# Critical Release Notice

**Publication number: 297-1001-330**
**Publication release: Standard 11.05**

The content of this customer NTP supports the SN06 (DMS) and ISN06 (TDM) software releases.

Bookmarks used in this NTP highlight the changes between the baseline NTP and the current release. The bookmarks provided are color-coded to identify release-specific content changes. NTP volumes that do not contain bookmarks indicate that the baseline NTP remains unchanged and is valid for the current release.

## Bookmark Color Legend

**Black: Applies to new or modified content for the baseline NTP that is valid through the current release.**

**Red: Applies to new or modified content for NA017/ISN04 (TDM) that is valid through the current release.**

**Blue: Applies to new or modified content for NA018 (SN05 DMS)/ISN05 (TDM) that is valid through the current release.**

**Green: Applies to new or modified content for SN06 (DMS)/ISN06 (TDM) that is valid through the current release.**

***Attention!***
*Adobe® Acrobat® Reader™ 5.0 is required to view bookmarks in color.*

# Publication History

**March 2004**

Standard release 12.01 for software release SN06 (DMS).

Change of phone number from 1-800-684-2273 to 1-877-662-5669, Option 4 + 1.

297-1001-330

DMS-100 Family

# Switch Performance Monitoring System

## Application Guide

BASE09 and up Standard 11.04 June 1998

NORTEL

NORTHERN TELECOM

DMS-100 Family

# Switch Performance Monitoring System

## Application Guide

Publication number: 297-1001-330
Product release: BASE09 and up
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# Publication history

### June 1998

BASE09 Standard 11.04

- Technical review changes based on ProStar 80807.

### February 1998

BASE09 Standard 11.03

- Added indices AOPSPERF, APUFLT, ARUDAAV, ARUFLT, DAMSGFLT, VSNFLT, and VSNLKFLT to the Operator Position Performance (OPPOSPF) aggregate index.
- Revised the diagnostics description for basic index C7TRKCFL: references to ISUP105, ISUP106, and ISUP107 logs changed to C7UP105, C7UP106, and C7107 logs.

### December 1997

BASE09 Standard 11.02

Revised to indicate which indices are supported in the DMS-100G switch.

### August 1997

BASE09 Standard 11.01

Revised Chapter 2 to incorporate feature YR2006 (two-digit to four-digit year for year 2000 transition)

### May 1997

BCS36 Standard 10.06

- Technical review changes to Chapter 2
- Editing changes

### March 1997

BCS36 Standard 10.05

Editing changes

### November 1996

BCS36 Standard 10.04

Revisions associated with PRS BY38912 and PRS BY43417

### November 1995

BCS36 Standard 10.03

Added information on CONF60VF using the sum of CF6P measurement CF6OVFL.

### December 1993

BCS36 Standard 10.02

Added a note about the SPMS R95 and R80 values

### September 1993

BCS36 Preliminary 10.01

updated aggregate indices XPMPERF, LMPERF, and LCMPERF

### July 1992

BCS33 Standard 09.02

- added aggregate index SLMPERF and the following basic indices to the terminals (TERMNALS) index of the maintenance performance (MTCEPERF) index:
  - SLMFAULT
  - SLMSOUT
  - SLMMOUT
- deleted basic index METERERR and replaced it with basic index METERPF
- added names of OM groups to the measurement list section of the ENET indices
- changed names of the OM group and registers associated with aggregate index SMNMPF and basic indices SMTOERR, SMTOFLT, and SMNOSYNC
- added and deleted indexes, added OM groups and changed names of OM groups and register.
- changed names of the of aggregate index SMNMPF and basic indices SMTOERR, SMTOFLT, and SMNOSYNC to APNMPF, APTOERR, APTOFLT, and APNOSYNC

- expanded the list of terms to include definitions

**October 1991**

BCS33 Standard 09.01

- modified startup procedures to include detailed information
- included the procedure to assign the OMRS report to table LOGCLASS
- included the explanation of the fields in table LOGCLASS
- added the procedure for defining the printer in order to print an automatic SPMS report
- documented the aggregate index SMNMPF and the following basic indices:
  - SMTOERR
  - SMTOFLT
  - SMNOSYNC

**March 1991**

BCS32 Standard 08.01

- provided diagnostic information for the NETBLK and INTEGFL indices
- changed the output of the DISPLAY command to display ENET indices, in offices equipped with ENET
- added CCS7 and ENET indices.

**February 1990**

BCS30 Standard 07.01

- added procedure for automatically-generated SPMS reports
- added SETREP subcommand
- replaced outage indices with system-outage indices and manual-outage indices

# Contents

# About this document

## When to use this document

This document provides information and index descriptions for the switch performance monitoring system (SPMS). It is intended for use by operating companies with feature package NTX738AB.

## How to check the version and issue of this document

The version and issue of the document are indicated by numbers, for example, 01.01.

The first two digits indicate the version. The version number increases each time the document is updated to support a new software release. For example, the first release of a document is 01.01. In the *next* software release cycle, the first release of the same document is 02.01.

The second two digits indicate the issue. The issue number increases each time the document is revised but rereleased in the *same* software release cycle. For example, the second release of a document in the same software release cycle is 01.02.

To determine which version of this document applies to the software in your office and how documentation for your product is organized, check the release information in *Product Documentation Directory,* 297-8991-001.

This document is written for all DMS-100 Family offices. More than one version of this document may exist. To determine whether you have the latest version of this document and how documentation for your product is organized, check the release information in *Product Documentation Directory,* 297-8991-001.

## What precautionary messages mean

The types of precautionary messages used in NT documents include attention boxes and danger, warning, and caution messages.

An attention box identifies information that is necessary for the proper performance of a procedure or task or the correct interpretation of information or data. Danger, warning, and caution messages indicate possible risks.

Examples of the precautionary messages follow.

ATTENTION Information needed to perform a task

**ATTENTION**

If the unused DS-3 ports are not deprovisioned before a DS-1/VT Mapper is installed, the DS-1 traffic will not be carried through the DS-1/VT Mapper, even though the DS-1/VT Mapper is properly provisioned.

DANGER Possibility of personal injury

**DANGER**

**Risk of electrocution**

Do not open the front panel of the inverter unless fuses F1, F2, and F3 have been removed. The inverter contains high-voltage lines. Until the fuses are removed, the high-voltage lines are active, and you risk being electrocuted.

WARNING Possibility of equipment damage

**WARNING**

**Damage to the backplane connector pins**

Align the card before seating it, to avoid bending the backplane connector pins. Use light thumb pressure to align the card with the connectors. Next, use the levers on the card to seat the card into the connectors.

CAUTION Possibility of service interruption or degradation

**CAUTION**

**Possible loss of service**

Before continuing, confirm that you are removing the card from the inactive unit of the peripheral module. Subscriber service will be lost if you remove a card from the active unit.

## How commands, parameters, and responses are represented

Commands, parameters, and responses in this document conform to the following conventions.

### Input prompt (>)

An input prompt (>) indicates that the information that follows is a command:

**>BSY**

### Commands and fixed parameters

Commands and fixed parameters that are entered at a MAP terminal are shown in uppercase letters:

**>BSY CTRL**

### Variables

Variables are shown in lowercase letters:

**>BSY CTRL ctrl_no**

The letters or numbers that the variable represents must be entered. Each variable is explained in a list that follows the command string.

### Responses

Responses correspond to the MAP display and are shown in a different type:

```
FP 3 Busy CTRL 0: Command request has been submitted.
FP 3 Busy CTRL 0: Command passed.
```

The following excerpt from a procedure shows the command syntax used in this document:

**1** Manually busy the CTRL on the inactive plane by typing

**>BSY CTRL ctrl_no**
and pressing the Enter key.

*where*

ctrl_no is the number of the CTRL (0 or 1)

*Example of a MAP response*:

```
FP 3 Busy CTRL 0: Command request has been submitted.
FP 3 Busy CTRL 0: Command passed.
```

# What is the switch performance monitoring system?

The switch performance monitoring system (SPMS) is a series of index values that describe how well the switch is operating. Performance results are displayed in a report. Index values are computed from switch-generated operational measurements (OM) on a daily and customer-defined monthly basis. On a daily basis, SPMS results are used to identify and correct trouble spots in the switch. The monthly results are used for customer administration plans, for evaluation of the quality of switch performance, and for the maintenance and provisioning effort that underlies that performance.

A primary function of the SPMS feature is to provide the necessary data for input to index plans. With the index plan in place, operating companies can evaluate switch operation over extended periods of time, and management can track the quality of maintenance and provisioning efforts.

The index plan is critical because it allows site management to monitor the performance of the office at frequent intervals throughout the month. Thus site management can take corrective action when needed and provide detailed explanations of unfavorable results.

It is important to note that the data produced by SPMS is input to the switch performance index, it is not a service index. A service index plan created by the operating company outlines how the service indices within SPMS are calculated.

## What can the switch performance monitoring system do for operating companies?

A series of monitoring tools are used to perform the maintenance function. The tools range from raw outputs of logs and operational measurements (OM) to the enhanced capabilities of OM thresholding. The volume of information available from the switch can make it difficult to determine where maintenance efforts should be directed. The OM thresholding and killer trunk reports help to reduce the volume of information, but are generally oriented to the hourly operation of the switch.

SPMS provides a medium-term review comprising detailed as well as summary level index values. This makes deviations from desired results easy to trace back to their origin.

SPMS produces performance indices covering all areas of switch operation. Each index is standardized so that

- an index result of 100 indicates perfect performance
- an index result of 95 indicates average performance as observed over a large sample of switches of various types and various performance levels. A well-run switch generally exceeds a 95 index
- an index result of 90 or below indicates a clearly abnormal situation requiring immediate attention

The indices are calculated from OMs, normalized to compensate for differences in office size and traffic volume. The formula for calculating indices uses constants derived from data obtained from the large sample of switches already in operation.

SPMS results can be used in switch performance index plans for administrative purposes. An operating company has the choice of using either the overall office performance index (OFCPERF), a selection of lower-level indices, or both.

Another feature of SPMS is its ability to isolate problem areas. On a daily basis, index results are used to detect and correct maintenance and provisioning problems that are not detected from hour to hour. Severe trouble spots are identified with two asterisks (**), and less serious problems are marked with one asterisk (*).

Basic indices provide the most detailed information about problem areas. They may be picked up directly from a complete SPMS report, or can be found by working downward from unfavorable aggregate indices that appear in summary reports.

Chapters 5, 6, and 7 provide a definition of each index, its mathematical derivation, and the diagnostic information needed to isolate and correct trouble spots.

To backtrack from an index to the cause of a problem, an operating company must maintain necessary historical information. This data can be stored on the switch or in a downstream database. Certain OM groups and logs (listed in Chapter 6) should be retained for at least 24 hours, and possibly for several days, to provide enough information to locate the source of a problem.

In many cases, events and conditions flagged by SPMS will have already been acted upon, or may reflect the results of maintenance actions. It is important to keep a record of all maintenance actions affecting the operation of the switch, from parameter changes through card changes. Such a record is invaluable for interpreting SPMS results.

# Startup procedures

SPMS operates automatically when SPMS option NTX738AB is present in the switch. The customer need only set the day for the start of the report month in the table OFCENG (office parameters).

## Setting the day of the month

Access the CI level of the MAP display by typing

**>QUIT ALL**

and pressing the Enter key.

Access table OFCENG by typing

**>TABLE OFCENG**

and pressing the Enter key.

***Note:*** If the system responds with a request for a password, contact your Nortel representative immediately.

*MAP response:*

```
TABLE: OFCENG
```

Position on the required tuple by typing

**>POS SPMS_START_OF_MONTH**

and pressing the Enter key.

Enter the day for the start of the report month.

***Note:*** The acceptable range of values for START_OF_MONTH is 1 to 28. The default value is 1.

## SPMS automatic report setup

SPMS reports can be automatically generated at any time you specify when SPMS option NTX738AB is present on the switch and your load is BCS30 or later. The operating company must add the SPMS report to the list of automatically generated reports that are in table OMREPORT. The reports assigned to table OMREPORT are called OMRS reports.

There are 24 provisionable reports in table OMEREPORT. Only 23 or fewer can be assigned by the operating company, the remaining are designated the report name *SPARE*.

Add the SPMS report to the list of automatically generated reports by typing

**>TABLE OMREPORT**

and pressing the Enter key.

*MAP response:*

```
TABLE: OMREPORT
```

Select a spare report to be assigned the name SPMSREP by typing

**>LIST ALL**

and pressing the Enter key.

***Note:*** You should see a list of all the reports. Any report identified with *SPARE* in the DATA field is available for use.

Once you have decided which report to use, position on the tuple associated with that report and continue as directed in the following steps.

Position on the tuple associated with the report (XX is the tuple/report number) by typing

**>POS XX**

and pressing the Enter key.

Change the existing tuple by typing

**>CHA**

and pressing the Enter key.

*MAP response:*

```
ACTIVE:N
```

Confirm the command by typing

**>Y**

and pressing the Enter key.

*MAP response:*

```
REP:AUTO
```

Access the time tuple by typing

**>DEVDAY**

and pressing the Enter key.

*MAP response:*

```
WHEN:
```

Enter the time of your choice, for example 8:30, by typing

**>8 C30**

and pressing the Enter key.

*MAP response:*

```
CLASS:HOLDING
```

Press the Enter key.

*MAP response:*

```
NAME:*SPARE*
```

Enter the name of the report by typing

**>SPMSREP**

and pressing the Enter key.

*MAP response example:*

```
TUPLE TO BE CHANGED
SCHEDNO     ACTIVE  DATA    WHEN            CLASS
   23       Y               DEVDAY 8 C30    HOLDING
            SPMSREP
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT.
```

Confirm the command by typing

**>Y**

and pressing the Enter key.

*MAP response:*

```
TUPLE CHANGED
```

You have created the OMRS report necessary to schedule the SPMS automatic report. To print the the report, assign the OMRS report to a log class in table LOGCLASS.

## Assigning OMRS report to table LOGCLASS

Follow the procedure below to assign the OMRS report to a log class in table LOGCLASS.

Access table LOGCLASS by typing

**>TABLE LOGCLASS**

and pressing the Enter key.

Add the report to table LOGCLASS by typing

**>ADD**

and pressing the Enter key.

*MAP response:*

`REPNAME:`

Enter the OMRS report for SPMS, for example OMRS 23, by typing

**>OMRS 23**

and pressing the Enter key.

*MAP response:*

`CLASS:`

Enter the log class assignment to the report, for example 15, by typing

**>15**

and pressing the Enter key.

*MAP response:*

`THRESHOLD:`

Type

**>0**

and press the Enter key.

*MAP response:*

`SUPPRESS:`

Type

**>N**

and press the Enter key.

*MAP response:*

```
TUNITS:
```

Type

**> 1**

and press the Enter key.

*MAP response:*

```
SYSLOG:
```

Type

**>N**

and press the Enter key.

*MAP response:*

```
TUPLE TO BE ADDED:
OMRS231 15  0   N   -1  N
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT.
```

Confirm the command by typing

**>Y**

and pressing the Enter key.

*MAP response:*

```
TUPLE CHANGED
```

You have assigned the OMRS report to table LOGCLASS.

## Explanation of table LOGCLASS fields

**TUNITS** indicates the time units. Enter the time in minutes when the register counts associated with a threshold report is to be reset to zero. A maximum of 100 unique TUNITS is allowed. Zero (0) or a negative value means print all reports. Enter 0 or a negative value when TUNITS = 0 or when no reset is required. The range of values is from –32767 to 32767.

**THRESHOLD** specifies which messages are to output. Where the threshold is zero (0), all messages are to be printed. Where the threshold is 1 to 255, office parameter THRESHOLD-IS-SAMPLING in table OFCVAR controls the action for log thresholding.

**SUPPRESS** allows you either to suppress or to not suppress the log output. If you do not want to print the log, enter Y. If you want to print the log, enter N.

**SYSLOG** identifies whether or not a log is a syslog.

## Defining a printer

To print the log assigned to OMRS report, route the log to a printer. If the devices already exist in table LOGDEV, perform the following procedure. If the devices do not exist in the table LOGDEV, perform the procedure on page 2-8.

### Procedure when devices already exist in table LOGDEV

Perform the following procedure to define a printer when the devices already exist in table LOGDEV.

Access table LOGDEV by typing

**> Table LOGDEV**

and pressing the Enter key.

*MAP response:*

```
TABLE LOGDEV
```

Display the devices by typing

**>LIST ALL**

and pressing the Enter key.

*MAP response example:*

```
>TOP
                DEV          ALT     CLASSES
FORMAT  PRIORITY        GUAR
-----------------------------------------------------------
        MAPPRT              NONE
                                (0-2, 4-7)
STD     Y               Y
                    SCCLOG  NONE
                        (0-7, 17, 20, 22, 23, 25, 26)
SCC2        N       N
                    TTPPRT  NONE    (18, 20, 23, 26)
BOTTOM
```

Identify the printer of choice and position on that device by typing

**>POS MAPPRT**

and pressing the Enter key.

*MAP response example:*

```
   MAPPRT            NONE
                             (0-2, 4-7)
STD         Y   Y
```

Add the log assigned to the OMRS report to the printer of your choice by typing

**>CHA**

and pressing the Enter key.

*MAP response:*

```
ALT: NONE
```

Press the Enter key.

*MAP response:*

```
CLASSES: (0-2, 4-7)
```

Enter the appropriate log class, for example 15, by typing

**>'(0-2, 4-7, 15)'**

and pressing the Enter key.

*MAP response:*

```
FORMAT: STD
```

Press the Enter key for standard format or for the AT&T #2 format, type

**>SCC2**

and press the Enter key.

*MAP response:*

```
PRIORITY: Y
```

Press the Enter key if you want to turn the message prioritization on or if you want to turn the message prioritization off, type

**>N**

and press the Enter key.

*MAP response:*

```
GUAR: Y
```

Press the Enter key.

*MAP response:*

```
TUPLE TO BE CHANGED:
    MAPPRT      NONE
                        (0-2, 4-7, 15)
    STD     Y   Y
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT.
```

Confirm the command by typing

**>Y**

and pressing the Enter key.

*MAP response example:*

```
TUPLE CHANGED
WRITTEN TO JOURNAL FILE AD JF NUMBER 1716
```

By following the above procedure you can define a printer when the device already exists in table LOGDEV.

### Procedure when devices do not exist in table LOGDEV

Perform the following procedure to define a printer when the devices do not exist in table LOGDEV.

Determine the print device to add to the table LOGDEV and then type

**>Table LOGDEV**

and press the Enter key.

*MAP response:*

```
TABLE LOGDEV
```

Add the device by typing

**>ADD**

and pressing the Enter key.

*MAP response:*

```
DEV:
```

Enter the printer by typing

**>MAPPRT**

and pressing the Enter key.

*MAP response:*

```
ALT:
```

Enter the alternative device, if any, by typing

**>NONE**

and pressing the Enter key.

*MAP response:*

```
CLASSES:
```

Enter the log class you assigned to the OMRS report by typing

**>’(15)**

and pressing the Enter key.

*MAP response:*

```
FORMAT:
```

Type STD for standard format or for the AT&T #2 format, type

**>SCC2**

and press the Enter key.

*MAP response:*

```
PRIORITY:
```

Press the Enter key if you want to turn the message prioritization on or if you want to turn the message prioritization off, type

**>N**

and press the Enter key.

Type Y if you want to turn the message prioritization on for each device or if you want to turn the message prioritization off for each device, type

**>N**

and press the Enter key.

*MAP response:*

```
GUAR
```

Type Y or N and press the Enter key.

*MAP response:*

```
TUPLE TO BE ADDED:
            MAPPRT          NONE
                                (0-2, 4-7, 15)
        STD         Y   Y
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT.
```

Confirm the command by typing

**>Y**

and pressing the Enter key.

After you have defined the printer, customize the report by using the SETREP subcommand.

## The SETREP subcommand

The SETREP subcommand allows you to set the format and content of your automatically generated SPMS report. The command format is as follows:

| SETREP | <option> | <argument> |
|---|---|---|
| | TREEDEPTH | <level> {0 to 10} |
| | TREETOPS | [<indexnamel>]..[<indexnamek>] \| ALL |
| | EXCEPTVAL | <indexname> {0 to 1001} |
| | UNSATLEVEL | <indexvalue> {0 to 1001} |
| | UNACCLEVEL | <indexvalue> {0 to 1001} |

Each option is described below.

**TREEDEPTH** indicates how many levels should be included below the indicated TREETOPS indices. Level 0 includes the TREETOPS indices only, level 1 adds their child indices in the tree, level 2 adds the children of the children, and so on. The default value of TREEDEPTH is 10, which is sufficient to include all lower-level indices contributing to the selected TREETOPS indices.

**TREETOPS** indicates the highest level of the report within the SPMS tree structure. Data is gathered from the level indicated in the TREETOPS command to the level indicated in TREEDEPTH.

**EXCEPTVAL** indicates which indices to suppress and which to include in the trees selected by TREETOPS. This value must be divided by ten to arrive at the index value it represents (for example, 950 represents 95.0). When the DISPLAY subcommand is used, only those indices with values less than the exception value are displayed; all other indices, including NA indices, are suppressed. The default value of EXCEPTVAL is 1001 (that is, 100.1), which ensures that all indices in the trees selected by TREETOPS will be displayed.

Setting EXCEPTVAL to its default value disables exception reporting.

To set any of the options to a specific value, type

**>SETREP <option> <value>**
and press the Enter key.

To display the current settings of each option, type

**>SETREP**
and press the Enter key.

To change each option to its default value, type

**>SETREP <option>**
and press the Enter key.

**UNSATLEVEL** is the upper limit of unsatisfactory performance for an index. Values below this number, but higher than UNACCLEVEL, are marked with an asterisk (*) in SPMS reports. This value must be divided by ten to arrive at the index value it represents (for example, 750 represents 75.0). The default value of UNSATLEVEL is 900 (90.0). The value of UNSATLEVEL must be greater than the value of UNACCLEVEL.

**UNACCLEVEL** is the upper limit of unacceptable performance for an index. Values below this number are marked with double asterisks (**) in SPMS reports. This value must be divided by ten to arrive at the index value it represents (for example, 750 represents 75.0). The default value of UNACCLEVEL is 800 (80.0). The value of UNACCLEVEL must be less than the value of UNSATLEVEL.

Use of the SETREP subcommand with default settings produces an automatically generated SPMS report similar to Figure 2-1.

**Figure 2–1**
**Automatically generated SPMS report**

```
89/07/12 <<*>> F04314_00          SITE NAME      BCS29ZI RTM 041289 <<*>>

1989/12/08 15:24:30.825 FRI.


                      L  |  891207       89 DEC        89 NOV
                         |               TO DATE
TOTATT (K)               |     51          739          1298
                         |
                         |                  *R*
   ----------------------+----------------------------------------

SERVICE            A     |  88.4*        93.6           98.0
..MTCESERV         A     |  81.4*        90.1           98.0
....MTCACCS        A     |  44.5**       73.0**         98.9
......CCRESET      B     |   0.0**       51.3**        100.0
......ORGLNOUT     B     |  92.6         96.9           97.0
......ORGPMBLK     B     |  74.2**       87.1*          99.0
....INSIGFL        A     |  92.5         93.7           97.0
......TINSIGFL     B     |  95.5         96.8           99.0
```

## The SET subcommand

The SET subcommand allows you to set the format and content of your manually generated SPMS report. The command format is as follows:

| | | |
|---|---|---|
| SET | <option> | <argument> |
| | PAGEWIDTH | <numchars>{50 to 131} |
| | TREEDEPTH | <level> {0 to 10} |
| | FORMFEED | <format> {DMS\|IBM} |
| | TREETOPS | [<indexnamel>]..[<indexnamek>] \| ALL |
| | EXCEPTVAL | <indexname> {0 to 1001} |
| | FORMAT | <output> {SHORT \| LONG} |
| | INDICES | <indices> {AVAIL \| ALL} |

Each option is described below.

**PAGEWIDTH** is the width of the output page in characters. The default value is 80 characters for each page.

**TREEDEPTH** indicates how many levels should be included below the indicated TREETOPS indices. Level 0 includes the TREETOPS indices only, level 1 adds their child indices in the tree, level 2 adds the children of the children, and so on. The default value of TREEDEPTH is 10, which is sufficient to include all lower-level indices contributing to the selected TREETOPS indices.

**FORMFEED** is one of two arguments available with this option (DMS or IBM). The one you use will depend on the hardware you have. The default value is DMS.

**TREETOPS** indicates the highest level of the report within the SPMS tree structure. Data will be gathered from the level indicated in the TREETOPS command to the level indicated in TREEDEPTH.

**EXCEPTVAL** indicates which indices to suppress and which to include in the trees selected by TREETOPS. This value must be divided by ten to arrive at the index value it represents (for example, 950 represents 95.0). When the DISPLAY subcommand is used, only those indices with values less than the exception value are displayed; all other indices, including NA indices, are suppressed. The default value of EXCEPTVAL is 1001 (that is, 100.1), which ensures that all indices in the trees selected by TREETOPS will be displayed.

Setting EXCEPTVAL to its default value disables exception reporting.

To set any of the options to a specific value, type

**>SET <option> <value>**

and press the Enter key.

To display the current settings of each option, type

**>SET**

and press the Enter key.

To change each option to its default value, type

**>SET <option>**

and press the Enter key.

FORMAT to include the “WT R_95 R_80” column when displaying the SPMS report, by typing

**>SET FORMAT LONG**

and pressing the Enter key.

Use of the LONG parameter and the DISPLAY subcommand produces a report similar to the one in Figure 2-2.

