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STATISTICS FOR ATS MESSAGING MANAGEMENT RELATED TO THE ASIA/PACIFIC AMHS PERFORMANCE ASSESSMENT

(Presented by Japan)

SUMMARY

The paper presents a survey of European 'ATS Messaging Management Manual', especially on operational statistics to provide some discussions for ATS Messaging Management, in particular of AMHS Performance Assessment in the Asia/Pacific region.

1. GENERAL

1.1   In the Asia/Pacific region, the document on AMHS Performance Assessment has being developed. Recently it is recognized that the European 'ATS Messaging Management Manual' provides a set of statistics for the ATS Messaging Management. It is found desirable to review these statistics and to align the Asia/Pacific performance assessment indicators to these statistics, if necessary. The paper provides such a review and discussions as an attachment to the paper.

2. ACTION BY THE MEETING

2.1   The meeting is invited to review the attached document.

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Statistics for ATS Messaging Management related to the Asia/Pacific AMHS Performance Assessment

1. Statistics described in the Manual

The statistics to be gathered are identified in ATS Messaging Management Manual ed. 2.0, issued on 04/05/2006('the Manual'); as follows;

The sentences in *Italic* are extracted from the Manual.

1.1 AMHS Operational Functions

In section *4.1 Identification of AMF-O functions/ Statistics* in the Manual in Chapter *4 AMHS Operational Functions*, where the following functions are listed as follows, and one of them is 'statistics' to be reviewed in the paper.

- *Network inventory*
- *Network planning*
- *Routing management*
- *Address management*
- *AMHS user capability management*
- *Security management*
- *Statistics*
- *Support(help desk)*

statistics: *this function, although identified in the CIDIN Management Manual, is not implemented at present in the CMC. In AMHS Management, this function will be far more useful than in CIDIN, because there is no practical knowledge base yet for dimensioning the AMHS network. It is thus essential that accurate statistics be gathered on both the traffic patterns (at the level of MHS and of lower layers to properly take into account protocol overhead effects), and how the systems perform, so as to predict future needs and ensure the ability of the service to meet these needs;*

There are two sections related to Statistics under Chapter 4 AMHS Operational functions;

- 4. AMHS Operational functions/4.2 Description of functions/4.2.7 Statistics, and
- 4. AMHS Operational functions/4.3 Functional specifications/4.3.9 Statistics

1.2 AMHS Operational Statistics

Although a set of 'statistics' are identified as functions, a set of statistics are identified as the statistical data of AMHS Operation

In Section 4.2.7

4.2.7 Statistics

This function, although identified in the CIDIN Management Manual, was not implemented in the CMC. It is useful to implement this function as part of AMHS Management, in order to build a knowledge base for current and future dimensioning of the underlying network.

It is also easier to implement with AMHS systems than with CIDIN systems. The reason is that the desired statistics have been identified before procurement by most States of AMHS systems, thereby enabling States to include in their AMHS systems call for tenders the requirement to gather at least raw data for this purpose.

The requirement to monitor and produce statistics for the communication between a given MTA and its adjacent MTAs has been developed by SPACE and integrated into the draft EUR AMHS Manual (Version 0.5 presented at the AFSG/6 meeting, see ref. [7]), which recommends that: "The AMHS System should monitor and produce statistics per direct MTA partner as follows:

a) Number of data messages transmitted

b) Average size of the data messages transmitted (without header size figures if possible)

c) Maximum size of the data messages transmitted

d) Average number of destination addresses per message transmitted

e) Number of data messages received

f) Average size of the data messages received

g) Maximum size of the data messages received

h) Number of delivery reports transmitted

i) Number of non-delivery reports transmitted

j) Number of delivery reports received

k) Number of non-delivery reports received

l) Minimum size of data messages received

m) Minimum size of data messages transmitted

n) Maximum, mean and minimum response time

o) Number of recipients processed

p) Number of messages deferred (the criterion for a deferred message should be specified by a configurable system parameter)

q) Number of messages redirected

r) Number of messages rejected

s) Number of loops detected"

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1.3 Processing Requirements of AMF-O statistics functions

The statistics function of AMF-O must therefore enable:

- *the provision by CCC Operators to the AMC Operator, of statistics produced by their AMHS COM Centres and concerning each adjacent MTA in other COM Centres;*
- *the aggregation by the AMC Operator of these individual statistics into a consolidated database;*
- *the publication by the AMC Operator of the aggregated/processed data for retrieval by CCC Operators;*
- *the production and publication by the AMC Operator of a high-level statistical report providing summary information about AMHS operation in the EUR/NAT Regions;*
- *the production and publication by the AMC Operator of a traffic matrix providing AMHS traffic volume information in the EUR/NAT Regions.*

