
APPENDIX N

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METEOROLOGICAL COMMUNICATIONS GROUP
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SADISOPSG

SADIS GATEWAY
HIGH LEVEL
TECHNICAL REQUIREMENTS
DOCUMENT

MOTNEG/SADGATE/01

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Abstract	
This document describes the requirements, in terms of textual OPMET and WAFS data, for the SADIS Gateway which is intended to validate and monitor meteorological products before they are distributed on the SADIS broadcast.	
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F.2 DOCUMENT CIRCULATION

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ISSUE	DATE	REASON FOR CHANGE
1.0		First Issue
2.0	13/05/98	IATA requested modifications added
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4.0	07/07/09	Further automatic correction added following endorsement by MOTNEG & SADISOPSG

1. Introduction

1.1 Background

AT SADISOPSG/1 a SADISOPSG Gateway Working Group was formed in order to carry out a number of tasks described in Appendix G of the Report of that meeting. These tasks were all related to the provision of information to support the provision of a Gateway to the SADIS. Included in these tasks were the production of detailed Requirements for the Gateway. The User Requirements were discussed and documented during the SADIS Gateway Working Group Meeting held at Heathrow during the 23rd and 24th of September 1997 and in a number of subsequent meetings. This document is a statement of the original Technical Requirements and is modified in order to take account of changing requirements.

1.2 Purpose

The purpose of this document is to briefly describe the High Level Technical Requirements for the proposed SADIS Gateway. It is intended that this document shall contain sufficient detail for use in the procurement and acceptance of the SADIS Gateway. The Technical Requirements should also define procedures associated with the operation of the SADIS Gateway.

1.3 Scope

This document shall define the types of data that is currently envisaged to be transmitted on SADIS and therefore must be processed by the Gateway. It shall also define the validation, monitoring and correction of this data that is required of the Gateway.