**Figure 2–2**
**Long format of SPMS report**

```
89/07/12 <<*>> F04314_00          SITE NAME      BCS29ZI RTM 041289 <<*>>

1989/12/08 15:24:30.825 FRI.


                    L   WT   R_95   R_80 | 891207        89 DEC            89 NOV
                                         |               TO DATE
TOTATT (K)                               |    51            739              1298
                                         |                   *R*
  ---------------------------------------+---------------------------------
                                         |
SERVICE          A  ---                  | 88.4*          93.6              98.0
..MTCESERV       A  60                   | 81.4*          90.1              98.0
....MTCACCS      A  30                   | 44.5**         73.0**            98.9
......CCRESET    B  35   0   6   23000   |  0.0**         51.3**           100.0
......ORGLNOUT   B  20  22   5    1172   | 92.6           96.9              97.0
......ORGPMBLK   B  20   0   7   15043   | 74.2**         87.1*             99.0
....INSIGFL      A  10                   | 92.5           93.7              97.0
......TINSIGFL   B  60  58   5    1860   | 95.5           96.8              99.0
```

To exclude the “WT R_95 R_80” column when displaying the SPMS report, type

**>SET FORMAT SHORT**

and press the Enter key.

Use of the SHORT parameter and the DISPLAY subcommand produces a report similar to the one in Figure 2-3.

**Figure 2–3**
**Short format of SPMS report**

```
89/07/12 <<*>> F04314_00          SITE NAME

1989/12/08 15:24:30.825 FRI.


                      L  |  891207      89 DEC      89 NOV
                         |              TO DATE
TOTATT (K)               |     51         739        1298
                         |                *R*
-------------------------+---------------------------------

SERVICE              A   |  88.4*       93.6         98.0
..MTCESERV           A   |  81.4*       90.1         98.0
....MTCACCS          A   |  44.5**      73.0**       98.9
......CCRESET        B   |   0.0**      51.3**      100.0
......ORGLNOUT       B   |  92.6        96.9         97.0
......ORGPMBLK       B   |  74.2**      87.1*        99.0
....INSIGFL          A   |  92.5        93.7         97.0
......TINSIGFL       B   |  95.5        96.8         99.0
```

## INDICES

To remove the display of “NA” indices from your SPMS report, type

**>SET INDICES AVAIL**

and press the Enter key.

***Note:*** Any “NA” indicates that have a corresponding numeric value will be displayed.

To include all indices in your report, type

**>SET INDICES ALL**

and press the Enter key.

***Note:*** If exception reporting is enabled those indices covered by exception are not displayed.

**UNSATLEVEL** is the upper limit of unsatisfactory performance for an index. Values below this number, but higher than UNACCLEVEL, are marked with an asterisk (*) in SPMS reports. This value must be divided by ten to arrive at the index value it represents (for example, 750 represents 75.0). The default value of UNSATLEVEL is 900 (90.0). The value of UNSATLEVEL must be greater than the value of UNACCLEVEL.

**UNACCLEVEL** is the upper limit of unacceptable performance for an index. Values below this number are marked with double asterisks (**) in SPMS reports. This value must be divided by ten to arrive at the index value it represents (for example, 750 represents 75.0). The default value of UNACCLEVEL is 800 (80.0). The value of UNACCLEVEL must be less than the value of UNSATLEVEL.

## The DISPLAY subcommand

The DISPLAY subcommand allows you to display a specific day's indices or a specified number of previous days in your SPMS report. The default of the DISPLAY command is to display the previous day's indices, the average of the current month, and the average of the previous month. The command format is as follows:

```
DISPLAY    <option>
           DAYS    <number> {0 to 30}
           DATE    <yy> {00 to 99}
                   <yyyy> {1976 to 9999}
           <MM> {1 to 12}
           <DD> {1 to 31}
```

***Note:*** Enter a 2- or 4-digit year only.

To display index values for certain days, type

**>DISPLAY DAYS <number>**

and press the Enter key.

Where <number> = 0 to 30

The following example illustrates the use of the DISPLAY subcommand.

Type

**>SET TREETOPS SERVICE**

and press the Enter key.

Type

**>DISPLAY**

and press the Enter key.

After you enter the commands, SPMS displays every aggregate and basic index for the latest day, beginning with the SERVICE index, and provides a report similar to the one in Figure 2-4.

**Figure 2–4**
**Manually-generated SPMS report**

```
89/07/12 <<*>> F04314_00          SITE NAME      BCS29ZI RTM 041289 <<*>>

1989/12/08 15:24:30.825 FRI.


                  L   WT   R_95   R_80 | 891207     89 DEC         89 NOV
                                       |            TO DATE
TOTATT (K)                             |    51         739           1298
                                       |              *R*
   ------------------------------------+-------------------------------
SERVICE        A  ---                  | 88.4*        93.6           98.0
..MTCESERV     A  60                   | 81.4*        90.1           98.0
....MTCACCS    A  30                   | 44.5**       73.0**         98.9
......CCRESET  B  35   0   6   23000   |  0.0**       51.3**        100.0
......ORGLNOUT B  20  22   5    1172   | 92.6         96.9           97.0
......ORGPMBLK B  20   0   7   15043   | 74.2**       87.1*          99.0
....INSIGFL    A  10                   | 92.5         93.7           97.0
......TINSIGFL B  60  58   5    1860   | 95.5         96.8           99.0
```

To display a specific date, enter the digits for the year, month, and day as in the following example for 2 December 1989:

Type

**>DISPLAY DATE 1989 12 02**

and press the Enter key.

or

Type

**>DISPLAY DATE 89 12 02**

and press the Enter key.

Indices are displayed in a stepped format that represents their hierarchical relationship. Basic indices always appear to the far right in a report.

Exception reports are generated by the DISPLAY subcommand when EXCEPTVAL is set to less than its default values. Exception reports differ from regular SPMS reports in three ways:

1 An extra line is printed in the report heading, indicating the exception level and the number of days in the report.
2 A line of three dots in the report indicates that at least one index at this point in the tree has been suppressed.
3 An index is printed only if its value on one of the last N days (where N is the selected number of days) or its month-to-date value is less than the exception value.

Figure 2-5 shows part of a sample report obtained by entering the following sequence of commands:

**>SET TREETOPS SERVICE**

**>SET EXCEPTVAL 800**

**>DISPLAY 1**

**Figure 2–5**
**SPMS report produced with EXCETIVAL set less than default**

```
89/07/12 <<*>> F04314_00            SITE NAME      BCS29ZI RTM 041289 <<*>>

1989/12/08 15:24:30.825 FRI.
  PRINTING INDICES<90.0 FOR LAST 1 DAY(S).

                       L   WT   R_95   R_80  | 891207        89 DEC              89 NOV
                                             |               TO DATE
TOTATT (K)                                   |    51            739               1298
                                             |
                                             |                    *R*
                       ----------------------+----------------------------------------
...                                          |  44.5    **      73.0     **        98.9
....MTCACCS            A  30                 |   0.0    **      51.3     **       100.0
......CCRESET          B  35    0     6  23000
...                                          |
......ORGPMBLK         B  20    0     7  15043  74.2    **      87.1     *         99.0
                                             |
```

## The DESCRIBE subcommand

The DESCRIBE subcommand is a help facility that provides brief descriptions of specified indices. The description of a basic index includes the OMs that are monitored by the index.

To activate the help facility, type

**>DESCRIBE <list of SPMS index names>**

and press the Enter key.

For example, if you enter

**>DESCRIBE SERVICE**

SPMS responds with

```
SERVICE
Aggregate Index
Summary of call processing performance
```

If you enter

**>DESCRIBE CCRESET**

SPMS responds with

```
Basic Index
Calls denied origination during a CC restart
OM: CP INITDENY
```

If you enter the following (two) indices:

**>DESCRIBE CCCTO PMDNY**

SPMS responds with

```
CCCTO
Basic index
Call cutoffs because of CC cold restarts
OMs: CP CINITC
PMDNY
Basic index
Originating calls denied because of PM overload
OMs: PMOVLD PORGDENY
```

## The EXCEPTION subcommand

The EXCEPTION subcommand is used to display indices containing values less than or equal to 90.0. The same output can be achieved by setting the EXCEPTVAL parameter of the SET command to 900.

The report displayed as a result of using the EXCEPTION subcommand includes a description of each index found in the report, but does not include the “WT R_95 R_80” column.

The EXCEPTION command default setting displays the previous day’s indices, the current month’s average, and the last month’s average for indices less than or equal to 90.0.

To activate the EXCEPTION command, type

**>EXCEPTION <days>**

and press the Enter key.

If you enter

**>EXCEPTION**

SPMS responds with a report similar to Figure 2-6.

**Figure 2–6**
**SPMS response to EXCEPTION subcommand**

```
89/07/12 <<*>> F04314_00        SITE NAME

1989/12/08 15:24:30.825 FRI.
PRINTING INDICES<90.0 FOR LAST 1 DAY(S).
                   L  | 891207   89 DEC       89 NOV
                      |          TO DATE
TOTATT (K)            |   51       739         1298
                      |           *R*
              --------+-----------------------------
OFCPERF          A    |  86.4*     92.7         98.7
..SERVICE        A    |  69.3**    84.1         99.5
...                   |
....MTCACCS      A    |  44.5**    73.0**       98.9
......CCRESET    B    |   0.0**    51.3**      100.0
...                   |
......ORGPMBLK   B    |  74.2**    87.1*        99.0
...                   |
..MTCEPERF       A    |  96.9      96.2         95.2
...                   |
..PROVRES        B    | 100.0      90.0         99.4

TOTATT = Total call attempts

OFCPERF
Composite Index
Summary of overall office performance.

SERVICE
Aggregate Index
Summary of call processing performance.

MTCACCS
Aggregate Index
Summary of maintenance contribution to switch access.

... (see note)

*R*     = Reboot or reload restart occurred
```

***NOTE***: The EXCEPTION report provides a description of each index listed.

# The indexing hierarchy

SPMS generates approximately 300 indices, covering all aspects of switch operation.  This is too much information to handle all at once.  The indices are therefore arranged in a hierarchy, or “tree.”  Indices at higher levels in the tree summarize the performance that is described in detail at lower levels.

SPMS makes a fundamental distinction between basic indices and aggregate indices:

1 **Basic** indices are computed directly from normalized OMs, and are therefore at the bottom of the tree.

a. **Aggregate** indices are computed from weighted averages of lower-level aggregate and basic indices.  Aggregate indices are found at all levels of the tree above the bottom.

Each index in the tree is designated by a label of up to eight characters in length.  The SPMS indices are described in detail in chapters 5, 6, and 7.

The index at the very top of the tree is overall office performance (OFCPERF).  It is computed from the weighted average of three other aggregate indices: SERVICE, MTCEPERF, and PROVRES.  Each of these is at the top of a main branch of the tree, as shown in Figure 3–1.

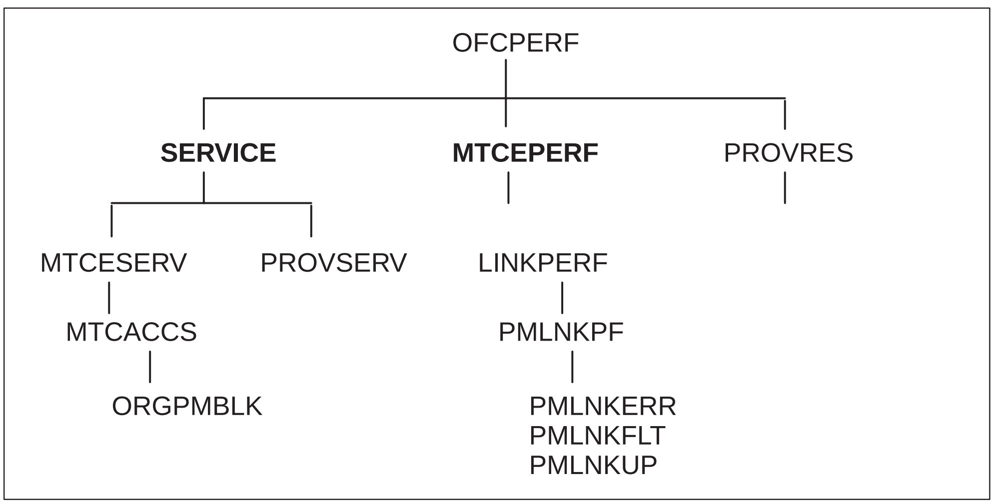
The service index (SERVICE) summarizes switch performance as seen by the users of the switch.  Its basic indices measure the rate at which calls are lost at a particular stage of service for a particular reason.  SERVICE is closest in content to existing operating company switch service indicators. SERVICE itself has two main branches: the maintenance service index (MTCESERV) and the provisioning service index (PROVSERV), reflecting the respective contributions of maintenance and traffic provisioning to the overall service results.  This split is necessary to serve the needs of those operating companies that have separate indexing plans for the maintenance and traffic provisioning sides of their organizations.

The maintenance performance index (MTCEPERF) summarizes switch performance as it would be observed by those in direct contact with the switch.  Most of the basic indices contributing to MTCEPERF are based on error counts, fault counts, or outage durations for the various switch components.

The provisionable resources index (PROVRES) summarizes the performance of traffic provisionable resources for both hardware and software within the switch. Most of its basic indices track rates of overflow or blocking.

Unfavorable results in indices of the SERVICE branch can usually be related to unfavorable results in MTCEPERF or PROVRES. The latter two branches are often more useful for tracking down the cause of such results, because of their direct relationship to individual components of the switch. For example, suppose the cause of a poor SERVICE result has been tracked down the tree to the basic index ORGPMBLK, as illustrated in Figure 3-1 ORGPMBLK tracks originating calls with delayed dialtone. The delay is due to lack of a path from the originating PM to the network. By inspecting values of the register ORIGBLK in the LMD OM group, you can determine which line control device (LCD) is experiencing the blocking. A frequent cause of originating PM-link blocking is trouble in the PM links themselves. To the extent that these are carrier links to remote installations, they are monitored by aggregate index PMLNKPF and its contributing basic indices PMLNKERR, PMLNKFLT, and PMLNKUO, as shown in Figure 3-1.

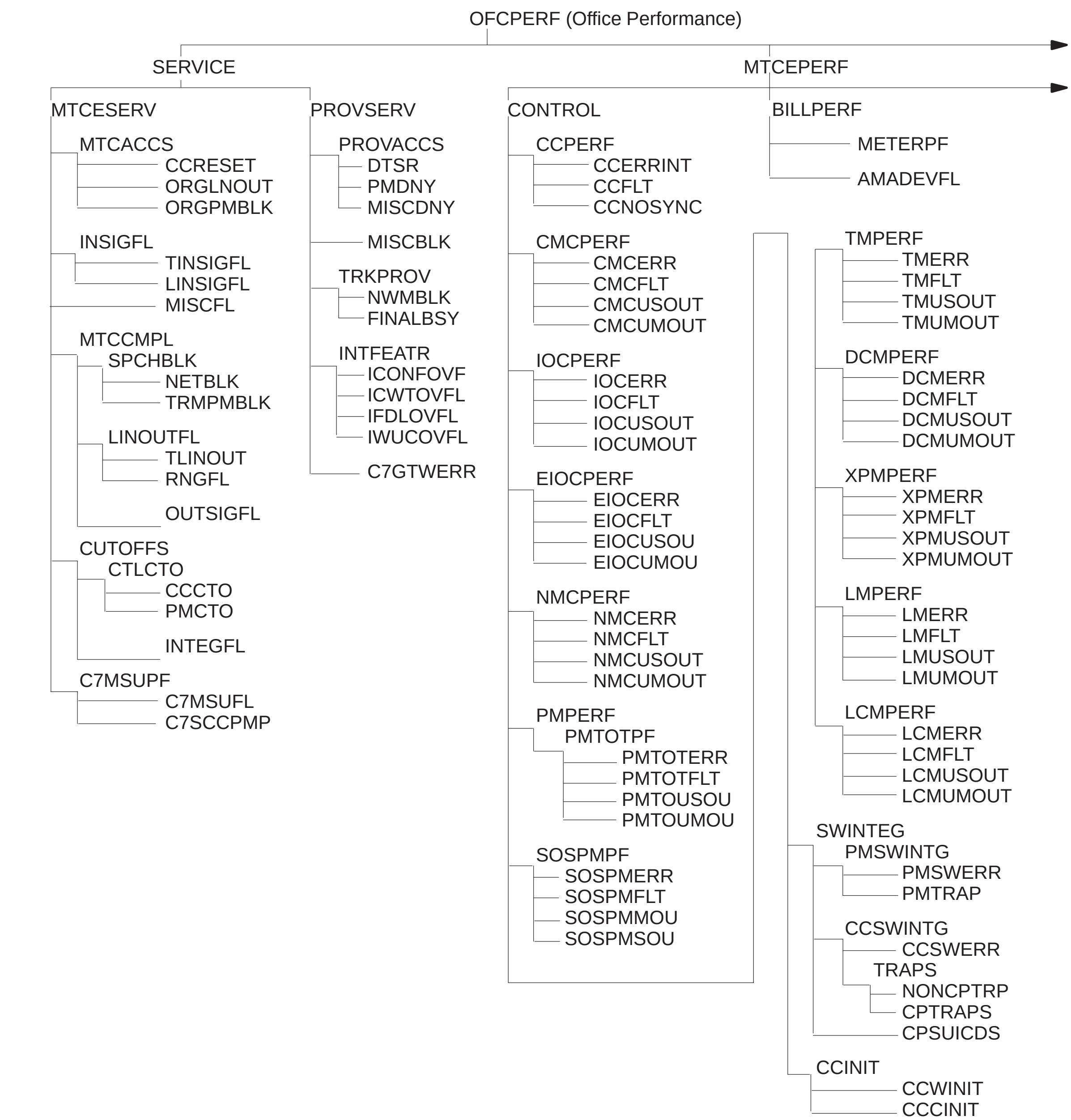
**Figure 3-1**
**SERVICE and MTCEPERF branches**




## SPMS structure for DMS-100

The following figure shows the hierarchy of all indices that relate to DMS-100.

**Figure 3-2**
**Hierarchy of indices that relate to DMS-100**




**—continued—**

**Figure 3-2**
**Hierarchy of indices that relate to DMS-100**

- OFCPERF (Office Performance) (Cont'd.)
  - MTCEPERF (Cont'd.)
    - LINKPERF
      - CMCLNKPF
        - CMCLNKER
        - CMCLKSUO
        - CMCLKMOU
      - IOCLNKPF
        - IOCLNKER
        - IOCLKSUO
        - IOCLKMUO
      - NMLNKPF
        - NMMSGLPF
          - NMMSGLER
          - NMMSGLFL
      - NMSPCHPF
        - NMSPCHER
        - NMSPCHFL
      - NMPTSOUT
      - NMPTMOUT
      - NMJCTSOU
      - NMJCTMOU
      - PMLNKPF
        - PMLNKERR
        - PMLNKFLT
        - PMLKSUOU
        - PMLKMUOU
      - C7LNKPF
        - C7LINK
          - C7LNKSFL
          - C7LNKOUT
        - C7LSOUT
    - TERMNALS
      - IODEV
        - MTUPERF
          - MTUERR
          - MTUFLT
          - MTUSOUT
          - MTUMOUT
        - DDUPERF
          - DDUERR
          - DDUFLT
          - DDUSOUT
          - DDUMOUT
        - CONSOLPF
          - CSLERR
          - CSLSOUT
          - CSLMOUT
      - SRVCCTPF
        - CONFPERF
          - CNF3PERF
          - CNF6PERF
        - ANNSTNPF
        - ESUPPERF
        - RCVRPERF
        - SPECSVPF
      - OPPOSPF
        - TOPSPERF
          - TPOSFLT
          - TPOSOUT
          - VIRTCFL
        - CPOSPERF
        - AOSSPERF
          - AOSSPFLT
          - AOSSPOUT
        - ATTCONPF
          - ATTCNERR
          - ATTCNFLT
        - AOPSPERF
          - VSNFLT
          - VSNLKFLT
          - VPSCFLT
          - APUFLT
          - DAMSGFLT
          - ARUFLT
          - ARUDAAV
      - LINEPERF
        - LINEFLT
        - LINEOUT
      - TRKPERF
        - TRKFLT
        - INTRKSOU
        - INTRKMOU
        - OGTRKSOU
        - OGTRKMOU
        - C7TRLCFL
      - CARRPERF
        - CARRERR
        - CARRFLT
        - CARRSOUT
        - CARRMOUT
      - C7RTPERF
        - C7ROUTE
          - C7RTDEGR
          - C7RTOUT
        - C7RTSET
          - C7RTSTCO
          - C7RTSTOU
  - PROVRES
    - CPRES
      - CCOCCUP
      - CCBOVFL
      - CPMAXBSY
      - CPLOVFL
      - OUTBOVFL
      - MULTBOVF
      - WAKEOVFL
      - ECCBOVFL
    - FTRQRES
      - FQAGOVFL
      - FQ0WOVFL
      - FQ2WOVFL
      - FQ4WOVFL
      - FQ8WOVFL
      - FQ16WOVL

**—continued—**

**Figure 3-2**
**Hierarchy of indices that relate to DMS-100**

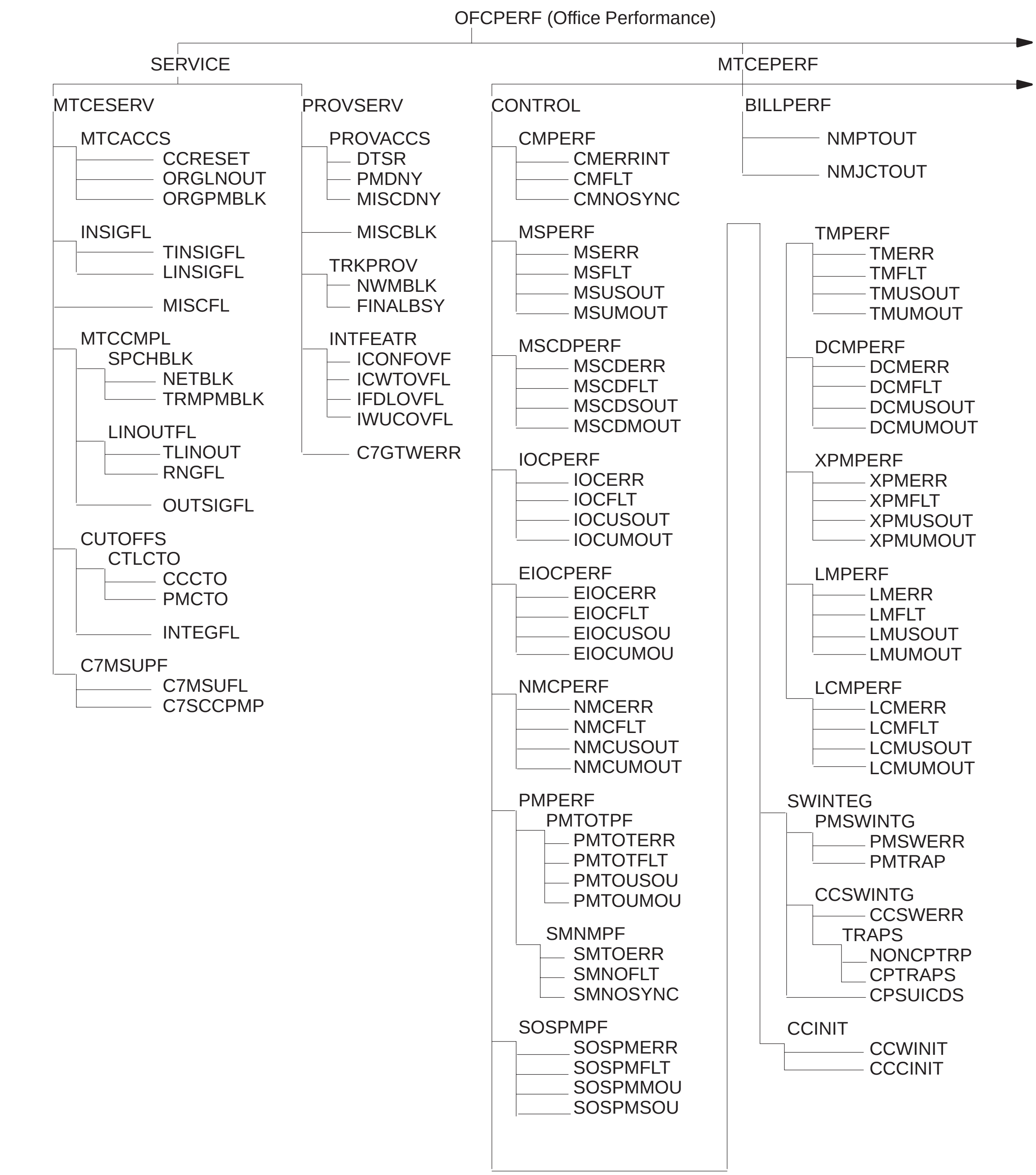
- OFCPERF (Office Performance) (Cont'd.)
  - PROVRES (Cont'd.)
    - EXTBLKS
      - FTREXT
        - PERMXOVF
        - CCISIXOV
        - TWCXOVFL
        - MTXHOVFL
        - CFWXOVFL
        - CSDDPXOV
        - ROTLPXOV
        - CWTXOVFL
        - IBNCQXOV
        - ALTADXOV
        - CFDXOVFL
        - FTRCTLXO
        - FTRDATXO
        - SDPATCXO
        - LTDXOVFL
        - KSHUNTXO
        - NSCXOVFL
        - DCRXOVFL
        - REGNSEMO
        - IBNIXOVF
        - LCOXOVFL
        - NCSXOVFL
        - ACCRSXOV
        - CDIVXOVF
        - E800TCXO
        - ISUPMSXO
        - SP250XOV
        - DMS250OXO
        - RDBXFMTO
        - FTRXLAXO
        - PCFDXOVF
        - ACCSTXOV
        - HISCNTXO
        - HISDXOVF
        - PVNXOVFL
        - DPNSSXOV
        - AUXXOVFL
        - TCAPSXOV
        - TCAPLXOV
        - TCAPXLXO
        - PVNTCAXO
        - ICTFRMXO
        - TCAPMXOV
        - PVNTRMXO
        - DMS250OBO
        - TPBXXOVF
        - SCSXOVFL
      - BILLEXT
        - AOSSRUOV
        - NTRUOVFL
        - TOPSRUOV
        - CATPSRUO
        - SMDRRUOV
        - ASORUOVF
        - AVCDRRUO
        - MCDRRUOV
        - BCRUOVFL
        - BCLAMRUO
        - NSGRUOVF
        - CDR3RUOV
        - OESDRUOV
        - AVDSAROV
        - INTLROVF
        - OCCROVFL
        - ICAMAROV
        - SORUOVFL
        - ITOPSROV
        - DMS250EX
        - CDRMTXOV
        - RU250XOV
        - INTLCCMO
    - SRVCTRES
      - ANNOVFL
      - STNOVFL
      - UTROVFL
      - ESUPOVFL
      - SPSVOVFL
      - CONFRES
        - CONF3OVF
        - CONF60VF
      - RCVRES
        - RCVRMFOV
        - RCVRDGOV
        - RCVRATDO
        - RCVRCNOV
        - RCVRMCSO
        - DGT300OV
        - MF300OVF
    - CHANRES
      - NETCHOVF
      - LPMCHAN

**End**

## SPMS structure for SuperNode

The following figure shows the hierarchy of indices that relate to SuperNode. The major differences between the SPMS structure for SuperNode and the SPMS structure for DMS-100 are the CONTROL and LINKPERF sections.

