International Civil Aviation Organization

THE SECOND MEETING OF ASIA/PACIFIC ATS INTER-FACILITY DATA COMMUNICATION (AIDC) IMPLEMENTATIONTASK FORCE (APA TF/2) OF APANPIRG

Bangkok, Thailand, 16 - 18 March 2016

Agenda Item 4: **Asia/Pacific AIDC implementation guidance material**

**REPORT OF TELECONFERENCES ON DEVELOPMENT OF
AIDC GUIDANCE MATERIALS**

(Presented by the Secretariat/Airports Authority of India)

SUMMARY
This paper presents the Contribution by India for Chapter 5 of the draft AIDC implementation Guidance Materials.

1. INTRODUCTION

1.1   The first meeting of this Task Force agreed to develop the guidance material based on the example of AIGD for ADS-B implementation in the Asia and Pacific Regions. The meeting made Decision 1/ 4 on development of the guidance material by an Ad Hoc Working Group.

2. DISCUSSIONS

2.1   The first Teleconference on development of AIDC Guidance material held on 10 November 2015 developed the initial structure of the draft Guidance Material.

2.3   The second Teleconference on 1 February 2016 agreed to assign tasks to the working group members to develop the initial draft for the sections/parts allocated to them.

2.4   Based on the agreement of the second Teleconference, Dr. Manish provided the draft material for Chapter 5 of the GM for review by this meeting.

3. ACTION BY THE MEETING

3.1   The meeting is invited to the contribution by India for Chapter 5 provided in the Attachment.

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Chapter-5: MESSAGE ERROR DESCRIPTION

5.1 Introduction

The effectiveness of AIDC functionality depends on many factors, including ATC automation systems, manufacturer of the equipment, AFTN connectivity, weather-related factors, Controllers training, Airspace Design, Coordination procedures between different ATSU's, etc. Some problems/difficulties observed during implementation/testing of AIDC procedures are of common nature irrespective of different OEM's and different States. Such problems, their possible cause and their solution evolved over time may be of great help to States in the process of implementing AIDC.

Every effort should be made to minimize the errors either with the help of OEM, in coordination with neighbouring ATSU and with the help of guidance material available from the States who have successfully implemented AIDC.

Every State through their ANSP has designated Focal point (Nodal Officer), the list is available on ICAO APAC website. In case of any issues, support can be requested through these Focal Points. Any State that has not notified AIDC Focal Point to ICAO APAC may notify the same at the earliest.

AIDC implementation in any State cannot happen in a day. Along with patience, it requires change of mindsets, change in the working environment, change of attitude and the will to do so.

5.2 Pre-implementation Checklist

Before AIDC is implemented, some pre-conditions have to be fulfilled. A quick guidance on such conditions is as follows:

S. No.	Pre-condition Description	Yes / No	Remarks, if any
i.	ATC automation systems are compliant with ICAO PAN AIDC ICD version 1.0 (For existing systems, older APAC ver 3.0 may still work).		
ii.	ATC automation systems' adaptation data have been properly configured with the pairing stations.		
iii.	ATC automation systems and Media are time synchronized (GPS / UTC).		
iv.	Media used (like AFTN, etc) meet the Required Network Communication Performance.		
v.	The adapted timings for AIDC messages like ABI, EST, CPL, etc. are as per the LOAs.		
vi.	AIDC functionality does not adversely affect the functioning of other sub-systems like AMAN.		