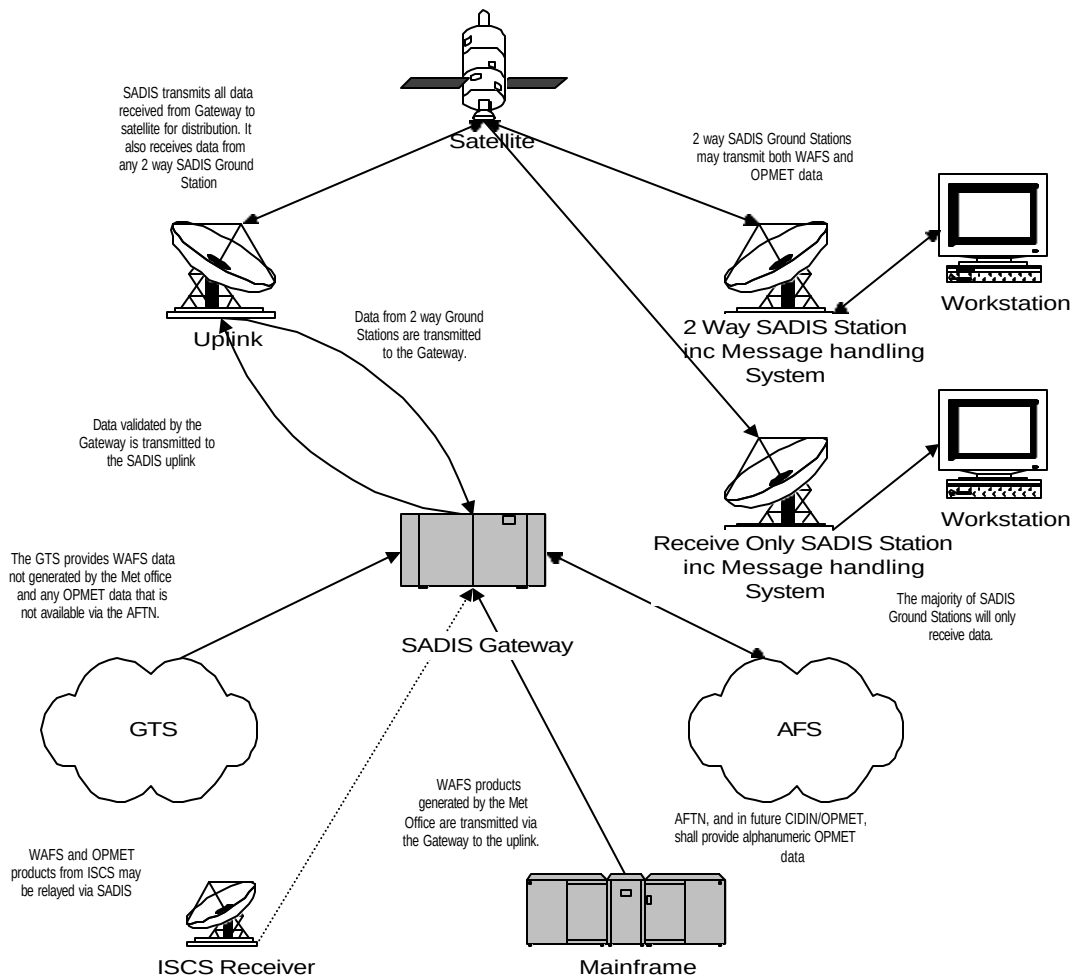
1.4 Associated Documents

- Annex 3 (Meteorology) to the Convention on International Civil Aviation.
- Annex 10 (Aeronautical Communications) to the Convention on International Civil Aviation
- EUR CIDIN Manual
- Manual on the Global Telecommunications System Volume 1 (WMO No.386)
- Manual on Codes (WMO No.306)
- SADIS Handbook

2. Summary of Technical Requirements

The SADIS Gateway shall function as a communications gateway between the SADIS Satellite distribution service and the communications services that supply it with source data. The Gateway shall be responsible for receiving this data, validating it to the required standard and transmitting it in the appropriate format to the SADIS uplink. The SADIS Gateway shall also be responsible for monitoring data passing through on a real time basis for scheduled reports and also for the provision of data that will permit off-line analysis of the service. This analysis will yield information on the quality of service allowing deficiencies in quality to be identified. Information received from SADIS two-way stations shall also be received and validated by the Gateway before being promulgated on the SADIS uplink and, if required, the AFTN/CIDIN network.

The diagram below illustrates the context of the SADIS Gateway.



3. Detailed Requirements

3.1 Data Requirements

3.1.1 Opmet Data

The SADIS OPMET Gateway will route the following currently defined message types to the SADIS uplink.

TT	Message Type
SA	METAR
SP	SPECI
FC	9 HR TAF
FT	18/24 HR TAF
WS	SIGMET
WC	Tropical Cyclone SIGMET
WV	Volcanic Ash SIGMET
WA	Airmets
FA	GAMETs
UA	Special AIREPs
FV	Volcanic Ash Advisory
FK	Tropical Cyclone Advisory

Provision shall also be made for the inclusion of new message types, it is desirable that the SADIS Gateway operator can define such new message types through configuration action. The METAR and TAF data shall satisfy the requirements detailed in 'Requirements in the SADIS for OPMET Information', (SADISOPSG/1 WP/12). Provision shall be made for expansion of the coverage of Aerodrome information initially to at least 5,000 aerodromes.

3.1.2 WAFS Data

The SADIS Gateway will route the following message types to the SADIS uplink.

T ₁	Message Type
H	WAFS GRIB
P	T.4 Products

BUFR Code may also be required pending the decision of the World Area Forecast System Study Group (WAFSSG).

3.1.3 Other Messages

The Gateway shall be capable of generating or passing on System Status messages that will inform users of circumstances affecting the quality or coverage of data received on the system. It shall also promulgate textual amendments to T.4 charts on the OPMET channel.