**Figure 3-3**
**Hierarchy of indices that relate to SuperNode**




**—continued—**

**Figure 3-3**
**Hierarchy of indices that relate to SuperNode**

- OFCPERF (Office Performance) (Cont'd.)
  - MTCEPERF (Cont'd.)
    - LINKPERF
      - MSLNKPF
        - MSLNKERR
        - MSLNKFLT
        - MSLNKSUO
        - MSLNKMOU
      - IOCLNKPF
        - IOCLNKER
        - IOCLKSUO
        - IOCLKMUO
      - NMLNKPF
        - NMMSGLPF
        - NMMSGLER
        - NMMSGLFL
      - NMSPCHPF
        - NMSPCHER
        - NMSPCHFL
      - NMPTSOUT
      - NMPTMOUT
      - NMJCTSOU
      - NMJCTMOU
      - PMLNKPF
        - PMLNKERR
        - PMLNKFLT
        - PMLNKSUOU
        - PMLNKMUOU
      - C7LNKPF
        - C7LINK
          - C7LNKSFL
          - C7LNKOUT
        - C7LSOUT
    - TERMINALS
      - IODEV
        - MTUPERF
          - MTUERR
          - MTUFLT
          - MTUSOUT
          - MTUMOUT
        - DDUPERF
          - DDUERR
          - DDUFLT
          - DDUSOUT
          - DDUMOUT
        - CONSOLPF
          - CSLERR
          - CSLSOUT
          - CSLMOUT
      - SRVCCTPF
        - CONFPERF
          - CNF3PERF
          - CNF6PERF
        - ANNSTNPF
        - ESUPPERF
        - RCVRPERF
        - SPECSVPF
      - OPPOSPF
        - TOPSPERF
          - TPOSFLT
          - TPOSOUT
          - VIRTCFL
        - CPOSPERF
        - AOSSPERF
          - AOSSPFLT
          - AOSSPOUT
        - ATTCONPF
          - ATTCNERR
          - ATTCNFLT
        - AOPSPERF
          - VSNFLT
          - VSNLKFLT
          - VPSCFLT
          - APUFLT
          - DAMSGFLT
          - ARUFLT
          - ARUDAAV
      - SLMPERF
        - SLMFAULT
        - SLMSOUT
      - LINEPERF
        - LINEFLY
        - LINEOUT
      - TRKPERF
        - TRKFLT
        - INTRKSOU
        - INTRKMOU
        - OGTRKSOU
        - OGTRKMOU
      - CARRPERF
        - CARRERR
        - CARRFLT
        - CARRSOUT
        - CARRMOUT
      - C7RTPERF
        - C7ROUTE
          - C7RTDEGR
          - C7RTOUT
        - C7RTSET
          - C7RTSTCO
          - C7RTSTOU
  - PROVRES
    - CPRES
      - CCOCCUP
      - CCBOVFL
      - CPMAXBSY
      - CPLOVFL
      - OUTBOVFL
      - MULTBOVF
      - WAKEOVFL
      - ECCBOVFL
    - FTRQRES
      - FQAGOVFL
      - FQ0WOVFL
      - FQ2WOVFL
      - FQ4WOVFL
      - FQ8WOVFL
      - FQ16WOVF

**—continued—**

**Figure 3-3**
**Hierarchy of indices that relate to SuperNode**

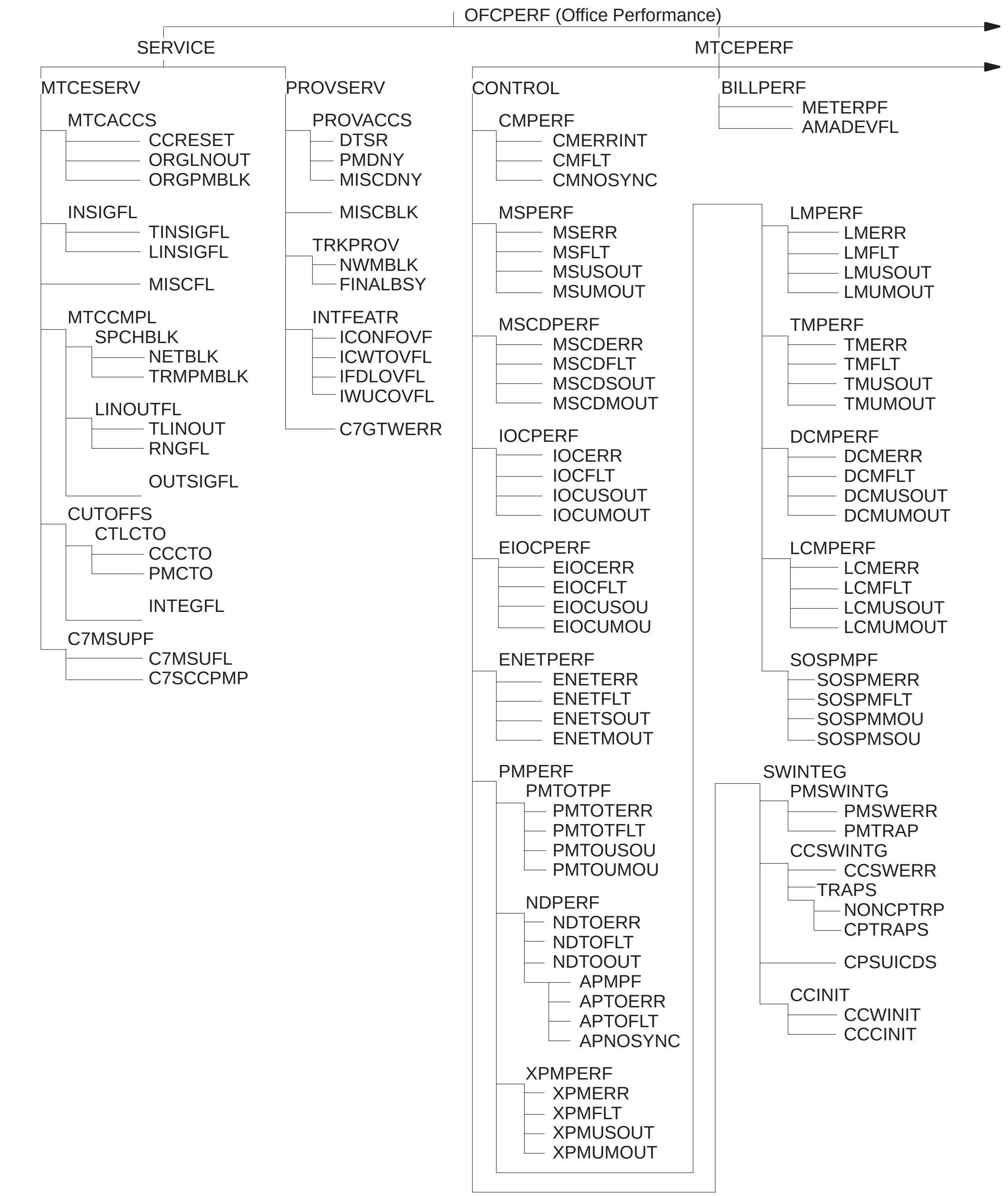
- OFCPERF (Office Performance) (Cont'd.)
  - PROVRES (Cont'd.)
    - EXTBLKS
      - FTREXT
        - PERMXOVF
        - CCISIXOV
        - TWXCXOVFL
        - MTXHOVFL
        - CFWXOVFL
        - CSDDPXOV
        - ROTLPXOV
        - CWTXOVFL
        - IBNCQXOV
        - ALTADXOV
        - CFDXOVFL
        - FTRCTLXO
        - FTRDATXO
        - SDPATCXO
        - LTDXOVFL
        - KSHUNTXO
        - NSCXOVFL
        - DCRXOVFL
        - REGNSEMO
        - IBNIXOVF
        - LCOXOVFL
        - NCSXOVFL
        - ACCRSXOV
        - CDIVXOVF
        - E800TCXO
        - ISUPMSXO
        - SP250XOV
        - DMS250XO
        - RDBXFMTO
        - FTRXLAXO
        - PCFDXOVF
        - ACCSTXOV
        - HISCNTXO
        - HISDXOVF
        - PVNXOVFL
        - DPNSSXOV
        - AUXXOVFL
        - TCAPSXOV
        - TCAPLXOV
        - TCAPXLXO
        - PVNTCAXO
        - ICTFRMXO
        - TCAPMXOV
        - PVNTRMXO
        - DMS250BO
        - TPBXXOVF
        - SCSXOVFL
      - BILLEXT
        - AOSSRUOV
        - NTRUOVFL
        - TOPSRUOV
        - CATPSRUO
        - SMDRRUOV
        - ASORUOVF
        - AVCDRRUO
        - MCDRRUOV
        - BCRUOVFL
        - BCLAMRUO
        - NSGRUOVF
        - CDR3RUOV
        - OESDRUOV
        - AVDSAROV
        - INTLROVF
        - OCCROVFL
        - ICAMAROV
        - SORUOVFL
        - ITOPSROV
        - DMS250EX
        - CDRMTXOV
        - RU250XOV
        - INTLCCMO
    - SRVCTRES
      - ANNOVFL
      - STNOVFL
      - UTROVFL
      - ESUPOVFL
      - SPSVOVF
      - CONFRES
        - CONF3OVF
        - CONF6OVF
      - RCVRES
        - RCVRMFOV
        - RCVRDGOV
        - RCVRATDO
        - RCVRCNOV
        - RCVRMCSO
        - DGT300OV
        - MF300OVF
    - CHANRES
      - NETCHOVF
      - LPMCHAN

**End**

## SPMS structure for ENET

The following figure shows the hierarchy of indices that relate to ENET. The major differences between the SPMS structure for ENET and the SPMS structure for SuperNode are the network module sections.

**Figure 3-4**
**Hierarchy of indices that relate to ENET**




**—continued—**

**Figure 3-4**
**Hierarchy of indices that relate to ENET**

- OFCPERF (Office Performance) (Cont'd.)
  - MTCEPERF (Cont'd.)
    - LINKPERF
      - MSLNKPF
        - MSLNKERR
        - MSLNKFLT
        - MSLNKSUO
        - MSLNKMOU
      - IOCLNKPF
        - IOCLNKER
        - IOCLKSUO
        - IOCLKMUO
      - NMLNKPF
        - NMMSGLPF
          - NMMSGLER
          - NMMSGLFL
        - NMSPCHPF
          - NMSPCHER
          - NMSPCHFL
        - NMPTSOUT
        - NMPTMOUT
        - NMJCTSOU
        - NMJCTMOU
      - ENETLKPF
        - ENLKERR
        - ENLKFLT
        - ENLKSOUT
        - ENLKMOUT
        - ENLKINAC
        - ENLKISOL
      - PMLNKPF
        - PMLNKERR
        - PMLNKFLT
        - PMLNKSUOU
        - PMLNKMUOU
        - NDLNKPF
          - NDLNKERR
          - NDLKFLT
          - NKLKOUT
      - C7LNKPF
        - C7LINK
          - C7LNKSFL
          - C7LNKOUT
        - C7LSOUT
    - TERMNALS
      - IODEV
        - MTUPERF
          - MTUERR
          - MTUFLT
          - MTUSOUT
          - MTUMOUT
        - DDUPERF
          - DDUERR
          - DDUFLT
          - DDUSOUT
          - DDUMOUT
        - CONSOLPF
          - CSLERR
          - CSLSOUT
          - CSLMOUT
      - SRVCCTPF
        - CONFPERF
          - CNF3PERF
          - CNF6PERF
        - ANNSTNPF
        - ESUPPERF
        - RCVRPERF
        - SPECSVPF
      - OPPOSPF
        - TOPSPERF
          - TPOSFLT
          - TPOSOUT
          - VIRTCFL
        - CPOSPERF
        - AOSSPERF
          - AOSSPFLT
          - AOSSPOUT
        - ATTCONPF
          - ATTCNERR
          - ATTCNFLT
        - AOPSPERF
          - VSNFLT
          - VSNLKFLT
          - VPSCFLT
          - APUFLT
          - DAMSGFLT
          - ARUFLT
          - ARUDAAV
      - SLMPERF
        - SLMFAULT
        - SLMSOUT
        - SLMMOUT
      - LINEPERF
        - LINEFLT
        - LINEOUT
      - TRKPERF
        - TRKFLT
        - INTRKSOU
        - INTRKMOU
        - OGTRKSOU
        - OGTRKMOU
        - C7TRLCFL
      - CARRPERF
        - CARRERR
        - CARRFLT
        - CARRSOUT
        - CARRMOUT
      - C7RTPERF
        - C7ROUTE
          - C7RTDEGR
          - C7RTOUT
        - C7RTSET
          - C7RTSTCO
          - C7RTSTOU
  - PROVRES
    - CPRES
      - CCBOVFL
      - CPLOVFL
      - OUTBOVFL
      - MULTBOVF
      - WAKEOVFL
      - ECCBOVFL
      - CPMAXBSY
      - CCOCCUP
    - FTRQRES
      - FQAGOVFL
      - FQ0WOVFL
      - FQ2WOVFL
      - FQ4WOVFL
      - FQ8WOVFL
      - FQ16WOVF
      - FQ32WOVF

**—continued—**

**Figure 3-4**
**Hierarchy of indices that relate to ENET**

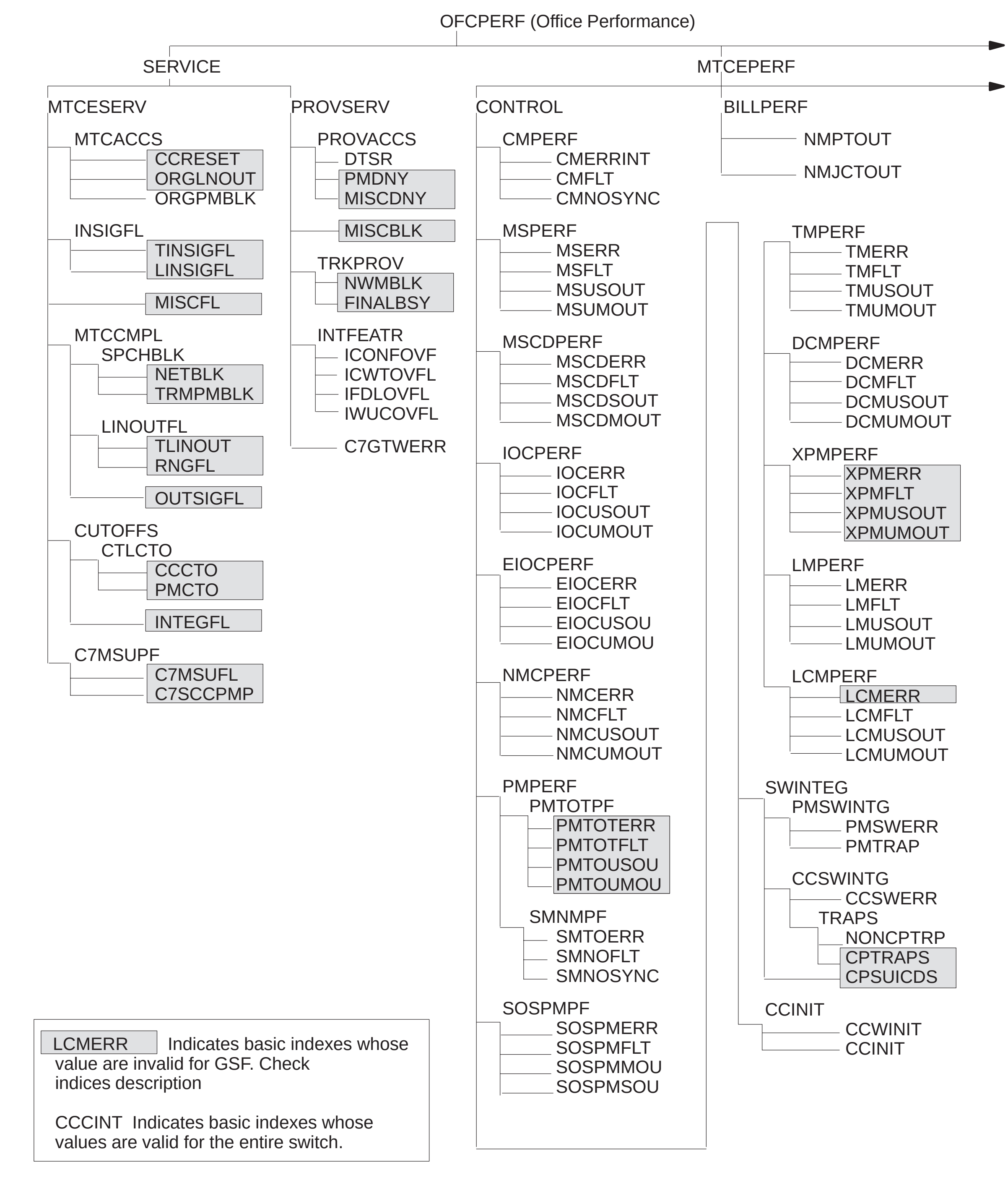
- OFCPERF (Office Performance) (Cont'd.)
  - PROVRES (Cont'd.)
    - EXTBLKS
      - FTREXT
        - PERMXOVF
        - CCISIXOV
        - TWXCXOVFL
        - MTXHOVFL
        - CFWXOVFL
        - CSDDPXOV
        - ROTLPXOV
        - CWTXOVFL
        - IBNCQXOV
        - ALTADXOV
        - CFDXOVFL
        - FTRCTLXO
        - FTRDATXO
        - SDPATCXO
        - LTDXOVFL
        - KSHUNTXO
        - NSCXOVFL
        - DCRXOVFL
        - REGNSEMO
        - IBNIXOVF
        - LCOXOVFL
        - NCSXOVFL
        - ACCRSXOV
        - CDIVXOVF
        - E800TCXO
        - ISUPMSXO
        - SP250XOV
        - DMS250XO
        - RDBXFMTO
        - FTRXLAXO
        - PCFDXOVF
        - ACCSTXOV
        - HISCNTXO
        - HISDXOVF
        - PVNXOVFL
        - DPNSSXOV
        - AUXXOVFL
        - TCAPSXOV
        - TCAPLXOV
        - TCAPXLXO
        - PVNTCAXO
        - ICTFRMXO
        - TCAPMXOV
        - PVNTRMXO
        - DMS250BO
        - TPBXXOVF
        - SCSXOVFL
      - BILLEXT
        - AOSSRUOV
        - NTRUOVFL
        - TOPSRUOV
        - CATPSRUO
        - SMDRRUOV
        - ASORUOVF
        - AVCDRRUO
        - MCDRRUOV
        - BCRUOVFL
        - BCLAMRUO
        - NSGRUOVF
        - CDR3RUOV
        - OESDRUOV
        - AVDSAROV
        - INTLROVF
        - OCCROVFL
        - ICAMAROV
        - SORUOVFL
        - ITOPSROV
        - DMS250EX
        - CDRMTXOV
        - RU250XOV
        - INTLCCMO
    - SRVCTRES
      - ANNOVFL
      - STNOVFL
      - UTROVFL
      - ESUPOVFL
      - SPSVOVF
      - CONFRES
        - CONF3OVF
        - CONF6OVF
      - RCVRES
        - RCVRMFOV
        - RCVRDGOV
        - RCVRATDO
        - RCVRCNOV
        - RCVRMCSO
        - DGT300OV
        - MF300OVF
        - RCVRCDCO
    - CHANRES
      - NETCHOVF
      - LPMCHAN

**End**

## SPMS structure for DMS-100G Switch

The following figure shows the hierarchy of indices that relate to DMS-100G switch.

**Figure 3-5**
**Hierarchy of indices that relate to DMS-100G Switch**




**—continued—**

**Figure 3-5**
**Hierarchy of indices that relate to DMS-100G Switch**

- OFCPERF (Office Performance) (Cont'd.)
  - MTCEPERF (Cont'd.)
    - LINKPERF
      - MSLNKPF
        - MSLNKERR
        - MSLNKFLT
        - MSLNKSUO
        - MSLNKMOU
      - IOCLNKPF
        - IOCLNKER
        - IOCLKSUO
        - IOCLKMUO
      - NMLNKPF
        - NMMSGLPF
        - NMMSGLER
        - NMMSGLFL
      - NMSPCHPF
        - NMSPCHER
        - NMSPCHFL
      - NMPTSOUT
      - NMPTMOUT
      - NMJCTSOU
      - NMJCTMOU
      - PMLNKPF
        - PMLNKERR
        - PMLNKFLT
        - PMLNKSUOU
        - PMLNKMUOU
      - C7LNKPF
        - C7LINK
          - C7LNKSFL
          - C7LNKOUT
        - C7LSOUT
    - TERMINALS
      - IODEV
        - MTUPERF
          - MTUERR
          - MTUFLT
          - MTUSOUT
          - MTUMOUT
        - DDUPERF
          - DDUERR
          - DDUFLT
          - DDUSOUT
          - DDUMOUT
        - CONSOLPF
          - CSLERR
          - CSLSOUT
          - CSLMOUT
      - SRVCCTPF
        - CONFPERF
          - CNF3PERF
          - CNF6PERF
        - ANNSTNPF
        - ESUPPERF
        - RCVRPERF
        - SPECSVPF
      - OPPOSPF
        - TOPSPERF
          - TPOSFLT
          - TPOSOUT
          - VIRTCFL
        - CPOSPERF
        - AOSSPERF
          - AOSSPFLT
          - AOSSPOUT
        - ATTCONPF
          - ATTCNERR
          - ATTCNFLT
      - SLMPERF
        - SLMFAULT
        - SLMSOUT
        - SLMSOUT
      - LINEPERF
        - LINEFLY
        - LINEOUT
    - TRKPERF
      - TRKFLT
      - INTRKSOU
      - INTRKMOU
      - OGTRKSOU
      - OGTRKMOU
    - CARRPERF
      - CARRERR
      - CARRFLT
      - CARRSOUT
      - CARRMOUT
    - C7RTPERF
      - C7ROUTE
        - C7RTDEGR
        - C7RTOUT
      - C7RTSET
        - C7RTSTCO
        - C7RTSTOU
  - PROVRES
    - CPRES
      - CCOCCUP
      - CCBOVFL
      - CPMAXBSY
      - CPLOVFL
      - OUTBOVFL
      - MULTBOVF
      - WAKEOVFL
      - ECCBOVFL
    - FTRQRES
      - FQAGOVFL
      - FQ0WOVFL
      - FQ2WOVFL
      - FQ4WOVFL
      - FQ8WOVFL
      - FQ16WOVF

LCMERR Indicates basic indexes that are invalid for GSF. Check index description

CCCINT Indicates basic indexes whose values are valid for the entire switch.

**—continued—**

**Figure 3-5**
**Hierarchy of indices that relate to DMS-100G Switch**

- OFCPERF (Office Performance) (Cont'd.)
  - PROVRES (Cont'd.)
    - EXTBLKS
      - FTREXT
        - PERMXOVF
        - CCISIXOV
        - TWXCXOVFL
        - MTXHOVFL
        - CFWXOVFL
        - CSDDPXOV
        - ROTLPXOV
        - CWTXOVFL
        - IBNCQXOV
        - ALTADXOV
        - CFDXOVFL
        - FTRCTLXO
        - FTRDATXO
        - SDPATCXO
        - LTDXOVFL
        - KSHUNTXO
        - NSCXOVFL
        - DCRXOVFL
        - REGNSEMO
        - IBNIXOVF
        - LCOXOVFL
        - NCSXOVFL
        - ACCRSXOV
        - CDIVXOVF
        - E800TCXO
        - ISUPMSXO
        - SP250XOV
        - DMS250XO
        - RDBXFMTO
        - FTRXLAXO
        - PCFDXOVF
        - ACCSTXOV
        - HISCNTXO
        - HISDXOVF
        - PVNXOVFL
        - DPNSSXOV
        - AUXXOVFL
        - TCAPSXOV
        - TCAPLXOV
        - TCAPXLXO
        - PVNTCAXO
        - ICTFRMXO
        - TCAPMXOV
        - PVNTRMXO
        - DMS250BO
        - TPBXXOVF
        - SCSXOVFL
      - BILLEXT
        - AOSSRUOV
        - NTRUOVFL
        - TOPSRUOV
        - CATPSRUO
        - SMDRRUOV
        - ASORUOVF
        - AVCDRRUO
        - MCDRRUOV
        - BCRUOVFL
        - BCLAMRUO
        - NSGRUOVF
        - CDR3RUOV
        - OESDRUOV
        - AVDSAROV
        - INTLROVF
        - OCCROVFL
        - ICAMAROV
        - SORUOVFL
        - ITOPSROV
        - DMS250EX
        - CDRMTXOV
        - RU250XOV
        - INTLCCMO
    - SRVCTRES
      - ANNOVFL
      - STNOVFL
      - UTROVFL
      - ESUPOVFL
      - SPSVOVF
      - CONFRES
        - CONF3OVF
        - CONF60VF
      - RCVRES
        - RCVRMFOV
        - RCVRDGOV
        - RCVRATDO
        - RCVRCNOV
        - RCVRMCSO
        - DGT300OV
        - MF300OVF
    - CHANRES
      - NETCHOVF
      - *LPMCHAN*

LCMERR Indicates basic indexes whose value are invalid for GSF. Check index description

CCCINT Indicates basic indexes whose values are valid for the entire switch.