vii.	AIDC is ON from the ATC automation systems (some systems may not have AIDC ON / OFF feature and may always remain in ON condition).		
viii.	Airspace design is such that there is no discrepancy over the jurisdiction of COPs.		
ix.	Trajectory deviations / diversions are successfully handled by ATC automation systems through AIDC.		
x.	AIDC does not create overload situation of ATC automation systems.		
xi.	AIDC does not create overload situation of AFTN / AMSS / Media.		
xii.	Concerned ACCs have proper sectorization keeping in mind the controllers workload.		
xiii.	AIDC HMI is controller friendly.		
xiv.	Pilots / Airlines Operators have been familiarized with the new scenario (Although AIDC is ground-to-ground coordination, the pilots' requests for frequent en-route level changes should be kept to the minimum, to reduce load on the system).		
xv.	Controllers / operators have been trained to handle AIDC.		
xvi.	Designated personnel have been trained to monitor / calculate media latency.		
xvii.	LOAs between the pairing stations have been signed.		
xviii.	Testing has been carried out under controlled conditions (Keep all the records of unexpected / unusual behaviour for faster troubleshooting).		
xix.	Standard Operating Procedures (SOP) have been deliberated and published.		
xx.	Cases have been identified where only Voice communication would be valid (eg. VVIP movements, activation of Danger areas).		
xxi.	In case of AIDC failures, contingency procedures have been published.		
xxii.	Number of LHDs reported before AIDC implementation have been recorded.		
xxiii.	Number of LHDs reported during AIDC testing have been recorded.		
xxiv.	Safety Assessments have been carried out. Hazards, Mitigation procedures, etc. have been identified / risk accepted.		
xxv.	The overall system has been fully checked and is ready for AIDC implementation.		

AIDC implementation would be smooth and effective if all the above checklist answers are YES. In case of any NO, analyse the reason and try to rectify the issue.

Table 5.1   Implementation Issues (for guidance only)

Issue reference	State/ Administration (AIDC Paring Stations)	Date of First Report	Description of fault	Fault Type	State/ATSU/Vendor	Priority (assessed by TF or RO)	Actions Taken/Updated Date/Status (Open/Closed)
AIDC-ISSUE-1	India/Pakistan (Delhi/Lahore)	Sep-14	Messages from Lahore to Delhi like ABI were rejected by Delhi system due to Error message61, Cyclic Redundancy Check (CRC) Error.	Technical	Delhi-AutoTrac-III (RAYTHEON) / Lahore-Aircon2100 (INDRA). **Note: Delhi is in the process of implementing new automation system from INDRA.**	HIGH	Error is perhaps because Lahore System is generating extra spaces. Action is required at Lahore to avoid generation of extra spaces (OPEN). **Note: After INDRA automation at Delhi, the issue may get resolved because of the similar automation systems from the same OEM.** Last updated: 30-Nov-2015.
AIDC-ISSUE-1	India/Pakistan (Delhi/Karachi)	Sep-14	Messages from Karachi to Delhi like ABI were rejected by Delhi system due to Error message61, Cyclic Redundancy Check (CRC) Error. **Karachi has done changes through OEM. Re-testing is in progress.**	Technical	Delhi - AutoTrac-III (RAYTHEON) / Karachi-Aircon2100 (INDRA). **Note: Delhi is in the process of implementing new automation system from INDRA.**	HIGH	Error is perhaps because Karachi System is generating extra spaces. Action is required at Karachi to avoid generation of extra spaces (OPEN) **Note: After INDRA automation at Delhi, the issue may get resolved because of the similar automation systems from the same OEM.** Last updated: 30-Nov-2015.
AIDC-ISSUE-1	India (Delhi/Varanasi)		AFTN Latency Issues observed at times.	Technical	Delhi - AutoTrac-III (RAYTHEON) / Varanasi-Aircon2100 (INDRA). **Note: Delhi is in the process of implementing new automation system from INDRA.**	LOW	**New AMSS installation at Delhi in progress (OPEN). Likely by December 2016.** Last updated: 30-Nov-2015.

