

Report of the MIAM Technical Working Group Meeting held on 29-30 September 2009

In attendance were:

Luc Rochard, Air France	Lou Toth, Honeywell
Luc Emberger, Airbus	Mike Russo, IA Staff
Doug Feiock, ARINC	Rob Morgenstern, MITRE
Jon Thilodeau, ARINC	Alain Bothorel, Rockwell Collins France
Jocelyn Descaillot, SITA, by Telephone	

Introduction

MIAM TWG Chairman Luc Emberger opened the meeting with a review of the agenda. SITA was not able to attend so arrangements were made to conduct a telecon with Jocelyn Descaillot for the review of SITA comments on the MIAM requirements white paper.

Main objectives of the meeting were:

- to discuss how MIAM will protect the RF (flow control)
- to review the high level protocol description

Handouts

The handouts to this meeting were:

MIAM TWG 29-30 Sept 09	Airbus
MIAM Use Cases and Requirements, Draft 4, 16th September 2009	Airbus
MIAM Overview	Rockwell Collins France
MIAM Overview SITA Comments: TWG – 29, 30 September 2009	SITA

The revised MIAM Action Item list is attached.

MIAM Principles

Luc Rochard stated that his justification for travel to this TWG emphasized the importance that Air France places on the need to protect the performance of the existing POA/VDLM2 links to ensure the prompt delivery of AOC messages critical to their operations (e.g., weight & balance) that are already in use.

It is to be noted that currently, ATC Uplink messages have a higher priority than all AOC Uplink messages (there is no priority between AOC messages).

The TWG considered the type of MIAM messages anticipated and their unique requirements. Luc Rochard noted that engine data would be a typical candidate MIAM message.

There are certain characteristics of the existing POA that should be recognized. POA can be inefficient in the case where a majority of message blocks are delivered and the communication lapses. ACARS per ARINC 620 will resend the entire message. MIAM should replace this operation rather than use it. Alain Bothorel noted that the MIAM server may send multiple blocks on POA without waiting for an ACK. Currently, any ACARS message greater in size than 3.3 kb sent to the DSP by the user will be rejected. Likewise, a downlink in excess of 3.3 kb will probably not be delivered to the user.

There was a general discussion of the tools available to mitigate traffic congestion. For uplinks, the DSP can reduce the frequency that uplinks from the user are sent to avoid overloading the

channel. One informal procedure in use today is for the ground to delay the uplink ACK to the aircraft. One aircraft is limited to no more than 10% of the available throughput. Under these rules, no more than message would be sent in a 4 second period. Today, the DSP can not control the aircraft transmission behavior. The TWG discussed ideas for the aircraft to throttle back its downlink traffic as well.

The TWG considered the potential to manage the downlink selection based on size as well as label (user preference table). The DSP does not have the capability to block the use of a particular media for uplinks. There could be a recommendation to separate transmissions of segments by a certain amount (based on the link being used) in order to avoid overloading the medium.

The TWG concluded that the MIAM protocol could incorporate a dynamic component (from message to message) in its MIAM media selection. This is different than POA.

Working Papers

Prior to the meeting, Alain had submitted a white paper on MIAM protocol. Jocelyn Descaillot had responded with comments. Alain led a discussion of his white paper as commented by Jocelyn. Jocelyn joined the discussion by telephone. Alain opened the telecon with a summary of the previous discussion. Consensus developed that there should be guidelines, as a minimum, concerning the message size for each link. Airline policy could override the guidelines. The guidelines could apply dynamically to each message, using the label for screening. The airline MIAM preference (different than the POA preference table) will be used for media selection.

The TWG considered that in any case, MIAM media selection will not supersede the Airline ARINC 618 routing policy configuration (already managed in the CMU). Nevertheless, MIAM shall specify some thresholds including a maximum message size allowed (one value for each link) for the use of MIAM ACARS convergence function.

Transition from one media to another was recognized as a significant issue. Luc Rochard stated that the user should have the capability to minimize its communication expenses e.g., if the message began on Satcom it could continue on the less expensive VDLM2 when VDLM2 became available. However attractive, this action presents a set of challenges. If the message is partially transmitted and a media change is made, should the CMU consider the size of the remainder of the message to be sent before allowing the transfer? Or, for simplicity, should the CMU ignore this factor?

Flow regulation is another challenge. Some type of “back-off mechanization” will be needed for the aircraft to defer transmissions during high traffic to preclude excessively high channel occupancy conditions. Success/Failure rate is based on the absence of a technical ACK on the last message, is one tool available to the aircraft. However, experience shows that simple failure rate does not correlate very closely with actual channel loading. The TWG concluded that, since the perception of the level of traffic in the aircraft is not accurate, the onus of flow control will fall to the DSP. Two alternatives present themselves: stop all MIAM transmissions temporarily and decrease the rate of transmissions. One idea, pacing, was that the DSP could request that the

aircraft increase the spacing between segments to reduce channel loading. A more generic approach would be for the DSP to deliver traffic information to the aircraft that could be used by the aircraft in making back-off decisions. While this approach would give the aircraft more flexibility, more data (read more overhead) would be required: available bandwidth, and channel (in terms of airport location and frequency) when the aircraft is on the ground.