*LPMCHAN* Indicates indexes which are valid for Line traffic only.

**End**

# How to interpret SPMS reports

SPMS indices has been calibrated using OM data from a large number of switches under normal working conditions. Day-to-day fluctuations in the indices of a few percent is normal, and not a cause for concern. If large variations in values do occur, they should be immediately investigated.

SPMS indices offers the following standards for interpreting report results:

- an index value of 100 indicates much higher then average performance
- an index value of 95 indicates normal performance as observed over a large sample of switches of various types and configurations.
- an index result of 90 or below indicates a situation requiring immediate attention. Note that in some cases a switch may have a low base line index under normal conditions. If the index remains constant over day-to-day operation there is no need for concern as long as the reason for the low indices is understood. If the index steadily decreases over several days, the reason for the decrease should be investigated.

It should be noter that the SPMS index is a weighted average, not a true average. For example if there are 10 failures in 1000 counts the true average is 99%, but the SPMS index may be 85% due the the weighting of the failures.

To aid in the isolation of problem areas, SPMS uses the following conventions:

- severe trouble spots are identified with two asterisks (**)
- less serious problems are marked with one asterisk (*)

Maintenance attention should focus first on indices with two asterisks, and then on those with one asterisk.

Either the DISPLAY subcommand or the SETREP subcommand causes the index results for the selected number of days to be generated.  Indices are listed starting with the selected tree tops, with child index results coming after those of their parents.  Indentation of index names indicates the relative level of each index in the hierarchy.  The report shows one index per line, with successive days (if applicable) printed in separate columns across the page. The two final results shown for each index are the report month averages for the current month to date and the previous complete month (these are the only results shown if 0 days are requested). Figure 4-1 shows a sample SPMS report for one day: 7 December 1987.

**Figure 4-1**
**Example of SPMS report**

```
89/07/12 <<*>> F04314_00            SITE NAME      BCS29ZI RTM 041289 <<*>>

1989/12/08 15:24:30.825 FRI.


                   L   WT   R_95   R_80 | 891207     89 DEC        89 NOV
                                        |            TO DATE
TOTATT (K)                              |    51        739          1298
                                        |
                                        |              *R*
   -------------------------------------+---------------------------------

SERVICE          A  ---                 | 88.4*        93.6          98.0
..MTCESERV       A  60                  | 81.4*        90.1          98.0
....MTCACCS      A  30                  | 44.5**       73.0**        98.9
......CCRESET    B  35   0   6  23000   |  0.0**       51.3**       100.0
......ORGLNOUT   B  20  22   5   1172   | 92.6         96.9          97.0
......ORGPMBLK   B  20   0   7  15043   | 74.2**       87.1*         99.0
....INSIGFL      A  10                  | 92.5         93.7          97.0
......TINSIGFL   B  60  58   5   1860   | 95.5         96.8          99.0
```

## Daily and report month results

SPMS provides both individual day and report month indices at all levels of the tree. It stores the most recent individual 30-day results. These are available for query at any time along with the results for the previous report month.

At each OM transfer period, the OMs needed by SPMS are accumulated into internal SPMS daily accumulating registers. These double precision registers cannot be accessed by the customer.

At 23:50 each evening, under normal circumstances, the following events take place:

- SPMS swaps accumulating registers so that OMs from midnight onwards are added into a new set (which has previously been initialized to zeros). The old set is available for further calculations.
- SPMS completes the work needed prior to index calculation by acquiring various equipment counts needed as normalization factors.
- Index calculations are carried out for the day. The new day's indices overwrite those of thirty days ago in protected store and remain available for later display.
- The complete set of data for the day just finished is added into monthly accumulation registers.
- Index calculations are carried out for the data collected for the month to date.
- The new day's indices and the updated values of the monthly accumulation registers are also passed to the journal file system for protection against switch reboots.

At the end of the reporting month, the month's average indices are computed from the contents of the monthly accumulating registers. These indices replace the previous month's results in store and are sent to the journal file system. The monthly accumulating registers are re-initialized to zero, ready for the next month's data.

Because monthly indices are computed directly from raw data rather than from daily indices, they are actually weighted averages of the indices. The days for which the normalizing factors are highest get the most weight; this means that, except for the MTCEPERF fault and outage indices, more weight is implicitly placed on results for days of higher traffic volume.

## Demand reports

Using SPMS, customers can query index values upon demand from the CI level of the MAP. The resulting reports may be routed as desired using the RECORD or SEND CI command.

Report output can be restricted to individual indices or segments of the index tree for output. For example, you can request the current and previous month's indices only, or any number of daily results up to 30, starting with the latest day and moving back in time. The header section of the report records the total number of calls (TOTATT (K)) for that day, for the month to date, and for the previous month. The value is denoted as *R*. Each line of the report shows results for one index, including the constants used to compute it (if it is basic) and its weight when averaged into the parent aggregate index at the next level. In addition to the index results, the report shows total call volume for each day and flags those days on which reload restarts or reboots caused loss of data.

## Operation in abnormal circumstances

Warm and cold restarts during the day interfere to some extent with the OM transfer process.

A reboot or reload restart during the day causes a loss of the contents of the daily accumulating registers up to the time of day when the restart occurred. The output of SPMS is flagged to indicate loss of data on the day concerned. Index results for prior days, for the previous month, and for the monthly accumulating register, are protected by the journal file system and are restored following reboots once the journal file is applied.

A warm or cold restart during index calculation causes the entire calculation process to be postponed until after the restart. No loss of data occurs unless a reboot or reload restart happens before the calculations can be completed.

If the timing of a cold or warm restart prevents the calculation process from waking up at 23:50, the SPMS accumulation for that day does not occur. Two days' data instead of one will be accumulated in the same set of registers before calculation takes place the following night. This has no effect on report month results (unless it was the end of the month), but individual daily output will appear to have a missing day.

Index calculation on any particular day may be delayed under the following circumstances:

- if image dumping is in progress at calculation time, the calculation is delayed until the image dump is completed. New index results cannot be written to the protected data store while an image dump is in progress.
- following a reboot or reload restart, calculation may be delayed up to three hours, pending a journal file application. If the journal file is not applied within three hours, index calculation proceeds. As a consequence, the results for that day may be out of sequence in the daily index display. If index calculation proceeds before the journal files are applied, the journal file application overwrites the monthly accumulation registers, with the result that the latest day's contribution to the registers is lost.
- following a reboot, calculation may be delayed up to three hours subsequent to a journal file application, waiting for the journal file system to restart.

Thus, in theory the calculations may be delayed by several hours following a reboot or reload restart if the old journal file is not applied promptly or the journal file system is not restarted. The length of delay depends only on what is happening with the journal file subsystem, not on the time of the restart itself.

At times other than the first calculation after a reboot or reload restart, no check of the status of the journal file is made. If the journal file subsystem is not operating on any particular day, that day's results are vulnerable to loss if a reboot occurs. The day's contribution to the monthly accumulating register is also vulnerable until a new version of these registers is written to the journal file on a subsequent day, or until an office image dump is taken.

## Date changes

Time changes during the day have little effect on SPMS. The one exception is if the calculation process wake-up time is skipped. If this happens, the SPMS accumulation for that day does not occur. Again, as with a restart over this time period, two days of data instead of one will be accumulated in the same set of registers before calculation takes place the following night.

A change of date could cause one of the following discrepancies:

- a date change to another day within the same month causes a loss of individual daily output results
- if the date is set forward, daily results cannot be recorded for the dates that are skipped
- if the date is set back, previous daily results will be overwritten for the dates that have already passed.

A date change to another month will clear all monthly accumulation registers to prepare for new monthly data regardless of the day of the month.

The month-to-date (MTD) index results up to and including the time of the date change are protected by the journal file system. If the date is changed back to the normal date before the calculation process wake-up time, the normal month's status can be recovered by applying the journal file. If the calculation process is permitted to proceed before returning to the normal month date, a new journal file will be made at the next date change. Recovering the previous month-to-date results under such circumstances requires technical assistance beyond the scope of this manual.

# SPMS SERVICE index descriptions

The following chapter provides index descriptions for the SERVICE branch of SPMS. The service index (SERVICE) summarizes switch performance as seen by the users of the switch. The high-level SERVICE index has two main branches, the maintenance service index (MTCESERV) and the provisioning service (PROVSERV) index.

## Where to find an index

This chapter provides descriptions for each aggregate and basic index that contribute to the SERVICE branch of SPMS.

The index descriptions are organized according to the DMS-100 hierarchy shown in Figure 3–2, SPMS structure for DMS-100. The indices shown in this figure supply information for an NT40 switch. Because many of the indices that pertain to an NT40 switch also pertain to a SuperNode switch and an enhanced network (ENET), the DMS-100 indices are not individually identified by switch type.

The index descriptions specifically provided for a SuperNode switch are identified as SuperNode components. These indices cannot function on an NT40 switch. See figure 3–3, SPMS structure for SuperNode, for the index hierarchy that applies to a SuperNode switch.

The ENET and DM-100G SWITCH indices are identified like the SuperNode indices. See Figure 3–4 for SPMS structure for ENET switch indices, and Figure 3-5 for SPMS structure for DMS-100G switch indices.

See the index for an alphabetical list of all the indices.

## How the indices are presented

This chapter contains aggregate and basic index descriptions for the SERVICE branch of SPMS.

The following headings appear in each description of an aggregate index:

- section
- description

- definition
- diagnostics

The information under these headings explains:

- the section below the SERVICE branch to which the index belongs
- the expansion of the index name
- the function and purpose of the index
- the steps required to locate the switch problem

The following headings appear in each description of a basic index:

- section
- description
- definition
- measurement list
- normalizer
- diagnostics

The information under these headings explains:

- the section below the SERVICE branch to which the index belongs
- the expansion of the index name
- the function and purpose of the index
- the combination of indices that contribute to the index in question based on a mathematical calculation performed by SPMS
- the appropriate weighting factors applied to an index based on OMS, and the frequency and importance of the index being examined
- the steps required to locate the switch problem

# Aggregate index SERVICE

## Section

The service (SERVICE) index is a top level office performance (OFCPERF) index. The service index derives data from the maintenance service (MTCESERV) and the provisional service (PROVSERV) indices.

## Description

Service

## Definition

The summary of switch performance from the caller's viewpoint. This index monitors the rate of failure for call attempts at various stages of processing. The results indicated by SERVICE should have a counterpart in maintenance performance (MTCEPERF) and the provisionable resources (PROVRES) sections of SPMS. MTCEPERF and PROVRES reflect the operating company's view of the switch.

## Diagnostics

None

# Aggregate index MTCESERV

## Section

MTCESERV

## Description

Maintenance service

SPMS SERVICE

SPMS SERVICE index descriptions

SPMS SERVICE index descriptions

## Definition

The summary of the maintenance contribution to service, as experienced by the caller.

## Diagnostics

None

# Basic index OUTSIGFL

## Section

MTCESERV

## Description

Outgoing line failure

## Definition

The proportion of outgoing calls not completed as a result of outpulsing failure.

DMS-100G Switch does not contribute to or provide an equivalent of OM group OFZ, measurements INOUT and OUTROSF.

## Measurement list

OUTSIGFL is based on OFZ OUTROSF (SOTS SOUTROSF in International offices).

## Normalizer

The normalizing factor for OUTSIGFL is the sum of OFZ registers ORIGOUT and INOUT, plus TOPSTRK (all with their respective extension registers). In International offices, this factor is the sum of OTS registers ORGOUT, INCOUT, and SYSOUT, with extension registers.

## Diagnostics

Locate the problem trunk group with register OUTFAIL of OM group TRK. TRK121, TRK113, and TRK162 logs indicate the particular trunks involved. Use the Enhance Maintenance Feature for Lines and Trunks to perform log analysis.

# Aggregate index MTCACCS

## Section

MTCESERV

## Description

Maintenance access

## Definition

The summary of the maintenance contribution to the caller's ability to gain access to the switch. It includes dial tone and start-to-dial signal.

## Diagnostics

None

# Basic index CCRESET

## Section

MTCESERV

## Description

Central control reset

## Definition

The number of calls denied access to the switch during central controller restarts, as a proportion of total calls offered to the switch.

DMS-100G Switch does not contribute to or provide an equivalent of:

- OM group CP, measurement INITDENY
- OM group OFZ, measurements NIN, and NIN2

## Measurement list

CCRESET uses measurement INITDENY of OM group CP. INITDENY is the estimated number of calls lost during restarts of the active central controller, based on the duration of the restart and the calling rate during the completed transfer period immediately preceding the restart.

## Normalizer

The normalizing factor is total call attempts plus INITDENY itself.

## Diagnostics

Obtain ETAS help as necessary to determine the cause of the CC restart and to prevent recurrences. Notify higher-level or manufacturer's technical support groups immediately about any unexpected CC restarts. Save log messages and operational measurements from the period in question for their examination. Provide an estimate of lost calls after CC107.

# Basic index ORGLNOUT

## Section

MTCESERV

## Description

Originating line outage

## Definition

The estimated fraction of originating call attempts denied access to the switch because lines or the peripherals serving those lines are maintenance busy. Besides individual cases of line, PM, or network failure, ORGLNOUT captures the lag in PM restoration subsequent to reload restarts. This effect is not caught in CCRESET.

DMS-100G Switch does not contribute to or provide an equivalent of

- OM group SYSPERF
- OM group OFZ, measurements NIN, and NIN2

## Measurement list

ORGLNOUT uses the estimated sum of lost originating call attempts. Lost attempts are estimated each transfer period as follows:

1 Total line outage is given by the sum of SYSPERF measurements LINPMBU and LINCCTBU.

2 Total line availability for the transfer period is equal to the total number of working lines in the office, multiplied by the duration of the period in CCS, minus total line outage for the period.

3 The estimate of lost call attempts is equal to the measured number of originating call attempts from OM group OTS measurements NORG and extension NORG2 or OM group OFZ measurements NORIG and extension NORIG2, multiplied by the total line outage, divided by the total line availability.

## Normalizer

ORLNOUT is normalized per total call attempts (TOTATT).

## Diagnostics

To determine the primary source of an outage check MTCEPERF indices LMUOUT, XPMUOUT, and LINEOUT. Review procedures for dealing with clearing of PM trouble indications before they become outages. Check procedures for line restoration to ensure that lines are not left manual busy longer than necessary.

# Basic index ORGPMBLK

## Section

MTCESERV

## Description

Originating PM block

## Definition

The proportion of line originations rejected by the CC because no path is available through the PM links to the core network. The peripherals re-originate the calls as long as the callers stay off-hook.

## Measurement list

The measurement used for ORGPMBLK is the sum over all tuples of LMD ORIGBLK.

## Normalizer

ORGPMBLK is normalized by total originating attempts.

## Diagnostics

To determine if the blocking is caused by link outage, check MTCEPERF PMLNKUO. If this is the case, follow the diagnostics for that index. Otherwise, check the traffic engineering of LCM, LGC, LTC, and LM C-side links. Check OM group PMOVLD registers PORGDENY and check PM PMTYP for link errors or faults. Check log NET130.

# Aggregate index INSIGFL

## Section

MTCESERV

## Description

Incoming signal failure

## Definition

The summary of the failure to receive digits properly.

## Diagnostics

None

# Basic index TINSIGFL

## Section

MTCESERV

## Description

Incoming signal failure for trunks

## Definition

The proportion of incoming call attempts that fail during the digit reception stage. This index counts the following events: permanent signal and partial dial occurring on machine-dialed trunks, and defective incoming signaling on any trunk.

DMS-100G Switch does not contribute to or provide an equivalent of

- OM group SYSPERF
- OM group OFZ, measurements NIN, NIN2, INABNIM, INABNC, PSGM, and PDLM

## Measurement list

TINSIGFL is based on SYSPERF TKBADDG plus the sum of OFZ2 PSGM and PDLM (or SOTS SOTSPSGM and SOTSPDLM in International offices).

## Normalizer

The normalizing factor, REMIN, is the total number of incoming attempts less abandoned calls OFZ INABNM and INABNC (or OTS INCABNM and SYSABDN in International offices).

## Diagnostics

To locate the source of the failures, check MTCEPERF indices RCVRPERF and TRKFLT. Review procedures for monitoring and clearing receiver or trunk faults. Use measurement TRK INFAIL to determine if the failures are specific to a particular trunk group. Use the Enhanced Maintenance Feature for Lines and Trunks to analyze TRK114, TRK116, TRK182, TRK118, TRK115, TRK117, TRK138, and TRK183 log messages for repeat offenders.

# Basic index LINSIGFL

## Section

MTCESERV

## Description

Incoming signal failure for lines

## Definition

The proportion of originating call attempts that fail during dial because of bad digits.

DMS-100G Switch does not contribute to or provide an equivalent of OM group SYSPERF.

## Measurement list

LINSIGFL is based on the SYSPERF measurement LINBADDG.

## Normalizer

LINSIGFL is normalized by total originating attempts less failures before dial tone OFZ ORIGLKT and less abandoned calls OFZ ORIGABN. In International offices, these last two quantities are replaced by OTS ORGLKT minus TRMTCU TCUORSS and OTS ORGABDN.

## Diagnostics

To locate the source of the dialing problems, check MTCEPERF indices RCVROUT and LINEFLT. Review procedures for monitoring and clearing line and receiver faults. Use the Enhanced Maintenance Feature for Lines and Trunks to analyze LINE105 and LINE106 log messages for repeat offenders.

# Basic index MISCFL

## Section

MTCESERV

## Description

Miscellaneous failures

## Definition

The proportion of calls lost during call setup because of machine-caused failures.

DMS-100G Switch does not contribute to or provide an equivalent of

- OM group CP, measurement WINITC
- OM group OFZ, measurements NIN, NIN2, INABNM, and INABNC

## Measurement list

MISCFL is based on the sum of CP CPTRAP, CPSUIC, and WINITC.

## Normalizer

The normalizing factor for MISCFL is total call attempts minus the sum of abandoned calls OFZ INABNM, INABNC, and ORIGABN, minus failures before dial tone OFZ ORIGLKT. In international offices, the subtracted quantities are replaced by OTS INCABNM, INCABNC, SYSABDN, ORGABDN, and ORGLKT minus TRMTCU TCUORSS.

## Diagnostics

Ensure that Nortel Field Technical Support is notified promptly when traps and call suicides occur. Save copies of log messages associated with restarts, traps and call suicides, plus log messages for the periods before and after these events. Pay particular attention to SWERR, TRAP, AUDT101, AUDT103, AUDT197, CC103, CC104, NET101 (with LINE104 OR TRK113), AUDT100, AUD395, AUD398, CC107, INIT, SOS100, and SWCT103.

# Aggregate index MTCCMPL

## Section

MTCESERV

## Description

Originating PM line blocked

## Definition

The summary of maintenance contribution to the rate at which calls cannot be successfully completed through the switch once digits have been received.

## Diagnostics

None

# Aggergate index SPCHBLK

## Section

MTCESERV

## Description

Speech blockage

## Definition

The summary of the rate at which calls fail as a result of no connection between the calling and called terminals.

## Diagnostics

None

# Basic index NETBLK

## Section

MTCESERV

## Description

Network blockage

## Definition

The proportion of calls that fail because they cannot be connected through the core network.

DMS-100G Switch does not contribute to or provide an equivalent of

- OM group TRMTRS
- OM group OFZ, measurements INOUT, and INTRM

## Measurement list

NETBLK is based on the treatment peg count TRMTRS TRSNBLH.

## Normalizer

The normalizing factor for NETBLK is the sum of OFZ registers ORIGOUT, ORIGTRM, INOUT, INTRM, TOPSTRAF, and TOPSTRK (with their respective extension registers). In International offices this factor is the sum of OTS registers ORGOUT, ORGTRM, INCOUT, SYSOUT, INCTRM, and SYSTRM, with extension registers.

## Diagnostics for NT40 and SuperNode

Confirm the incidence of network blocking with PROVRES index NETCHOVF. Check whether network blocking has a maintenance-related cause by examining MTCEPERF indices contributing to the NMLNKPF aggregate index. If there is a maintenance-related cause, review network integrity performance using the index. If not, review network integrity performance using the NETINTEG analysis tool at the NET level of the MAP. Further information is provided by the periodic NETM110–111 summary count logs, by the NET130–132 and NET136 logs, and by analysis of TRK138 and LINE138 logs if they have been enabled for NBLH treatment.

If blocking persists and does not seem to relate to maintenance problems, check network traffic usages in OM group TS against traffic provisioning recommendations.

## Basic index NETBLK (end)

### Diagnostics for ENET

Confirm the incidence of network blocking with the PROVRES index NETCHOVF. Determine if the network blocking has a maintenance-related cause by examining the MTCEPERF contributing to the MNLNKPF or ENETLKPF aggregate indices. If the cause is maintenance-related, review network integrity performance by completing the following steps:

- if JNET is the active network, use the NETINTEG analysis tool at the NET level of the MAP
- enter INTEG at the ENET level of the MAP
- if ENET is the active network, check OM ENCALDND

See the periodic NETM110-132 summary count logs for further information. Analyze the NET130-132, NET136, ENCP100-102, and ENCP136 logs. Analyze the TRK138 and LINE138 logs if they are enabled for NBLH treatment.

If blocking is persistent and is not a maintenance problem, check network traffic usage in OM group TS against traffic provisioning recommendations.

# Basic index TRMPMBLK

## Section

MTCESERV

## Description

Terminating peripheral module blockage

## Definition

The proportion of calls that fail because of the lack of a path through the terminating PM links, or because the terminating PM is too busy to process the calls.

DMS-100G Switch does not contribute to or provide an equivalent of

- OM group TRMTRS
- OM group OFZ, measurements INTRM

## Measurement list

TRMPMBLK is based on the treatment count TRMTRS TRSNBLN, plus the sum over all LCMs and LGCs of PMOVLD PTRMDENY.

## Normalizer

The normalizing factor for TRMPMBLK is the sum of the OFZ registers ORIGTRM and INTRM (with their respective extension registers). In International offices this factor is the sum of OTS registers ORGTRM, INCTRM, and SYSTRM, with extension registers.

## Diagnostics

To locate the PMs affected by the blocking examine OM groups LMD (register TERMBLK) and PMOVLD (register PTRMDENY). If the LCDs concerned are remotes, check the health of their links in OM group DS1CARR (PMCARR in International offices). Review real-time loading of LCMs and LGCs and traffic usage of PM links. Check LINE138, TRK138, PM128, and PM106 logs.

# Aggergate index LINOUTFL

## Section

MTCESERV

## Description

Line outage failure

## Definition

The summary of the extent to which calls fail to terminate on line because of maintenance conditions.

## Diagnostics

None

# Basic index TLINOUT

## Section

MTCESERV

## Description

Terminate line outage

## Definition

The proportion of calls unable to terminate on the lines to which they were routed because these lines were in a maintenance busy state. Examples of these busy states are manual busy, LM busy, cutoff, seized, unloaded, and restricted idle.

DMS-100G Switch does not contribute to or provide an equivalent of

- OM group OFZ, measurement INTRM
- OM group OFZ LMD, measurements PERCLFL

## Measurement list

TLINOUT is based on SYSPERF TRMLNFL.

## Normalizer

The normalizing factor for TLINOUT is the sum of the OFZ registers ORIGTRM and INTRM (with their respective extension registers). In International offices this factor is the sum of OTS registers ORGTRM, INCTRM, and SYSTRM, with extension registers.

## Diagnostics

Check MTCEPERF indices LMUOUT, LCMUOUT, XPMUOUT, and LINEOUT to locate the source of the outage. Review maintenance procedures with a view to increasing the availability of the components concerned.

# Basic index RNGFL

## Section

MTCESERV

## Description

Ringing failure

## Definition

The proportion of terminating calls given treatment as a result of ringing failure.

DMS-100G Switch does not contribute to or provide an equivalent of

- OM group LMD
- OM group OFZ, measurements INTRM

## Measurement list

RNGFL is based on the sum over all tuples of LMD PERCLFL.

## Normalizer

The normalizing factor for RNGFL is the sum of the OFZ registers ORIGTRM and INTRM (with their respective extension registers). In International offices this factor is the sum of OTS registers ORGTRM, INCTRM, and SYSTRM, with extension registers.

## Diagnostics

To locate LCDs with a high incidence of ringing problems relative to terminating attempts (register NTERMATT), look at OM group LMD, register PERCLFL. See also OM group PM, registers PMRGERR and PMRGFLT. Check logs LINE107, LINE110, and LINE113.

# Aggregate index CUTOFFS

## Section

MTCESERV

## Description

Call cutoffs

## Definition

The summary of the degree to which calls are cut off after they have been connected. Cutoffs occurring before this point are included in the events indexed by MISCFL. CUTOFFS applies to calls that are ringing or awaiting downstream answer as well as those with conversation in progress.

## Diagnostics

None

# Aggergate index CTLCTO

## Section

MTCESERV

## Description

Cold restart call cutoffs

## Definition

The summary of cutoffs of connected calls because of cold restarts in central or peripheral controllers. Warm restarts do not affect connected calls and their effects are therefore not included in CTLCTO.