Issue reference	State/ Administration (AIDC Paring Stations)	Date of First Report	Description of fault	Fault Type	State/ATSU/Vendor	Priority (assessed by TF or RO)	Actions Taken/Updated Date/Status (Open/Closed)
AIDC-ISSUE-1	India (Delhi/Nagpur)		AFTN Latency Issues observed at times.	Technical	Delhi - AutoTrac-III (RAYTHEON) / Nagpur-Aircon2100 (INDRA). **Note: Delhi is in the process of implementing new automation system from INDRA.**	LOW	**New AMSS installation at Delhi in progress (OPEN). Likely by December 2016.** Last updated: 30-Nov-2015.
AIDC-ISSUE-1	India (Delhi/ Ahmedabad)		AFTN Latency Issues observed at times. **Ahmedabad HMI issues for automated exchanged messages solved in-house to a great extent and are under testing.**	Technical	Delhi - AutoTrac-III (RAYTHEON) / Ahmedabad-Aircon2100 (INDRA). **Note: Delhi is in the process of implementing new automation system from INDRA.**	LOW	**New AMSS installation at Delhi in progress (OPEN). Likely by December 2016.** Last updated: 30-Nov-2015.
AIDC-ISSUE-1	India (Ahmedabad/ Nagpur)		AFTN Latency Issues observed at times.		Ahmedabad-Aircon2100 (INDRA) / Nagpur-Aircon2100 (INDRA)	LOW	Last updated: 30-Nov-2015.

Issue reference	State/ Administration (AIDC Paring Stations)	Date of First Report	Description of fault	Fault Type	State/ATSU/Vendor	Priority (assessed by TF or RO)	Actions Taken/Updated Date/Status (Open/Closed)
AIDC-ISSUE-1	India/Pakistan (Ahmedabad/ Karachi)	2014/06/05	ABI messages exchanged between two system and messages were rejected due route error and mismatch in coordination timing. Modification in airways was required for Ahmedabad and Karachi DBM. On 12.06.2014 required modification were made in airways (like imaginary points) for effectively acceptance of AIDC messages. ABI messages of some of the aircrafts were not correlated with Flight plan available in ATS automation system. **Karachi has done changes through OEM. Re-testing is in progress.**	Technical/ Operational	Ahmedabad-Aircon2100 (INDRA) / Karachi-Aircon2100 (INDRA)	HIGH	Coordination protocol dialogue timeout was observed. Karachi AMSS/AFTN system time was also synchronized. Automatic time synchronization through GPS server in AMSS/AFTN system at Ahmedabad and Karachi was done for smooth exchange of AIDC messages. Rejection of AIDC messages have reduced. Last updated: 30-Nov-2015.
AIDC-ISSUE-1	India (Varanasi/ Nagpur)		Some HMI issues at both the stations.		Varanasi-Aircon2100 (INDRA) / Nagpur-Aircon2100 (INDRA).	LOW	Last updated: 30-Nov-2015.
AIDC-ISSUE-1	India (Kolkata/ Varanasi)		Some HMI issues at Varanasi. **AIDC being done for limited hours.**	Technical	Kolkata-Aircon Icon (INDRA) / Varanasi-Aircon2100 (INDRA).	LOW	Last updated: 30-Nov-2015.
AIDC-ISSUE-1	India (Kolkata/Nagpur)		Some HMI issues at Nagpur. **AIDC being done for limited hours.**	Technical	Kolkata-Aircon Icon (INDRA) / Nagpur-Aircon2100 (INDRA).	LOW	Last updated: 30-Nov-2015.

Issue reference	State/ Administration (AIDC Paring Stations)	Date of First Report	Description of fault	Fault Type	State/ATSU/Vendor	Priority (assessed by TF or RO)	Actions Taken/Updated Date/Status (Open/Closed)
AIDC-ISSUE-1	India (Kolkata/ Chennai)		**Under trial phase.** Timely non-receipt of LAM/LRM was not received.		Kolkata-Aircon Icon (INDRA) / Chennai-AutoTrac-III Plus (RAYTHEON).		Last updated: 30-Nov-2015.
AIDC-ISSUE-1	India (Chennai/ Nagpur)		Even after sending a rejection or counter coordination message by Chennai, the sending station continues to send the CDN message.		Chennai-AutoTrac-III Plus (RAYTHEON) / Nagpur-Aircon2100 (INDRA)		Last updated: 30-Nov-2015.
AIDC-ISSUE-1	India/Sri Lanka (Chennai/ Colombo)	2015-08-06 2015-10-06 and 2015-12-06 **2015-06-11**	Though the initial test in Nov 2014 was quite successful. The test in June 2015 were not successful, due to technical issues at Colombo. Re-testing have to be done after rectification at Colombo. **The Re-testing was done after rectification of identified technical issues at Colombo. Testing was successful. Will start trials for limited hours.**		Chennai-AutoTrac-III Plus (RAYTHEON) / Colombo-INTEL CAN		Last updated: 30-Nov-2015.
AIDC-ISSUE-1	India/Maldives (Chennai/Male)	2014-11-25	Trials were mostly successful barring some LRMs, like reference ID in ODF 3 is not as per ICD.	Technical	Chennai-AutoTrac-III Plus (RAYTHEON) / Male-SELEX.		Message transaction rate is 100% and the message delivery was successful (CLOSED)
AIDC-ISSUE-1	India (Chennai/ Trivandrum)		Even after sending a rejection or counter coordination message by Chennai, the sending station continues to send the CDN message.		Chennai-AutoTrac-III Plus (RAYTHEON) / Trivandrum-Aircon2100 (INDRA)		Last updated: 30-Nov-2015.