In any case, this “congestion” information should not be transmitted to the MIAM user. The user will be informed if the transmission failed and will have the responsibility to retransmit (or not) the message.

Jocelyn confirmed that the capability to dynamically modify the spacing between two segments could be a useful tool (per message basis). A dedicated MIAM Uplink message could be defined to negotiate this spacing during the message transmission.

The TWG highlighted this negotiation mechanism. The DSP could monitor the sub-network load. This would not be possible if the MIAM server is located at the Airline, or if several DSPs are involved in the transmission of a given message. That is why alternative architectures could be interesting (MIAM ACARS Convergence Function DSP based, and MIAM Core and IP Convergence Function at the Airline).

The TWG summarized the following conclusions on the RF ACARS protection:

- MIAM will not include mechanisms to select a media. Nevertheless some recommendations will be made
- It is too early to define a detailed flow control solution today; the MIAM capability to negotiate the important transfer parameters (e.g. spacing between segments) seems to be useful.
- « Legacy » ACARS users will be protected by using large values for MIAM thresholds (in particular for the message lifetime).
- DSPs will investigate how to use a “back-off”-like function at the MIAM level

Moving to the specifics of the SITA comments, the TWG made the following observations.

If the handshake is optional, another mechanism is necessary to deliver the version number, e.g., the MIAM core layer. Having the version number in a handshake ALO would potentially enable the identification of incompatible MIAM versions.

The handshake would also be useful to avoid sending MIAM messages to an Aircraft whose communication system is NOCOMM. The TWG agreed that this function is optional (but it remains mandatory to answer to the ALO).

Discrimination among PDU information and local exchanges between DSP (MIAM CF) and the MIAM core encoding. Application type should contain information indicating if encoding (base 64?) is necessary by the MIAM CF.

Similarly, an indication from the application as to whether or not compression is to be performed (this is a MIAM core function) is needed. E.g., some data may already be compressed by the application. Doubling the compression would be counterproductive.

The TWG conclusion was that no local parameters are needed because the MIAM core will perform compression for all messages and use it only if there is an improvement.

The application type can be used to indicate encoding rules, both local and end-to-end.

The UTC (validity time) is not needed in the MIAM core header. It will be carried up to the level of the MIAM CF only.

The MIAM CF on the receiving end should know the validity time so it can close any buffer that is dedicated to the message after expiration. The time needs to be included in the payload.

Yes. This is also true for segment numbers.

Alain did not address the message restart conditioning and message numbering in his white paper. He suggested that the TWG develop a strategy to recognize resets and define a process describing how to proceed when they take place.

There is a tradeoff of overhead and the need to extract date/time values. Having the UTC start time is a useful tool. UTC is not needed for a single transfer, only for file transfers. It was noted that FANS has a time of day that is binary encoded. In ISO-5, it could be minimal in length. See Action Item 14.

An alternative approach is to use a message lifetime value. For the lifetime approach, one issue is that if the message becomes stuck in the CMU, the timer will not start on time (e.g., a 5-minute delay). The TWG concluded that this delay would not be meaningful in light of the typical 3-day lifetime of most MIAM messages.

Same as earlier MIAM core question- may receive retransmission of a segment and its file number that is identical to a file/segment that is, in fact, a different message. Yes, we will have to deal with segment numbers. The task will be to specify what is to be done when a duplicate segment (number) is received (throw one away?).

Yes, we should specify that message assurance is required for MIAM.

The MIAM CF must support file interleaving.

NoComm can lead to unnecessary unsuccessful uplinks. There will be a need to resolve (decide on) the maximum number of retries for POA (not an issue for VDLM2).

- The Segment size for POA small header (about 3 bytes)
- The POA/VDL transitions are a concern. The segment size will change xx some kind of synchronization will be needed. SITA is mapping 1028 into a superframe.

From POA to AOA, then some efficiency is lost (not worth the complexity).

From VDL to POA, segments will be mapped into multi-blocks.

Use of single block segment length is preferred, but negotiation based on user preference should be supported.

With respect to ground-ground interfaces, the Type X protocol is assumed in order to carry XML messages. The Type X protocol was developed cooperatively by ARINC and SITA. A Type X specification is expected to be published as an IATA standard. Type X is considered to be a good candidate for carrying MIAM ground-ground messages because it does not have ht size limitation of 3840 characters.

A Type B message can be encapsulated into a Type X payload. Type X displays new distribution advantages, enabling it to perform deliveries to FAX and e-mail destinations.

