrementally bumped up to make the later slot available to that airline. Others benefit from the incremental bumps.

- An airline may want to cancel a flight and move another flight up that cannot quite make the slot time. Compression would move the flight up, however, if the next compression cycle were after the desired departure time, the flight would not be moved in time. The 20-minute window, in this case, would give the airline the benefit of the doubt that the next compression cycle will formally give it the slot that it is assuming it can have. (This will in fact be true in about 99% of the cases according to Mike Wambsganns.)

- An airline cancels a flight and has two flights that could possibly use the slot. One can make the slot time, one just misses it. However, the airline would like to leapfrog the latter flight ahead of the former flight. Without the 20-minute window, there is no way to do this. If the 20-minute window is allowed, the next compression cycle will re-arrange the slots to accommodate the airline's desired order.

An interesting point was raised during this discussion: why limit the window to 20 minutes? As long as the slot the airline wants is later than the slot the airline has, why shouldn't it be allowed to have it? Compression, in essence, has an infinite window. Why not just let the airline have the same capability when it subs? We decided that this was an interesting notion that needed further thought and discussion, but we were not ready to commit to as a recommended requirement. However, this does lead to a technical requirement:

- The 20-minute limit for substitutions shall be implemented as a run-time parameter.

4.13. **When a new flight appears that is predicted to arrive in the GDP time interval and that flight does not have an EDCT, ETMS shall assign a FA (Fuel Advisory) delay as it does in the current system.**

The current method of handling pop-ups undermines the goal of achieving a desired AAR. We discussed the idea that airlines should be limited to using the slots assigned in the original GDP, which were rationed according to its original schedule. However, this leaves the problem of GA and military flights. We could not imagine that they would accept the notion of not getting a slot until the end of the GDP. It therefore would not be fair to apply this rule only to airline pop-up flights. So, we decided that the current system was the only feasible choice. It is expected that the specialist running the program will monitor the effect of the pop-ups on the demand, and revise the program when the demand gets too far above the AAR.

(Formerly Req. 4.14.)

This requirement came from a discussion of a proposed error check that "every flight included in the GDP must have a slot." The airlines feel that once they have their slots, they should be able to use them for new flights as long as the slots are open. However, the issue of pop-up slots has become quite

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complicated. Other restrictions have been placed on subbing pop-up slots that interfere with the implementation of this requirement (see changes in req. 4.17). This requirement may be re-opened as further changes are made for pop-up flights.

4.14. An airline may create a slot for an existing flight as long as that flight is not already part of the GDP; that is, the flight does not already have an EDCT or FA delay assigned to it.

This requirement was created to provide a mechanism for handling a specific limitation of the current GDP. In a current GDP, a flight that was originally in the GDP time window may be delayed after a flight that is scheduled after the GDP. An airline currently has no way to swap the times for these two flights to restore the original schedule order. To resolve this problem, the airline will now be allowed to voluntarily "control" non-controlled flight that is scheduled to arrive after the GDP. Once the flight is controlled, the airline can then swap it with the delayed flight using the normal sub message formats and rules. An airline will create a slot by using a new "Slot Create" message type as described in section 5.

4.15. When an airline sends a substitution message, it may modify the EDCT times for its flights to reflect the time that the airline feels the flight should take off to meet their CTAs. However, ETMS shall reject a message that changes the ETE by more than 50%.

This is a continuation of the current policy. An airline can use the slot list to change EDCTs for flight whose slots are unchanged (just as it currently can with the ADJ message). This requirement, although not new, partially achieves the Control by Time of Arrival requirement.

4.16. ETMS shall reject any airline substitution message that does not meet the following error checking and constraints (NOTE: these constraints apply also to cancelled flights that still occupy a slot):

4.16.1. An airline can only assign its flights to those slots that have been allocated to the airline by FAA and issued in a GDP slot list, or that have been created by the airline using the Slot Create message

4.16.2. An airline can assign only one flight to any given slot.

4.16.3. An airline can assign any given flight to only one slot.

4.16.4. Once the FAA assigns a flight to a slot, the airline must continue to assign that flight to a slot.

4.16.5. The CTA for a flight must be no earlier than its slot time and no more than 20 minutes later.

4.16.6. A flight cannot be swapped if already completed, as indicated by ETMS having received an AZ message, or if the slot time is in the past.

4.16.7. A flight cannot be assigned to an earlier slot if that slot is currently owned by a flight that was once a pop-up.

4.16.8. An airline can create a slot for an uncontrolled flight if that flight exists in the ETMS database, does not already have an EDCT or FA delay, and if it is scheduled to arrive after the end of the GDP.

The error checks just enforce the previously discussed requirements along with the "one-flight-one-slot" rule.

4.17. If any errors are detected in an airline's substitution message, ETMS shall reject the entire list and apply none of the changes to the ETMS databases. In addition, ETMS

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shall provide an explanation of the error condition(s) that is sufficient for the airlines to be reasonably certain why the message was rejected.

This appears to be the best way to assure database consistency and to make it easy for the airline to correct the error. The FAA processing will identify as many errors as possible in the airline message in order to minimize the number of re-transmissions of the message.

4.18.   When ETMS accepts an airline substitution message, it shall send a reply to the airline in the same format as the EDCT list and re-synch message. The reply shall contain only those flights and slots that were changed.