Statistical data needs to be produced by COM Centres on a monthly basis. To preserve consistency with other AMC procedures, collection and publication of data remains in accordance with the AIRAC cycle. The collected statistical data should include:

- *data corresponding to the peak hour traffic over the past month,*
- *total data corresponding to the daily traffic over the past month.*

1.3 Limiting statistical data set (*not all elements above are strictly needed*)

Not all elements above are strictly needed to give a reasonably useful view of AMHS operational behavior in the EUR/NAT Regions. To avoid manipulating excessive volumes of data, the collected information is limited to the following elements among those listed above:

a) Number of data messages transmitted

b) Average size of the data messages transmitted (without header size figures if possible)

c) Maximum size of the data messages transmitted

d) Average number of destination addresses per message transmitted

e) Number of data messages received

f) Average size of the data messages received

g) Maximum size of the data messages received

n) Average transfer time

r) Number of messages rejected (if any)

Note: Reasons to limit statistical data are not given.

1.4 Additional statistic data recommended (*should be collected*)

Additionally, the following data not listed in the referred documents should also be collected:

   1) Overall traffic volume at the level of IP packets (peak hour and total cycle time period)

   2) Maximum outage duration of association between MTAs (if any)

   3) Cumulated outage duration of association between MTAs (if any)

    Note: Reasons to add statistical data are not given.

1.5 Another Requirements on AMF-O statistics functions

 In section 4.3.9, there are another requirements are given.

  4.3.9 Statistics

This function shall provide:

- *the capability to gather statistics data in a predefined database,*

- *the capability to process these data,*

- *the capability to view and download relevant information.*

This function shall include:

- *a monthly statistics sub-function, showing daily data for the considered month, on a COM Centre to COM Centre basis;*

- *a peak hour statistics sub-function, showing the peak hour determined over the considered month and the associated traffic data, on a COM Centre to COM Centre basis.*

Actions associated with this function for CCC Operators, depending on the considered data area, shall be View, EXPORT DEMO FILE, IMPORT STATISTICS and CREATE.

Depending on the data area, the CCC Operator shall view either his own statistics (background area) or the consolidated statistic tables generated by the AMC Operator (pre-operational and operational areas). Additional actions associated with this function for AMC Operator, in the background data area, shall be through the Process Statistics function of the Manage Background Data group of functions. This function shall include three sub-functions:

- *table generation,*

- *monthly statistics,*

- *peak hour statistics.*

The IMPORT STATISTICS action shall allow CCC Operators to introduce statistics from their Com Centres into the AMC (with a pre-defined format).

The GENERATE MONTHLY TABLE and GENERATE PEAK HOUR TABLE actions in the Process Statistics function shall enable to AMC Operator to create consolidated tables and publish them as part of AMF-O functions.

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The procedure associated with this function shall be the STATISTICS UPDATE procedure, by which statistics are provided by CCC Operators and published by the AMC Operator, for use by CCC Operators.

Statistics recommended by SPACE and Euro AMHS Management Manual

Indicators	SPACE	AMHS Mgt Manual
a)Number of data messages transmitted	X	X
b)Average size of the data messages transmitted (without header size figures if possible)	X	X
c)Maximum size of the data messages transmitted	X	X
d)Average number of destination addresses per message transmitted	X	X
e)Number of data messages received	X	X
f) Average size of the data messages received	X	X
g)Maximum size of the data messages received	X	X
h)Number of delivery reports transmitted	X	
i) Number of non-delivery reports transmitted	X	
j) Number of delivery reports received	X	
k)Number of non-delivery reports received	X	
l) Minimum size of data messages received	X	
m)Minimum size of data messages transmitted	X	
n)Maximum, mean and minimum response time	X	X(note)
o)Number of recipients processed	X	
p)Number of messages deferred (the criterion for a deferred message should be specified by a configurable system parameter	X	
q)Number of messages redirected	X	
r)Number of messages rejected	X	X
s)Number of loops detected	X	
1) Overall traffic volume at the level of IP packets (peak hour and total cycle time period)		X
2) Maximum outage duration of association between MTAs (if any)		X
3) Cumulated outage duration of association between MTAs (if any)		X

Note: Average Transfer Time

2.   Discussions on the Statistics in the Manual

Some discussion points are provided in the section and later some conclusions are provided.

2.1 Discussion Point 1; Purpose of gathering statistics

   The purposes to gather Statistics described in the Manual are as follows;

   In order to predict future needs and ensure the ability of the service to meet these needs,
   accurate statistics be gathered on both the traffic patterns (at the level of MHS and of lower
   layers to properly take into account protocol overhead effects), and how the systems perform.