## Diagnostics

None

# Basic index CCCTO

## Section

MTCESERV

## Description

Central control call cutoffs

## Definition

The proportion of calls cut off because of a cold restart of the active central controller.

DMS-100G Switch does not contribute to or provide an equivalent of

- OM group CP, measurment CINITC
- OM group OFZ, measurements INTRM and INOUT

## Measurement list

CCCTO is based on the measurement CP CINITC. Since this measurement counts all CCBs in use at the time of the restart, it includes calls being set up as well as those established.

## Normalizer

The normalizing factor for CCCTO is the sum of OFZ registers ORGTRM, INTRM, ORIGOUT, INOUT, TOPSTRAF, and TOPSTRK (with their respective extension registers). In International offices, this factor is the sum of OTS registers ORGTRM, INCTRM, SYSTRM, ORGOUT, INCOUT, and SYSOUT, with extension registers.

## Diagnostics

To determine the cause of the CC restart and prevent recurrences, obtain ESAC/TAS help. Notify higher-level or manufacturer technical support groups immediately about any unexpected CC restarts; save log messages and OMs from the period in question.

# Basic index PMCTO

## Section

MTCESERV

## Description

Peripheral module call cutoffs

## Definition

The proportion of calls cut off as a result of PM failure.

DMS-100G Switch does not contribute to or provide an equivalent of

- OM group CP, measurment CINITC
- OM group OFZ, measurements INTRM, and INOUT
- OM group PMPTY, measurements PMTMBTCO and PMTSBTCO

## Measurement list

PMCTO is based on the sum of PMTYP PMTMBTCO plus PMTSBTCO, summed over all PM types in the office.

## Normalizer

The normalizing factor for PMCTO is the same as that for CCCTO.

## Diagnostics

Poor values of PMCTO should be associated with poor values of MTCEPERF indices PMTOTFLT and PMTOUOUT. Check OM group PM to determine the particular PMs at fault. Review procedures for monitoring and clearing troubles on PMs before they lead to outage and for minimizing the length of outage. Check call cutoff when PM is system busied.

# Basic index INTEGFL

## Section

MTCESERV

## Description

Integrity failure

## Definition

The proportion of calls in ringing or talking state that are cut off because of a loss of cross-switch path integrity detected and reported by a PM. Index

DMS-100G Switch does not contribute to or provide an equivalent of

- OM group SYSPERF
- OM group OFZ, measurements INOUT and INTRM

## Measurement list

INTEGFL is based on SYSPERF CINTEGFL.

## Normalizer

The normalizing factor for INTEGFL is the same as for CCCTO.

## Diagnostics for NT40 and SuperNode

The same network hits and faults that influence INTEGFL may cause lower values of index NETBLK (described above) and of MTCEPERF index NMSPCHFL. See the maintenance-related follow-up advice given for index NETBLK. Also check logs LINE104, TRK113, and TOPS102.

## Diagnostics for ENET

If JNET is the active network, the same network hits and faults that influence INTEGFL may cause lower values of index NETBLK and of MTCEPERF indices NMSPCHER and NMSPCHFL. If ENET is the active network, indices ENLKERR and ENLKFLT may have lower values. See the maintenance-related diagnostics given for index NETBLK.

# Aggregate index C7MSUPF

## Section

MTCESERV

## Description

CCS7 messaging

## Definition

The C7MSUPF index measures the performance of the message signal units (MSU). Information is provided on the MSU lost by the message transfer part (MTP) and MSU received by the signaling connection control part (SCCP) that could not be routed.

## Diagnostics

None

# Basic index C7MSUFL

## Section

MTCESERV

## Description

CCS7 message signal units (MSU) failure

## Definition

C7MSUFL monitors the number of MSUs lost and discarded by the message transfer part (MTP).

DMS-100G Switch does not contribute to or provide an equivalent of

- OM group C7LINK2, measurement C7MSUTX, C7MSUTX2, C7MSURX, C7MSURX2, C7MSUSC, C7MSUSC1, C7MSUSC2, and C7MSUSC3

## Measurement list

C7MSUFL is the sum of measurements C7MSUDSC, C7MSUDC1, C7MSUDC2, and C7MSUDC3 of OM group C7LINK2.

## Normalizer

C7MSUFL is normalized by the total number of MSUs being transmitted and received by the signaling terminal (ST). The measurements affected are C7MSUTX, C7MSUTX2, C7MSURX, C7MSURX2 of OM group C7LINK2.

## Diagnostics

Verify OM group C7LINK2, registers C7MSUDSC, C7ONSET1, C7ONSET2, C7ONSET3, C7MSUDC1, C7MSUDC2, C7MSUDC3, OM group C7LINK3, register C7MSUBOV, and OM group C7MTP, registers C7MSIDPC and C7MSISIO. If this index is consistently low, take action to improve link transmission, or decrease the traffic load on the link. See CCS173 log for further information.

# Basic index C7SCCPMP

## Section

MTCESERV

## Description

CCS7 SCCP layer messaging

## Definition

C7SCCPMP measures the number of messages received by the SCCP routing control (SCRC) that could not be routed. The messages received by the SCRC could arrive from the link through the message transfer part (MTP) or from a local subsystem through SCCP connectional control (SCLC).

DMS-100G Switch does not contribute to or provide an equivalent of OM group C7CCPMP, measurement C7RTFALL, C7MSGHDL, and C7MSGHDL2

## Measurement list

C7SCCPMP uses measurement C7RTFALL of OM group C7SCCP.

## Normalizer

C7SCCPMP is normalized by the total number of messages handled by the SCRC. The affected fields are C7MSGHDL and C7MSGHD2 of OM group C7SCCP.

## Diagnostics

Verify OM group C7SCCP, registers C7RTFALL, C7RTFNTN, C7RTFNTA, C7RTFNWF, C7RTFNWC, C7RTFSSC, and C7RTFUEQ. See logs CCS201, CCS202, CCS203, CCS204, and CCS205 for further information.

# Aggregate index PROVSERV

## Section

PROVSERV

## Description

Provisioning service

## Definition

The summary of the contribution of traffic provisioning to service, as experienced by the caller.

## Diagnostics

None

# Aggregate index PROVACCS

## Section

PROVSERV

## Description

Provisioning access

## Definition

The summary of the quality of subscriber access to the switch as it is influenced by traffic provisioning.

## Diagnostics

None

# Basic index DTSR

## Section

PROVSERV

## Description

Dial tone speed results

## Definition

The proportion of calls originating at the switch that experience dial tone delay exceeding three seconds.

## Measurement list

DTSR uses the dial tone speed results given in OM groups DTSR, SITE, and SITE2. The measured value is equal to the sum of the delay peg counts reported in these groups. This sum is a mixture to the extent that the switch contains both LMs and newer peripheral types. For a given switch, however, the trend of DTSR over time will give a valid indication of the quality of dial tone service provided by that switch.

## Normalizer

The normalizing factor for DTSR is the sum over all sites and line types of the call attempt counts reported in OM groups DTSR, SITE, and SITE2. For LMs, the call attempt counts are counts of the number of test calls made. For other peripheral types, the attempt counts are counts of actual calls made.

## Diagnostics

Check SERVICE indices PMDNY, MISCDNY, and ORGPMBLK; MTCEPERF index RCVRPERF; and PROVRES indices CCOCCUP, CCBOVFL, CPLOVFL, CPMAXBSY, RCVRDGOV, UTROVFL, and NETCHOVF to locate the source of the delays. Take action as suggested for the indices concerned. Use the ALMSTAT command with NODE or ALL parameter, issued by individual PM.

# Basic index PMDNY

## Section

PROVSERV

## Description

Central control reset

## Definition

The proportion of line and XPM trunk originations not processed by peripherals because the peripherals are overloaded. It also includes the sum of incoming digitone, dial-pulse, multi-frequency, and other attempts (OM register DPATMPT, DTATMPT, MFATMPT, OTHATMPT) from OM group ISDD. ISDD reports the incoming start-to-dial delay measurements collected on a per XPM basis by DTCs, LTCs, and RCCs with trunks. The number of seizures, call attempts, delays, and abandons are kept for signal types DP, DT, MF, and “other.” XPMs, with incoming or two-way trucks, collect these OM measurements and transmit them in one unsolicited data message to the CC every five or fifteen minutes.

DMS-100G Switch does not contribute to or provide an equivalent of

- OM group PMOVLD, measurement PORGDENY
- OM group OFZ, measurements NIN, and NIN2

## Measurement list

PMDNY uses measurement PMOVLD PORGDENY, summed over all peripherals reported in PMOVLD.

## Normalizer

The normalizing factor for PMDNY is that portion of total originating attempts at LCMs and XPMs, plus the sum of PMOVLD PORGDENY.

## Diagnostics

Ensure that real-time loading of the PMs reporting call denials in OM group PMOVLD follows recommended standards for the software releases contained in the PMs and the traffic mix served. Determine the latter from OM group LMD. Check PM128 and PM1027 logs.

# Basic index MISCDNY

## Section

PROVSERV

## Description

Line and trunk originations denied

## Definition

The number of line and trunk originations rejected by the CC prior to the granting of dial tone or start-to-dial signaling, as a proportion of total call attempts on the switch.

DMS-100G Switch does not contribute to or provide an equivalent of

- OM group CP, measurement CPOOVFL
- OM group OFZ, measurements NIN, NIN2, and INLKT

## Measurement list

MISCDNY uses the sum of OFZ ORIGLKT and INLKT, CP ORIGDENY, CP2 INEFDENY, CCBOVFL and CPLOOVFL, minus the total of LMD ORIGBLK over all tuples in LMD. In International offices, MISCDNY uses the sum of OTS ORGLKT, OTS SYSLKT, and OTS INCLKT, minus the treatment count TRMTCU TCUORSS.

## Normalizer

MISCDNY is normalized by total call attempts.

## Diagnostics

Check MTCEPERF index RCVRPERF and PROVRES indices CCOCCUP, CCBOVFL, CPLOVFL, CPMAXBSY, RCVRMFOV, and NETCHOVF to locate the source of the failures. Take action as suggested for the indices concerned.

# Basic index MISCBLK

## Section

PROVSERV

## Description

Call blockage

## Definition

MISCBLK indexes calls not served because of the lack of a software resource such as an extension block, or the lack of a service circuit or free operator position.

DMS-100G Switch does not contribute to or provide an equivalent of

- OM group TRMTRS
- OM group OFZ, measurements NIN, NIN2, INABNM, INABNC, PSGM, and PDLM

## Measurement list

MISCBLK is based on the sum of TRMTRS treatment counts TRSNOSR, TRSNOSC, TRSSORD, TRSCQOV, and TRSEMR3 through TRSEMR6, plus TRMTCM TCMATBS.

## Normalizer

The normalizing factor for MISCBLK is total call attempts minus the sum of abandoned calls OFZ INABNM, INABNC, and ORIGABN, minus failures before dial tone OFZ ORIGLKT. In International offices, the subtracted quantities are replaced by OTS INCABNM, INCABNC, SYSABDN, ORGABDN, and ORGLKT minus TRMTCU TCUORSS.

## Diagnostics

Many of the indices of the PROVRES hierarchy relate to MISCBLK. If high levels of MISCBLK persist, review traffic provisioning for the software or hardware components identified by unfavorable PROVRES utilization or overflow indices.

Some information may be provided by analysis of LINE138 and TRK138 logs (NOSR, NOSC, SORD CQOV, EMR3 through EMR6, TRMTCM, TCMATBS) for the treatments covered by MISCBLK, provided logging for these treatments has been enabled in the various sub-tables of table TMTCNTL.

# Aggregate index TRKPROV

## Section

PROVSERV

## Description

Trunk provisioning

## Definition

The summary of the extent of call blocking because of conditions in the trunking network.

## Diagnostics

None

# Basic index NWMBLK

## Section

PROVSERV

## Description

Network management treatment

## Definition

The proportion of outgoing calls given treatment as a result of network management controls.

GSF does not contribute to or provide an equivalent of:

- OM group TRMTRS
- OM group OFZ, measurements INOUT and INOUT2

## Measurement list

NWMBLK is based on the sum of treatment counts TRMTRS TRSEMR1, TRSEMR2, TRSNCRT and TRSTOVD.

## Normalizer

The normalizing factor for NWMBLK is the sum of OFZ registers ORIGOUT and INOUT, plus TOPSTRK (all with their respective extension registers). In International offices, this factor is the sum of OTS registers ORGOUT, INCOUT, and SYSTOUT, with extension registers.

## Diagnostics

Review conditions requiring imposition of network management controls to see if corrective action is called for. Review network management procedures to ensure that controls are removed when no longer needed.

For details on which destinations are affected by the blocking, examine the network-management-related registers PREU, DREU, and DEFLDCA of OM group TRK, the contents of OM groups CBK, ICBK IHTRP IPRP, NPAPEG, NWMSILC, PRP, and RRTE, and registers TOPSQ QDEF and AOSS AOSSQDEF. Further information may be generated by the analysis of TRK138 and LINE138 logs if they have been enabled for the treatments counted by NWMBLK in the various sub-tables of table TMTCNTL.

# Basic index FINALBSY

## Section

PROVSERV

## Description

Final trunk busy

## Definition

The proportion of outgoing calls given treatment because no trunk is available in the final trunk group of their route list.

DMS-100G Switch does not contribute to or provide an equivalent of

- OM group TRMTRS
- OM group OFZ, measurements INOUT and INOUT2

## Measurement list

FINALBSY is based on the sum of treatment counts TRMTRS TRSGNCT and TRSNECG.

## Normalizer

The normalizing factor for FINALBSY is the sum of OFZ registers ORIGOUT and INOUT, plus TOPSTRAF TOPSTRK (all with their respective extension registers). In International offices, this factor is the sum of OTS registers ORGOUT, INCOUT, and SYSOUT, with extension registers.

## Diagnostics

Review provisioning of outgoing trunks. For further breakdown of the type of traffic affected by the blocking, check the various registers of OFZ2 (SOTS in International offices). To identify trunk groups with high overflow, use the ACHREP OMRS report, or examine the NOVFLATB field of OM group TRK. However, blocked calls result only if the overflows are from final trunk groups. These must be identified from routing lists.

Further information may be generated by the analysis of TRK138 (GNCT) and LINE138 logs if they have been enabled for the treatments counted by FINALBSY in the various sub-tables of the table TMTCNTL.

# Aggregate index INTFEATR

## Section

PROVSERV

## Description

International feature

## Definition

The summary of International subscriber feature performance on the switch. The performance of other International features can be confirmed through EXTBLKS indices.

## Diagnostics

None

# Basic index ICONFOVF

## Section

PROVSERV

## Description

International conference features

## Definition

The ratio of the number of times a subscriber is unable to engage a three-port or six-port conference circuit because of a lack of system resource.

## Measurement list

ICONFOVF uses measurements TWCOVRFL and SWCOVFL of OM group ICONF.

## Normalizer

ICONFOVF is normalized by measurements TWCOVRFL, SWCOVFL, TWCUSGE and SWCUSGE of group ICONF.

## Diagnostics

Check OM group ICONF, the availability of the three- and six-port conference circuits, and indices CCBOVFL and FTRDATXO. Further information may be provided by log FTR138.

# Basic index ICWTOVFL

## Section

PROVSERV

## Description

International call waiting overflow

## Definition

The number of times insufficient resources prevent calls from waiting on a subscriber’s line.

## Measurement list

ICWTOVFL uses measurement CWTOVFL of OM group ICWT.

## Normalizer

ICWTOVFL is normalized by the measurements CWTUSGE and CWTOVFL of OM group ICWT.

## Diagnostics

Check OM group ICWT, indices INTLCCMO and FTRDATXO and application of Call Waiting Tone or audible ringing to the subscriber. Further information may be provided by log FTR138.

# Basic index IFDLOVFL

## Section

PROVSERV

## Description

International fixed destination line

## Definition

The number of times a subscriber cannot be routed to HTL or WLN destinations because of data corruption or software errors.

## Measurement list

IFDLOVFL uses measurement HTLOVFL and WLNOVFL of OM group IFDL.

## Normalizer

IFDLOVFL is normalized by measurements HTLUSGE, WLNUSGE, HTLOVFL, and WLNOVFL of OM group IFDL.

## Diagnostics

Check OM group IFDL and index FTRDATXO.

# Basic index IWUCOVFL

## Section

PROVSERV

## Description

International wakeup call overflow

## Definition

The number of times a wakeup attempt could not be performed because of insufficient wakeup feature storage or call processing resources.

## Measurement list

IWUCOVFL is calculated from two registers of the OM group IWUC (WUCOVFL, WUCNRSC).

## Normalizer

IWUCOVFL is normalized by measurement WUCUSGE, WUCOVFL, and WUCNRSC of group IWUC.

## Diagnostics

Check OM group IWUC (WUCOVFL, WUCNRSC) and index FTRDATXO.

# Basic index C7GTWERR

## Section

PROVSERV

## Description

CCS7 STP gateway screening failures

## Definition

C7GTWERR provides information on the number of message signal units (MSUs) that caused errors in the screening function. In this case, the MSUs that were to be blocked by the screening process went through to the LIU7 peripherals.

## Measurement list

C7GTWERR uses measurement MSUSCRER of OM group C7GTWSCR.

## Normalizer

C7GTWERR is normalized by the total number of MSUs received and transmitted. The affected fields are C7MSUTX, C7MSUTX2, C7MSURX, and C7MSURX2 of OM group C7LINK2.

## Diagnostics

Verify OM group C7GTWSCR, field MSUSCRER. See log CCS503 for further information. Review datafill for tables C7GTWLKS, C7ALWOPC, C7BLKOPC, C7ALWDPC, C7BLKDPC, C7ALWSIO, C7DSTFLD, C7CGPA, C7ALWGTT, C7CDPA, and C7AFTPC.

# SPMS MTCEPERF index descriptions

The following chapter provides index descriptions for the MTCEPERF branch of SPMS. The maintenance performance index (MTCEPERF) summarizes switch performance as it would be observed by those in direct contact with the switch. The high level MTCEPERF index has four main branches, the control index (CONTROL), bill performance index (BILLPERF), link performance index (LINKPERF), and terminals index (TERMNALS).

## Where to find an index

This chapter provides descriptions for each aggregate and basic index that contribute to the MTCEPERF branch of SPMS.

The index descriptions are organized according to the DMS-100 hierarchy shown in Figure 3-2, SPMS structure for DMS-100. The indices shown in this figure supply information for an NT40 switch. Because many of the indices that pertain to an NT40 switch also pertain to a SuperNode switch and an enhanced network (ENET), the DMS-100 indices are not individually identified by switch type.

The index descriptions specifically provided for a SuperNode switch are identified as SuperNode components. These indices cannot function on an NT40 switch. See Figure 3–3, SPMS structure for SuperNode, for the index hierarchy that applies to a SuperNode switch.

The ENET and DMS-100G Switch indices are identified like the SuperNode indices. See Figure 3–4, SPMS structure for ENET switch indices, and Figure 3-5 , for SPMS structure for DMS-100G Switch indices.

See the Index for an alphabetical list of all the indices.

## How the indices are presented

This chapter contains aggregate and basic index descriptions for the MTCEPERF branch of SPMS.

The following headings appear in each description of an aggregate index:

- section

- description
- definition
- diagnostics

The information under these headings explains:

- the section below the MTCEPERF branch to which the index belongs
- the expansion of the index name
- the function and purpose of the index
- the steps required to locate switch problem

The following headings appear in each description of a basic index:

- section
- description
- definition
- measurement list
- normalizer
- diagnostics

The information under these headings explains:

- the section below the MTCEPERF branch to which the index belongs
- the expansion of the index name
- the function and purpose of the index
- the combination of indices that contribute to the index in question based on a mathematical calculation performed by SPMS
- the appropriate weighting factors applied to an index based on OMS, and the frequency and importance of the index being examined
- the steps required to locate the switch problem

# Aggregate index MTCEPERF

## Section

The maintenance performance (MTCEPERF) index is a top level office performance (OFCPERF) index. The maintenance performance index derives data from the control (CONTROL), bill performance (BILLPERF), link performance (LINKPERF), and terminals (TERMNALS) indices.

## Description

Maintenance performance

## Definition

The maintenance performance index (MTCEPERF) summarizes three general categories of component performance: error rates, failure rates, and unavailability. Errors are usually related to call volume. Failure rates are generally per unit equipment per unit time. Finally, unavailabilities are computed as manual-busy plus system-busy unit outage per unit equipment per unit time. For components of lesser importance, only one or two of these measures is presented. Within MTCEPERF the switch is seen as a collection of three broad categories of components: control sub-systems, intra-switch messaging and speech links, and terminals.

## Diagnostics

None

# Aggregate index Control

## Section

CONTROL

## Description

System control

## Definition

The performance summary of the major components of system control: the central controllers (CC), the central message controller (CMC), the input/output device controller (IOC), the network module controllers (NMC), and the peripheral module controllers (PMC).

## Diagnostics

None

# Aggregate index CCPERF

## Section

CONTROL

## Description

Central controller performance

## Definition

The summary of the maintenance performance of central controllers (CCs), program and data store, and the CC-CMC data links.

## Diagnostics

Diagnose error or fault conditions promptly at the CC and subtending levels of the MAP. Look for detailed information in CC subsystem logs.

# Basic index CCERRINT

## Section

CONTROL

## Description

Central control error interrupts

## Definition

The frequency of mismatch interrupts caused by problems in the CC, in a portion of program or data store, or on a CC-CMC data link.

## Measurement list

CCERRINT uses measurement CPU MTCHINT.

## Normalizer

CCERRINT is normalized per unit time.

## Diagnostics

None

# Basic index CCFLT

## Section

CONTROL

## Description

Central control fault

## Definition

The failure rate of CC, memory, and CC-CMC data port hardware.

## Measurement list

CCFLT uses measurement CPU CPUFLT.

## Normalizer

CCFLT is normalized per unit time.

## Diagnostics

None

# Basic index CCNOSYNC

## Section

CONTROL

## Description

Central controller not synchronized

## Definition

The amount of time during which the Central Controllers (CCs) are running unsynchronized.

## Measurement list

CCNOSYNC uses the sum of CPU MSYLOSSU and SSYLOSSU.

## Normalizer

CCNOSYNC is normalized per unit time. Check logs CC102 and CC110.

## Diagnostics

None

# Aggregate index CMCPERF

## Section

CONTROL

## Description

Central message controller performance

## Definition

The summary of the maintenance performance of both the central message controller (CMC) and the system clocks attached to it.

## Diagnostics

Diagnose promptly the error and fault conditions at the CMC and SYNCK levels of the MAP. Look for detailed information in CMC subsystem logs.

# Basic index CMCERR

## Section

CONTROL

## Description

Central message controller errors

## Definition

The per-call occurrence of transient and persistent faults in the central message controller (CMC) and system clock hardware.

## Measurement list

CMCERR uses measurement CMC CMCERR, summed over both CMCs.

## Normalizer

CMCERR is normalized by total call attempts on the switch.

## Diagnostics

Verify OM group CMC (CMCERR). Diagnose error conditions promptly at the CMC or SYNCLK levels of the MAP. Look for detailed information in CMC subsystem logs LOST101, LOST102, LOST104, LOST105, LOST107, and CMC102.

# Basic index CMCFLT

## Section

CONTROL

## Description

Central message controller faults

## Definition

The unit failure rate of the CMC and system clock hardware.

## Measurement list

CMCFLT uses measurement CMC CMCFLT, summed over both CMCs.

## Normalizer

CMCFLT is normalized per unit per unit time. The number of CMC units is always two.

## Diagnostics

Check logs SYNC103, SYNC104, CMC111, CMC107, CC104, and CMC110.

## Basic index CMCUSOUT

### Section

CONTROL

### Description

Central message controller unit system outage

### Definition

The unavailability of CMCs and their associated system clocks as a result of system action.

### Measurement list

CMCUSOUT uses the sum of CMC measurement CMCSBU totalled over both CMCs.

### Normalizer

CMCUSOUT is normalized per unit per unit time. The number of CMC units is always 2.

### Diagnostics

Verify OM group CMC (CMCSBU). Diagnose error and fault conditions promptly at the CMC or SYNCLK levels of the MAP. Look for detailed information in the CMC subsystem logs CMC101 and CMC102.

# Basic index CMCUMOUT

## Section

CONTROL

## Description

Central message controller unit manual outage

## Definition

The unit unavailability of CMCs and their associated system clocks as a result of manual action.

## Measurement list

CMCUMOUT uses the sum of CMC measurement CMCSBU totalled over both CMCs.

## Normalizer

CMCUMOUT is normalized per unit per unit time. The number of CMC units is always two.

## Diagnostics

Verify OM group CMC (CMCMBU) and ensure it agrees with manual maintenance being carried out on the CMCs or their associated clocks.

# Aggregate index IOCPERF

## Section

CONTROL

## Description

Input/output controller performance

## Definition

The summary of the maintenance performance of input/output controllers.

## Diagnostics

Diagnose error and fault conditions at the IOC and relevant levels of the MAP. Look for detailed information in the input/output device (IOD) logs.

# Basic index IOCERR

## Section

CONTROL

## Description

Input/output controller error

## Definition

The frequency of transient and persistent malfunctions of input/output controllers.

## Measurement list

IOCERR uses measurement IOC IOCERR.

## Normalizer

IOCERR is normalized per working IOC per unit time.

## Diagnostics

Verify OM group IOC (IOCERR). Diagnose error conditions at the IOC and relevant levels of the MAP. Look for detailed information in IOD subsystem logs IOD115, IOD120, IOD123, IOD124, IOD125, IOD126, IOD127, IOD104, IOD118, and IOD119.

# Basic index IOCFLT

## Section

CONTROL

## Description

Input/output controller fault

## Definition

The unit failure rate of input/output controllers.