This maintains consistency in format and allows the operational personnel at the airline to verify the updated content of the ETMS database for these flights. It also avoids overwhelming the operator with data if they are making multiple changes in separate messages. If an operator wants to get a full list, they can simply embed a "re-synch" request in the simplified sub message.

4.19.   When ETMS accepts an airline substitution message, it shall send a notification to the FAA ATCSCC and to other affected facilities as required by FAA.

This keeps FAA operational personnel on the same page as the airlines.

4.20.   ETMS shall provide a command for the specialist to turn substitution processing off and on for a specified airport. ETMS shall reject any SS packets received while subs are off for the specified airport.

When compression is run or when a GDP is being re-computed, the substitution processing will be turned off temporarily for that airport to assure that the databases all stay synchronized. The motivation is the same is with the current process. A feature will perhaps be added to FSM to provide a visual indicator of when subs are off.

4.21.   ETMS shall send a message to the airlines whenever subs are turned on or off. The message shall provide a short window for airline to stop sending their subs when a "SUB OFF" message is sent. A "SUB ON" message shall be effective immediately.

These messages will make it possible for airlines to program their swapping software to automatically hold new slot lists when subs are off. The message will indicate that, for example, subs will be turned off in 60 seconds. This gives the airlines a little time to turn its sending off, and thus reduces the chance that subs are "in the pipe" at the moment that the subbing is turned off.

4.22.   ETMS shall send a message to the airlines whenever a GDP is cancelled (purged). The message shall indicate to the airlines exactly what EDCTs to purge.

These messages will allow the airlines to keep their databases in synch with the ETMS databases. That is, when ETMS processes an EDCT purge command, the airlines can process the same command.

4.23.   FAA shall provide sufficient notice to the airlines of these requirements to allow them to make the necessary programming changes.

4.24.   FAA shall support both the old and new EDCT/sub formats until the termination of the old approach has been properly coordinated with all users.

FAA will establish the time period with consultation from the airlines

4.25.   ETMS shall send the new slot lists over either the ARINC ADNS network or over the CDMNET.

4.26.   ETMS shall accept the messages in the new format over the ARINC ADNS network or over the CDMNET.

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The new simplified process will be made available through ARINC to allow any airline to easily participate. However, there is no apparent motivation for supporting the old SIs over the CDMNET. ETMS must be easily configurable to allow the slot lists to be directed either over ARINC ADNS or over CDMNET.

4.27. ETMS shall use a communications protocol similar to that used for ADL files and flight data messages for the new slot list messages.

A similar protocol will be used to make the software implementation straightforward for those who have already implemented the flight data exchange over the CDMNET.

4.28. ETMS shall support a new "re-synch" message that returns the data in the new slot list format.

This will allow the airlines to deal with only one data format. This will be done via a new request so airlines using the CTALIST request won't see any change. The new request could be called REQ SLOTLIST.

4.29. ETMS shall provide a report on request that shows all the GDPs that are currently in place.

4.30. ETMS shall provide a report on request that subs the status of the substitutions (on or off) in all current GDPs.

Requirements 4.29 and 4.30 allow an airline client to get the current status when it starts up.

4.31. ETMS shall send a notice to an airline whenever the control times for one of its flights are manually updated by the command center.

4.32. ETMS shall send a notice to an airline whenever an FA delay is applied to one of its flights.

Requirements 4.31 and 4.32 keep an airline client apprised of changes to its flights without having to continually do re-synch requests. The notification in these cases will use the slot list format to send the flight data.

4.33. ETMS shall allow an airline to switch from using the new simplified sub messages to the old substitution messages (SIs) during a GDP.

This requirement provides a fallback for airlines as they are phasing over to their new sub tools. Note that ETMS will not support switching from the old format to the new during a GDP.

5. Interface Specifications

Messages from ETMS to Airlines

This section describes the new GDP messages initiated by ETMS to the airlines. The messages in this section are event triggered; that is, the sending of these messages is triggered by external events rather than a request from an airline. The airline request/reply is described in a later section.

Slot List

The slot list is the message for transmitting GDP information to the airlines. Currently, there are three different formats for sending GDP information to the airlines: EDCTs, CTALISTs, and SI replies. The new system will use one consistent format for all three. The new slot list has been designed to provide all

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of the information about a flight and slot that is relevant to a CDM GDP. Following are the details of the slot list message.

5.1. **The slot list format will be used whenever slot assignments are sent from FAA to the airlines; that is:**

5.1.1. **when a GDP (initial, compression, revision, or revision) is issued**

5.1.2. **in response to a "re-synch" request**

5.1.3. **to confirm the processing of an airline substitution message**

5.2. **The slot list will consist of a header line, a line of column headers, and a list of flight records, as in the following example.**

```
SLOT LIST FOR SFO

ACID    ASLOT       DEP  CTD    CTA    TYPE EX CX SH ERTA   IGTD
ABC1234 SFO180156A  MEM  172235 180156 GDP  Y  -  Y  172030 172020
DEF5678 SFO180251A  LAX  180208 180251 GS   -  Y  -  180130 180100
```

NOTES:

- Line 1 identifies the report type (SLOT LIST) and the airport being controlled (SFO).

- Line 2 provides headers for the data fields. The headers have been abbreviated to keep the slot list line length under the ARINC limit.