Luc Emberger commented that having an IP ground-ground interface with the MIAM core and CF at the airline would be an attractive architecture. See Action item 13.

Patent on Base64 Compression

Early suggestions have been that MIAM would utilize the compression scheme defined in ARINC 823, ACARS Security. Lou Toth reminded the TWG that the use of base 64, used in this way, would invoke the Honeywell patent, as is does in ARINC 823. Mike Russo explained that the AEEC Patent Policy was that patents (and patent applications) are required to (1) be disclosed and (2) the patent holder must submit a Commitment to License (CTL). By making this announcement, Honeywell has satisfied the first point. Since the Honeywell CTL is already on file with the ARINC IA Staff, the second requirement has also been satisfied.

See action item #16.

Work Plan and Telecon/Meeting Schedule

The next step will be to prepare a MIAM Strawman for review and comment by the DLK Systems Subcommittee at its next meeting.

The date of the next DLK SAI SC meeting was previously planned for November 3-4, 2009. The MIAM requested that the date be deferred until 8-9 December to allow more time to prepare a first MIAM strawman. The revised schedule has been coordinated with the DLK Systems chairman and notice has been sent to the DLK Systems e-mail list advising them of the schedule change.

MIAM Telecons and TWGs will continue. The schedule will be driven primarily on the availability of Strawman iterations and working papers.

The tentative plan for developing the MIAM Strawman is:

	Action	Date
1	Circulate Strawman 1	November 20, 2009
2	DLK Sys SC Review	8-9 December, 2009
3	MIAM Telecon 4	January 2010
4	MIAM Telecon 5	February 2010
5	MIAM TWG 2	February or March 2010
6	Circulate Strawman 2	April 2010
7		
8		

This report was prepared by Mike Russo and Alain Bothorel.

**ATTACHMENT 1
ACTION ITEM LIST**

Num	Description	Status
1	Airbus: to identify / comment on the impacts / pros / cons of multiple MIAM ground entities. Specifically, to investigate the potential for multiple sessions (multiple MIAM servers at one airline or ANSP).	Closed 8 Jun 09
2	All: to comment on the Airbus Use Cases and Requirements paper for discussion at MIAM Telecon 1. Airbus to finalize the paper for review at MIAM Telecon 3.	Open Due 9/25/09
3	SITA/ARINC are working to analyze spectrum utilization (RF protection) of VHF and VDLM2 by MIAM and make recommendations to avoid loss of performance to existing users/applications. An ad hoc telecon was set to be held on 16 Sept.	Open Due 9/25/09
4	Airbus: to propose a set of questions / concerns / issues to the MIAM TWG. The coordinated output will be submitted to the ANFS SC for the coordination of MIAM PP841 and AGIE PP830.	Closed 20 Jul 09
5	Airbus: to identify application requirements that would drive services to be included in MIAM functionality or operation. These answers will be included in the Airbus requirements document. The A380 and B787 can be used as the basis for this input.	Open Due 9/25/09

Num	Description	Status
6	Alain Bothorel: Update the MIAM Protocol Overview slides before next telecon. All: comment the slides before next telecon.	Open 9/15/09
7	Debbie Graves: Send proposals on flow regulation before next telecon.	Open 9/25/09
8	Honeywell took an action to develop a rationale for a distributed architecture and Airbus/RCF will analyze the impact on the current (proposed) definition.	Open 9/25/09

Num	Description	Status
9	Alain Bothorel will prepare an initial draft table of contents for PP841.	Open 9/25/09

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ACTION ITEM LIST**

Table 4: MIAM TWG 1 – September 29 - 30, 2009 Action Items		
Num	Description	Status
10	Airbus to review known MIAM applications in terms of size and delivery time criteria.	Open 10/23/09
11	DSPs to investigate information that could be used to promote flow control – MIAM advisories; avionics pacing.	Open 10/23/09
12	Avionics Mfgs to examine data available for self-determination of channel loading.	Open 10/23/09
13	Luc Emberger will update the use case white paper to add the MIAM alternative architectures: e.g., locating the ACARS CF at the DSP and MIAM core is located at the airline (supplemented by some IP conversion functions).	Open 11/20/09
14	Alain Bothorel will develop a Strawman 1 for PP841, including proposals for MIAM Message Number and Segment Number management, and UTC time encoding.	Open 11/20/09
15	Alain Bothorel will propose a technique for minimizing the overhead when an aircraft become NOCOMM to avoid repeated retries of an outstanding MIAM message segments e.g., setting a counter.	Open 11/20/09
16	Lou Toth will provide a corporate statement from Honeywell legal department concerning the release of licenses under the commitment to license submitted to AEEC. This input is germane to the DLK Sys SC decision as to whether or not to include base64 compression/encoding.	Open 12/08/09