

# INTERNATIONAL CIVIL AVIATION ORGANIZATION



## SUMMARY OF DISCUSSIONS AND CONCLUSIONS OF THE FIFTIETH MEETING OF THE NORTH ATLANTIC SYSTEMS PLANNING GROUP

*Paris, 23 to 27 June 2014*

## APPENDIX X — TORS FOR THE NAT DATA LINK MONITORING AGENCY (DLMA)

(paragraph 7.3.6 refers)

*Editorial Note:* Amendments are arranged to show deleted text as greyed out text using strikethrough (~~text to be deleted~~), and added text with grey shading (**text to be inserted**).

### NAT Data Link Monitoring Agency (NAT DLMA)

#### Terms of Reference

The NAT Data Link Monitoring Agency (DLMA) will report to the NAT CNSG with respect to data link implementation, trials and operations.

It will receive and process routine and ad-hoc data and problem reports from end users and interested parties

The main tasks of the NAT DLMA are:

- ~~1. Monitor and report communications performance, availability and problems, with respect to requirements.~~
- ~~2. Develop and promulgate forms, specifications and procedures required for reporting of problems and routine data.~~
- ~~3. Monitor and report message traffic statistics.~~
- ~~4. Co-ordinate end to end system functionality, performance and interoperability.~~
- ~~5. Co-ordinate in order to diagnose and resolve system problems.~~
- ~~6. Co-ordinate the development of ground system navigation databases.~~
- ~~7. Report ATSU's data link capabilities with respect to trials and operational requirements for the Region. Receive advisories of same from ATS providers.~~
- ~~8. Co-ordinate with similar agencies for other airspaces.~~
- ~~9. Collect notices of service disruptions, restorations and major system changes. Correlate the information same to problems reported.~~

#### **PART I**

**Problem analysis and resolution per D.3 of the GOLD, which includes:**

- 1. A means for reporting, e.g. a web-based service.**
- 2. Diagnose problems and recommend resolutions.**
- 3. Co-ordinate problem reports and resolutions with other regional data link monitoring agencies.**

*Note 1: In the context of the ToR, provisions of D.3 and D.4 of the GOLD are mandatory.*

*Note 2: The entity must enter into a confidentiality agreement with those stakeholders who require it to provide problem reports. Except as authorized by individual stakeholders, all problem reports and associated documentation shall be de-identified prior to distribution to members to protect the name and/or company originating the problem report. The entity must implement and maintain a program to protect confidential and sensitive information provided by NAT stakeholders. No identified data shall be kept longer than is essential to the successful resolution of the associated problem.*

