International Civil Aviation Organization

INFORMATION PAPER

MEETING OF THE METEOROLOGY PANEL (METP)
WORKING GROUP MOG

FIRST MEETING

Gatwick, London, United Kingdom, 8 to 11 September 2015

Agenda Item 3: Matters relating to SADIS
3.4: Status of outstanding SADISOPSG Conclusions

REPORT OF THE SADISOPSG TECHNOLOGICAL DEVELOPMENTS TEAM

(Presented by the SADIS Provider State, on behalf of the disbanded SADIS
Technological Developments Team)

SUMMARY

This working paper summarizes the work undertaken by the SADISOPSG
Technological Developments Team since the SADISOPSG/19 meeting in
relation to the development of the SADIS.

By necessity, the Report addresses several topics relating to the recent and
future development of the SADIS.

Action by the METP-WG/MOG is in paragraph 4.

1. **INTRODUCTION**

1.1   This paper summarizes the work undertaken by the SADISOPSG Technological
Developments Team since the last SADISOPSG[1] meeting, in relation to the development of the SADIS.

1.2   It should be noted that the SADIS Technological Developments Team has been involved
in work relating to several other Working Papers that will be presented separately to this meeting.

2. **DISCUSSION**

2.1   The following actions have been completed with regard to the development of the
SADIS.

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[1] SADISOPSG/19, 27 to 29 May 2014, London, United Kingdom

2.2   **Replacement of the CP6000 CPUs at the Whitehill satellite uplink facility, Whitehill**

2.2.1   The CP6000 CPUs that are an essential and indispensable component of the SADIS 2G infrastructure became end of life at the end of March 2015. Originally, it had been expected that these would be replaced as part of a general hardware refresh of the SADIS 2G ground-segment hardware. However, the question of the future of the SADIS 2G service (whether it would be ceased on 31 July 2016 or extended as a 3G service with new downlink parameters to November 2019), quite understandably delayed any decisions regarding a general hardware refresh. However, the function performed by the CP6000 CPUs is so vital to the SADIS 2G service it was considered that even though the SADIS 2G service may cease on 31 July 2016, replacement units (CP7000 CPUs) were essential.

2.2.2   As such, the CP6000 CPUs were replaced with CP7000 CPUs on 31 March 2015 at a total cost of GBP33,500 including installation and on year's support and maintenance.

2.2.3   A two hour outage was necessary during the change, but this was planned to occur at the least disruptive time, and administrative messages were issued

2.3   **Increase to Secure SADIS FTP individual client connection limits.**

2.3.1   The group will recall that at the SADISOPSG/19 meeting a proposal was made to increase the allocated bandwidth[2] beyond the current 16 Mbit/sec bursting to 24 Mbit/sec. The group will further recall that – at the time - it was felt unnecessary to increase the bandwidth.

2.3.2   Notwithstanding the decision of the group to retain the existing bandwidth, the SADIS Provider has undertaken work to optimise – within the overall bandwidth – the download rate of users.

2.3.3   At the time of the SADISOPSG/19 meeting, the individual client limit was 512Kbit/sec. Over a period of several weeks ending 15 August 2014, the individual client limit was raised in 256Kbit/sec increments to (the current) limit of 1024kbit/sec. Figure 1 and Figure 2 below indicate the overall data traffic usage against capacity before and after the increases were applied.
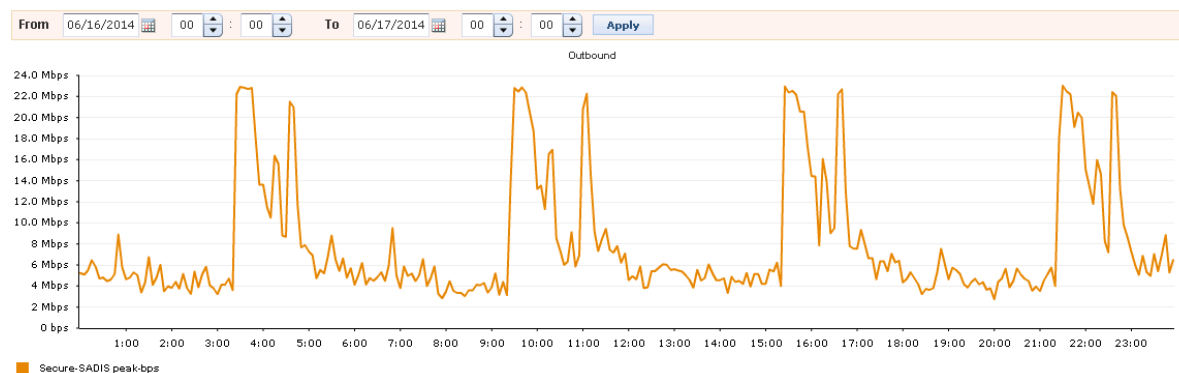

Figure 1: Secure SADIS FTP download activity against capacity (16Mbit/sec bursting to 24Mbit/sec), 16 June 2014. At this point the individual client limit rate was set to 512Kbit/sec.