Issue reference	State/ Administration (AIDC Paring Stations)	Date of First Report	Description of fault	Fault Type	State/ATSU/Vendor	Priority (assessed by TF or RO)	Actions Taken/Updated Date/Status (Open/Closed)
AIDC-ISSUE-1	India (Chennai/ Mangalore)		Even after sending a rejection or counter coordination message by Chennai, the sending station continues to send the CDN message.		Chennai-AutoTrac-III Plus (RAYTHEON) /Mangalore-Aircon2100 (INDRA)		Last updated: 30-Nov-2015.
AIDC-ISSUE-1	India (Chennai/Trichy)		Even after sending a rejection or counter coordination message by Chennai, the sending station continues to send the CDN message.		Chennai-AutoTrac-III Plus (RAYTHEON) / Trichy-Aircon2100 (INDRA)		Last updated: 30-Nov-2015.
AIDC-ISSUE-1	India (Chennai/ Hyderabad)	2015-03-24	The SSR Codes received through AIDC message are getting retained in Chennai FDPS for days and are not available for re-use. Controller have to use Chennai adapted pool of limited SSR codes for track correlation. As a result the adapted Chennai pool of SSR codes gets exhausted very soon. AIDC testing is temporarily suspended.		Chennai-AutoTrac-III Plus (RAYTHEON) / Hyderabad-SELEX		Last updated: 30-Nov-2015.

Issue reference	State/ Administration (AIDC Paring Stations)	Date of First Report	Description of fault	Fault Type	State/ATSU/Vendor	Priority (assessed by TF or RO)	Actions Taken/Updated Date/Status (Open/Closed)
AIDC-ISSUE-1	India (Chennai/ Bengaluru)	2015-03-24	The SSR Codes received through AIDC message are getting retained in Chennai FDPS for days and are not available for re-use. Controller have to use Chennai adapted pool of limited SSR codes for track correlation. As a result the adapted Chennai pool of SSR codes gets exhausted very soon. AIDC testing is temporarily suspended.		Chennai-AutoTrac-III Plus (RAYTHEON) / Bengaluru-SELEX		Last updated: 30-Nov-2015.
AIDC-ISSUE-1	India (Mumbai/ Ahmedabad)		**Ahmedabad HMI issues for automated exchanged messages solved in-house to a great extent and are under testing.**		Mumbai-AutoTrac-III (RAYTHEON) / Ahmedabad-Aircon2100 (INDRA)	LOW	Last updated: 30-Nov-2015.
AIDC-ISSUE-1	India (Mumbai/ Nagpur)		Some HMI issues at Nagpur.		Mumbai-AutoTrac-III (RAYTHEON) / Nagpur-Aircon2100 (INDRA)	LOW	Last updated: 30-Nov-2015.
AIDC-ISSUE-1	Maldives	2014-09-17	Melbourne reported that Field 15 route information contains seconds in the LAT/LONG information generated from our system	Technical	MALDIVES/VRMM/SELEX		Vendor investigated and provided updated software /22May2015/Closed.
AIDC-ISSUE-1	Singapore	2015-11-11	Rejection of ABI message due to unknown point in route	Technical	Singapore/Singapore/THALES	HIGH	Need to update ATMS dataset to include SIDs/STARs that may be filed by operator/17 Nov 2015/Closed