**PART II - Problem analysis and resolution per D.3 of the GOLD**

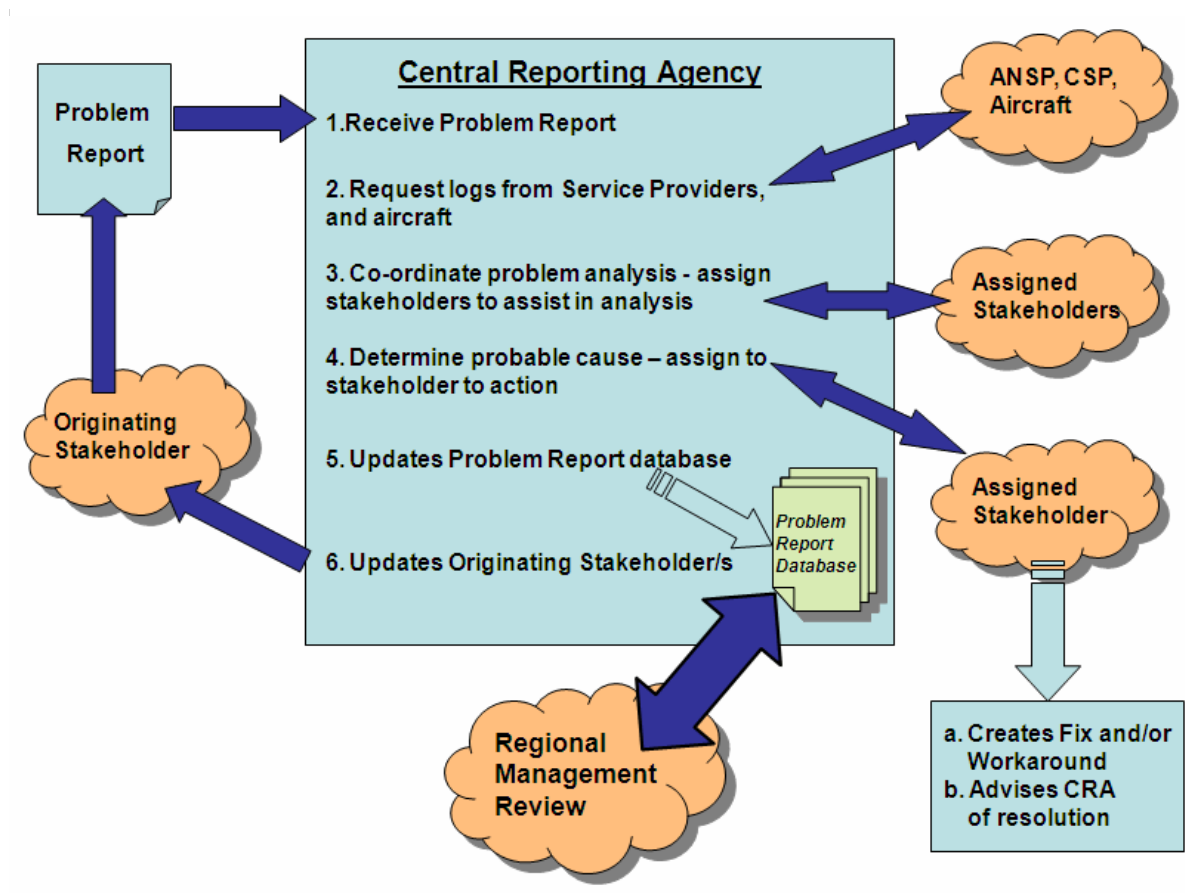
**D.3 Problem reporting and resolution**

**D.3.1 General**

D.3.1.1 The working principles in this guidance material result from the combined experience of the North Atlantic, Asia-Pacific, South American, African-Indian Ocean, and European Regions. Many regions have formed a regional monitoring agency to manage the problem reporting and resolution process.

D.3.1.2 All stakeholders should be actively involved in the problem reporting and resolution process. It is essential that all aircraft operators in a region have the opportunity to become involved in the process and CRA's should be pro-active in getting all aircraft operators and other stakeholders to register and participate in the process.

D.3.1.3 The problem identification and resolution process, as it applies to an individual problem, consists of a data collection phase, followed by problem analysis and coordination with affected parties to secure a resolution, and recommendation of interim procedures to mitigate the problem in some instances. This is shown in the *Figure D-20*.



*Figure D-20. Problem reporting and resolution process*

### D.3.2 Problem report form

D.3.2.1.1 The problem identification task begins with receipt of a problem report from a stakeholder, usually an operator, ANSP or CSP but may include aircraft or avionics manufacturers. Standard reporting forms should be developed and regions should investigate the use of a website to receive and store problem reports.

D.3.2.1.2 As an example, the EUR region uses JIRA<sup>\*</sup>, a secured web-based problem reporting and tracking application, which is managed by the LINK2000+/Central Reporting Office of EUROCONTROL. Problems should be reported, regardless whether it can be resolved locally or needs to be handled to promote knowledge sharing across the data link community.