NO	System Administration messages
FX	Textual Amendments to T.4 Charts

3.2 Interface Requirements

3.2.1 AFTN Interface

The Gateway shall support an AFTN interface in accordance with the standards, recommended practices and procedures defined in Annex 10 (Aeronautical Communications) to the Convention on International Civil Aviation. It shall support IA5 codes only.

3.2.2 CIDIN Interface

The Gateway shall support a CIDIN interface in accordance with the EUR CIDIN Manual, Appendix B (ICAO EUR DOC 005). Both CIDIN(AFTN) and CIDIN(OPMET) shall be supported.

3.2.3 WMO Interface

The Gateway shall support independent interfaces between the Gateway and the SADIS Uplink/Downlink WMO between the Gateway and the GTS.

3.2.3.1 GTS/Gateway Interface

The Gateway shall support WMO interfaces in accordance with the Manual on the Global Telecommunications System Volume 1 (WMO No.386) where it interfaces to the GTS. The interface may also be used to accept data from interfaces other than AFTN or CIDIN that are required for the uplink but unavailable through these interfaces.

3.2.3.2 Uplink-Downlink/Gateway Interface

The Gateway shall support a WMO interface in accordance with the Part II of the Manual on the Global Telecommunications System Volume 1 (WMO No.386) for the SADIS Uplink with the following exceptions.

- All transmissions to and from the SADIS uplink shall be in IA5 format only.
- Requests for repetition shall not be supported.
- Addressed messages shall not be supported.

This interface shall be used to transmit all data from the Gateway to the SADIS Uplink and to receive data from the SADIS two-way channels.

3.2.4 Future Interfaces

The above requirements cover existing communications. Future communications systems such as ATN shall be shall be interfaced to system following the receipt of a statement of requirements, and a change assessment procedure. The design of the Gateway shall facilitate the implementation of additional interfaces.

3.2.5 Priority

Messages received for output to the SADIS uplink shall be prioritised on the basis of their message type, as identified from the T₁ T₂ characters of the WMO header. These priorities shall be configurable by the Gateway operator.

OPMET Messages received from the SADIS uplink for dissemination on AFTN or CIDIN shall be prioritised on the basis of their message type, as defined in Annex 10 Volume 2, Section 4.4.1.1 and the EUR CIDIN Manual paragraph 3.2.6.3, as identified from the T₁ character of the WMO header and the BBB optional group.

3.2.6 Protocol Conversion

The Gateway shall be able to convert incoming data in AFTN and CIDIN protocols to WMO format for transmission to the SADIS Uplink. The Gateway shall also be capable of relaying bulletins received in WMO format from the SADIS two way terminal into AFTN and/or CIDIN formats for onward distribution over terrestrial networks. Any conversion must take account of the various maximum message sizes of the various protocols.

It is desirable that the Gateway shall also be able to relay bulletins received in WMO format from GTS or ISCS links to AFTN/CIDIN Networks.

3.2.7 Segmentation

Segmentation of data received from SADIS 2-way stations for distribution on terrestrial networks shall be carried out according to the procedures defined in the WMO Manual on the GTS. Segmentation shall only be carried out on messages that are to be distributed on terrestrial networks and whose size exceeds a configurable value, which shall be determined by the AFTN maximum message size.

Segmented OPMET data received by the SADIS Gateway for transmission on the SADIS uplink shall be reconstituted into a single message provided that the message has been correctly segmented and all its parts have been correctly transmitted.

The requirement for unsegmented binary data on SADIS shall be satisfied by bilateral agreements for the supply of unsegmented data for the uplink.

3.2.8 Invalid Characters

Any characters detected in OPMET data messages received for distribution on the SADIS that are not in the set of valid IA5 characters defined in Annex 10 shall be substituted by a configurable character.

3.3 Validation Requirements

3.3.1 OPMET Data Validation

3.3.1.1 Message Validation

Each message received by the gateway will be made up of a message envelope conforming to the standards defined for the particular protocol in which it is received. Any service messages associated with the protocol shall be handled in accordance with the protocols as referenced in section 3.1.1. Messages which fail this level of validation shall be rejected to a manual position for inspection and, if appropriate, repair.