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[2] The bandwidth between the SADIS Provider's servers and the SADIS Provider's Internet Service Provider (ISP).
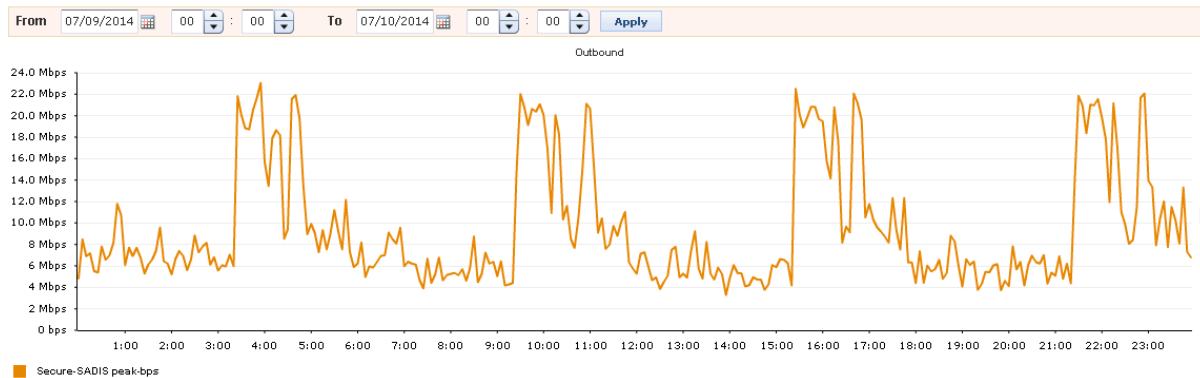
Figure 2: Secure SADIS FTP download activity against capacity (16Mbit/sec bursting to 24Mbit/sec), 9 July 2014. At this point the individual client limit rate was set to 1024Kbit/sec.

2.3.4   It is evident from the graphs that there has been no adverse overall impact to the service following the changes. What is not obvious from the graphs is the improvement to download times for large files (1 Mbyte and greater). Prior to the changes a 20 Mbyte GRIB2 file would typically take 7-15 minutes to download. Since 15 August 2015, such a file would typically take 2 to 7 minutes to download. Some caution must be applied with regard to expectations because, due to the overall capacity limit, if all users attempted to download a 20Mbyte file at exactly the same time, then the download time would increase to 20 minutes.

2.3.5   It is also important to realise that a given bandwidth is a finite resource, and whilst some users will benefit from the higher data rates within that bandwidth allocation, there must be reduction elsewhere. Table 1 below highlights this:

	Users achieving a download rate as specified, when downloading files of =>1 MByte:							
	200 kbit/sec	300 kbit/sec	400 kbit/sec	500 kbit/sec	600 kbit/sec	700 kbit/sec	800 kbit/sec	900 kbit/sec
Client limit of 512kbit/sec	84%	72%	59%	N/A	N/A	N/A	N/A	N/A
Client limit of 1024kbit/sec	63%	52%	43%	34%	27%	20%	13%	3%

Table 1: Comparison of users achieving specified download rates with specific individual client rate limits.

It is evident that whilst 34% are achieving download rates of more than 500kbit/sec following the increase to the client limit to 1024kbit/sec; overall the percentage of users achieving 200kbit/sec has reduced from 84% to 63%. Of course the download activity is complex, since – as can be seen in Figure 1 and Figure 2 – data downloads are very cyclic throughout the day (linked primarily to availability of WAFS GRIB2 data), but also due to the fact that some users will themselves not be able to take advantage of the higher data rates because of their own internet connectivity limitations.

2.3.6   So, although the relationship is complex, it is apparent that increasing the individual client limit without increasing overall bandwidth capacity does have some negative impacts and an appropriate balance needs to be achieved.

2.3.7   In summary, whilst it is believed the increase to the individual client rate discussed above has resulted in an overall improved user experience the relationships are complex. It is considered that any further increases to the individual client limit should only be implemented if the overall bandwidth of Secure SADIS FTP is increased from its current 16Mbit/sec bursting to 24Mbit/sec.

2.3.8   In addition, more recent monitoring of Secure SADIS FTP activity has shown greater demand, as shown in Figure 3 below. The need to consider increasing the overall Secure SADIS FTP bandwidth is therefore addressed in a separate Working Paper presented to this meeting.
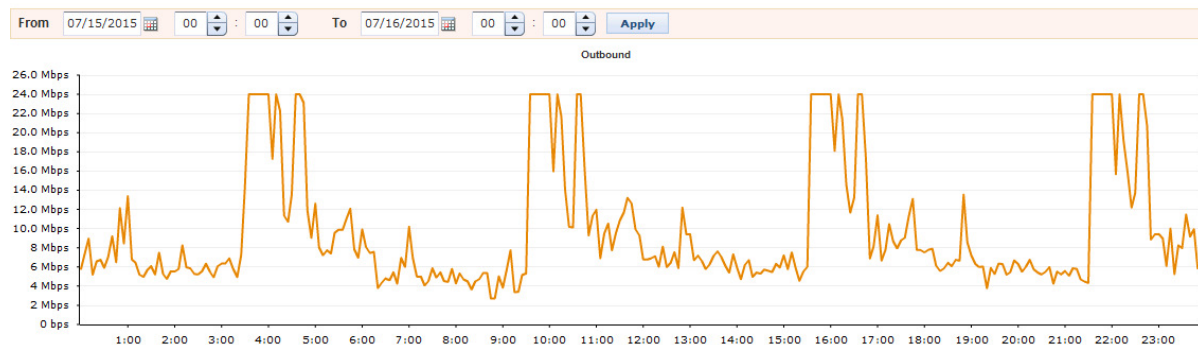