- Lines 3-n provide the individual flight-slot assignments.

- The individual flight data fields are defined as follows:

  ACID – The flight identifier as filed on the flight plan.

  ASLOT – The arrival slot assigned by the FAA. The identifier consists of the arrival airport code (3 or 4 letters) followed by the slot time (DDHHMM) followed by a single letter (A-Z).

  DEP – The departure airport (3 or 4 letters)

  CTD – The controlled time of departure currently assigned to the flight.

  CTA – The controlled time of arrival currently assigned to the flight.

  TYPE – The source of the current control times. The possible sources are:

  - GDP – an initial GDP, an extension, or a revision

  - GS – a ground stop program

  - COMP – compression

  - FA – a fuel-advisory delay

  - BLKT – a blanket (+/-) program

  - SUB – an airline substitution message

  - UPD – an ETMS "EDCT UPDATE" command

  EX – Indicates whether the flight was exempt from delays when the GDP was computed.

  CX – Indicates whether the flight is currently cancelled.

  SH – If the flight is cancelled, SH indicates whether the slot is currently held by the airline.

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ERTA – The earliest runway time of arrival that can be accommodated by the flight (as provided by the airline).

- IGTD – The Initial Gate Time of Departure for the flight, defined when the flight is first created in ETMS.The Slot List differs significantly from the old CTALIST. Some of the important differences are:

    - Dates are added to the time fields

    - The meaningless prefixes are removed from the EDCT and CTA columns.

    - DEPT was renamed to ETD and EDCT to CTD to be consistent with the ADL format.

    - Initial Gate Departure Time (IGTD) is added to assist in flight data matching.

    - The cancelled flights and open slot sections are eliminated from the CTALIST; these are now embedded in the core report. [Cancelled flights are indicated by the CX flag; open slots are indicated by the SH flag.]

    5.3.   The slot list format will adhere to the following rules:

    5.3.1.   Data fields will be column-aligned.

    5.3.2.   Columns will be separated by spaces.

    5.3.3.   Times will include day-hour-minute

    5.3.4.   Flag values are indicated as "Y" for TRUE and "-" for FALSE or undefined.

These are the same rules that the ADL files follow.

5.4.   When a GDP – including compression, revision, or extension – is issued, the slot list will be sent to those addresses that have been specified by the airlines. The addresses can either be ARINC addresses or CDMNET clients.

This allows flexibility to the users.

Sub On/Sub Off

The sub on and sub off messages to the airlines will follow the same format as the messages sent by the traffic management specialist to the ETMS hub processing.

5.5.   A sub off message will indicate the airport for which subs are being turned off in the following format:

```
EDCT SUB OFF DFW
```

5.6.   A sub on message will indicate the airport for which subs are being turned on in the following format:

```
EDCT SUB ON DFW
```

EDCT Purge

A GDP is cancelled in ETMS when a traffic management specialist enters a EDCT PURGE command. Whenever ETMS successfully processes an EDCT PURGE command, it will echo the command out to the airlines.

5.7.   An EDCT PURGE command will indicate the airport for which the GDP is begin cancelled in the following format:

.

```
EDCT PURGE DFW
EDCT PURGE DFW B1900
EDCT PURGE DFW A2100
```

Most often an EDCT PURGE is issued with no time option. In this case, the airline should remove any controls that have not yet taken effect (i.e., for all flights that have not yet departed).

If the EDCT PURGE is issued with the "B" time option, the airline should remove only those controls with a CTA before the specified time.

If the EDCT PURGE is issued with the "A" time option, the airline should remove only those controls with a CTA after the specified time.

EDCT Update

A specialist at the command center manually corrects or overrides the control times for a flight using the ETMS command "EDCT UPDATE". Whenever ETMS performs an EDCT UPDATE on a flight, it will send a message out to the affected carrier notifying it of the change.

5.8. **Whenever ETMS performs an EDCT UPDATE command for a flight, it will send a message using the slot list format. The header will indicate this is an EDCT UDPATE message, as follows:**

```
EDCT UPDATE FOR SFO

ACID    ASLOT      DEP  CTD    CTA     TYPE EX CX SH ERTA   IGTD
ABC1234 SFO180156A MEM  172235 180156 GDP  Y  -  -  172030 172020
```

FA Delay

ETMS automatically applies an FA delay to a flight "pops-up" during a GDP. Whenever ETMS applies an FA delay to a flight, it will send a message out to the affected carrier notifying it of the change.

5.9. **Whenever ETMS applies an FA delay to a flight, it will send a message using the slot list format. The header will indicate this is an FA Delay message, as follows:**

```
FA DELAY FOR SFO

ACID    ASLOT      DEP  CTD    CTA     TYPE EX CX SH ERTA   IGTD
ABC1234 SFO180156A MEM  172235 180156 GDP  Y  -  -  172030 172020
```

Substitutions

The following general approach will be used for sending simplified substitutions:

- Airlines will assign flights to slots primarily by using FM messages. Fields will be added to the FMs for specifying the assigned arrival slot, CTD, and CTA.

- Airlines will package "subbing" FMs in a new packet type: SS. This will look just like an FD packet, but the SS will indicate to everyone that it is doing subs.