Issue reference	State/ Administration (AIDC Paring Stations)	Date of First Report	Description of fault	Fault Type	State/ATSU/Vendor	Priority (assessed by TF or RO)	Actions Taken/Updated Date/Status (Open/Closed)
AIDC-ISSUE-2	India (Delhi/Varanasi)		Some HMI issues at Varanasi.	Technical	Delhi - AutoTrac-III (RAYTHEON) / Varanasi-Aircon2100 (INDRA). **Note: Delhi is in the process of implementing new automation system from INDRA.**	LOW	**New AMSS installation at Delhi in progress (OPEN). Likely by December 2016.** Last updated: 30-Nov-2015.
AIDC-ISSUE-2	India (Delhi/Nagpur)		Some HMI issues at Varanasi.	Technical	Delhi - AutoTrac-III (RAYTHEON) / Nagpur-Aircon2100 (INDRA). **Note: Delhi is in the process of implementing new automation system from INDRA.**	LOW	**New AMSS installation at Delhi in progress (OPEN). Likely by December 2016.** Last updated: 30-Nov-2015.
AIDC-ISSUE-2	India (Ahmedabad/ Nagpur		Some HMI issues at Nagpur.		Ahmedabad-Aircon2100 (INDRA) / Nagpur-Aircon2100 (INDRA)	LOW	Last updated: 30-Nov-2015.
AIDC-ISSUE-2	India (Kolkata/Chennai)		Under trial phase. The acceptance of EST message is in manual mode.		Kolkata-Aircon Icon (INDRA) / Chennai-AutoTrac-III Plus (RAYTHEON).		Last updated: 30-Nov-2015.
AIDC-ISSUE-2	India (Chennai/Nagpur)		The ICAO route truncation indicator is not supported by aircon2100 system.				
AIDC-ISSUE-2	India/Maldives (Chennai/Male)	2014-11-25	Seconds field included in Lat/Long is received which is not as per ICD. Testing planned again in presence of Male OEM.	Technical	Chennai-AutoTrac-III Plus (RAYTHEON) / Male-SELEX.		Message transaction rate is 100% and the message delivery was successful (CLOSED) Last updated: 30-Nov-2015.

Issue reference	State/ Administration (AIDC Paring Stations)	Date of First Report	Description of fault	Fault Type	State/ATSU/Vendor	Priority (assessed by TF or RO)	Actions Taken/Updated Date/Status (Open/Closed)
AIDC-ISSUE-2	India (Chennai/ Trivandrum)		The ICAO route truncation indicator is not supported by aircon2100 system.		Chennai-AutoTrac-III Plus (RAYTHEON) / Trivandrum-Aircon2100 (INDRA)		Last updated: 30-Nov-2015.
AIDC-ISSUE-2	India (Chennai/ Mangalore)		The ICAO route truncation indicator is not supported by aircon2100 system.		Chennai-AutoTrac-III Plus (RAYTHEON) / Mangalore-Aircon2100 (INDRA)		Last updated: 30-Nov-2015.
AIDC-ISSUE-2	India (Chennai/ Trichy)		The ICAO route truncation indicator is not supported by aircon2100 system.		Chennai-AutoTrac-III Plus (RAYTHEON) / Trichy-Aircon2100 (INDRA)		Last updated: 30-Nov-2015.
AIDC-ISSUE-2	Maldives	2014-09-17	Melbourne reported a small number of messages contain a route designator in field 15 prior to Entry COP	Technical	MALDIVES/VRMM/SELEX		Vendor is investigating/22Jun2015/Open.
AIDC-ISSUE-2	Singapore	2015-11-11	Rejected EST message due to invalid flight plan state (coordinated) were queued in erroneous folder.	Operational	Singapore/Singapore/THALES	LOW	Air Traffic Control Support Officer would verify the information on the EST message against the coordinated flight plan. To follow up with the upstream ATSU if any discrepancies were discovered/12 Nov 2015/Closed
AIDC-ISSUE-3	India (Kolkata/Chennai)		The ICAO route truncation indicator is not supported by INDRA system.		Kolkata-Aircon Icon (INDRA) / Chennai-AutoTrac-III Plus (RAYTHEON).		Last updated: 30-Nov-2015.