3.3.1.2 Bulletin Validation

Each message received and not identified as a service message shall be regarded as a bulletin and the message text shall be checked in the following manner

3.3.1.2.1 Bulletin Duplication

Bulletins with the same header as a bulletin already received shall be compared with the original bulletin. If the contents of the bulletins are the same then the later bulletin shall be automatically discarded. If there is a difference between the contents of the two bulletins then the second bulletin shall be processed as normal.

3.3.1.2.2 Abbreviated Header Validation

The first line of the message text shall be assumed to be the abbreviated bulletin header with the following format.

$T_1T_2A_1A_2$ ii[SPACE(S)]CCCC[SPACE(S)]YYGGgg[SPACE(S)](BBB)

This format should conform to that defined in the WMO Manual on the GTS. The SADIS Gateway shall automatically accept only those messages which conform to that format and whose message type, as defined by the T_1T_2 portion of the WMO header format corresponds to a message type for which the system can accept.

3.3.1.2.2.1 ii Numbers

Headers that have only 1 character in the ii portion of the WMO bulletin header shall be automatically modified so that they have 2 numeric character by the insertion of a leading zero.
For example :

FTCA1 MSLP 301000 becomes FTCA01 MSLP 301000

Headers which have no characters in the ii portion of the WMO bulletin header shall be automatically modified by the insertion of two configurable numeric characters in the ii portion of the WMO bulletin header

For example :

FTCA MSLP 301000 becomes FTCA41 MSLP 301000
where 41 are the configured characters.

Bulletins which fail to correspond to the format, apart from those corrected for ii as described above, shall be rejected to a manual position for inspection and, if appropriate, repair.

3.3.1.2.2.2 *Optional Groups*

The following Optional Groups are to be permitted.

RR*	Delayed Routine meteorological report
CC*	Correction to previously relayed report
AA*	Amendment to processed information
P**	Segmented bulletins
RTD	Delayed Routine meteorological report
COR	Correction to previously relayed report
AMD	Amendment to processed information

where * is an alphabetic character of A through X

Attachment II-12 of the WMO Manual on the GTS should be consulted for variations on this table.

When the first part of a segmented message is received a configurable period should be allowed for the remainder of the message to be received. Should all the segments not be received by the end of the configurable period then the received segments shall be discarded.

3.3.1.2.3 Report Validation

3.3.1.2.3.1 *METARs and SPECIs (SA, SP)*

For each individual METAR or SPECI within a bulletin the following items shall be validated:-

- (a) CCCC The report must commence with a valid 4-letter ICAO location indicator. A full list of valid ICAO indicators shall be maintained on the SADIS Gateway against which the indicator can be validated. Note that it is acceptable for this group to be prefixed by the string 'METAR'.
- (b) YYGGggZ The report shall have a valid date and time of observation. This group is optional in the METAR report so if it is not present the observation time shall be taken as the YYGGgg part of the abbreviated Bulletin Heading. For METARs the observation time is acceptable if it is either the same as or earlier than the current system time.

- (c) = The report shall be terminated by the character '='. To check this each individual report shall be identified by examining the first group of each line in the text part of a bulletin. If the first group was either 'METAR' or a valid ICAO location indicator then providing it was not the first report in the bulletin it should be preceded by the terminating character '=' of the previous report.

Bulletins containing any reports failing this validation shall be rejected to a manual position for inspection and, if appropriate, repair.