D.3.2.1.3 An example of an online problem reporting form currently used on-line by regional CRA in the NAT, and Asia Pacific regions is shown in *Figure D-21*. The fields used in the form are as follows:

- a) Originator's Reference Number: Originators problem report reference (e.g. ANZ\_2009-23);
- b) Title: A short title which conveys the main issue of the reported problem (e.g. CPDLC transfer failure);
- c) Date UTC: Date in YYYYMMDD format (e.g. 20090705);
- d) Time UTC: Time in HHMM (e.g. 2345);
- e) Aircraft registration: ICAO flight plan aircraft registration (e.g. ZKADR);
- f) Aircraft identification: ICAO flight plan call sign if applicable (e.g. NZA456);
- g) Flight Sector: If applicable the departure and destination airfield of the flight (e.g. NZAA-RJBB);
- h) Organization: Name of the originators organization (e.g. Airways NZ);
- i) Active Center: Controlling Centre at time of occurrence if applicable (e.g. NZZO);
- j) Next Center: Next controlling centre at time of occurrence if applicable (e.g. NFFF);
- k) Position: Position of occurrence (e.g. 3022S16345E);
- l) Problem Description: Detailed description of problem;
- m) Attach File: Area of web page where originator and assigned stakeholders can attach data files or other detailed information such as geographic overlays; and
- n) Additional Data: Area set aside for feedback from stakeholders assigned by the regional/State monitoring agency. This will includes the results of the investigation and the agreed action plan.

*Note: A number of regional monitoring agencies are developing websites to manage the problem reporting process. Website addresses and the regional monitoring agency to which they are applicable are listed in Appendix E.*

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\* <http://www.eurocontrol.int/link2000/wiki/index.php>

### FANS 1/A Problem Report Form

Form Details			
Originators Reference Number			<input type="text"/>
Title	<input type="text"/>		
Date UTC	<input type="text"/>	Time UTC	<input type="text"/>
Registration	<input type="text"/>	Flight Number	<input type="text"/>
Flight Sector	<input type="text"/>		
Originator	<input type="text"/>	Aircraft Type	<input type="text"/>
Organisation	<input type="text"/>		
Active Center	<input type="text"/>	Next Center	<input type="text"/>
Postion	<input type="text"/>		
Problem Description (box will expand as you type)	<input type="text"/>		
Attach File	<input type="text"/>	Browse...	(click browse - do not type in this field)
	<input type="text"/>	Browse...	(click browse - do not type in this field)
	<input type="text"/>	Browse...	(click browse - do not type in this field)
	<input type="text"/>	Browse...	(click browse - do not type in this field)
	<input type="text"/>	Browse...	(click browse - do not type in this field)
Additional Data	<input type="text"/>		
<input type="button" value="Submit PR"/>			

Figure D-21. Example on-line problem reporting form

### D.3.3 Problem assessment

#### D.3.3.1 Data collection

D.3.3.1.1 The data collection phase consists of obtaining message logs from the appropriate parties (which will depend on which ANSPs and CSPs were being used and operator service contracts). Today, this usually means obtaining logs for the appropriate period of time from the CSPs involved. Usually, a log for a few hours before and after the event that was reported will suffice, but once the analysis has begun, it is sometimes necessary to request additional data, (perhaps for several days prior to the event if the problem appears to be an on-going one).

D.3.3.1.2 Additionally, some aircraft-specific recordings may be available that may assist in the data analysis task. These are not always requested initially as doing so would be an unacceptable imposition on the operators, but may occur when the nature of the problem has been clarified enough to indicate the line of investigation that needs to be pursued. These additional records include:

- a) Aircraft maintenance system logs.
- b) Built-In Test Equipment data dumps for some aircraft systems.
- c) SATCOM activity logs.
- d) Logs and printouts from the flight crew and recordings/logs from the ANSPs involved in the problem may also be necessary. It is important that the organization collecting data for the analysis task requests all this data in a timely manner, as much of it is subject to limited retention.

#### D.3.3.2 Data analysis

D.3.3.2.1 Once the data has been collected, the analysis can begin. For this, it is necessary to be able to decode all the messages involved, and a tool that can decode every ATS data link message type used in the region is essential. These messages include:

- a) AFN (ARINC 622), ADS-C and CPDLC (RTCA DO-258/EUROCAE ED-100) in a region operating FANS-1/A.
- b) Context Management, ADS-C and CPDLC applications (ICAO Doc 9705 and RTCA DO 280B/ED-110B) in a region using ATN B1.
- c) ARINC 623 messages used in the region.