Issue reference	State/ Administration (AIDC Paring Stations)	Date of First Report	Description of fault	Fault Type	State/ATSU/Vendor	Priority (assessed by TF or RO)	Actions Taken/Updated Date/Status (Open/Closed)
AIDC-ISSUE-3	India (Chennai/Nagpur)		Airspace configuration issue.		Chennai-AutoTrac-III Plus (RAYTHEON) / Nagpur-Aircon2100 (INDRA)		Last updated: 30-Nov-2015.
AIDC-ISSUE-3	India (Chennai/ Trivandrum)		Airspace configuration issue (UTV/LTV airspace configuration)		Chennai-AutoTrac-III Plus (RAYTHEON) / Trivandrum-Aircon2100 (INDRA)		Last updated: 30-Nov-2015.
AIDC-ISSUE-3	India (Chennai/ Mangalore)		Airspace configuration issue.		Chennai-AutoTrac-III Plus (RAYTHEON) / Mangalore-Aircon2100 (INDRA)		Last updated: 30-Nov-2015.
AIDC-ISSUE-3	India (Chennai/Trichy)		Airspace configuration issue		Chennai-AutoTrac-III Plus (RAYTHEON) / Trichy-Aircon2100 (INDRA)		Last updated: 30-Nov-2015.
AIDC-ISSUE-3	Singapore	2015-11-11	Message time out parameter set too short whereby ACP messages from downstream ATSU were not processed. More prevailing with network was busy.	Operational	Singapore/Singapore/THALES	HIGH	Need to update ATMS dataset to increase the timeout parameter/17/Nov 2015/Closed
AIDC-ISSUE-3	Maldives	2014-03-13	Colombo reported Msg ID out to VCCC had wrong ID sent from our system	Technical	MALDIVES/VRMM/SELEX		Configuration corrected/15Mar2014/Closed
AIDC-ISSUE-4	India (Kolkata/Chennai)		AFTN Latency issues observed at times.		Kolkata-Aircon Icon (INDRA) / Chennai-AutoTrac-III Plus (RAYTHEON).		Last updated: 30-Nov-2015.

Issue reference	State/ Administration (AIDC Paring Stations)	Date of First Report	Description of fault	Fault Type	State/ATSU/Vendor	Priority (assessed by TF or RO)	Actions Taken/Updated Date/Status (Open/Closed)
AIDC-ISSUE-4	Maldives	2014-04-06	When Male sends ABI message within Colombo domestic squawk range, it causes complication in their system	Technical	MALDIVES/VRMM/SELEX		Colombo changed their domestic SSR allocation/16Mar2015/Closed
AIDC-ISSUE-5	Maldives	2014-11-25	Reference ID of Optional Data Field 3 (ODF) is incorrect in message received by VOMM	Technical	MALDIVES/VRMM/SELEX		Reported issue to Vendor/27Nov2014/Open.
AIDC-ISSUE-6	Maldives	2014-11-25	Chennai automation system rejected latitude/longitude represented with seconds (041627N0733138E)	Technical	MALDIVES/VRMM/SELEX		Vendor investigated and provided updated software on /22May2015/Closed.
AIDC-ISSUE-7	Maldives	2015-11-19	Colombo reported LRM received from VRMM saying invalid SSR equipment in FPL	Technical	MALDIVES/VRMM/SELEX		Reported issue to Vendor/20Nov2015/Open
AIDC-ISSUE-8	Maldives	2015-11-19	ABI and CPL message in ICAO 2012 FPL format sent from Colombo rejected	Technical	MALDIVES/VRMM/SELEX		Reported issue to Vendor/20Nov2015/Open

5.3 Handling Implementation Issues

Over a period of time during testing and implementation of AIDC across ICAO-APAC region, several error messages were encountered by different concerned ATSU's. Some of these messages are of common nature and some of them may be unique for a particular ATSU. Such messages compiled from various ATSU's are given below with a little description of the errors contained in those messages. The list of messages is not exhaustive and different ATSU's may face similar or a new type of error messages.