   The purposes of collecting statistics are clearly stated that 'to predict future needs and ensure the
ability of the service to meet these needs'. The 'predicting future needs' and 'ensuring meeting these
needs' are assumed as management functions, not necessary as a part of AMHS messaging
management functions though.

   It is important to predict future needs and ensure the ability of the service to meet these needs, but
who are responsible for 'predicting future needs' and 'ensuring meeting these needs'?

   On the other hand, the AMHS Performance Assessment document is intended to identify current
operational status and to ensure the service to meet current target in the Asia/Pacific Region.

2.2 Discussion Point 2; Statistics on Organizational levels; either State or Regional Level

   Related to the Discussion Point 1, the next one is that whether statistics gathered to be used at
Regional or State level?

   If the scope is at the regional level, then how the regional future needs to be defined? Although
there is a description that the recommended elements are *to give a reasonably useful view of AMHS*
operational behavior in the EUR/NAT Regions, it is not clear what is the useful view of AMHS
operational behavior in the Regions.

   Since there is no such guiding description of the statistics as a regional matter, the scope of the
Statistics is considered to be at individual State level.

   If the scope is at State level, then why such detailed statistics are gathered at the Centre, while the
most of them are matters of individual State?

   Does the Centre provide the utility of statistical function processing for States?

2.3 Discussion Point 3; Statistics in Operational Phase and for Planning Phase

   It is obvious that the Statistics are gathered during the operational phase. There is a description
that the Statistics help to *identify the desired statistics before procurement by most States of AMHS*
systems, but a list of Statistics to identify the desired statistics, i.e. a set of names of indicators, does
not help for procurement without specific performance targets of these indicators.

   How such specific performance targets are available at the procurement stage, i.e. before the

operational stage? It may be that we learn such desired targets in future after some experiences, but it is doubtful such lessons learned are useful for any State, where 'we' means each State, and the operational environment is different from one State to another.

Again related to other discussions, at Discussion Point 1, it is pointed out that the Future Needs are discussed, and at Discussion Point 2, that useful view of AMHS operational behavior is referring the activity at the operational phase. Here at Discussion Point 3, it is pointed out that usefulness at the procurement phase is mentioned.

The Statistics may be useful for any phases of the AMHS life, but it appears that the purpose and scope (organizational and AMHS life phases) of Statistics are not consistent.

2.4 Discussion Point 4; Statistics on Service Levels (Messaging and Lower Layers)

There is a description in the Manual that *'accurate statistics be gathered on both the traffic patterns, at the level of MHS and of lower layers to properly take into account protocol overhead effects'*.

Since the traffic patterns at the lower layers are dynamic in nature, especially in case of the AMHS, it is hard to gather consistent data (at same time) among various sites in these layers. Even if these data are collected, it is hard to interpret the meanings of these data.

As a matter of fact, in the Manual it is not listed any to-be-gathered statistics related to the traffic patterns at the lower layers. Since all indicators listed are named with a label 'message', the listed indicators characterize the traffic patterns at the messaging level, that is, *the level of MHS*.

2.5 Discussion Point 5; Peak hour and Daily Statistics in a month

The collected statistics are used for generating monthly statistics and peak hour statistics. The statistics are updated monthly on two types of data;

- *data corresponding to the peak hour traffic over the past month,*
- *total data corresponding to the daily traffic over the past month.*

The meaning of 'peak hour' should be clarified. Usually 'peak hour' is defined as the hour experiencing the 'peak number of messages' in one day. If it is defined as such, then only 'number of data messages transmitted' and 'number of data messages received' can be used for the 'peak hour' statistics, and any other statistics, e.g. 'maximum outrage duration of association between MTAs', may not be needed.. Since the peak hours for 'number of data messages transmitted' and 'number of data messages received' may be different, and also the peak hours of messaging to/from various MTA partners are different, it is meaningless if anyone wants to know the peak hour of total traffic on data messages transmitted and/or data messages received (total 'number of data messages transmitted' to direct MTA partners + total 'number of data messages received' from direct MTA

partners), that is, the maximum demand, over the last month. It is not clear AMC can generate the total traffic out of the peak hours of two different indicators to/from direct MTA partners.

For monthly statistics, all indicators listed are measured daily and updated to AMC monthly per direct MTA partner. The data volume for each MTA is (number of direct MTA partners) x (24 hours) x (31 days) x (number of specified indicators = 11 in the Manual) + one peak hour traffic (2 indicators).