D.3.3.2.2 The analysis of the decoded messages requires a thorough understanding of the complete message traffic, including:

- a) Media management messages.
- b) Relationship of ground-ground and air-ground traffic.
- c) Message envelope schemes used by the particular data link technology (ACARS, ATN, etc).

D.3.3.2.3 The analyst must also have a good understanding of how the aircraft systems operate and interact to provide the ATS data link functions, as many of the reported problems are aircraft system problems.

D.3.3.2.4 This information will enable the analyst to determine a probable cause by working back from the area where the problem was noticed to where it began. In some cases, this may entail manual decoding of parts of messages based on the appropriate standard to identify particular encoding errors. It may also require lab testing using the airborne equipment (and sometimes the ground networks) to reliably assign the problem to a particular cause.

D.3.3.2.5 Once the problem has been identified, then the task of coordination with affected parties begins. The stakeholder who is assigned responsibility for fixing the problem must be contacted and a corrective action plan agreed. The stakeholder who initiated the problem report shall be provided with regular updates on the progress and resolution of the problem

D.3.3.2.6 This information (the problem description, the results of the analysis and the plan for corrective action) is then entered into a database covering data link problems, both in a complete form to allow continued analysis and monitoring of the corrective action and in a de-identified form for the information of other stakeholders. These de-identified summaries are reported at the appropriate regional management forum and made available to other regional central reporting/monitoring agencies on request.

#### D.3.4 Mitigating procedures – problem resolution

D.3.4.1 The regional monitoring agency's responsibility does not end with determining the cause of the problem and identifying a fix. As part of that activity, and because a considerable period may elapse while software updates are applied to all aircraft in a fleet, procedural methods to mitigate the problem may have to be developed while the solution is being coordinated. The regional monitoring agency should identify the need for such procedures and develop recommendations for implementation by the ANSPs, CSPs and operators involved.

#### D.4 Regional performance monitoring

##### D.4.1 General

D.4.1.1 This section provides guidance on periodic reporting by individual ANSP of observed system performance in their airspace that will enable regional performance metrics to be developed for the availability, CPDLC transaction time and ADS-C surveillance data transit time requirements specified in Appendix B and Appendix C.

D.4.1.2 These regional performance metrics should be made available to all interested stakeholders. The use of regional websites to enhance the distribution of these metrics should be considered. An example of such a website can be viewed at <http://www.ispacg-cra.com/>.

D.4.1.3 It is recommended that regions implement monthly performance reporting to obtain system performance metrics. These reports will provide data on observed availability, CPDLC transaction time and ADS-C surveillance data transit time as described herein.

##### D.4.2 Reporting on availability

D.4.2.1 ANSP should report on CSP notified system outages and on detected outages that have not been notified as described in paragraph D.2.4.3.2. This is used to calculate the actual availability of service provision.

D.4.2.2 For each outage the following information should be reported:

- a) Time of CSP outage notification: In YYYYMMDDHHMM format or “Not Notified” if no CSP notification received.
- b) CSP Name: Name of CSP providing outage notification if applicable.
- c) Type of outage: Report media affected SATCOM, VHF, HF, ALL.
- d) Outage start time: In YYYYMMDDHHMM format
- e) Outage end time: In YYYYMMDDHHMM format
- f) Duration of Outage: In minutes.

D.4.2.3 As per Appendix B only outages greater than 10 minutes are reported. An example form is shown in *Figure D-24*.

D.4.2.4 For EUR region, the number of Provider Aborts experienced by the ANSP and manually reported availability problems affecting a single aircraft should be reported. This provides an acceptable indication of the actual Availability of Use.