Figure 3: Secure SADIS FTP download activity against capacity (16Mbit/sec bursting to 24Mbit/sec) with individual client limit rate was set to 1024Kbit/sec, 7 July 2015.

2.3.9   **Secure SADIS FTP client connection log on time.**

2.3.9.1   Following feedback from SADISOPSG/19, it was identified that the log-on/handshake process for connecting to Secure SADIS FTP was considered to be excessively long, ranging from 15 to 40 seconds. The SADIS Provider is pleased to inform the group that as of 1500 UTC 29 October 2014 typical connection times fell to approximately 1 second or less.

2.3.10   **Provision of one-minute updates to traditional alphanumeric OPMET data on Secure SADIS FTP**

2.3.10.1   The initial update to the service was implemented d on 22 July 2014. Unfortunately, the update had to be withdrawn on the same day due to unexpected problems. Following re-evaluation of the methodology, the change was successfully re-implemented on 29 Oct 2014 at 1200 UTC. This addresses and completes **SADISOPSG Conclusion 19/19.**

2.3.11   **Modification to 5 Minute OPMET files**

2.3.11.1   On 1 October 2014, a modification was made to ensure that files of the form OPMET_HH00 were made available within the OPMET SET_OF_5_MINUTE_FILES data folder.

2.4   **Modification to Secure SADIS FTP to deal with corrected SIGWX and GRIB2 data**

2.4.1   In accordance with SADISOPSG/19 Conclusion 19/18, the behaviour of Secure SADIS FTP was modified to enable it to deal appropriately with the issuance of corrected WAFS SIGWX and WAFS GRIB2 data. This modification was implemented on 2 December 2014, effective 1200 UTC. Several 'Live tests' of the issuance of corrections to WAFC London SIGWX have been undertaken since implementation. This addresses and completes **SADISOPSG Conclusion 19/18.**

2.5   **Monitoring of the SADIS 2G Downlink.**

2.5.1   The group will recall that at the SADISPSG/19 meeting, it was decided that there should be no additional 'significant expense' on improving the SADIS downlink monitoring. However, it was

acknowledged that should opportunities arise where the SADIS 2G downlink monitoring could be augmented at nil or trivial costs, these may be explored.

2.5.2   The group will be pleased to note that the Member representing Switzerland on the SADIS Technological Developments Team, in coordination with the SADIS Provider, has been able to provide a feed of their SADIS 2G data downlink to the SADIS Provider. This permits combined monitoring with the SADIS Provider's own downlink. The group will be pleased to note this data has contributed a great deal to the provision of real time monitoring, and also the creation of downlink monitoring statistics provided in the SADIS Management Report 2014-2015.

2.6   **Provision of a standalone server for running SADIS Monitoring software**.

2.6.1.1   The group will recall that SADISOPSG Conclusion 19/13 invited the SADIS Provider to migrate the software that monitors timeliness and availability of WAFS data on the SADIS 2G and Secure SADIS FTP services to a standalone server in order to ensure sufficient reliability of monitoring.

2.6.1.2   Subsequent to that Conclusion, the change in circumstances that has resulted in the SADIS 2G service being withdrawn on 31 July 2016 resulted in a review of the need of such migration for a relatively short period of time.

2.6.1.3   As a consequence, the SADIS Provider considers that a separate server is no longer necessary, and as such has not undertaken any further work in this regard. No expense has so far been incurred in relation to this matter.

2.7   **Additional   Alphanumeric   Bulletins   in   OPMET_LAST_5MINS   and OPMET_LAST_MINUTE files**

2.7.1   Following   a   request   from   IATA,   the   OPMET_LAST_5MINS   and OPMET_LAST_MINUTE files on Secure SADIS FTP were updated to include additional data alphanumeric bulletins. This was implemented on 18 February 2015.

3.   **CONCLUSION**

3.1   **Overview of changes to the SADIS services**

3.1.1   Since the last meeting of the SADISOPSG, the group will note that there have been a number of changes that enhance the user experience of the services. Some of those changes are the result of specific SADISOPSG Conclusions. A number of changes have also been introduced where improvements can be made without risk to the overall service, and where no additional expense has been incurred.

4.   **ACTION BY THE METP-WG/MOG**

          a)   The METP-WG/MOG is invited to note the information contained in this paper.

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