Also it is important to specify that the sampling and generating statistics should be based on UTC time instead of local time.

2.6 Discussion Point 6; Integrity/Reliability indicators

The indicators specified by SPACE include some indicators for integrity/reliability; e.g. number of non-delivery messages, while some other indicators, like number of received messages with detected errors, are missing in the list provided in the Manual. In the Manual, all indicators related to integrity/reliability are dropped from the list. Since the purpose of the statistics is to predict future needs, it is understandable that these indicators are missing.

If the purpose of the statistics is to capture the status of health in the messaging services, the indicators for integrity/reliability should be included in the list.

2.7 Discussion Point 7; Time efficiency indicators

The indicators specified by SPACE include one indicator (actually three indicators) for time efficiency; i.e. maximum mean and minimum response time, while in the Manual, one indicator for time efficiency; i.e. average transfer time is in the list. It is understood that the response time and transfer time are different.

Since in the store-and-forward scheme, there is no concept of response time, i.e. it is not request-response scheme, hence there is not response time defined, and it is not appropriate to specify the response time for statistics.

Although the transfer time(of message) can be collected by message-by-message basis, each State can not collected such statistics alone, since message transfer starts at one MTA site and ends at the other MTA site. If such a transfer time to be collected, two of direct MTA partners should coordinate such data collections and the precise definition of Transfer Time should be provided.

Since the time to transfer message depends on the traffic volume, especially at the receiving site, in the environment, not simply per direct MTA partner base, it is important to clearly identify the total receiving traffic volume at the receiving site by using hourly volume profile. It is questionable to use, as a useful statistical data, the average transfer time between direct MTA partners over the previous month or the peak traffic hour in the previous month. Instead of the 'average transfer time' indicated, it may be desirable to collect the 'transfer time at the total peak receiving hour'.

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Moreover, it may not desirable to collect 'transfer time' in a regular manner, if the statistical transfer time is used for predicting future needs. Once the transfer time is known, any anomalies in the transfer time would be caused by elements of dynamic nature where such anomalies would not help to predict future needs in a regular base.

Based on the last observation, most of the statistics recommended in the Manual may not be needed for collecting statistics in a regular base. Only 'Number of Messages received' and 'Number of Message transmitted' may be sufficient in this regard.

3. Concluding Remarks

After discussing the nature of proposed statistics in the Manual, the following concluding remarks are proposed.

3.1 Purpose of Statistics

Since the purpose of the Statistics in the Manual is for predicting future needs, the statistics related to integrity/reliability are excluded. The Statistics are collected in a regular manner and used for giving a view for future of AMHS operational behavior in normal operational environment.

The document 'AMHS Performance Assessment' in the Asia/Pacific Region has a purpose to give a current view of AMHS operational behavior including some exceptional cases.

Because of such a difference, two documents can be developed mutually independent, while some alignments may be necessary.

3.2 Statistics needed for Asia/Pacific Document

It is felt that statistics related to integrity/reliability should be included as statistics. Further more, the Statistics collected should be of regional scope, instead of direct MTA partner pair. In this regard, the definitions of statistics should be clarified further.

3.3 Statistics not necessary needed in the Manual

Most of the statistics recommended are not necessary needed for predicting future needs in a regular sampling base. Once a measurement is made for such statistics, it is not needed to collect such statistics every day.

3.4 Things to be aligned in both Documents

In order to correlate statistics in both documents, if necessary, it is useful to align the measurement specifics, like sampling period, can be made.

The Statistics of two documents are listed in the following table.

Comparing the AMHS Statistics (including Performance Statistics) indicators recommended by Euro AMHS Management Manual with Asia/Pacific regional guide document

Indicators	AMHS Mgt Manual	A/P Region Proposal	Responsibility
a) *Number of data messages transmitted*	X	X-R	Region
b) *Average size of the data messages transmitted (without header size figures if possible)*	X		
c) *Maximum size of the data messages transmitted*	X		
d) *Average number of destination addresses per message transmitted*	X	X-BS	
e) *Number of data messages received*	X	X-R	Region
f) *Average size of the data messages received*	X		
g) *Maximum size of the data messages received*	X		
k) *Number of non-delivery reports received*		X-R	Region
n) *Maximum, mean and minimum response time*	X		
r) *Number of messages rejected*	X		
1) Overall traffic volume at the level of IP packets (peak hour and total cycle time period)	X		
2) Maximum outage duration of association between MTAs (if any)	X		
3) Cumulated outage duration of association between MTAs (if any)	X		
(1) Number of received messages with detected error(s)		X-R	
(2) Hourly receiving message traffic profile		X-BS	