3.3.1.2.3.2 TAFs (FC, FT)

For each individual forecast within a bulletin the following items shall be validated:-

- (a) CCCC The forecast must commence with a valid 4-letter ICAO location indicator. A full list of valid ICAO indicators shall be maintained on the SADIS Gateway against which the indicator can be validated.
- (b) YYGGggZ The forecast shall, if the field is included, have a valid date and time of origin of forecast. The validity of this field shall depend on it being within a configurable period of time defined in relation to the current system time. For example up to 6 hours before the current time and up to 30 minutes after the current time.
- (c) Y₁Y₁G₁G₁ G₂ G₂ The forecast shall have a valid period of validity.
- (d) = The forecast shall be terminated by the character '='. To do this each individual report shall be identified by examining the first group of each line in the text part of a bulletin. If the first group was either 'TAF' or a valid ICAO location indicator then providing it was not the first report in the bulletin it should be preceded by the terminating character '=' of the previous report.

Bulletins failing this validation shall be rejected to a manual position for inspection and, if appropriate, repair.

3.3.1.2.3.3 SIGMETs and AIRMETs (WS, WV, WC, WA)

For each individual SIGMET the following items shall be validated:-

- (a) CCCC The SIGMET, on the line following the abbreviated header, i.e. the pre-amble defined in Annex 3, must commence with a valid 4 letter ICAO location indicator indicating the ATSU for the FIR for which the SIGMET was issued. A full list of valid ICAO indicators for ATSUs shall be maintained on the SADIS Gateway against which the indicator can be validated.
- (b) YYGGgg/YYGGgg The SIGMET or AIRMET shall have a valid period of validity. This period of validity shall be in the format YYGGgg/YYGGgg and should not exceed 6 hours for normal SIGMETs and AIRMETs or 24 hours for Tropical Cyclone and Volcanic Ash SIGMETs.

Messages failing this validation shall be rejected to a manual position for inspection and, if appropriate, repair.

3.3.1.2.4 Other Bulletin Types (UA, FV, FK)

Other bulletin types such as Special AIREPs, Volcanic Ash Advisories and Tropical Cyclone Advisories shall not be validated beyond their Abbreviated Bulletin Headers.

3.3.1.2.5 Automatic Report Correction

A number of rules for the automatic correction of specific data problems shall be made available on the system. These are as follows: -

- a) If the date of the promulgation of a TAF and the date of its validity period are for the day after the date on which they are received then the dates shall be modified automatically to the current date.

E.g. If at 2000Z on the 16th a TAF is received
XFBD 172000Z 172106 02010KT 8000 etc.
Then it shall be modified to
XFBD 162000Z 162106 02010KT 8000 etc.

- b) If the group identified as a TAF validity time ends with '00' then the last 2 digits shall be modified to '24'.

E.g. if a TAF is received as follows
XFBD 170000 02010KT 8000 etc.
Then it shall be modified to
XFBD 170024 02010KT 8000 etc.
if a TAF is received as follows
XFBD 162300Z 170000 02010KT 8000 etc.
Then it shall be modified to
XFBD 162300Z 17024 02010KT 8000 etc.

- c) If a 6-digit group followed by a Z occurs immediately after a TAF location indicator but is not followed by a 6-digit validity time then the Z shall be stripped from the group and it shall be validated as the TAF validity period.

E.g. if a TAF is received as follows:-
EDDF 100606Z 12006KT etc.
Then it shall be modified to
EDDF 100606 12006KT etc

- d) If two 6-digit groups occur immediately after a TAF location indicator then the first group shall have a Z appended.

e.g. if a TAF is received as follows :-
EDDF 100606 100606 12006KT etc.
Then it shall be modified to
EDDF 100606Z 100606 12006KT etc.

- e) If two 6-digit groups each followed by a Z occur immediately after a TAF location indicator then the second group shall have the Z removed and it shall be validated as the TAF validity period.

e.g. if a TAF is received as follows :-
EDDF 100606Z 100606Z 12006KT etc.
Then it shall be modified to

EDDF 100606Z 100606 12006KT etc.