## Measurement list

IOCFLT uses measurement IOC IOCFLT.

## Normalizer

IOCFLT is normalized per working IOC per unit time.

## Diagnostics

Verify OM group IOC (IOCFLT). Diagnose error conditions at the IOC and relevant levels of the MAP. Look for detailed information in IOD subsystem logs IOD104, IOD116, IOD118, IOD119, IOD124, IOD125, IOD126, IOD127, IOD109, IOD113, and IOD129.

# Basic index IOCUSOUT

## Section

CONTROL

## Description

Input/output controller (IOC) unit system outage

## Definition

The unit unavailability of IOCs.

## Measurement list

IOCUSOUT uses the sum of IOC measurement IOCSBU.

## Normalizer

IOCUOSUT is normalized per working IOC per unit time.

## Diagnostics

Verify OM group IOC (IOCSBU). Diagnose error and fault conditions at the IOC and relevant levels of the MAP. Look for detailed information in IOD subsystem logs IOD103 and IOD104.

# Basic index IOCUMOUT

## Section

CONTROL

## Description

Input/output controller (IOC) unit manual outage

## Definition

The unit unavailability of IOCs.

## Measurement list

IOCUMOUT uses the sum of IOC measurement IOCMBU.

## Normalizer

IOCUMOUT is normalized per working IOC per unit time.

## Diagnostics

Verify OM group IOC (IOCMBU) to ensure that these results agree with manual maintenance being performed.

# Aggregate index EIOCPERF

## Section

CONTROL

## Description

Enhanced input/output controller performance

## Definition

The summary of the maintenance performance of enhanced input/output controller links. This index is based on OM group EIOC for switches with an EIOC.

## Diagnostics

Check EIO logs and OM group EIOC for further information.

# Basic index EIOCERR

## Section

CONTROL

## Description

Enhanced input/output controller error

## Definition

The frequency of transient and persistent malfunctions of EIOC Links.

## Measurement list

EIOCERR is calculated from the value of OM register EIOCERR of OM group EIOC.

## Normalizer

EIOCERR is normalized per working EIOC per unit time.

## Diagnostics

Verify OM group EIOC (EIOCERR). Further information may be provided by logs EI0115, EI0116, EI0117, EI0124, EI121, EI0125, EI0126, and EI0127.

# Basic index EIOCFLT

## Section

CONTROL

## Description

Enhanced input/output controller fault

## Definition

The card failure rate of EIOC.

## Measurement list

EIOCFLT is calculated from the value of OM register EIOCFLT of OM group EIOC.

## Normalizer

EIOCFLT is normalized per working EIOC per unit time.

## Diagnostics

Verify field EIOCFLT of OM group EIOC. Refer to index EIOCERR for information on logs.

# Basic index EIOCUSOU

## Section

CONTROL

## Description

Enhanced input/output controller (EIOC) system unit outage

## Definition

The CARD unavailability of EIOC links.

## Measurement list

EIOCUSOU uses the sum of EIOC measurement EIOCSBU.

## Normalizer

EIOCUSOU is normalized per working EIOC per unit time.

## Diagnostics

Verify OM group EIOC (EIOCSBU). Check for logs EIO115, EIO116, EIO117, EIO121, EIO124, EIO125, EIO126, and EIO127.

# Basic index EIOCUMOU

## Section

CONTROL

## Description

Enhanced input/output controller (EIOC) manual unit outage

## Definition

The CARD unavailability of EIOC links.

## Measurement list

EIOCUMOU uses the sum of EIOC measurement EIOCMBU.

## Normalizer

EIOCUMOU is normalized per working EIOC per unit time.

## Diagnostics

Verify OM group EIOC (EIOCMBU) and ensure that these results agree with manual maintenance being performed.

# Aggregate index NMCPERF

## Section

CONTROL

## Description

Network message controller performance

## Definition

The summary of the maintenance performance of network module controllers.

## Diagnostics

Diagnose network module controller error and fault conditions at the NET level of the MAP. Look for detailed information in NET and NETM subsystem logs.

# Basic index NMCERR

## Section

CONTROL

## Description

Network message controller error

## Definition

The per-call occurrence of transient and persistent malfunctions of network module controllers.

## Measurement list

NMCERR uses measurement NMC NMCERR.

## Normalizer

NMCERR is normalized by total call attempts on the switch.

## Diagnostics

Verify OM group NMC (NMCERR). Diagnose network module controller error conditions at the NET level of the MAP. Look for detailed information in NET subsystem log NETM128.

# Basic index NMCFLT

## Section

CONTROL

## Description

Network message controller fault

## Definition

The unit failure rate of network module controllers.

## Measurement list

NMCFLT uses measurement NMC NMCFLT.

## Normalizer

NMCFLT is normalized per working NM controller per unit time. The number of working NM controllers is equal to the number of working NMs doubled (two planes per NM).

## Diagnostics

Verify OM group NMC (NMCFLT). Diagnose the network module controller for fault. For further information look at PM subsystem logs NETM112, NETM128, NETM116, NETM120, NETM122, and NETM126.

## Basic index NMCUSOUT

### Section

CONTROL

### Description

Network message controller unit system outage

### Definition

The unit system unavailability of network module controllers.

### Measurement list

NMCUSOUT uses the sum of NMC measurement NMSBU.

### Normalizer

NMCUSOUT is normalized per working NM controller per unit time.

### Diagnostics

Verify OM group NMC (NMSBU). For further details look for the following logs: NETM103, NETM104, NETM105, and NETM138.

# Basic index NMCUMOUT

## Section

CONTROL

## Description

Network message controller unit manual outage

## Definition

The unit unavailability of network module controllers.

## Measurement list

NMCUMOUT uses the sum of NMC measurement NMMBU.

## Normalizer

NMCUMOUT is normalized per working NM controller per unit time.

## Diagnostics

Verify OM group NMC (NMMBU) and ensure that these results agree with manual maintenance being performed.

# Aggregate index CMPERF for SuperNode CONTROL components

## Section

CONTROL

## Description

Computing module performance

## Definition

The summary of the maintenance performance of SuperNode computing modules (CM) program and data store.

## Diagnostics

Diagnose error for fault conditions promptly at the CM and relevant levels of the MAP. Look for detailed information in CM and NM subsystem logs.

# Basic index CMERRINT for SuperNode CONTROL components

## Section

CONTROL

## Description

Computing module error interrupts

## Definition

The frequency of mismatch interrupts that result from problems in the CM or in a portion of program or data store.

## Measurement list

CMERRINT uses the sum of CM measurements CMTRMISM and CMDPSYNC.

## Normalizer

CMERRINT is normalized per unit time.

## Diagnostics

Check log MM101.

# Basic index CMFLT for SuperNode CONTROL components

## Section

CONTROL

## Description

Computing module fault

## Definition

The failure rate of the computing module and the associated memory hardware.

## Measurement list

CMFLT uses the sum of CM measurements CMCPUFLT, CMMEMFLT, CMSSCFLT, CMMCSBSY, CMRMEMFL, CMRCPUFL, and CMRLNKFL.

## Normalizer

CMFLT is normalized per unit time.

## Diagnostics

Check logs CM125, CM112, CM104, and CM122.

# Basic index CMNOSYNC for SuperNode CONTROL components

## Section

CONTROL

## Description

Computing module not synchronized

## Definition

The time intervals during which the CMs are running unsynchronized.

## Measurement list

CMNOSYNC uses the sum of CM measurements CMMSMPXU and CMSSMPXU.

## Normalizer

CMNOSYNC is normalized per unit time.

## Diagnostics

Check logs CM102, CM117, CM120, MM100, and MM101.

# Aggregate index MSPERF for SuperNode CONTROL components

## Section

CONTROL

## Description

Message switch performance

## Definition

The summary of the maintenance performance of the message switch (MS) node resources.

## Diagnostics

Diagnose error and fault conditions promptly at the MS level of the MAP. Look for detailed information in MS subsystem logs.

# Basic index MSERR for SuperNode CONROL components

## Section

CONTROL

## Description

Message switch error

## Definition

The per-call occurrence of transient and persistent faults in MS node resource hardware.

## Measurement list

MSERR uses measurement MS MSERR, summed over both message switches.

## Normalizer

MSERR is normalized by total call attempts on the switch.

## Diagnostics

Check log MS103.

# Basic index MSFLT for SuperNode CONTROL components

## Section

CONTROL

## Description

Message switch fault

## Definition

The unit failure rate of MS node resource hardware.

## Measurement list

MSFLT uses measurement MS MSFLT, summed over both message switches.

## Normalizer

MSFLT is normalized per unit per unit time. The number of MS nodes is always two.

## Diagnostics

Check log MS103.

# Basic index MSUSOUT for NETWORK INDEX components

## Section

CONTROL

## Description

Message switch (MS) unit system outage

## Definition

The unit unavailability of MS nodes as a result of system action.

## Measurement list

MSUSOUT uses the sum of MS measurement MSSBU totalled over both message switches.

## Normalizer

MSUSOUT is normalized per unit per unit time. The number of MS nodes is always two.

## Diagnostics

Verify OM group MS (MSSBU). Diagnose error and fault conditions promptly at the MS level of the MAP. Look for detailed information in the MS subsystem logs.

# Basic index MSUMOUT for SuperNode CONTROL components

## Section

CONTROL

## Description

Message switch unit manual outage

## Definition

The unit unavailability of MS nodes as a result of manual action.

## Measurement list

MSUMOUT uses the sum of MS measurements MSMBU totalled over both message switches.

## Normalizer

MSUMOUT is normalized per unit per unit time. The number of MS nodes is always two.

## Diagnostics

Verify OM group MS (MSMBU) and ensure that the results in it agree with manual maintenance activity.

# Aggregate index MSCDPERF for SuperNode CONTROL components

## Section

CONTROL

## Description

Message switch card performance

## Definition

The summary of the maintenance performance of the message switch (MS) interface card resources.

## Diagnostics

Diagnose error and fault conditions promptly at the MS level of the MAP. Look for detailed information in MS subsystem logs.

# Basic index MSCDERR for SuperNode CONTROL components

## Section

CONTROL

## Description

Message switch and error

## Definition

The per-call occurrence of transient and persistent faults in MS interface cards.

## Measurement list

MSCDERR uses measurement MS MSCDERR, summed over both message switches.

## Normalizer

MSCDERR is normalized by total call attempts on the switch.

## Diagnostics

Check log MS263.

# Basic index MSCDFLT for SuperNode CONTROL components

## Section

CONTROL

## Description

Message switch card fault

## Definition

The unit failure rate of MS interface cards.

## Measurement list

MSCDFLT uses measurement MS MSCDFLT, summed over both message switches.

## Normalizer

MSCDFLT is normalized per working unduplicated MS interface card per unit time.

## Diagnostics

Check log MS263.

# Basic index MSCDSOUT for SuperNode CONTROL components

## Section

CONTROL

## Description

Message switch card unit system outage

## Definition

The unit system unavailability of MS interface cards.

## Measurement list

MSCDSOUT uses the sum of MS measurement MSCDSBU totalled over both message switches.

## Normalizer

MSCDSOUT is normalized per working unduplicated MS interface card per unit time.

## Diagnostics

Verify OM group MS (MSCDSBU). Look for detailed information in the MS subsystem logs.

# Basic index MSCDMOUT for SuperNode CONTROL components

## Section

CONTROL

## Description

Message switch card unit manual outage

## Definition

The unit unavailability of MS interface cards.

## Measurement list

MSCDMOUT uses the sum of MS measurement MSCDMBU totalled over both message switches.

## Normalizer

MSCDMOUT is normalized per working unduplicated MS interface card per unit time.

## Diagnostics

Verify OM group MS (MSCDMBU) and ensure these results agree with manual maintenance being performed.

# Aggregate index ENETPERF for ENET CONTROL components

## Section

CONTROL

## Description

Enhanced network (ENET) system performance

## Definition

ENETPERF provides a summary of the performance of the ENET system cards.

## Diagnostics

None

# Basic index ENETERR for ENET CONTROL components

## Section

CONTROL

## Description

Enhanced network (ENET) system errors

## Definition

ENETERR monitors the number of errors detected in the ENET system cards.

## Measurement list

ENETERR uses operational measurement ENERR of OM group ENETSYS.

## Normalizer

ENETERR is normalized by the total call attempts made on the switch per day.

## Diagnostics

Verify OM group ENETSYS (ENERR). Log ENET108 may provide additional information.

# Basic index ENETFLT for ENET CONTROL components

## Section

CONTROL

## Description

Enhanced network (ENET) system faults

## Definition

ENETFLT monitors the number of times a system card cannot recover from an error.

## Measurement list

ENETFLT uses operational measurement ENFLT of OM group ENETSYS.

## Normalizer

ENETFLT is normalized by the total call attempts made on the switch per day.

## Diagnostics

Verify OM group ENETSYS (ENFLT). See log ENET103 for additional information.

# Basic index ENETSOUT for ENET CONTROL components

## Section

CONTROL

## Description

Enhanced network (ENET) system-busy shelves.

## Definition

ENETSOUT monitors system-busy ENET shelves.

## Measurement list

ENETSOUT uses operational measurement ENSBU of OM group ENETSYS.

## Normalizer

ENETSOUT is normalized per working shelf per time unit.

## Diagnostics

Verify OM group ENETSYS (ENSBU).

# Basic index ENETMOUT for ENET CONTROL components

## Section

CONTROL

## Description

Enhanced network (ENET) manual-busy shelves

## Definition

ENETMOUT monitors manual-busy ENET shelves.

## Measurement list

ENETMOUT uses operational measurement ENMBU of OM group ENETSYS.

## Normalizer

ENETMOUT is normalized per working shelf per unit time.

## Diagnostics

Verify OM group ENETSYS (ENMBU).

# Aggregate index PMPERF

## Section

CONTROL

## Description

Peripheral module performance

## Definition

The summary of the software and hardware performance of all peripheral modules (PM) in the switch.

To keep a small number of units of one PM type from having a disproportionate effect on total office results, the aggregate index PMTOTPF is the only one contributing to PMPERF and its parents. This is accomplished by giving zero weight to the other PM aggregates when calculating PMPERF as a weighted average.

## Diagnostics

None

# Aggregate index PMTOTPF

## Section

CONTROL

## Description

Peripheral module total performance

## Definition

The summary of unit software and hardware performance of peripheral modules. Every PM unit in the switch is given the same weight.

## Diagnostics

Check the PM OM group for PMs with high error, fault, or outage measurements. For further information, examine the PM subsystem logs. Diagnose error and fault conditions at the PM level of the MAP.

# Basic index PMTOTERR

## Section

CONTROL

## Description

Peripheral module total errors

## Definition

The average per-call frequency of software and hardware malfunctions. Both transient or persistent malfunctions are reported by peripherals attached to the switch.

DMS-100G Switch does not contribute to or provide an equivalent of:

- OM group PMTYP, measurement PMTERR
- OM group OFZ, measurements NIN, and NIN2

## Measurement list

PMTOTERR uses measurement PMTYP PMTERR divided by all peripheral types covered by the TMPERF, DCMPERF, LMPERF, XPMPERF, and LCMPERF indices. PMTOTERR also uses the measurement PMTYP PMTRGFLT divided by the peripheral types covered by LMPERF and LCMPERF indices.

## Normalizer

PMTOTERR is normalized per total call attempts offered to the office.

## Diagnostics

Locate in OM group PM those PMs with high error measurements. For further information refer to logs UTR100, LOST108, LOST109, LOST111, NET102, PM101, PM108, PM113, PM115, PM116, PM117, PM118, PM119, PM121, PM122, PM124, PM125, PM126, PM128, PM150, PM160, PM180, PM194, PM198, TRK123, DDM101, DDM102, DDM104, CCS231, NPAC210, CCS236, DLC101, and MPC906. Diagnose error conditions at the PM level of the MAP.

# Basic index PMTOTFLT

## Section

CONTROL

## Description

Peripheral module total faults

## Definition

The average unit failure rate of peripherals of the switch.

DMS-100G Switch does not contribute to or provide an equivalent of OM group PMTYP measurement PMTFLT

## Measurement list

PMTOTFLT uses measurement PMTYP PMTFLT divided by all peripheral types covered by the TMPERF, DCMPERF, LMPERF, XPMPERF, and LCMPERF indices. PMTOTFLT also uses the measurement PMTYP PMTRGFLT divided by the peripheral types covered by LMPERF and LCMPERF indices.

## Normalizer

PMTOTFLT is normalized per working peripheral unit per unit time.

## Diagnostics

Locate in OM group PM those PMs with high fault measurements. Further information may be provided by subsystem logs PM100, PM101, PM102, PM114, PM117, PM127, PM151, PM161, PM162, PM164, PM180, PM181, PM185, PM199, DLC102, MPC904, DPAC104, and NPAC211. Diagnose fault conditions at the PM level of the MAP.

# Basic index PMTOUSOU

## Section

CONTROL

## Description

Peripheral module total units system outage

## Definition

The average unit unavailability of peripherals of the switch, as a result of system actions.

DMS-100G Switch does not contribute to or provide an equivalent of OM group PMTYP, measurement PMTUSBU

## Measurement list

PMTOUSOU uses PMTYP measurement PMTUSBU, totalled over all peripheral types covered by the TMPERF, DCMPERF, LMPERF, XPMPERF, and LCMPERF indices.

## Normalizer

PMTOUSOU is normalized per working peripheral unit per unit time.

## Diagnostics

Locate in OM group PMTYP (PMTUSBU) and in OM group PM (PMUSBU) those PMs with high outage measurements. For further information, analyze PM subsystem logs PM102, PM105, PM128, PM152, PM182, PM183, PM190, PM191, PM192, CCS234, CCS218, and CCS233.

# Basic index PMTOUMOU

## Section

CONTROL

## Description

Peripheral module total units manual outage

## Definition

The average unit unavailability of peripherals of the switch, as a result of manual actions.

DMS-100G Switch does not contribute to or provide an equivalent of OM group PMTYP,  measurement PMTUSBU

## Measurement list

PMTOMUOU uses PMTYP measurement PMTUMBU, totalled over all peripheral types covered by the TMPERF, DCMPERF, LMPERF, XPMPERF, and LCMPERF indices.

## Normalizer

PMTOUMOU is normalized per working peripheral unit per unit time.

## Diagnostics

Locate in OM group PMTYP (PMTUMBU) and in OM group PM (PMUMBU) those PMs with high outage measurements and ensure that these agree with manual maintenance being performed.  The XPMs included are DTC, LTC, RCC, ILTC, ADTC, PDTC, TDTC, TLTC, TRCC, LGC, ILGC, PLGC, SMR, SMU, CSC, and MSB6.

## Basic index NDTOERR (continued)

### Section

NDPERF

### Description

Node maintenance type errors

### Definition

NDTOERR is the error rate for each equipped node per time unit for in-service and out-of-service nodes.

### Measurement

NDTOERR uses measurement NMTCTYPE NDTERR.

### Normalizer

NDTOERR normalized per node per unit time.

### Diagnostics

Check OM group NMTCTYPE

## Section

NDPERF

## Description

Node maintenance faults.

## Definition

A measurement of faults that persist after system diagnostics have been executed. The index is the equipped node fault rate per time unit.

## Measurement

NDTOFLT uses measurement NMTCTYPE NDTFLT.

## Normalizer

NDTOFLT is normalized per node per time unit.

## Diagnostics

Check OM group NMTCYPE.

## Basic index NDTOOUT (continued)

### Section

NDPERF

### Description

Total node outage.

### Definition

Total equipped node outage (manual busy and system busy) on a node-by-node basis per time unit.

### Measurement

NDTOOUT uses measurements NMTCUNIT NDUMBU and NDUSBU.

### Normalizer

NDTOOUT is normalized per time unit.

### Diagnostics

Check OM group NMTCTYPE.

# Aggregate index APMPF for SuperNode CONTROL components

## Section

CONTROL

## Description

Application processor performance

## Definition

SMNMPF provides a summary of the maintenance performance of the application processor (AP).

## Diagnostics

Diagnose error for fault reporting on the relevant level of the MAP (PM node level and PM plane level). Look at the relevant logs for more information.

# Basic index APTOERR for SuperNode CONTROL components

## Section

CONTROL

## Description

Errors in the application processor

## Definition

The frequency of mismatch interrupts due to software or hardware problems in the application processor.

## Measurement list

SMTOERR uses the sum of the operational measurements APTRMISM and APSDROP in group APSYS.

## Normalizer

SMTOERR is normalized per unit time, per SYNC-matched nodes number.

## Diagnostics

Check logs AP317, AP318 and AP501 for more information.

# Basic index APTOFLT for SuperNode CONTROL components

## Section

CONTROL

## Description

Failure rate in the application processor.

## Definition

Monitors the failure rate of the hardware in the application processor.

## Measurement list

SMTOFLT uses the sum of the operational measurements APCPUFLT, APMEMFLT and APPRTFLT in the group APSYS.

## Normalizer

SMTOFLT is normalized per unit time, per SYNC-matched nodes number.

## Diagnostics

Check logs AP317, AP318, and AP502 for more information.

# Basic index APNOSYNC for SuperNode CONTROL components

## Section

CONTROL

## Description

Unsynchronized application processors

## Definition

Monitors the amount of time during which the application processors run in an unsynchronized mode.

## Measurement list

SMNOSYNC uses the sum of the operational measurements APMSMPXU and APSSMPXU in group APSYS.

## Normalizer

SMNOSYNC is normalized per unit time, per SYNC-matched nodes number.

## Diagnostics

Check logs AP137 and AP138 for more information.

# Aggregate index SOSPMPF

## Section

CONTROL

## Description

SOS-based peripheral module (PM) performance

## Definition

SOSPMPF provides a summary of the performance of the SOS-related peripheral types. The peripheral types monitored are the link interface unit for CCS7 (LIU7) and the link interface module (LIM). The LIU7 and the LIM are collectively referred to as the link peripheral processor (LPP).

## Diagnostics

None

# Basic index SOSPMERR

## Section

CONTROL

## Description

SOS-based peripheral module errors

## Definition

SOSPMERR monitors the per-call occurrence of hardware and software errors, transient or persistent, reported from the peripheral module (PM) types listed in the SOSPMPF index.

## Measurement list

SOSPMERR uses measurements PMTERR of OM group PMTYP, and PM1ERR of OM group PM1 summed over all PM types covered in SOSPMPF index, specifically the link interface unit for CCS7 (LIU7) and the link interface module (LIM).

## Normalizer

SOSPMERR is normalized per working unit per unit time by the PMs covered by the SOSPMPF index.

## Diagnostics

Locate in the PM and PM1 OM groups those PMs with high error measurements. See log PM102 and PM128 for additional information. Check remote logs RLOGTAB and RLOGSYS for possible information.

# Basic index SOSPMFLT

## Section

CONTROL

## Description

SOS-based peripheral module faults

## Definition

SOSPMFLT monitors the failure rate of the peripheral module (PM) types listed in the SOSPMPF index, specifically the link interface unit for CCS7 (LIU7) and the link interface module (LIM).

## Measurement list

SOSPMFLT uses measurements PMTFLT of OM group PMTYP, and PM1FLT of OM group PM1 summed over all the PM types listed in the SOSPNPF index.

## Normalizer

SOSPMFLT is normalized per working unit per unit time by the PMs covered by the SOSPMPF index.

## Diagnostics

Locate in the PM and PM1 OM groups those PMs with high fault measurements. See log PM102 for additional information.

# Basic index SOSPMMOU

## Section

CONTROL

## Description

SOS-based peripheral module manual outage

## Definition

SOSPMMOU monitors the manual availability of the peripheral module (PM) types listed in the SOSPMMOU index.

## Measurement list

SOSPMMOU uses measurements PMTUMBU of OM group PMTYP, and PM1MBU of OM group PM1 summed over all PM types covered in the SOSPMPF index.

## Normalizer

SOSPMMOU is normalized per working unit per unit time by the PMs covered by the SOSPMPF index.

## Diagnostics

Verify OM group PM and PM1. Ensure the results agree with the manual maintenance being performed. Log PM105 indicates a transition into the manual busy state.

# Basic index SOSPMSOU

## Section

CONTROL

## Description

SOS-based peripheral module system outage

## Definition

SOSPMSOU monitors the system availability of the peripheral module (PM) types listed in the SOSPMMOU index.

## Measurement list

SOSPMSOU uses measurements PMTUSBU of OM group PMTYP, and PM1SBU of OM group PM1 summed over all PM types covered in the SOSPMPF index.

## Normalizer

SOSPMSOU is normalized per working unit per unit time by the PMs covered by the SOSPMPF index.

## Diagnostics

Verify OM group PM and PM1. See logs PM102 and PM103 for additional details.

# Aggregate index TMPERF

## Section

CONTROL

## Description

Trunk module performance

## Definition

The summary of the performance of TM-related peripheral types. These include trunk modules 2, 4, and 8, trunk module (8-wire circuit), TMA, package trunk module, maintenance trunk module, remote maintenance module, service trunk module, remote service module, MTMA, test access network, and office alarm unit.

## Diagnostics

To isolate the problem, look at the OM group PM. A high error, fault, or outage measurement will be apparent in one or more of the TM-related peripherals listed above. For further information refer to PM subsystem logs. Diagnose error and fault conditions at the PM level of the MAP.

# Basic index TMERR

## Section

CONTROL

## Description

Trunk module error

## Definition

The per-call occurrence of hardware and software errors, transient or persistent, reported from PM types covered by the TMPERF indices respectively.

## Measurement list

TMERR uses OM measurement PMTYP PMTERR summed over all PM types covered by the index in question.

## Normalizer

TMERR is normalized per total call attempt offered to the office.

## Diagnostics

In OM group PM, locate those TMs with high fault measurements. For further information refer to PM subsystem logs. Diagnose error conditions at the PM level of the MAP. Refer to the PMTOTERR index for more diagnostic information.