D.4.2.5 ANSP can use graphical analysis to track availability as illustrated in *Figure D-22* and *Figure D-23*.

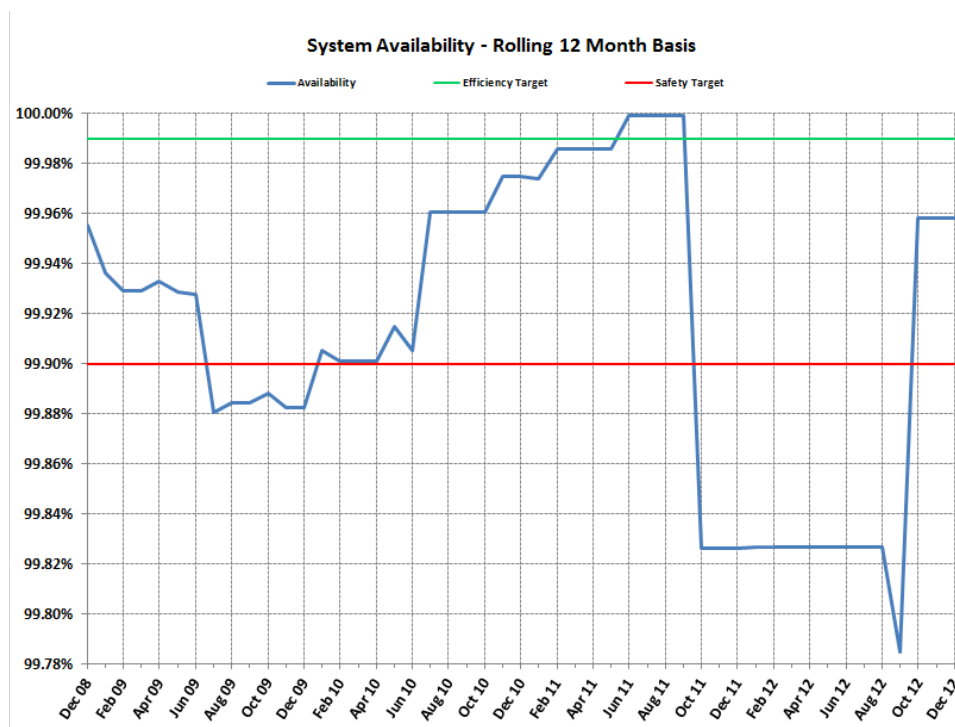


Figure D-22. Example system availability graph



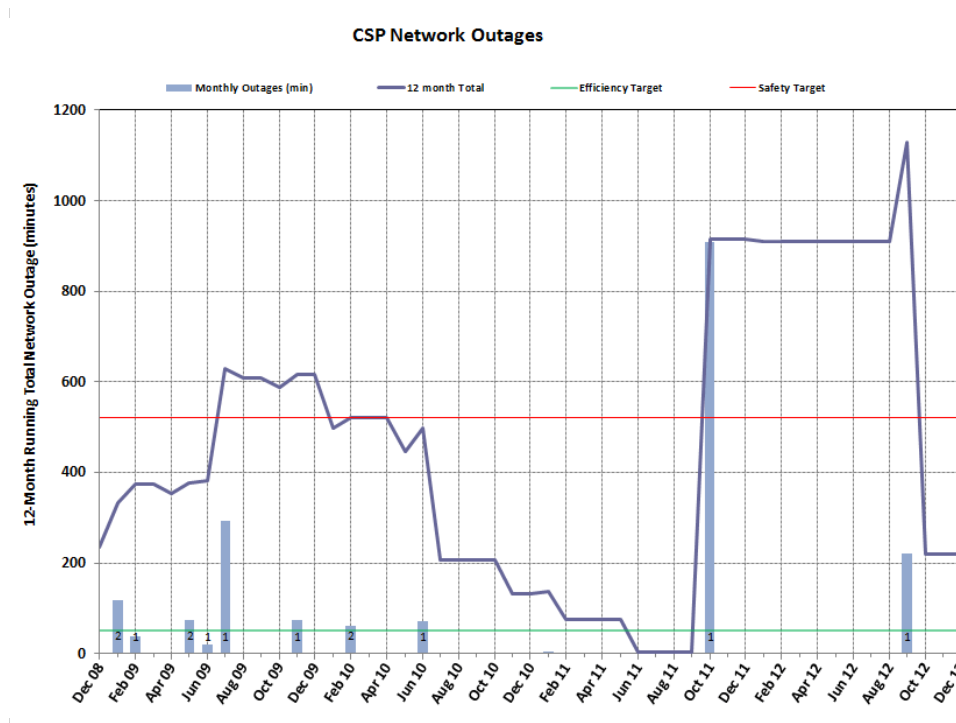


Figure D-23 Example network outage graph

#### D.4.3 Reporting on CPDLC actual communications performance

D.4.3.1 ANSP should report observed ACP and ACTP for RCP240 and RCP400 for different media paths using all transactions involving a WILCO response as described in paragraph D.2.4. The media paths to report are:

- From all aircraft via all remote ground station (RGS) types.
- From all aircraft where both uplink and downlink are via SATCOM RGS
- From all aircraft where both uplink and downlink are via VHF RGS
- From all aircraft where both uplink and downlink are via HF RGS
- From all aircraft where either uplink and downlink are via HF or SATCOM RGS

D.4.3.2 A tabular reporting format can be used to capture the observed performance at the 95% and 99.9% RCP240/400 times.

D.4.3.3 As PORT is independent of media path, this need only be reported for all RGS types. An example form is shown in *Figure D-24*.

D.4.3.4 ANSPs within the EUR region should record the observed ACP and ACTP for RCP 150 and CPDLC-flight crew-initiated log files for different media paths using all transactions requiring a response. In addition, it should record the observed ACP and ACTP for DLIC-Contact/CPDLC log files and ATN B1 transport level log