- f) If the TAF promulgation time is greater than 6 hours after the start time of the TAF validity period then the date of the start time of the TAF validity period shall be incremented, taking into account the month.
- e.g. if a TAF is received as follows :-
EDDF 102200Z 100606 12006KT etc.
Then it shall be modified to
EDDF 102200Z 110606 12006KT etc.
- g) If the TAF promulgation time is greater than 6 hours before the start of the TAF validity time then the date of the start time of the TAF validity period shall be decremented taking into account the month.
- e.g. if a TAF is received as follows :-
EDDF 102200Z 120606 12006KT etc.
Then it shall be modified to
EDDF 102200Z 110606 12006KT etc.
- h) If a bulletin is received with YYGGggZ in the AHL, then the system shall automatically correct it by removing the 'Z'.
- e.g.
SAUK02 EGGW 201650Z<CR><CR><LF>
shall be modified to
SAUK02 EGGW 201650<CR><CR><LF>
- i) If an AHL is received with a single character following the YYGGgg, then it shall be corrected by deleting that character and any spaces between YYGGgg and the alignment function.
- e.g.
WSAZ31 LPMG 221749<SP>7<CR><CR><LF>
shall be modified to
WSAZ31 LPMG 221749<CR><CR><LF>
- j) If any blank lines which consist of superfluous spaces and/or alignment functions are found between the AFTN Origin line and the AHL, then they shall be automatically deleted.
- e.g.
230611 OLLLYPYX<CR><CR><LF>
<STX><CR><CR><LF>
SAIR31 OIII 230600 etc.
shall be output as
230611 OLLLYPYX<CR><CR><LF>
<STX>SAIR31 OIII 230600 etc.
- k) It shall be possible to configure a list of text strings, that if found between AFTN Origin line and the AHL, shall be automatically deleted from the message.
- e.g.
assuming that 'FOR MOTNE' is one of the configured strings then
221802 LCLKYMYX<CR><CR><LF>
<STX>FOR MOTNE<CR><CR><LF>
SACY31 LCLK 221800 etc.
shall be output as

221802 LCLKYMYX<CR><CR><LF>
<STX>SACY31 LCLK 221800 etc.

- l) It shall be possible to configure a list of text strings, that if found between the last '=' and the <VT><ETX>, shall be automatically deleted from the message.
e.g.
assuming that 'DUPE' is one of the configured strings
.06/05 Q1020=<CR><CR><LF>
DUPE<CR><CR><LF>
<VT>
<ETX>
the string 'DUPE', along with any alignment functions, shall be deleted and the message shall be output as
.06/05 Q1020=<CR><CR><LF>
<VT>
<ETX>

3.3.2 WAFS Data Validation

3.3.2.1 Message Validation

Each message received by the gateway shall be made up of a message envelope conforming to the WMO standards defined in the Manual on the Global Telecommunications System Volume 1 (WMO No. 386).

3.3.2.2 Bulletin Validation

Each message received and not identified as a service message shall be regarded as a bulletin and the message text shall be checked in the following manner

3.3.2.2.1 Abbreviated Header Validation

The first line of the message text shall be assumed to be the abbreviated bulletin header with the following format.

T₁T₂A₁A₂ ii[SPACE(S)]CCCC[SPACE(S)]YYGGgg[SPACE(S)](BBB)

This format should conform to that defined in the WMO Manual on the GTS. The SADIS Gateway shall automatically accept only those messages which conform to that format and whose message type, as defined by the T₁T₂ portion of the WMO header format corresponds to a message type for which the system can accept (see 3.1.2).

3.3.2.2.2 Time validation

Each bulletin received into the Gateway shall be checked for timeliness as follows:-
The YYGGgg group of the abbreviated header shall be checked to see if is included in the range
T-23 hours 30 minutes to T+30 minutes
where T is the current date/time.
If the bulletin fails this validation it shall be rejected to a manual position.

3.4 Monitoring Requirements

3.4.1 OPMET Data Monitoring

It shall be possible to initiate monitoring on specific bulletins or aerodrome reports.

3.4.1.1 Bulletin Monitoring

It shall be possible to define a bulletin, by means of the 1st two groups of an abbreviated header, in order for it to be monitored. Wild cards shall be available when defining the abbreviated header. The monitoring process shall record the time of reception, and contents of each bulletin into the Gateway system. The number of bulletins that can be simultaneously monitored shall be at least 1500.