- Airlines will cancel flights using FX messages. These may either come in an FD packet or an SS packet. An FX should be included in an SS only if the flight being cancelled currently has an assigned arrival slot.

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- The messages in an SS packet, when considered together, must pass the consistency checking specified in the functional requirements.

- The SS packet will also be used to send slot status data and "re-synch" requests.

Following are the detailed requirements for the simplified substitution messages.

Packeting

5.10. **Airlines will send simplified substitution data to ETMS in a new packet type: SS.**

5.11. **The SS packet will follow the same general formatting as the FD packet. (see CDM Message Formats document.)**

5.12. **An SS packet may only contain messages relevant to a GDP; that is, messages that:**

5.12.1. **change a flights' slot assignment**

5.12.2. **cancel a flight that has a slot**

5.12.3. **creates a new flight and assigns it to an open slot**

5.12.4. **changes a slot status (either individually or globally)**

5.12.5. **requests re-synch data**

A sample SS packet follows:

```
SS ABC0906180523.01
FM ABC1 MEM SFO 06172050 T5 172350 T6 180350 A2 SFO180350A
FM ABC2 DEN SFO 06180030 T1 180050 T2 180250 T3 180035 T4 180310 –
T5 180050 T6 180250 A2 SFO180250A
FX ABC3 LAX SFO 06180200 A6 H
```

5.13. **Airlines will send SS report requests over ARINC using a new packet type: RQ. The RQ packet will require no additional data in the header line. [Note: SS requests sent over CDMNET do not require a packet header.]**

5.14. **An RQ packet can contain only report requests. The reports will be returned to the ARINC address from which the request was made.**

5.15. **An RQ packet may contain more than one report request.**

A sample RQ packet follows:

```
RQ
EDCT LIST
EDCT SUB SHOW
```

Assigning flights to slots

5.16. **Airlines will change a flight's slot assignment by sending a "subbing" FM message for that flight. The "subbing" FM must contain three new fields: CTD (T5), CTA (T6), and Assigned Arrival Slot (A2).**

5.17. **Airlines may send a "subbing" FM only in an SS packet.**

5.18. **Airlines may include any of the normal FM data fields on a "subbing" FM.**

.

5.19. **Airline may create a slot and assign it to a flight using a "Slot Create" (SC) message (new). The SC message will be formatted similar to a subbing FM. The required fields for an SC message are:**

- **Message type (SC)**
- **Flight ID**
- **Origin airport**
- **Destination airport**
- **Original departure date/time (8 digits)**
- **CTD (T5)**
- **CTA (T6)**
- **Assigned Arrival Slot (A2)**

A sample SC message follows:

```
SS ABC0906180523.01 ADDRESS
SC ABC1 MEM SFO 06172050 T5 172350 T6 180350 A2 SFO180350A
```

5.20. **Airlines may include an FX in an SS packet if that flight is currently part of a GDP (i.e., the flight has a assigned arrival slot). [NOTE: Airlines may also include an FX for a flight with an arrival slot in an FD packet.]**

5.21. **ETMS shall perform error checking on an SS packet containing "subbing" FMs and/or SCs as specified in the functional requirements (4.16 and 4.17).**

A sample simplified sub packet with subbing messages follows:

```
SS ABC0906180523.01 ADDRESS
FM ABC1 MEM SFO 06172050 T5 172350 T6 180350 A2 SFO180350A
FM ABC2 DEN SFO 06180030 T1 180050 T2 180250 T3 180035 T4 180310 –
T5 180050 T6 180250 A2 SFO180250A
FX ABC3 LAX SFO 06180200 A6 H
```

The ADDRESS field can only be an ARINC address. If the ADDRESS field is blank, the reply will be returned to the sender; that is, if sent over CDMNET, the reply will be sent back to the client over the existing socket connection.

An argument can be made for sending the LRTD/A at the same time as the CTD/A. The hub processing uses either the CTD or the LRTD - whichever is later - as the ETD. Assume a flight has been delayed to 1230, and the airline has updated the LRTD to 1230. The airline then subs the flight up to a new CTD of 1200. If the LRTD is still 1230, the ETD will remain 1230. This will make the flight's slot appear to be open on FSM. However, this has not been made a requirement.

Substitution replies

Sub replies in general will follow a similar format to the FD replies. However, a successful substitution packet reply will include a slot list for those flights that were changed.

5.22. **When a sub is processed with no errors, ETMS will reply with a slot list containing only the changed flights. The reply will include the packet identifier.**

.

5.23. **When an SS packet is processed with error(s), ETMS will reply with explanatory information regarding what the error(s) was(were) and where it(they) occurred.**

5.24. **ETMS will format the reply similar to the FD replies, specifically:**

5.24.1. **Each reply will include the packet identifier sent by the airline.**

5.24.2. **The reply will indicate whether the processing was successful or not.**

5.24.3. **If the processing was not successful, the reply will include the number of errors and a detailed error message for each.**

A sample good reply follows:

```
SS ABC0906180523.01 ACCEPTED.
SLOT LIST FOR SFO
ACID    ASLOT       DEP  CTD    CTA    TYPE EX CX SH ERTA   IGTD
ABC1234 SFO180156A  MEM  172235 180156 GDP  Y  -  Y  172030 172020
DEF5678 SFO180251A  LAX  180208 180251 GS   -  Y  -  180130 180100
```

A sample error reply follows:

```
SS ABC0906180523.01 REJECTED. 1 ERROR.

FM ABC1 MEM SFO 06172050 T5 172350 T6 180350 A2 SFO180350A
ERR501: CTA NOT WITHIN 20-MINUTE WINDOW
```

5.25. **ETMS will send replies to the airline in the following manner:**

5.25.1. **If an optional ARINC address is provided, ETMS will send the reply only to that ARINC address.**

5.25.2. **If no optional address is provided, ETMS will send the reply to either the ARINC or CDMNET address from which the message was received.**

Communications Protocol

The new data exchange for simplified subs will follow existing conventions and protocols in use for EDCT and flight data exchange. The details are specified in a revision to the CDM Protocol for CDMNET document. Some of the general rules are specified here.