files, deployment and system health log files in the standardised XML-format as described in paragraph D.1.1.2. All ANSPs send the log files to the CRO for importing into PRISME (Pan-European Repository of Information Supporting the Management of EATM). PRISME is an integrated ATM data warehouse for creation of various performance monitoring reports (e.g. EUR network, an ANSP, an Aircraft Operator, particular avionics configuration).

D.4.3.5 The EUR network performance monitoring reports are published on the CRO website. The reports at the other levels (per ANSP, per Aircraft Operator and per Avionics configuration) would normally be restricted to just EUROCONTROL and the relevant stakeholder.

#### D.4.4 Reporting on RSP data transit time

D.4.4.1 ANSP should report observed RSP data transit time for RSP 180 and RSP 400 and DO290/ED120 based performance specifications for different media paths as described in paragraph D.2.4. The media paths to report are:

- a) From all aircraft via all Remote Ground Station (RGS) types.
- b) From all aircraft where both uplink and downlink are via SATCOM RGS
- c) From all aircraft where both uplink and downlink are via VHF RGS
- d) From all aircraft where both uplink and downlink are via HF RGS
- e) From all aircraft where either uplink and downlink are via HF or SATCOM RGS

D.4.4.2 A tabular reporting format can be used to capture the observed performance at the 95% and 99.9% RSP 180 and RSP 400 times. An example form is shown in *Figure D-24*.