1. **Error Message: Rejection of ABI messages by receiving system due to Error message61, Cyclic Redundancy Check (CRC) Error.**

   Error message 61 or cyclic redundancy check (CRC) error had been experienced by almost all of the ATSU's

   Cyclic redundancy check (CRC): A Cyclic redundancy check is an **error**-detecting code commonly used in digital networks and storage devices to detect accidental changes to raw data. Blocks of data entering these systems get a short *check value* attached, based on the remainder of a polynomial division of their contents. On retrieval, the calculation is repeated and, in the event the check values do not match, corrective action can be taken against data corruption.

   A CRC-enabled device calculates a short, fixed-length binary sequence, known as the *check value* or *CRC*, for each block of data to be sent or stored and appends it to the data, forming a *codeword*. When a codeword is received or read, the device either compares its check value with one freshly calculated from the data block, or equivalently, performs a CRC on the whole codeword and compares the resulting check value with an expected *residue* constant. If the check values do not match, then the block contains a data error. The device may take corrective action, such as rereading the block or requesting that it be sent again

   CRCs are specifically designed to protect against common types of errors on communication channels, where they can provide quick and reasonable assurance of the integrity of messages delivered. However, they are not suitable for protecting against intentional alteration of data.

   Cause: Error is perhaps because sending system is generating extra spaces. Action is required by sending system to avoid generation of extra spaces.

   Solution: This error can be overcome by making changes in sender ATM system to not to generate any extra spaces while transmitting AIDC messages.

2. **Error Message: AFTN Issues.**

The AFTN network was selected as the media to support the exchange of AIDC messages as the established infrastructure is already available and it has the ability to re-direct messages through alternate paths in the event of a direct connection failure. Through the various technical testing with adjacent FIRs, several issues were encountered:

a. **AFTN Latency:** Latency generally is the amount of time a message takes to traverse a system. In computer network, it is an expression of how much time it takes for a packet of data to get from one designated point to another. It is sometimes measured as the time required for a packet to be returned to its sender.

AFTN latency in AIDC messages is not acceptable or acceptable up to a certain limit as system expects automatic system response for all AIDC messages in a time bound manner. If no automatic system response is received by the sender system in a fixed time, then the sender system generates a LTO (time out response).

b. **Message timeout errors** due to the re-routing of messages caused by the failure of the direct AFTN link.

c. **Rejected EST message** due to missing or multiple flight plans;

Solution: The probable solution may be to expand the bandwidth of existing AFTN network or increase the message time-out parameter for all messages to avoid generation of LTO messages.

3. **Error Message: Rejection of ABI messages exchanged between system due to route error and mismatch in coordination timing.**

ABI messages of some of the aircrafts are not correlated with Flight plan available in ATS automation system

Cause: This problem may be because of how common airways are defined in the pairing automation systems. Some airways may be defined up to a certain extent in next FIR, while others may be defined only up to the FIR boundary. This may cause the system to reject the incoming ABI message because of unrecognised route portion.

Solution: To overcome this problem minor modifications in the airways may be required at both the pairing Data base (DBM). Modification in airways (like imaginary points) may also be considered in airways for effectively acceptance of AIDC messages.

4. **Error Message: Coordination protocol dialogue timeout observed.**

   Cause: Time not synchronised in both pairing AMSS/AFTN systems.

   Solution: Automatic time synchronization through GPS server in AMSS/AFTN system at both receiving and sending system is required to be done for smooth exchange of AIDC messages.

5. **Error Message: Timely non-receipt of ACP messages results in unnecessary LRM messages.**

   Cause: Messages may be accepted manually at receiving ATSU. In some of the automation system installed there is no provision of automatic acceptance of EST messages.

   Solution: It is recommended that AIDC messages like EST are accepted automatically to avoid frequent LRM messages. As it is discussed earlier also that system expects response for every AIDC message in a fix time. Non receipt of response within a fix time span results in frequent LRM and LTO messages.