5.26. **If using CDMNET,**

5.26.1. **Airlines will send simple subs to a port specified by FAA. [NOTE: This may be the same port as the flight data messages. An airline may have multiple connections to this port.]**

5.26.2. **If an airline wants to get slot lists, sub on, sub off, EDCT purge, and/or SS replies over CDMNET, the connection to the port must be continuous.**

5.26.3. **Airlines will send SS packets using the same protocol as for the FD packets (as documented in *CDM Protocol for CDMNET*). A new message type will be specified.**

5.26.4. **ETMS will send slot lists, sub on, sub off, and EDCT purge messages to the airlines using the same protocol. Again, new message types will be defined.**

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5.26.5. In the event that the connection to ETMS is lost, an airline should automatically and persistently attempt to re-establish the connection.

5.26.6. In the case of a lost connection, ETMS will NOT queue messages for that client. The client should re-synch itself by doing new data requests when it starts up.

5.27. If using ARINC,

5.27.1. Airlines will send simple subs to an address specified by FAA. [NOTE: This may be the same address as the flight data messages.]

5.27.2. Airlines will send SS packets using the priority QU.

5.27.3. ETMS will send slot lists, sub on, sub off, and EDCT purge messages to the airlines using pre-defined ARINC addresses in the same manner as the current EDCTs.

It is not a requirement that an airline check for a positive acknowledgment on each sub message and re-transmit in none is received. However, it is strongly recommended. The sub data is critical for both the airline and the FAA, and every attempt should be made to ensure that the messages are delivered and processed correctly. This raises the possibility that a packet will be processed correctly but the acknowledgment get lost. In this case, the airline would re-transmit the message even though it has been processed. To avoid processing the message twice:

5.28. ETMS will maintain a list of recently processed packet IDs. When a packet is received, ETMS will not process it if it has already been successfully processed.

Maintenance of Open Slots

An open slot is created whenever a flight with an assigned arrival slot is cancelled. If that flight belongs to an airline, the airline maintains ownership of the slot even though there is not a viable flight in it. The slot can then be filled in two ways: the airline can fill it by sending a sub message, or the FAA can fill it by running compression. An issue therefore exists as to what opportunity the airline has to fill an open slot through substitution before compression fills it. A procedure has been defined that gives an airline the first opportunity to fill its open slots, but ensures that if the airline does not, compression will.

An important part of the CDM GDP concept is the arrival slot as a tangible object. The assignment of slot names to the airlines was the first step in realizing this concept. The management of open slots furthers this concept. At the time that a flight is cancelled, the flight is implicitly used to identify the slot that is being opened. Thereafter, any changes in the status of an open slot are done by referring to the slot name; that is, there is no need to refer to a cancelled flight as in the current ETMS.

In the following items, the term "held" is used to mean that the next compression will not fill the slot. The term "released" is used to indicate that the next compression will fill the slot.

5.29. A new field will be added to the FX and FM messages for indicating whether an open slot created by this cancel should be held or released. The use of this field will be as follows:

5.29.1. The field will be referred to as the "hold flag"

5.29.2. The field identifier will be "A6"

5.29.3. The A6 field value will be one letter: "H" for hold, "R" for release

5.29.4. The field will be optional.

Example:

.

```
FX  ABC3  LAX  SFO  06180200  A6  H
```

5.30. Airlines may send an FX with a hold flag (A6) in either an SS packet (if the flight currently has a slot) or in an FD packet.

5.31. If the airline does not provide an A6 field on an FX, ETMS will set the value of the hold flag to released (R).

5.32. When a flight is cancelled for a reason other than an FX message, and the flight belongs to an airline, ETMS will set the value of the hold flag to ~~held (H).~~released (R).

5.33. When a flight is cancelled, ETMS will apply the hold flag (whether airline-provided or set by default) in the following manner:

    5.33.1. If the flight has an assigned arrival slot at the time it is cancelled, the hold flag will be applied to that slot.

    5.33.2. If the flight does not have an assigned arrival slot at that time, the hold flag will be saved. If at a later time an arrival slot is assigned to that flight, the hold flag will be assigned to that slot.

5.34. Once a flight is already cancelled, an FM message may be used to modify the value of the hold flag.

5.35. When an airline substitutes a flight into an open slot, ETMS will carry the hold flag value over to the new open slot.

5.36. ETMS will accept a new message that allows an airline to hold all their current open slots, as follows:

    5.36.1. The message format will be, HOLD ALL SLOTS FOR APT, where APT is the airport name.

    5.36.2. Airlines may send the message either over ARINC or the CDMNET.

    5.36.3. ETMS will apply the message by setting the hold flag to held (H) for all future open slots for the airline (and authorized affiliates) for that airport.