Monthly Report of Datalink Performance by < ANSP Name> for < FIR Name > for <month> <year>								
Section 1: Availability								
CSP Notification	CSP Name	Outage Type	Start	End	Duration (Mins)			
200907150005	ARINC	SATCOM	200907150001	200907150020	19			
Not Notified	N/A	SATCOM	200907212233	200907212255	22			
200907281515	SITA	VHF	200907281510	200907281525	15			
Section 2: CPDLC								
ALL RGS			SATCOM					
ACTP RCP240	120sec	98.20%	ACTP RCP240	120sec				
	150sec	100%		150sec				
ACP RCP240	180sec	98%	ACP RCP240	180sec				
	210sec	99.70%		210sec				
PORT	60sec	98%						
ACTP RCP400	260sec		ACTP RCP400	260sec				
	310sec			310sec				
ACP RCP400	320sec		ACP RCP400	320sec				
	370sec			370sec				
VHF			HF					
ACTP RCP240	120sec		ACTP RCP240	120sec				
	150sec			150sec				
ACP RCP240	180sec		ACP RCP240	180sec				
	210sec			210sec				
ACTP RCP400	260sec		ACTP RCP400	260sec				
	310sec			310sec				
ACP RCP400	320sec		ACP RCP400	320sec				
	370sec			370sec				
SATCOM + HF								
ACTP RCP240	120sec							
	150sec							
ACP RCP240	180sec							
	210sec							
ACTP RCP400	260sec							
	310sec							
ACP RCP400	320sec							
	370sec							
Section 3: ADS-C								
ALL RGS						SATCOM		
ASP RSP180	90sec	98.80%				ASP RSP180	90sec	
	180sec	100%					180sec	
ASP RSP400	300sec		ASP RSP400	300sec				
	400sec			400sec				
VHF			HF					
ASP RSP180	90sec		ASP RSP180	90sec				
	180sec			180sec				
ASP RSP400	300sec		ASP RSP400	300sec				
	400sec			400sec				
SATCOM + HF								
ASP RSP180	90sec							
	180sec							
ASP RSP400	300sec							
	400sec							

Figure D-24. Example ANSP monthly report

D.4.5 Reporting data to enable graphical reports

D.4.5.1 In addition to the tabular performance reporting described above regions should consider presenting performance data using graphical means. Performance graphs illustrating regional communications and surveillance performance for the different media paths can be readily obtained by aggregating spreadsheet data from individual ANSP as illustrated in *Figure D-25*. This figure illustrates part of an ANSP report of actual performance for ACTP, ACP, and PORT against the RCP240 requirements for a particular media type where the number of messages received within a time is recorded at one second intervals. This type of data can be included in an ANSP monthly report to enable regional aggregation of agreed performance information to allow it to be presented in graphical form. Regions could present all or some of the data reported in tabular form per paragraphs D.4.3 and D.4.4 above in graphical form if desired. This method of reporting would also assist global aggregation.