6. **Error Message: Truncated routes are not getting accepted by accepting unit.** Melbourne reported a small number of messages contain a route designator in field 15 prior to Entry COP.

   Cause: ICAO route truncation indicator is not supported by many accepting unit. Incorrect route truncation. The Asia/Pacific ICD clearly states the rules required for truncating a route after the last known significant route point. If these rules are not followed there are significant risks associated with the transmission of incorrect route information to the downstream ATC unit. While the majority of instances investigated are the result of human error, there have been occasions when the automation system behaved unexpectedly. With the increasing use of route modifications, the accuracy of route handling and transmission between automated systems is of great importance.

   Solution: Manufacturer and States must ensure that automation system must be designed/changed as per APAC-ICD mandated by ICAO. To avoid human errors, a comprehensive training backed up by regular refresher training is required to be imparted to controllers/system operators.

7. **Error Message: Even after sending a rejection or counter coordination message by accepting unit, the sending station continues to send the CDN message.**

E.g. a CDN message is sent by sender system to an accepting system. The receiving system in response to incoming message will send either an acceptance (ACP) message, rejection message (REJ) or counter- coordination message (CDN). The sender system should wait for the above messages from receiving system and then send the appropriate message.

Cause: Unnecessary generation of CDN messages without acknowledgement.

Solution: As per PAN-ICD protocol, transmitting system must wait to receive response for a CDN message. This response may be accept, reject or counter-coordination. Multiple generation of automatic CDN messages, without waiting for an acknowledgement, might be due to system getting into some loop or may be due to some other system problem. The temporary solution may be to stop automatic generation of CDN messages by the system.

8. **Error Message:**
   a. **The SSR Codes received through AIDC message are getting retained in FDPS** for days and are not available for re-use. Controller has to use adapted pool of limited SSR codes for track correlation. As a result the adapted Station pool of SSR codes gets exhausted very soon.
   b. **Use of incorrect ORCAM SSR code** by ATSU-1 may cause complication in ATSU-2 system.

Cause: This problem may be because of wrong adaptation of SSR codes in automation system by transmitting system.

Solution: Every AIDC partner must ensure proper allocation of SSR codes in their automation system as per ICAO regional allocation of SSR codes due to availability of limited number of SSR codes.

9. **Error Message: Some automation systems rejected latitude/longitude represented upto seconds** (041627N0733138E).

Cause: As per AIDC-ICD seconds is not part of the standard LAT/LONG format.

Solution: Automation system may conform to AIDC ICD.

10. **Error Messages: ICAO FPL 2012 Format.**
    a. ABI and CPL message in ICAO 2012 FPL format were rejected, reported LRM received with invalid SSR equipment in FPL.
    b. Reference ID of Optional Data Field 3 (ODF) is incorrect in messages.

Solution: Pairing Systems may be modified to support ICAO FPL 2012 format.

11. HMI Issues: Some of HMI issues found in India across all of the automation systems.

a. Separate CWP is required for radar and planning controller for efficiently carrying out AIDC functionality.

    i.   Multiple AIDC HMI is preferred as it may not be practicable for RADAR controller alone to handle AIDC.

    ii.   Dedicated AIDC message exchange window like DLD window to display readily the current status and actual content of messages exchanged is preferred.

    iii. There should be provision for automatic as well as manual mode of message exchange.

b. Status of AIDC coordination and provision for hand-off may be made available in Data Block.

c. Flexible provision for automatic/manual responses for the messages like EST, CPL, PAC, CDN, etc.

d. Non provision of creation of flight plan with ABI message, if a flight is not available. Some automation system creates flight plan from incoming ABI message in case of non-availability of flight plan whereas others reject ABI message altogether in case of non- availability of flight plan.

e. The clocks of the AFTN and Automation System need regular synchronisation. This problem is frequently encountered by various automation systems that messages are getting rejected due to different time stamping at the time of receiving and sending the messages.

f. Colour combinations should facilitate easier comprehension of AIDC state.

g. Pending ACP from ATSU-2, incoming PAC is sometimes displayed in sector inbound list only. It is required that same be available in coordination list also.

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