    5.36.4. If using CDMNET, airlines may send this message only in an SS packet.

    5.36.5. ETSM will also accept this message from a traffic manager. The traffic manager will be required to provide one additional parameter: the name of the airline whose slots are to be held.

5.37. ETMS will accept a new message that allows an airline to release all their current open slots, as follows:

    5.37.1. The message format will be, RELEASE ALL SLOTS FOR APT, where APT is the airport name.

    5.37.2. Airlines may send the message either over ARINC or the CDMNET.

    5.37.3. ETMS will apply the message by setting the hold flag to released (R) for all future open slots for the airline (and authorized affiliates) for that airport.

    5.37.4. If using CDMNET, airlines may send this message only in an SS packet.

    5.37.5. ETSM will also accept this message from a traffic manager. The traffic manager will be required to provide one additional parameter: the name of the airline whose slots are to be released.

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Example:

```
SM SFO171823A A6 H
```

5.38.   ETMS will accept or reject hold flags on FM messages as follows:

5.38.1. ETMS will accept an FM that contains the hold flag field (A6) only if the flight is cancelled.

A Hold Flag has no meaning if the slot is not open, so it seems logical to not allow the flag to be set for any non-cancelled flight.

~~**5.39.   ETMS will track what cancelled flight "belongs" to an open slot. The airline will have two options:**~~

~~**5.39.1. When the airline substitutes a flight into an open slot, the airline can substitute the previously cancelled flight into the new open slot (that is, the slot previously assigned to the flight being subbed).**~~

~~**5.39.2. If the airline chooses not to substitute the previously cancelled flight, ETMS will automatically assign the slot to the cancelled flight.**~~

5.40.   When an airline assigns a cancelled flight to a new slot, and the hold flag is not sent as part of the FM message, ETMS will carry the value of the hold flag along with the cancelled flight.

In other words, the hold flag will still be associated with the open slot after the swap is made.

5.41.   When a cancelled flight is re-instated by an FC message, ETMS will automatically clear the hold flag.

Again, since the Hold Flag has no meaning if the slot is not open, it seems more logical to clear the flag in this case.

The maintenance of the open slots can perhaps be better understood by walking through a typical cycle. After SSR is implemented, we anticipate that the first GDP will be RBS++. The sequence is as follows:

1. Prior to the GDP, an airline can set up its open slots to be "held" or "released" as it wishes. The expectation is that the airline will use held as a default only at those airports and during those time periods where substitutions are viable.

2. In the first GDP, RBS++ fills any "released" slots. "Held" slots remain open for the airline to use. After the GDP is issued, all open slot hold flags are reset to "released".

3. An airline subs using its open slots. Possibly, they "re-hold" some that they want to hang on to, but are not ready to use.

4. In the case of a catastrophic failure of the sub software at an airline, they can send an ARINC message releasing all their slots, allowing compression to give them as much benefit as possible.

5. In the case that an airline sees compression approaching and is not ready for it, they can send an ARINC message holding all their slots, giving them more time to resolve their plan.

5.42.   ETMS will provide a new message to allow a traffic management specialist to hold slots. The message will work in two modes:

5.42.1. The specialist will be able to hold all slots for an airline and its sub-carriers involved in a particular GDP. The format for this message will be: EDCT HOLD ALL

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SLOTS FOR APT AIRLINE, where APT is the airport name and AIRLINE is the three-letter carrier code. Example: EDCT HOLD ALL SLOTS FOR LGA USA.

5.42.2. The specialist will be able to hold all slots for all flights in a particular GDP. The format for this message will be: EDCT HOLD ALL SLOTS FOR APT, where APT is the airport name. Example: EDCT HOLD ALL SLOTS FOR LGA.

5.43. ETMS will provide a new message to allow a traffic management specialist to release slots. The message will work in two modes:

5.43.1. The specialist will be able to release all slots for an airline and its sub-carriers involved in a particular GDP. The format for this message will be: EDCT RELEASE ALL SLOTS FOR APT AIRLINE, where APT is the airport name and AIRLINE is the three-letter carrier code. Example: EDCT RELEASE ALL SLOTS FOR LGA USA.

5.43.2. The specialist will be able to release all slots for all flights in a particular GDP. The format for this message will be: EDCT RELEASE ALL SLOTS FOR APT, where APT is the airport name. Example: EDCT RELEASE ALL SLOTS FOR LGA.

Report Requests from Airlines to ETMS

This section describes the reports that the airlines can request from ETMS. In each case, the following two requirements will be met:

5.44. ETMS will accept a report request over either ARINC or CDMNET. (NOTE: The new report request for simplified subs will not be embedded in an SS packet as the CTALIST request was.)

5.45. ETMS will return the report to the ARINC address or CDMNET client that made the request.

Slot Lists (a.k.a. Re-synch Requests)

The slot list or re-synch request allows an airline client to get the current, complete data for any GDP. It is exactly analogous to the current CTALIST request, but returns the new format instead.

5.46. ETMS will accept a slot list request in the following format:

```
EDCT SLIST DFW
```

5.47. ETMS will return a slot list in the exact same format as the unsolicited slot lists (see Item 5.2). The list will include every flight involved in a GDP except those that have landed.