# Basic index TMFLT

## Section

CONTROL

## Description

Trunk module fault

## Definition

The failure rate of PM types covered by the TMPERF indices.

## Measurement list

TMFLT uses measurement PMTYP PMTFLT summed over all PM types covered by the index in question.

## Normalizer

TMFLT is normalized per working unit per unit time, where the working units are of the PM types covered by the respective indices.

## Diagnostics

In OM group PM, locate those TMs with high fault measurements. For further information refer to PM subsystem logs. Diagnose fault conditions at the PM level of the MAP. Refer to the PMTOTFLT index for more diagnostic information.

# Basic index TMUSOUT

## Section

CONTROL

## Description

Trunk module (TM) unit system outage

## Definition

The unavailability of PM types covered by the TMPERF indices, as a result of system actions.

## Measurement list

TMUSOUT uses PMTYP measurement PMTUSBU summed over all PM types covered by the index in question.

## Normalizer

TMUSOUT is normalized per working unit per unit time, where the working units are of the PM types covered by each index.

## Diagnostics

In OM group PMTYP (PMTUSBU) and OM group PM (PMUSBU), locate those TMs with high outage measurements. For further information refer to PM subsystem logs (see PMTOUSOU).

# Basic index TMUMOUT

## Section

CONTROL

## Description

Trunk module (TM) unit manual outage

## Definition

The unavailability of PM types covered by the TMPERF indices, as a result of manual actions.

## Measurement list

TMUMOUT uses PMTYP measurement PMTUMBU summed over all PM types covered by the index in question.

## Normalizer

TMUMOUT is normalized per working unit per unit time, where the working units are of the PM types covered by each index.

## Diagnostics

In OM group PMTYP (PMTUMBU) and OM group PM (PMUMBU), locate those TMs with high outage measurements and ensure that this result agrees with manual maintenance being performed.

# Aggregate index DCMPERF

## Section

CONTROL

## Description

Digital carrier module performance

## Definition

The summary of the performance of DCM-related peripheral types. These include digital carrier module, digital carrier module 250, DCMT, and digital echo suppressor.

## Diagnostics

To isolate the problem, look at the OM group PM. A high error, fault, or outage measurement will be apparent in one or more of the DCM-related peripherals listed above. For further information, refer to PM subsystem logs. Diagnose error and fault conditions at the PM level of the MAP.

# Basic index DCMERR

## Section

CONTROL

## Description

Digital carrier module error

## Definition

The per-call occurrence of hardware and software errors, transient or persistent, reported from PM types covered by the DCMPERF indices.

## Measurement list

DCMERR uses measurement PMTYP PMTERR summed over all PM types covered by the index in question.

## Normalizer

DCMERR is normalized per call attempt offered to the office.

## Diagnostics

In OM group PM, locate those DCMs with high error measurements. For further information refer to PM subsystem logs LOST108, LOST109, LOST111, NET102, PM101, PM108, PM113, PM115, PM116, PM117, PM118, PM119, PM121, PM122, PM124, PM125, PM126, PM128, PM160, and TRK123. Diagnose error conditions at the PM level of the MAP.

# Basic index DCMFLT

## Section

CONTROL

## Description

Digital carrier module fault

## Definition

The unit failure rate of PM types covered by the DCMPERF indices.

## Measurement list

DCMFLT uses measurement PMTYP PMTFLT summed over all PM types covered by the index in question.

## Normalizer

DCMFLT is normalized per working unit per unit time, where the working units are of the PM types covered by each index.

## Diagnostics

In OM group PM, locate those DCMs with high fault measurements. For further information refer to PM subsystem logs PM100, PM101, PM102, PM114, PM117, PM127, PM151, PM161, PM162, and PM164. Diagnose fault conditions at the PM level of the MAP.

# Basic index DCMUSOUT

## Section

CONTROL

## Description

Digital carrier module (DCM) unit system outage

## Definition

The unavailability of PM types covered by the DCMPERF indices, as a result of system actions.

## Measurement list

DCMUSOUT uses PMTYP measurement PMTUSBU summed over all PM types covered by the index in question.

## Normalizer

DCMUSOUT is normalized per working unit per unit time, where the working units are of the PM types covered by each index.

## Diagnostics

In OM group PM (PMTUSBU), locate those DCMs with high outage measurements. For further information refer to PM subsystem logs PM102 and PM128.

# Basic index DCMUMOUT

## Section

CONTROL

## Description

Digital carrier module (DCM) unit manual outage

## Definintion

The unavailability of PM types covered by the DCMPERF indices, as a result of manual actions.

## Measurement list

DCMUMOUT uses PMTYP measurement PMTUMBU summed over all PM types covered by the index in question.

## Normalizer

DCMUMOUT is normalized per working unit per unit time, where the working units are of the PM types covered by each index.

## Diagnostics

In OM group PM (PMTUMBU), locate those DCMs with high outage measurements and ensure that this agrees with manual maintenance being performed.

# Aggregate index XPMPERF

## Section

CONTROL

## Description

XMS-based peripheral module performance

## Definition

The summary of the performance of XMS-based dual unit peripheral modules. The peripheral types are DTC, LTC, IDTC, DTCI, RCC, ARCC, PRCC, SRCC, RCCI, RCC2, RCO2, IAC, ILTC, ADTC, PDTC, LGC, ALGC ILGC, PLGC, SMR, SMS, SMSR, SMU, CSC, MSB6, MSB7, IAC, DTCI, TMS, SMA, and ICP.

## Diagnostics

None

# Basic index XPMERR

## Section

CONTROL

## Description

XMS-based peripheral module errors

## Definition

The per-call occurrence of hardware and software errors, transient or persistent, reported from PM types listed under XPMPERF.

DMS-100G Switch does not contribute to or provide an equivalent of OM group PMTYP, measurement PMTERR

## Measurement list

XPMERR uses measurement PMTYP PMTERR summed over all PM types covered in XPMPERF.

## Normalizer

XPMERR is normalized by the total call attempts to the office.

## Diagnostics

In OM group PM, locate those XPMs with high error measurements. For further information refer to PM subsystem logs. Diagnose error conditions at the PM level of the MAP. Refer to the PMTOTERR index description for further diagnostic information.

# Basic index XPMFLT

## Section

CONTROL

## Description

XMS-based peripheral module faults

## Definition

The unit failure rate of the peripheral module types listed in XPMPERF.

DMS-100G Switch does not contribute to or provide an equivalent of OM group PMTYP, measurement PMTFLT

## Measurement list

XPMFLT uses measurement PMTYP PMTFLT summed over all PM types covered in XPMPERF.

## Normalizer

XPMFLT is normalized per working unit per unit time, where the working units are of the PM types covered by the respective indices. Note that there are two units per module of the PM types covered by XPMFLT.

## Diagnostics

In OM group PM, locate those XPMs with high fault measurements. For further information analyze PM subsystem logs. Diagnose fault conditions at the PM level of the MAP. Refer to the PMTOTFLT index description for further diagnostic information.

# Basic index XPMUSOUT

## Section

CONTROL

## Description

XMS-based peripheral module unit system outage

## Definition

The unavailability of PM types covered by the XPMPERF indices, as a result of system actions.

DMS-100G Switch does not contribute to or provide an equivalent of OM group PMTYP, measurement PMTUSBU

## Measurement list

XPMUSOUT uses PMTYP measurement PMTUSBU summed over all PM types covered by the index in question.

## Normalizer

XPMUSOUT is normalized per working unit per unit time, where the working units are of the PM types covered by each index.

## Diagnostics

In OM group PMTYP (PMTUSBU), locate those XPMs with high outage measurements. For further information refer to PM subsystem logs PM105, PM170, PM179, PM180, PM182, and PM191.

# Basic index XPMUMOUT

## Section

CONTROL

## Description

XMS-based peripheral module unit manual outage

## Definition

The unavailability of PM types covered by the XPMPERF indices, as a result of manual actions.

DMS-100G Switch does not contribute to or provide an equivalent of OM group PMTYP, measurement PMTUMBU

## Measurement list

XPMUMOUT uses PMTYP measurement PMTUMBU summed over all PM types covered by the index in question.

## Normalizer

XPMUMOUT is normalized per working unit per unit time, where the working units are of the PM types covered by each index.

## Diagnostics

In OM group PMTYP (PMTUMBU), locate those XPMs with high outage measurements and verify that these results agree with manual maintenance being performed.

# Aggregate index LMPERF

## Section

CONTROL

## Description

Line module performance

## Definition

The summary of the performance of single-unit line controlling peripheral types. The peripheral types are as follows: line modules, remote concentrator terminal, remote carrier urban, remote concentrator SLC-96, and integrated digital terminals.

## Diagnostics

To isolate the problem look at the OM group PM. A high error, fault, or outage measurement will be apparent in one or more of the peripherals listed above. For further information refer to PM subsystem logs. Diagnose error and fault conditions at the PM level of the MAP.

# Basic index LMERR

## Section

CONTROL

## Description

Line module error

## Definition

The per-call occurrence of hardware and software errors, transient or persistent, reported from PM types covered by the LMPERF indices.

## Measurement list

LMERR uses measurements PMTYP PMTRGERR and PMTERR summed over all PM types covered in the LMPERF section.

## Normalizer

LMERR is normalized by the sum of originating and terminating attempts (LMD NORIGATT and NTERMATT) on the peripherals covered by LMPERF.

## Diagnostics

In OM group PM, locate those LMs with high fault measurements. For further information refer to PM subsystem log PM160. Diagnose error conditions at the PM level of the MAP.

# Basic index LMFLT

## Section

CONTROL

## Description

Line module faults

## Definition

The unit failure rate of PM types covered by LMPERF.

## Measurement list

LMFLT is equal to the sum of PMTYP PMTRGFLT and PMTFL over the appropriate PM types.

## Normalizer

LMFLT is normalized per working unit per unit time, where the working units are of the PM types covered by the respective indices.

## Diagnostics

In OM group PM, locate those LCMs with high fault measurements. For further information refer to subsystem logs PM161, PM162, and PM163. Diagnose fault conditions at the PM level of the MAP.

# Basic index LMUSOUT

## Section

CONTROL

## Description

Line module (LM) unit system outage

## Definition

The unavailability of PM types covered by the LMPERF indices, as a result of system actions.

## Measurement list

LMUSOUT uses PMTYP measurement PMTUSBU summed over all PM types covered by the index in question.

## Normalizer

LMUSOUT is normalized per working unit per unit time, where the working units are of the PM types covered by each index.

## Diagnostics

In OM group PMTYP (PMTUSBU) and OM group PM (PMUSBU), locate those LMs with high outage measurements. For further information refer to PM subsystem logs.

# Basic index LMUMOUT

## Section

CONTROL

## Description

Line concentrating module unit manual outage

## Definition

The unavailability of PM types covered by the LMPERF indices, as a result of manual actions.

## Measurement list

LMUMOUT uses PMTYP measurement PMTUMBU summed over all PM types covered by each index in question.

## Normalizer

LMUMOUT is normalized per working unit per unit time, where the working units are of the PM types covered by each index.

## Diagnostics

In OM group PMTYP (PMTUMBU) and OM group PMCPMUMBU, locate those LCMs with high outage measurements and ensure that this agrees with manual maintenance being performed.

# Aggregate index LCMPERF

## Section

CONTROL

## Description

Line concentrating module performance

## Definition

The summary of the performance of dual-unit line controllers. These include line concentrating modules (LCM), international line concentrating modules (ILCM), enhanced line concentrating modules (ELCM), Austrian line concentrating modules (ALCM), and emergency stand-alone (ESA).

## Diagnostics

To isolate the problem look at the OM group PM. A high error, fault, or outage measurement will be apparent in one or more of the line controllers listed above. For further information refer to PM subsystem logs. Diagnose error and fault conditions at the PM level of the MAP.

# Basic index LCMERR

## Section

CONTROL

## Description

Line concentrating module errors

## Definition

The per-call occurrence of hardware and software errors, transient or persistent, reported from PM types covered by the LCMPERF indices.

DMS-100G Switch does not contribute to or provide an equivalent of OM group LMD, measurements NORIGATT and NTRMATT

## Measurement list

LCMERR is the sum of PMTYP PMTRGERR and PMTYP PMTERR over the appropriate PM types.

## Normalizer

LCMERR is normalized by the sum of originating and terminating attempts (LMD NORIGATT and NTERMATT) on the peripherals of LCMPERF.

## Diagnostics

In OM group PM, locate those LCMs with high error measurements. For further information refer to PM subsystem log PM160. Diagnose error conditions at the PM level of the MAP.

# Basic index LCMFLT

## Section

CONTROL

## Description

Line concentrating module fault

## Definition

The failure rate of peripheral modules covered by LCMPERF.

## Measurement list

LCMFLT uses measurements PMTYP PMTRGFLT and PMTFLT over respective PM types.

## Normalizer

LCMFLT is normalized per working unit per unit time, where the working units are the PM types covered by the respective indices. Note that there are two units per module of the PM types covered by LCMFLT.

## Diagnostics

In OM group PM, locate those LCMs with high fault measurements. For further information refer to subsystem logs PM161, PM162, and PM163. Diagnose fault conditions at the PM level of the MAP.

# Basic index LCMUSOUT

## Section

CONTROL

## Description

Line concentrating module unit system outage

## Definition

The unavailability of PM types covered by the LCMPERF indices, as a result of system actions.

## Measurement list

LCMUSOUT uses PMTYP measurement PMTUSBU summed over all PM types covered by each index in question.

## Normalizer

LCMUSOUT is normalized per working unit per unit time, where the working units are of the PM types covered by each index.

## Diagnostics

In OM group PMTYP (PMTUSBU), locate those LCMs with high outage measurements. For further information refer to PM subsystem logs PM102, PM107, PM128, PM152, and PM183.

# Basic index LCMUMOUT

## Section

CONTROL

## Description

Line concentrating module unit manual outage

## Definition

The unavailability of PM types covered by the LCMPERF indices, as a result of manual actions.

## Measurement list

LCMUMOUT uses PMTYP measurement PMTUMBU summed over all PM types covered by each index in question.

## Normalizer

LCMUMOUT is normalized per working unit per unit time, where the working units are of the PM types covered by each index.

## Diagnostics

In OM group PMTYP (PMTUMBU), locate those LCMs with high outage measurements and verify that these results agree with manual maintenance being performed.

# Aggregate index SWINTEG

## Section

CONTROL

## Description

Software integrity

## Definition

The summary of the rate of occurrence of software-related errors in the switch.

## Diagnostics

To ensure that relevant data can be retrieved from the switch before it is overwritten, promptly report any problems indexed by SWINTEG to Nortel Field Technical Support. Provide Nortel Technical Support with the associated log messages plus all logs for the hours preceding and following the error events.

# Aggregate index PMSWINTG

## Section

CONTROL

## Description

Peripheral module software integrity

## Definition

The summary of the rate of occurrence of PM-related software or firmware errors.

## Diagnostics

Associate unfavorable values of PMSWINTG with unfavorable values of PMTOTERR. While PMSWINTG is intended as an index of software integrity, the associated conditions are often correctable by local maintenance. Identify the PMs responsible for poor values of PMSWINTG by significant PMTERR counts in OM group PM. Further details may be gained from PM122, PM124, PM125, PM126, PM179, PM180, PM185, and PM300 logs. Check the PMs concerned from the PM level of the MAP. If you cannot correct the error, report the condition promptly to Nortel Technical Support. Be sure to keep copies of the applicable log messages.

# Basic index PMSWERR

## Section

CONTROL

## Description

Peripheral module software error

## Definition

The per-call rate at which PMs generate messages to the CC indicating software or firmware error conditions.

## Measurement list

PMSWERR uses measurement LOGS PMSWERCT.

## Normalizer

PMSWERR is normalized per total call attempt on the switch.

## Diagnostics

From the OM group PM and PM log reports PM122, PM124, PM125, PM126, and PM180, identify the PMs responsible for poor values. If the error condition cannot be corrected, report the condition promptly to Nortel Technical Support, making sure to keep copies of the applicable log messages.

# Basic index PMTRAP

## Section

CONTROL

## Description

Peripheral module trap

## Definition

The per-call rate at which PMs generate messages to the CC, indicating trap conditions.

## Measurement list

PMTRAP uses measurement LOGS PMTRAPCT.

## Normalizer

PMTRAP is normalized per total call attempt on the switch.

## Diagnostics

Identify the PMs responsible for poor values of PM software integrity by significant PMTERR counts in OM group PMTYP and in OM group PM (PMERR). Further details may be gained from logs PM125, PM179, PM185, and PM300. Check the PMs concerned from the PM level of the MAP. If the error condition cannot be corrected, report the condition promptly to Nortel Technical Support, making sure to keep copies of the applicable log messages.

## Section

PMASWINTG

## Description

Node software integrity

## Definition

The summary of none software performance

## Diagnostics

None

## Basic index NDSWERR (continued)

### Section

NDSWINT

### Description

Node software error messages.

### Definition

NDSWERR is the rate at which software error messages occur on each node.

### Measurement

NDSWERR uses the measurement NMTCTYPE NDTSWERR.

### Normalizer

NDSWERR is the normalized per node per time unit.

### Diagnostics

Check OM group NMTCTYPE.

## Section

NDSWINT

## Description

Node traps

## Definition

The per node rate of rate of maintenance error traps.

## Measurement

NDTRAP uses measurement NMTCTYPE NDTTRAP.

## Normalizer

NDTRAP is normalized per node per unit time.

## Diagnostics

Check the OM group NMTCTYPE.

# Aggregate index CCSWINTG

## Section

CONTROL

## Description

Central controller software integrity

## Definition

The summary of the rate of occurrence of CC-related software errors.

## Diagnostics

None

# Basic index CCSWERR

## Section

CONTROL

## Description

Central controller software error

## Definition

The per-call rate of generation of SWER logs.

## Measurement list

CCSWERR uses measurement LOGS SWERRCT.

## Normalizer

CCSWERR is normalized per total call attempt on the switch.

## Diagnostics

Ensure that Nortel Technical Support is aware of the content of the SWER logs indexed by CCSWERR, particularly PMSWERCT, PM122, PM124, PM126, PM180, PMTRAPCT, PM125, PM179, PM185, and PM300. Be prepared to supply copies of these log reports on request.

# Aggregate index TRAPS

## Section

CONTROL

## Description

Central controller traps

## Definition

The summary of the rate of occurrence of CC traps within the switch.

## Diagnostics

If traps occur and the cause cannot be identified locally, notify Nortel Technical Support promptly.

# Basic index NONCPTRP

## Section

CONTROL

## Description

Non call processing traps

## Definition

The rate of occurrence of traps originating in code other than call processing code, or as a result of hardware malfunctions.

## Measurement list

NONCPTRP uses measurement CPU TRAPINT minus measurement CP CPTRAP.

## Normalizer

NONCPTRP is normalized per unit time.

## Diagnostics

Verify OM groups CPR (TRAPINT) and CP (CPTRAP). Measurement NONCPTRP equals TRAPINT minus CPTRAP. Check logs CC103, SWERR, TRAP, and CC104. Notify Nortel Technical Support promptly if traps occur and the cause cannot be identified.

# Basic index CPTRAPS

## Section

CONTROL

## Description

Call processing traps

## Definition

The per-attempt rate of occurrence of traps in call processing code.

DMS-100G Switch does not contribute to or provide an equivalent of OM group OFZ, measurements NIN and NIN2

## Measurement list

CPTRAPS uses measurement CP CPTRAP.

## Normalizer

CPTRAPS is normalized per total call attempt on the switch.

## Diagnostics

Same as SWERRS. Notify Nortel Technical Support promptly if traps occur and the cause cannot be identified locally. Be ready to produce copies of traps and trapinfo output as required. Check group CP for volume of trap. Also check logs SWERR, TRAP, AUDT101, AUDT103, AUDT197, CC103, and CC104.

# Basic index CPUICDS

## Section

CONTROL

## Description

Call processing suicides

## Definition

The per-attempt occurrence of call processing suicides. These occur when call processing has encountered severe error conditions, as a result of software errors, software or hardware problems in peripherals, or datafill errors.

DMS-100G Switch does not contribute to or provide an equivalent of OM group OFZ, measurements NIN, and NIN2

## Measurement list

CPSUICDS uses measurement CP CPSUIC.

## Normalizer

CPSUICDS is normalized per total call attempt on the switch.

## Diagnostics

Check the call processing suicide rate using OM CPSUIC in OM group CP. The problem may be due to software errors, software or hardware problems in the peripherals, or datafill errors. Analyze system logs SWERR, AUDT100, AUDT103, AUD103, AUD395, AUD398, or NET101 associated with line 104 and TRK113. Use DISPCALL to aid analysis.

# Aggregate index CCINT

## Section

CONTROL

## Description

Central control initialization

## Definition

The summary of the occurrence of warm and cold CC restarts within the switch.

## Diagnostics

To determine the cause of the CC restart and prevent recurrences, obtain help from Nortel Technical Support. Notify higher-level or manufacturer technical support groups immediately about any unexpected CC restarts. Save log messages and operational measurements from the period in question for technical examination.

# Basic index CCWINIT

## Section

CONTROL

## Description

Central control warm initialization

## Definition

The rate of occurrence of warm CC restarts.

## Measurement list

CCWINIT uses measurement CPU SYSWINIT or CM CMSWINIT and CMMWINIT.

## Normalizer

CCWINIT is normalized per unit time.

## Diagnostics

To determine the cause of the warm restarts, contact Nortel Technical Support. Verify OM group CPU (SYSCINIT) or for SuperNode, group CM (CMSCINIT, CMMCINIT). Check logs CC107, INIT, and SWCT103.

## Basic index CCCINIT

### Section

CONTROL

### Description

Central control cold initialization

### Definition

The rate of occurrence of cold CC restarts.

### Measurement list

CCCINIT uses measurement CPU SYSCINIT or CM CMSCINIT aand CMMCINIT.

### Normalizer

CCCINIT is normalized per unit time.

### Diagnostics

To determine the cause of the CC restart and prevent recurrences, contact Nortel Technical Support. Notify higher-level manufacturer technical support groups immediately of any unfavorable results. Check logs CC107 and INIT.

# Aggregate index BILLPERF

## Section

BILLPERF

## Description

Billing performance

## Definition

The summary of billing performance on the switch.

## Diagnostics

None

# Basic index METERPF

## Section

BILLPERF

## Description

Metering performance

## Definition

The summary of the error performance during central control (CC) metering.

## Measurement list

METERERR uses the sum of measurements DTCALLP, DTXPM, DTFEAT, TIMEST0, DURERR, COUNTERR, MTRBKERR, MTRAUDER, RECYCFND, RECYCCLR, THQOVFL, THQERR, and TODXPMFL of OM group MTRPERF.

## Normalizer

METERPF is normalized per metered calls obtained from OM group MTRUSG registers LNXPMM1, LNXPMM2, TKXPMM1, TKXPMM2, LNCCM1, LNCCM2, TKCCM1 and TKCCM2.

## Diagnostics

Check OM group MTRPERF and logs MTR100 through MTR142.

# Basic index AMADEVFL

## Section

BILLPERF

## Description

Automatic message accounting device failure

## Definition

The number of Automatic Message Accounting (AMA) calls that could not be recorded. It is based on the AMAFREE and AMAROUTE fields of OM group AMA. AMAFREE is the number of times an AMA call is routed free of charge. Included are calls that went free of charge because of no devices, no recording units, or process dead. AMAROUTE is the number of times an AMA call is routed to announcement or TOPS or tone during AMA failure.

## Measurement list

AMADEVFL is calculated from two registers of the OM group AMA: AMAFREE and AMAROUTE.

## Normalizer

AMADEVFL is normalized by the number of AMA record entries, including OM group AMA fields AMAENT, AMAENT2, AMAFREE, and AMAROUTE.

## Diagnostics

Check AMA logs and MAPCI DIRP level for alarms indicating device failures. Also check DIRP logs.

# Aggregate index LINKPERF

## Section

LINKPERF

## Description

Link performance

## Definition

The summary of the maintenance performance of connecting path within the switch. This includes the CMC/MS, IOC, network module, and peripheral module P-side links, plus the speech paths through the network modules.

## Diagnostics

None

# Aggregate index CMCLNKPF

## Section

LINKPERF

## Description

Central message controller link performance

## Definition

The summary of the maintenance performance of links between CMCs and network modules or IOCs.

## Diagnostics

Further information is available from CMC subsystem logs. Diagnose CMC P-side port problems at the CMC level of the MAP.

# Basic index CMCLNKER

## Section

LINKPERF

## Description

Central message controller link error

## Definition

The per-call occurrence of errors on links between the CMCs and NMs or IOCs.

## Measurement list

CMCLNKER uses measurement CMC CMCLERR, summed over both CMCs.

## Normalizer

CMCLNKER is normalized per total call attempt on the office.

## Diagnostics

Verify OM group CMC (CMCLERR). Further information is available from system logs LOST103, LOST106, IOD119, CMC107, CMC112, and IOAU102. Diagnose CMC P-side port problems at the CMC level of the MAP.

# Basic index CMCLKSOU

## Section

LINKPERF

## Description

Central message controller (CMC) link system unit outage

## Definition

The unavailability of links between the CMCs and the NMs and IOCs, as a result of system action.

## Measurement list

CMCLKSUO uses the sum of CMC measurement CMCLKSBU.

## Normalizer

CMCLKSUO is normalized per working P-side CMC link per unit time.

## Diagnostics

Verify OM group CMC (CMCLKSBU). Further information is available from system logs CC113, CC114, CC115, CMC106, CMC107, and ICM0101. Diagnose CMC P-side port problems at the CMC level of the MAP.

# Basic index CMCLKMUO

## Section

LINKPERF

## Description

Central message controller (CMC) link manual unit outage

## Definition

The unavailability of links between the CMCs and the NMs and IOCs, as a result of manual actions.