ACTP#	ACTP%	ACP#	ACP%	CREW#	CREW%	t"							
0	0.00%	0	0.00%	149	0.89%	0	16660	99.65%	16540	98.94%	16655	99.62%	200
0	0.00%	0	0.00%	176	1.05%	1	16660	99.65%	16543	98.95%	16656	99.63%	201
0	0.00%	0	0.00%	210	1.26%	2	16662	99.67%	16547	98.98%	16656	99.63%	202
0	0.00%	0	0.00%	322	1.93%	3	16662	99.67%	16549	98.99%	16656	99.63%	203
0	0.00%	0	0.00%	673	4.03%	4	16662	99.67%	16549	98.99%	16656	99.63%	204
0	0.00%	0	0.00%	1444	8.64%	5	16662	99.67%	16550	99.00%	16657	99.64%	205
1	0.01%	0	0.00%	2330	13.94%	6	16662	99.67%	16553	99.01%	16657	99.64%	206
29	0.17%	0	0.00%	3133	18.74%	7	16662	99.67%	16556	99.03%	16657	99.64%	207
988	5.91%	0	0.00%	3946	23.60%	8	16662	99.67%	16561	99.06%	16657	99.64%	208
3939	23.56%	0	0.00%	4731	28.30%	9	16664	99.68%	16563	99.07%	16659	99.65%	209
6726	40.23%	0	0.00%	5667	33.90%	10	16664	99.68%	16564	99.08%	16662	99.67%	210
8519	50.96%	0	0.00%	6763	40.45%	11	16664	99.68%	16565	99.08%	16662	99.67%	211
9566	57.22%	3	0.02%	7811	46.72%	12	16664	99.68%	16566	99.09%	16662	99.67%	212
10585	63.31%	13	0.08%	8794	52.60%	13	16666	99.69%	16567	99.10%	16663	99.67%	213
11356	67.93%	33	0.20%	9594	57.39%	14	16667	99.69%	16571	99.12%	16663	99.67%	214
11910	71.24%	67	0.40%	10355	61.94%	15	16667	99.69%	16572	99.13%	16665	99.68%	215
12401	74.18%	136	0.81%	10964	65.58%	16	16667	99.69%	16574	99.14%	16665	99.68%	216
12962	77.53%	232	1.39%	11483	68.69%	17	16667	99.69%	16575	99.14%	16665	99.68%	217
13530	80.93%	609	3.64%	11899	71.17%	18	16667	99.69%	16576	99.15%	16666	99.69%	218
13938	83.37%	1949	11.66%	12267	73.38%	19	16669	99.71%	16577	99.16%	16666	99.69%	219
14247	85.22%	3280	19.62%	12595	75.34%	20	16669	99.71%	16579	99.17%	16666	99.69%	220
14415	86.22%	4326	25.88%	12867	76.96%	21	16669	99.71%	16580	99.17%	16666	99.69%	221
14586	87.25%	5362	32.07%	13145	78.63%	22	16672	99.72%	16581	99.18%	16666	99.69%	222
14724	88.07%	6308	37.73%	13387	80.08%	23	16673	99.73%	16583	99.19%	16666	99.69%	223
14839	88.76%	7057	42.21%	13588	81.28%	24	16674	99.74%	16586	99.21%	16666	99.69%	224
14943	89.38%	7766	46.45%	13764	82.33%	25	16675	99.74%	16586	99.21%	16667	99.69%	225
15029	89.90%	8388	50.17%	13930	83.32%	26	16675	99.74%	16589	99.23%	16667	99.69%	226
15128	90.49%	8977	53.70%	14098	84.33%	27	16676	99.75%	16589	99.23%	16667	99.69%	227
15220	91.04%	9494	56.79%	14249	85.23%	28	16676	99.75%	16593	99.25%	16668	99.70%	228
15323	91.66%	9968	59.62%	14425	86.28%	29	16677	99.75%	16594	99.26%	16668	99.70%	229
15402	92.13%	10373	62.05%	14562	87.10%	30	16677	99.75%	16596	99.27%	16668	99.70%	230
15448	92.40%	10763	64.38%	14696	87.91%	31	16677	99.75%	16597	99.28%	16668	99.70%	231
15501	92.72%	11102	66.41%	14826	88.68%	32	16677	99.75%	16598	99.28%	16668	99.70%	232
15543	92.97%	11433	68.39%	14938	89.35%	33	16677	99.75%	16601	99.30%	16668	99.70%	233
15599	93.31%	11720	70.10%	15049	90.02%	34	16677	99.75%	16604	99.32%	16668	99.70%	234
15640	93.55%	11985	71.69%	15160	90.68%	35	16678	99.76%	16604	99.32%	16668	99.70%	235
15683	93.81%	12235	73.18%	15258	91.27%	36	16678	99.76%	16605	99.32%	16668	99.70%	236
15720	94.03%	12477	74.63%	15338	91.75%	37	16679	99.77%	16606	99.33%	16668	99.70%	237
15747	94.19%	12703	75.98%	15405	92.15%	38	16679	99.77%	16607	99.34%	16668	99.70%	238
15790	94.45%	12908	77.21%	15476	92.57%	39	16680	99.77%	16609	99.35%	16668	99.70%	239
15813	94.59%	13111	78.42%	15533	92.91%	40	16681	99.78%	16609	99.35%	16668	99.70%	240
15851	94.81%	13289	79.49%	15603	93.33%	41	37	0.22%	109	0.65%	50	0.30%	>240
							16718	100.00%	16718	100.00%	16718	100.00%	Total

Figure D-25 Example ANSP monthly report that will enable graphical analysis