It shall be possible for each bulletin being monitored for the system to raise an alarm should the bulletin not be received for a given interval determined at the time of setting up the monitor for the specific bulletin.

3.4.1.2 Scheduled Report Monitoring

It shall be possible to monitor scheduled data for all aerodromes. The monitoring process shall record the time of reception of each bulletin containing a relevant report into the Gateway system, the bulletin header and the report contents. The aerodrome location indicator shall be one of those defined as a valid aerodrome in the reference data (see 2.3.4.1). The number of reports that can be simultaneously monitored shall be at least 5,000.

It shall be possible for each report being monitored for the system to raise an alarm should the report not be received or a series of NILs received for a given interval determined at the time of setting up the monitor for the specific report.

3.4.2 WAFS Data Monitoring

The SADIS Gateway shall be capable of monitoring the time of transmission of WAFS products. It shall be possible to monitor the type of product as defined by all or part of the of the TTAAii and CCCC groups. An alarm shall be raised should a product not be received within a time interval specified for the particular type of product.

3.4.3 Off Line Analysis

Data shall be gathered from the Gateway in the form of archives and reports from which it shall be possible to carry out off line analysis. This analysis shall provide at a minimum the following information :-

- Throughput of each individual message type.

- Breakdown of messages which fail validation, according to message type, aerodrome, FIR, state.
- Breakdown of messages which fail timeliness constraints, according to message type, aerodrome, FIR, state.

3.5 Procedural Support Requirements

3.5.1 Administrative Messages

The SADIS Gateway shall be capable of generating and transmitting SADIS administrative messages that shall be used to inform users of problems, clearance of problems and system related information.

3.5.2 Content Reporting

The SADIS Gateway shall be capable of transmitting, on a regular basis, messages describing the expected contents of the SADIS transmission. The SADIS Gateway shall also be capable of generating administrative messages describing any additions or deletions to the contents of the expected transmission.

4. Performance

4.1 OPMET Data

4.1.1 Data Volume

On the basis of the assumption that data on up to 5,000 aerodromes shall be processed the Gateway shall be capable of processing during a 24-hour period.

240,000	METARs (SA).
40,000	9 Hour TAFs (FC).
20,000	18/24 Hour TAFs (FT).
24,000	METAR (SA) bulletins.
5,700	9 Hour TAF (FC) bulletins.
5,000	18/24 Hour TAF (FT) bulletins
400	SIGMET (WS,WC & WV) bulletins
100	System Information (NO) bulletins.

Where each bulletin will average 10 reports for METARs, 7 reports for 9 Hour TAFs and 4 reports for 18/24 hour TAFs These averages have been calculated by examining the bulletin contents of the current SADIS transmission.

The Gateway shall be capable of processing , at a peak period :-

5,000	METARs	in 2.5 minutes
500	METAR bulletins	in 2.5 minutes

4.1.2 Data Transit Times

Transit times for valid data entering the Gateway to exiting it shall not exceed the following

	Gateway transit times
METAR (SA) bulletins.	2.5 minutes
9 Hour TAF (FC) bulletins.	2.5 minutes
18/24 Hour TAF (FT) bulletins	2.5 minutes
SIGMET (WS,WC & WV) bulletins	1 minute

4.2 WAFS Data

4.2.1 Data Volume

The Gateway shall be capable of handling the current and extended profiles described below.

4.2.1.1 Current Profile

The output profile for WAFS GRIB and T4 products during March 1996 is shown in Figure 1 of Attachment B. The total traffic level is summarised below

Data Type	Quantity per 24 hour period
GRIB	Between 5 and 5.5 Mbytes, twice a day. Data is available at approximately 03:40 and 15:40 UTC
T4 Products	Approximately 16 to 20 Mbytes

4.2.2 Data Transit Times

WAFS data shall be provided in accordance with the requirements of Annex 3.