EDCT Lists

The EDCT list allows an airline client to get a complete list of all the ground delay programs and ground stops that are currently in effect.

5.48. ETMS will accept a EDCT list request in the following format:

```
EDCT LIST
```

5.49. ETMS will return an EDCT list in the following format:

```
Number of airports currently controlled: 3
```

23

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```
DEST    TIMES    CONTROL    FLIGHTS    SUBS
------------------------------------------
EWR    /18/23/  EDCT+FA    44      ON
EWR    /19/01/  EDCT+FA   255         ON
LGA    /18/23/  EDCT+FA   123         ON
JFK    /20/23/  EDCT+FA   111         ON

Number of sectors currently controlled: 0

Printer:  $fsa.//wkstn32
```

NOTES:

- Line 1 identifies the number of controlled airports.

- Lines 5-n provide the following data for each controlled airport:

    - The time range of the last issued EDCT file.

    - Whether regular EDCTs, FA delays, and/or ground stop EDCTs have been issued.

    - The number of flights currently controlled.

<u>Substitution Status</u>

5.50.   ETMS will accept a substitution status request in the following format:

```
EDCT SUB SHOW
```

5.51.   ETMS will return a substitution status report in the following format:

```
Airport   SI Processing Activated

EWR       YES
LGA       YES
JFK       NO
```

NOTES:

- A "NO" next to an airport name indicates that subs are currently not being processed for that airport.

Configuration Data

In order to ensure that the proper data is sent to the proper places, ETMS will require the airlines to provide certain configuration data. Conversely, ETMS will have to provide certain data to the airlines to allow their clients to connect.

5.52.   Airlines will provide ETMS with the following configuration data to participate in simplified subs:

5.52.1.   Zero or more ARINC addresses to which ETMS will send SS messages regarding flights for this carrier.

5.52.2.   Zero or more CDMNET clients (as identified by tag numbers) to which ETMS will send SS messages regarding flights for this carrier.

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5.52.3. Zero or more ARINC addresses from which ETMS will accept SS sub packets and report requests regarding flights for this carrier.

5.52.4. Zero or more CDMNET clients (as identified by tag numbers) from which ETMS will accept SS sub packets and report requests regarding flights for this carrier.

5.52.5. The IP addresses from which any CDMNET clients will connect.

5.53.   ETMS will provide airlines with the following configuration data to participate in simplified subs:

5.53.1. The client tags that may be used for simplified subs.

The configuration control will be intended to provide the same capability for defining relationships between major and sub-carriers as the current ETMS provides. It might be best to illustrate this by an example.

There are two configuration files; call them "sending configuration" and the "authorization configuration". Assume airline AAA is a major with two subs, BBB and CCC. AAA can sub for all three, BBB can also sub for itself, and CCC cannot do its own subs. The configuration files might be set up as follows:

 "sending configuration" file:

```
AAA   ARINCAA   AAA-SS
BBB   ARINCAA   ARINCBB   AAA-SS
CCC   ARINCAA   AAA-SS
```

 "authorization configuration" file:

```
AAA   AAA-SS
BBB   ARINCBB   AAA-SS
CCC   AAA-SS
```

When a GDP is issued, the slot lists will be issued as follows:

- AAA will get slot lists for AAA, BBB, and CCC over both ARINC (to ARINCAA) and the CDMNET (client AAA-SS).

- BBB will get slot lists for BBB only over ARINC (to ARINCBB).

- CCC won't get any data.

For subbing,

- AAA can sub flights for AAA, BBB, and CCC only over the CDMNET (client AAA-SS).

- BBB can sub their own flights over ARINC (from ARINCBB).

- CCC can't do any subs.

ETMS User Interface Changes

When a GDP is issued, the EDCTs for each departure center are sent to the TMUs. These are currently sent using the old EDCT format. The same format is used whenever a flight is substituted by the airlines. In ETMS 7.1.5, the TMUs will see the following changes:

5.54.   When a GDP is issued, the TMU will get a slot list for flights departing its center.

5.55.   When an airline modifies controls for its flights using the new simplified sub messages, the TMUs will receive an update for those flights in the slot list format.

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NOTE: If an airline uses an old-style sub message, the TMU will get an update in the old format.

5.56. EDCT CHECK will be enhanced to show all the data fields in the slot list in a format that is consistent with slot list, including showing the 6-digit date/time fields.

A sample of the current format is:

```
UAL457 ORD JFK CTD1751 CTA1920 CT sent (SI delay)
```

The new format will appear as follows:

```
UAL457 ASLOT:JFK231920A DEP:ORD CTD:231751 CTA:231920 TYPE:GDP EX:Y
CX:N SH:N ERTA:231830 IGTD:231701 CT sent
```

NOTE: The arrival airport is not shown as an explicit field, as it is contained in the ASLOT name.

5.57. EDCT LIST will be enhanced to also show the data from the EDCT SUB SHOW.

This allows a user to see the whole picture with one request, rather than having to make an additional EDCT SUB SHOW command.

The current EDCT LIST format is:

```
Number of airports currently controlled: 2

DEST TIMES    CONTROL    FLIGHTS
-----------------------------

ATL  /12/18  EDCT+FA     167
BOS  /15/19  EDCT+FA     115


Number of sectors currently controlled: 0
```

The new format will be:

```
Number of airports currently controlled: 2

DEST TIMES    CONTROL    FLIGHTS  SUBS
-----------------------------------

ATL  /12/18  EDCT+FA     167      ON
BOS  /15/19  EDCT+FA     115      OFF


Number of sectors currently controlled: 0
Printer: $fsa.//wkstn31
```

NOTE: The EDCT SUB SHOW command will continue to work as it currently does.

5.58. When a GDP is issued, the file name in the EDCT LOG will start with "slot" instead of "edct". The file name format will be otherwise unchanged.

5.59. When an airline subs flights using the new simplified sub messages, the EDCT LOG will get a copy of the reply as generated to the airline; that is, a slot list (see fig. 1) for those flights that were modified by the sub message.

Note: If an airline uses the old sub messages, the EDCT LOG will continue to show the old format.

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5.60. **The EDCT LOG will show the EDCT UPDATE command in its new format (see below).**

5.61. **EDCT SHOW will be enhanced as follows:**

5.61.1. Time fields will be changed to 6 digits.

5.61.2. The exempt, cancel, and slot hold flags will be added.

5.61.3. The "source" columns will be combined into a single column.

A sample of the current format is:

```
EDCT SHOW output for EWR        Last program received at 19:36:13 on 1/5/2000


CURRENT STATUS

ACID    DEP  CDT   CTA   CT SENT? CTR FROM FA FROM SI FROM GS ORIG. CDT ORIG. CTA

COA1146 BWI  C1947 C2017    Y      ZDC

ACA774  CYUL C1826 C1932           CZU           Y            1848      1954
```

A sample of the new format follows:

```
EDCT SHOW output for EWR        Last program received at 19:36:13 on 1/5/2000


CURRENT STATUS

ACID    DEP  CDT    CTA    CT SENT? CTR CTL_TYPE EXEMPT? CANCELLED? SLOT HELD? ORIG.
CDT ORIG. CTA

COA1146 BWI  051947 052017    Y      ZDC    GDP

ACA774  CYUL 051826 051932           CZU    SUB                                1848
1954
```

5.62. **ETMS will include a new command for requesting a slot list in the exact slot list format that goes to the airlines.**

The slot list request can be done in one of two ways. To request all the flights for an airport, the request format is, for example:

EDCT SLIST ORD

To request a slot list as an airline would see it, also include the airline name after the airport name, as follows:

EDCT SLIST ORD AAL

In either case, the reply will be a slot list in the format shown in Figure 1. If an airline name is included, the slot list will show the flights for that carrier plus all of the sub-carriers that the airline can sub for.

5.63. **The EDCT SUMMARY command will be eliminated.**

5.64. **EDCT UPDATE will be modified as follows:**

5.64.1. The IGTD field will be required as a critical element. (The IGTD will be used to ensure that the UPDATE is applied to the correct flight entry.)

5.64.2. The time fields on EDCT UPDATE will be expanded to 6-digits.

5.64.3. The fields that can be modified will be expanded to include the following: cancel flag (CX), slot hold (SH), and Earliest Runway Time of Arrival (ERTA).

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5.64.4. The format will be change to allow the modified fields to be optional.

A sample of the current format is:

```
EDCT UPDATE UAL457 ORD JFK 1751 1920
```

A sample of the new format is:

```
EDCT UPDATE UAL457 ORD JFK 231701 CTD:231751 CTA:231920 CX:N SH:N
ERTA:231830
```

The new format requires the first four fields (ACID, origin, destination, and IGTD) to positively identify the flight. Following those fields, the command can optionally include any of the remaining items. The prefix (e.g., 'CTD:') will tell EDCT which fields are being modified. Other examples are:

```
EDCT UPDATE UAL457 ORD JFK 231701 CTD:231751 CTA:231920
```

```
EDCT UPDATE UAL457 ORD JFK 231701 CX:Y
```

NOTE: In the user documentation, we should recommend that a user always does an EDCT CHECK before trying an EDCT UPDATE so that they are sure they are using the right data.

Appendix A. Deployment Plan

There are some significant issues regarding the deployment of the simplified substitutions.

One has to do with phasing from the old system to the new system in a graceful manner. It is always difficult to enact a system-wide change involving many users in an abrupt manner (for example, saying that as of 1/1/99 only the new format will be used). We need to plan a transition period where users can try the new format, but still fallback to the old in case of problems. This will be handled as follows:

Once the new software is deployed in ETMS,

- ETMS will be able to issue GDPs in both the old and new formats. These may be separately addressed (that is, the old format can go to the same ARINC addresses an airline is already using; the new format can go to new ARINC addresses and/or CDMNET clients).

- Airlines will be able to do substitutions using the new approach or the old.

- If an airline uses the new simplified subs, they may at any time fall back to the old substitutions messages simply by doing a re-synch request.

- Once an airline uses an old-style substitution, they are committed to staying with the old format for the remainder of that GDP.

The deployment will then be to deploy the new ETMS software first, still using the old style GDPs and subs. (At this point, the airlines can be receiving the new format slot lists, but not sending SS messages yet.) Once it is verified that ETMS is working correctly in the operational environment with the old format, airlines can begin to try their new tools according to their own schedules.

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