## Measurement list

CMCLKMUO uses the sum of CMC measurement CMCLKMBU.

## Normalizer

CMCLKMUO is normalized per working P-side CMC link per unit time.

## Diagnostics

Verify OM group CMC (CMCLKMBU) and ensure that these results agree with manual maintenance being performed.

# Aggregate index IOCLNKPF

## Section

LINKPERF

## Description

Controller link performance

## Definition

The summary of the maintenance performance of the links between IOCs and I/O devices or device controllers.

## Diagnostics

Further information is available from IOD subsystem logs. Diagnose IOC P-side port problems at the IOD and lower levels of the MAP.

# Basic index IOCLNKER

## Section

LINKPERF

## Description

Input/output controller link error

## Definition

The rate of occurrence of errors on links between the IOCs and I/O devices or device controllers.

## Measurement list

IOCLNKER uses measurement IOC IOCLKERR.

## Normalizer

IOCLNKER is normalized per working IOC P-side link per unit time.

## Diagnostics

Verify OM group IOC (IOCLKERR). Further information is available from IOD subsystem logs IOD117 and IOD129. Diagnose IOC P-side port problems at the IOC and CARD levels of the MAP.

# Basic index IOCLKSUO

## Section

LINKPERF

## Description

Input/output controller (IOC) link system unit outage

## Definition

The unavailability of links between the IOCs and I/O devices or device controllers.

## Measurement list

IOCLKSUO uses the sum of IOC measurement IOCLKSBU.

## Normalizer

IOCLKSUO is normalized per working P-side IOC link per unit time.

## Diagnostics

Verify OM group IOC (IOCLKSBU). Further information is available from IOD subsystem logs IOD103, IOD104, IOD108, IOD109, IOD112, and IOD113. Diagnose IOC P-side port problems at the IOC and CARD levels of the MAP.

# Basic index IOCLKMUO

## Section

LINKPERF

## Description

Input/output controller (IOC) link manual unit outage

## Definition

The unavailability of links between the IOCs and I/O devices or device controllers.

## Measurement list

IOCLKMUO uses the sum of IOC measurement IOCLKMBU.

## Normalizer

IOCLKMUO is normalized per working P-side IOC link per unit time.

## Diagnostics

Verify OM group IOC (IOCLKMBU) to ensure these results agree with manual maintenance being performed.

# Aggregate index MSLNKPF for SuperNode LINKPERF components

## Section

LINKPERF

## Description

Message switch link performance

## Definition

The summary of the maintenance performance of message switch (MS) P-side links. Note that these links include the links to the computing modules (CM).

## Diagnostics

Further information is available from message switch (MS) subsystem logs. Diagnose message switch P-side port problems at the MS level of the MAP.

# Basic index MSLNKERR for SuperNode LINKPERF components

## Section

LINKPERF

## Description

Message switch link error

## Definition

The per-call occurrence of errors on message switch P-side links.

## Measurement list

MSLNKERR uses measurement MS MSPTERR, summed over both message switches.

## Normalizer

MSLNKERR is normalized per total call attempt on the office.

## Diagnostics

Check log MS303.

# Basic index MSLNKFLT for SuperNode LINKPERF components

## Section

LINKPERF

## Description

Message link switch fault

## Definition

The unit failure rate of message switch P-side links.

## Measurement list

MSLNKFLT uses measurement MS MSPTFLT, summed over both message switches.

## Normalizer

MSLNKFLT is normalized per working unduplicated message switch P-side port per unit time.

## Diagnostics

Check log MS303.

# Basic index MSLNKSUO for SuperNode LINKPERF components

## Section

LINKPERF

## Description

Message switch (MS) link unit system outage

## Definition

The unit unavailability of message switch P-side links, as a result of system actions.

## Measurement list

MSLNKSUO uses measurement MS MSPTSBU summed over both message switches.

## Normalizer

MSLNKSUO is normalized per working unduplicated message switch P-side port per unit time.

## Diagnostics

Verify OM group MS (MSPTSBU).

# Basic index MSLNKMUO for SuperNode LINKPERF components

## Section

LINKPERF

## Description

Message switch (MS) link unit manual outage

## Definition

The unit unavailability of message switch P-side links, as a result of manual actions.

## Measurement list

MSLNKMUO uses measurement MS MSPTMBU summed over both message switches.

## Normalizer

MSLNKMUO is normalized per working unduplicated message switch P-side port per unit time.

## Diagnostics

Verify OM group MS (MSPTMBU) and ensure that these results agree with manual maintenance being performed on the MS.

# Aggregate index NMLNKPF

## Section

LINKPERF

## Description

Network module link performance

## Definition

The summary of the maintenance performance of speech paths within network modules, and of speech and message links between network modules and peripherals.

## Diagnostics

Check the indices shown in the equation above to get more information on the nature of the network problems.

# Aggregate index NMMSGLPF

## Section

LINKPERF

## Description

Network module message link performance

## Definition

The summary of the error and fault performance of the messaging links between the individual planes of the network modules and the peripherals attached to them.

## Diagnostics

Work at the LINKS sublevel of the NET level of the MAP to diagnose and clear P-side message link problems. Look for further information in NETM subsystem log messages.

# Basic index NMMSGLER

## Section

LINKPERF

## Description

Network module message link error

## Definition

The per-call rate of occurrence of errors on the message links between network modules and peripherals.

## Measurement list

NMMSGLER uses measurement NMC NMMSGER.

## Normalizer

NMMSGLER is normalized per total call attempt on the office.

## Diagnostics

Verify OM group NMC (NMMSGER). Work at the links sublevel of the NET level of the MAP to diagnose and clear P-side message link problems. Look for further information in NETM subsystem log messages and logs NETM129 and NET102. The CHKLNK tool may help identify trouble.

# Basic index NMMSGLFL

## Section

LINKPERF

## Description

Network module message link fault

## Definition

The failure rate per working link of the message links between network modules and peripherals.

## Measurement list

NMMSGLFL uses measurement NMC NMMSGFL.

## Normalizer

NMMSGLFL is normalized per working message link per unit time. The links of the two network planes are counted separately.

## Diagnostics

Verify OM group NMC (NMCSGFL). Further information may be obtained from logs NETM120, NETM126, and NETM129. Diagnose the message links from the network LINKS level for problems.

# Aggregate index NMSPCHPF

## Section

LINKPERF

## Description

Network module speech performance

## Definition

The error and fault performance of speech paths through the network.

## Measurement list

None

## Normalizer

None

## Diagnostics

Review network integrity performance using the NETINTEG analysis tool at the NET level of the MAP. Further information is provided by the periodic NETM110 and NET111 summary count logs, and by analysis of NET130–132 and NET136 logs.

# Basic index NMSPCHER

## Section

LINKPERF

## Description

Network module speech error

## Definition

The rate of occurrence of errors on speech paths through the network, per CCS of traffic carried.

## Measurement list

NMSPCHER uses measurement NMC NMSPCHER.

## Normalizer

NMSPCHER is normalized by the sum over all network modules of network traffic registers TS TS0 through TS7.

## Diagnostics

Check log NET102.

# Basic index NMSPCHFL

## Section

LINKPERF

## Description

Network module speech fault

## Definition

The rate at which path hard faults are detected in speech path per network module plane.

## Measurement list

NMSPCHFL uses measurement NMC NMSPCHFL.

## Normalizer

NMSPCHFL is normalized per network module plane per unit time.

## Diagnostics

Verify OM group NMC (NMSPCHFL). Review network integrity performance using the NETINTEG analysis tool at the NET level of the MAP. Further information is provided by by analysis of NET102, NETM120, NETM126, NETM129, and NET131 logs. The NETINTEG command filter may help identify trouble.

# Basic index NMPTSOUT

## Section

LINKPERF

## Description

Network module port system outage

## Definition

The unit unavailability of network module peripheral facing ports. Each port carries 30 speech channels plus a potential message link.

## Measurement list

NMPTSOUT uses the sum of NMC measurement NMPTSBU.

## Normalizer

NMPTSOUT is normalized per network module port per unit time. The number of network module ports is calculated as the number of working network modules, multiplied by two planes, multiplied by 64 ports.

## Diagnostics

Check the availability of the network module peripheral facing ports. Check the OM NMC (NMPTSBY) and logs NETM116, NETM129, NETM117, and NETM139.

# Basic index NMPTMOUT

## Section

LINKPERF

## Description

Network module port manual outage

## Definition

The unit unavailability of network module peripheral facing ports. Such a port carries 30 speech channels plus a potential message link.

## Measurement list

NMPTMOUT uses the sum of NMC measurement NMPTMBU.

## Normalizer

NMPTMOUT is normalized per network module port per unit time. The number of network module ports is calculated as the number of working network modules, multiplied by two planes, multiplied by 64 ports.

## Diagnostics

Check the availability of the network module peripheral facing ports. Check the OM NMC (NMPTMBU) and ensure that this result agrees with manual maintenance being performed.

# Basic index NMJCTSOU

## Section

LINKPERF

## Description

Network module junctor system outage

## Definition

The unavailability of network module junctor facing ports. Each port carries 31 speech channels.

## Measurement list

NMJCTSOU uses the sum of NMC measurement NMJRSBU.

## Normalizer

NMJCTSOU is normalized per network module port per unit time. The number of network module ports is calculated as the number of working network modules, multiplied by two planes, multiplied by 64 ports.

## Diagnostics

Verify OM group NMC (NBMJRSBU). Check the availability of the network module junctor facing ports. Junctor ports can be diagnosed from JCTRS level of the MAP. Further information may be obtained from logs NETM122, NETM123, and NETM140.

# Basic index NMJCTMOU

## Section

LINKPERF

## Description

Network module junctor manual outage

## Definition

The unavailability of network module junctor facing ports. Each port carries 31 speech channels.

## Measurement list

NMJCTMOU uses the sum of NMC measurement NMJRMBU.

## Normalizer

NMJCTMOU is normalized per network module port per unit time. The number of network module ports is calculated as the number of working network modules, multiplied by two planes, multiplied by 64 ports.

## Diagnostics

Verify OM group NMC (NBMJRMBU). Check the availability of the network module junctor facing ports.

# Aggregate index ENLKPERF for ENET LINKPERF components

## Section

LINKPERF

## Description

Enhanced network (ENET) link performance

## Definition

ENLKPERF provides a summary of the performance of the ENET matrix cards and P-side links.

## Diagnostics

None

# Basic index ENLKERR for ENET LINKPERF components

## Section

LINKPERF

## Description

ENET link errors

## Definition

ENLKERR monitors the number of errors occurring in the link components of the ENET. This includes the P-side links as well as the matrix card components (that is, crosspoint cards and paddle boards).

## Measurement list

ENLKERR uses the sum of operational measurements ENCDERR and ENPBERR of OM group ENETMAT, and ENLKERR of OM group ENETPLNK.

## Normalizer

ENLKERR is normalized by the total call attempts made on the switch per day.

## Diagnostics

Verify OM groups ENETMAT (ENCDERR, ENPBERR) and ENETPLNK (ENLKERR). See logs ENET208 and ENET308 for additional information.

# Basic index ENLKFLT for ENET LINKPERF components

## Section

LINKPERF

## Description

ENET link faults

## Definition

ENLKFLT monitors the number of hard faults occurring in the link components of the ENET.

## Measurement list

ENLKFLT uses the sum of operational measurements ENCDFLT and ENPBFLT of OM group ENETMAT, and ENLKFLT of OM group ENETPLNK.

## Normalizer

ENLKFLT is normalized by the total call attempts made on the switch per day.

## Diagnostics

Verify OM groups ENETMAT (ENCDFLT, ENPBFLT) and ENETPLNK (ENLKFLT). See logs ENET203 and ENET303 for additional information.

# Basic index ENLKSOUT for ENET LINKPERF components

## Section

LINKPERF

## Description

Enhanced network (ENET) system-busy link components

## Definition

ENLKSOUT monitors system-busy link components in the ENET.

## Measurement list

ENLKSOUT uses the sum of operational measurements ENSBCDU and ENSBPBU of OM group ENETMAT, and ENSBLKU of OM group ENETPLNK.

## Normalizer

ENLKSOUT is normalized per working link component per unit time.

## Diagnostics

Verify OM groups ENETMAT (ENSBCDU, ENSBPBU) and ENETPLNK (ENSBLKU).

# Basic index ENLKMOUT for ENET LINKPERF components

## Section

LINKPERF

## Description

Enhanced network (ENET) manual-busy link components

## Definition

ENLKMOUT monitors manual-busy link components in the ENET.

## Measurement list

ENLKMOUT uses the sum of operational measurements ENMBCDU and ENMBPBU of OM group ENETMAT, and ENMBLKU of OM group ENETPLNK.

## Normalizer

ENLKMOUT is normalized per working link component per unit time.

## Diagnostics

Verify OM groups ENETMAT (ENMBCDU, ENMBPBU), and ENETPLNK (ENMBLKU).

# Basic index ENLKINAC for ENET LINKPERF components

## Section

LINKPERF

## Description

Enhanced network (ENET) inaccessible paths

## Definition

ENLKINAC monitors the number of inaccessible paths between P-side links due to out of service components in the ENET.

## Measurement list

ENLKINAC uses the sum of operational measurements ENPARULO and ENPARUHI of OM group ENETSYS.

## Normalizer

ENLKINAC is normalized by the total number of equipped P-side links in the ENET per unit time.

## Diagnostics

Verify OM groups ENETSYS (ENPARU), ENETMAT (ENCDPARU, ENPBPARU), and ENETPLNK (ENLKPARU). Check for cards and links out of service on opposite planes in the network.

# Basic index ENLKISOL for ENET LINKPERF

## Section

LINKPERF

## Description

Enhanced network (ENET) isolated peripherals

## Definition

ENLKISOL monitors the number of PMs isolated because-of-out of service components in the ENET.

## Measurement list

ENLKISOL uses the sum of operational measurements ENISOU of OM group ENETSYS, ENCDISOU and ENPBISOU of OM group ENETMAT, and ENLKISOU of OM group ENETPLNK.

## Normalizer

ENLKISOL is normalized by the total number of equipped P-side links in the ENET per unit time.

## Diagnostics

Verify OM groups ENETSYS (ENETSYS), ENETMAT (ENCDISOU, ENPBISOU), and ENETPLNK (ENLKISOU).

# Aggregate index PMLNKPF

## Section

LINKPERF

## Description

Peripheral module link performance

## Definition

The summary of the maintenance performance of digital links to remote PMs.

## Diagnostics

Determine which carrier system is causing unfavorable results by reviewing the results in OM group DS1CARR (PCMCARR in International offices). Check the CARRIER level of the MAP to determine whether the troubles are in the office or the outside plant.

# Basic index PMLNKERR

## Section

LINKPERF

## Description

Peripheral module link error

## Definition

The error rate on digital carrier links to remote PMs.

## Measurement list

PMLNKERR uses the sum of DS1CARR measurements DS1BER, DS1LOF, and DS1SLP. In International offices, PMLNKERR uses the sum of PCMCARR measurements LLFAERR, LLMAERR, RFAIERR, RMAIERR, AISERR, BERERR, SLIPERR, SIGLERR, CRC4ERR, AISI6ERR, LLCMAERR, and CREERR.

## Normalizer

PMLNKERR is normalized per working remote carrier link per unit time. Protection links are included in this count.

## Diagnostics

Determine which carrier system is causing unfavorable results by reviewing the results in OM group DS1CARR (DS1BER, DS1LOF, DS1SLP). In International offices, review the results in OM group PCMCARR. Check at the carrier level of the MAP to determine if the troubles are in office or the outside plant. Also look for logs PM110 and PM112.

# Basic index PMLNKFLT

## Section

LINKPERF

## Description

Peripheral module link fault

## Definition

The failure rate on digital carrier links to remote PMs.

## Measurement list

PMLNKFLT uses the sum of DS1CARR measurements DS1AIS, DS1LCGA and DS1RCGA. In International offices, PMLNKFLT uses the sum of PCMCARR measurements LLFAFLT, LLMAFLT, RFAIFLT, RMAIFLT, AISFLT, BERFLT, SLIPFLT, SIGLFLT, CRC4FLT, AISI6FLT, LLCMAFLT, and CREFLT.

## Normalizer

PMLNKFLT is normalized per working carrier link per unit time. Protection links are included in this count.

## Diagnostics

Determine which carrier system is causing unfavorable results by reviewing the results in OM group DS1CARR (DS1BER, DS1LOF, DS1SLP). In International offices, review the results in OM group PCMCARR. Check at the carrier level of the MAP to determine if the troubles are in office or the outside plant. Also look for logs PM109 and TRK109.

# Basic index PMLKSUOU

## Section

LINKPERF

## Description

Peripheral module (PM) link system unit outage

## Definition

The unit unavailability of digital carrier links to remote PMs.

## Measurement list

PMLKSUOU uses the sum of DS1CARR measurement DS1SBU. In International offices, this index uses the sum of PCMCARR measurement CARRSYSB.

## Normalizer

PMLKSUOU is normalized per working carrier link per unit time. Protection links are included in this count.

## Diagnostics

Determine which carrier system is causing unfavorable results by checking OM group DS1CARR (DX1SBU or PCMCARR in International offices). Check at the carrier level of the MAP to determine if the troubles are in the office or the outside plant. Also look for logs PM105, TRK109, and TRK182.

# Basic index PMLKMUOU

## Section

LINKPERF

## Description

Peripheral module (PM) link manual unit outage

## Definition

The unit unavailability of digital carrier links to remote PMs.

## Measurement list

PMLKMUOU uses the sum of DS1CARR measurement DS1MBU. In International offices, this index uses the sum of PCMCARR measurement CARRMANB.

## Normalizer

PMLKMUOU is normalized per working carrier link per unit time. Protection links are included in this count.

## Diagnostics

Verify OM group DS1CARR (DS1MBU or PCMCARR in International offices).

## Basic index NDLKERR (continued)

### Section

NDLNKPF

### Description

Node link error

### Definition

Index NDLKERR is the total link error rate for the node maintenance message channel and the physical link channel.

### Measurement

NDLKERR uses measurements NMTCLINK NDMCHERR and NDPLIERR

### Normalizer

NDLKERR is normalize per link per time unit.

### Diagnostics

Check OM group NMTCLINK.

## Basic index NDLKFLT (end)

### Section

NDLNKPF

### Description

Node link fault

### Definition

Index NDLKFLT is the total node-link fault rate for the message and physical link channels

A measurement of faults that persist after system diagnostics have been executed. The index is for the node-link faults on the message and physical link channels.

### Measurement

NDLKFLT is the sum of measurements NMTCLINK NDMCHFLT and NDPLKFLT.

### Normalizer

NDLKFLT is normalize per link per time unit.

### Diagnostics

Check OM group NMTCLINK.

## Basic index NDLKOUT (continued)

### Section

NDLKPF

### Description

Node link outage

### Definition

NDLKOUT indicates the total number of message channels and physical links that are system or manually busy.

### Measurement

NDLKOUT is the sum of measurements NMTCLINK NDMCHMBP, NDMCHSBP, NDPLKSBP, and NDPLKMBP.

# Aggregate index C7LNKPF

## Section

LINKPERF

## Description

CCS7 link performance

## Definition

C7LNKPF provides information on the availability and failure of the links and the availablity of the linkset.

## Diagnostics

None

# Aggregate index C7LINK

## Section

LINKPERF

## Description

CCS7 link

## Definition

C7LINK provides information on the availability and failure of the links.

## Diagnostics

None

# Basic index C7LNKSFL

## Section

LINKPERF

## Description

CCS7 link synchronization failure

## Definition

C7LNKSFL monitors the failure rate of the CCS7 link due to one or more of the following reasons:

- abnormal forward indicator bit Rx (FIBR)
- backward sequence number Rx (BSNR)
- excessive delay of acknowledgement from the signaling terminal (ST)
- excessive duration of congestion (remote congestion timeout)
- inability to allocate ST or transmission link
- failure to get network connection
- failure of signalling link test

## Measurement list

C7LNKSFL uses the sum of measurements C7LKFAIL, C7STALFL, C7TLALFL, C7NETCON, and C7SLTFL from OM group C7LINK1.

## Normalizer

C7LNKSFL is normalized per working CCS7 link per unit time.

## Diagnostics

Verify OM group C7LINK1, registers C7LKFAIL, C7STALFL, C7TLALFL, C7NETCON, C7SLTFL, C7ABNRFB, C7EXDLAY, C7EXERR, C7EXCONG, and C7ALIGNF.

# Basic index C7LNKOUT

## Section

LINKPERF

## Description

CCS7 link outage

## Definition

C7LNKOUT monitors the availability of CCS7 links. The system busy and manual busy link states are considered unavailable.

## Measurement list

C7LNKOUT uses measurement C7LKUNAU of OM group C7LINK1.

## Normalizer

C7LNKOUT is normalized per working CCS7 link per unit time.

## Diagnostics

Verify OM group C7LINK1 and register C7LKUNAU.

# Basic index C7LSOUT

## Section

LINKPERF

## Description

CCS7 linkset outage

## Definition

C7LSOUT provides information on the outage of the linkset. This index monitors the availability of the CCS7 linkset. System busy and manual busy are the link states considered unavailable.

## Measurement list

C7LSOUT uses measurement C7LSUNAU of OM group C7LKSET.

## Normalizer

C7LSOUT is normalized per working CCS7 link per unit time.

## Diagnostics

Verify OM group C7LKSET, register C7LSUNAU, and OM group C7LINK1. Promptly perform diagnostics at the C7LKSET level of the MAP. Log CCS101 may provide additional details.

## Aggregate index TERMNALS

### Section

TERMNALS

### Description

Terminals

### Definition

The summary of the performance of devices controlled by the IOC and the peripheral modules. These include tape, disk, and console units; service circuits of various kinds; operator positions, lines, trunks, and digital carrier facilities.

### Diagnostics

None

# Aggregate index IODEV

## Section

TERMNALS

## Description

Input/output device

## Definition

The summary of the maintenance performance of the various types of terminal equipment attached to the IOCs.

## Diagnostics

To identify the source of unfavorable results, check the indices from which IODEV is derived.

# Aggregate index MTUPERF

## Section

TERMNALS

## Description

Magnetic tape unit performance

## Definition

The summary of the maintenance performance of magnetic tape devices.

## Diagnostics

IOD subsystem logs may give more details. Diagnose magnetic tape troubles at the MTD level of the MAP.

# Basic index MTUERR

## Section

TERMNALS

## Description

Magnetic tape unit error

## Definition

The rate of occurrence of errors in magnetic tape unit operation.

## Measurement list

MTUERR uses measurement MTU MTUERR.

## Normalizer

MTUERR is normalized per working tape unit per unit time.

## Diagnostics

Verify OM group MTU (MTUERR). IOD subsystem logs IOD206, IOD207, IOD209, IOGA101, and MTD101 may give more details. Diagnose magnetic tape troubles at the MTD level of the MAP. Perform routine maintenance on the tape drive.

# Basic index MTUFLT

## Section

TERMNALS

## Description

Magnetic tape unit fault

## Definition

The rate of occurrence of persistent malfunctions of magnetic tape units.

## Measurement list

MTUFLT uses measurement MTU MTUFLT.

## Normalizer

MTUFLT is normalized per working tape unit per unit time.

## Diagnostics

Verify OM group MTU (MTUFLT). IOD subsystem logs (IOD208, IOD210, IOD212, IOD213, IOD214, IOD215, SOS100, MTD103) may give more details. Diagnose magnetic tape troubles at the MTD level of the MAP. Perform routine maintenance on the tape drive.

# Basic index MTUSOUT

## Section

TERMNALS

## Description

Magnetic tape unit system outage

## Definition

The unavailability of magnetic tape units as a result of system actions.

## Measurement list

MTUSOUT uses the sum of MTU measurement MTUSBU.

## Normalizer

MTUSOUT is normalized per working tape unit per unit time.

## Diagnostics

Verify OM group MTU (MTUSBU). IOD subsystem logs IOD203, IOD124, and MTD103 may provide more details. Diagnose magnetic tape troubles at the MTD level of the MAP. Perform routine maintenance on the tape drive.

# Basic index MTUMOUT

## Section

TERMNALS

## Description

Magnetic tape unit manual outage

## Definition

The unavailability of magnetic tape units as a result of manual actions.

## Measurement list

MTUMOUT uses the sum of MTU measurement MTUMBU.

## Normalizer

MTUMOUT is normalized per working tape unit per unit time.

## Diagnostics

Verify OM group MTU (MTUMBU) and ensure that this corresponds to manual activity being performed.

# Aggregate index DDUPERF

## Section

TERMNALS

## Description

Disk drive unit performance

## Definition

The summary of the maintenance performance of disk units and their controllers.

## Diagnostics

DDU subsystem logs may give more details. Diagnose disk unit and controller troubles at the DDU level of the MAP.

# Basic index DDUERR

## Section

TERMNALS

## Description

Disk drive unit error

## Definition

The rate of occurrence of errors in disk drive unit operation.

## Measurement list

DDUERR uses measurement DDU DDUERROR.

## Normalizer

DDUERR is normalized per working disk drive unit per unit time.

## Diagnostics

Verify OM group DDUERROR. DDU subsystem logs DDU100, DDU101, IOGA101, DDU204, and DDU205 may give more details. Diagnose disk unit and controller troubles at the DDU level of the MAP. Check firmware counters.

# Basic index DDUFLT

## Section

TERMNALS

## Description

Disk drive unit fault

## Definition

The rate of occurrence of persistent disk drive unit malfunctions.

## Measurement list

DDUFLT uses measurement DDU DDUFAULT.

## Normalizer

DDUFLT is normalized per working disk drive unit per unit time.

## Diagnostics

Verify OM group DDUFAULT. DDU subsystem logs DDU208, DDU209, DDU212, DDU224, and DDU225 may give more details. Diagnose disk unit and controller troubles at the DDU level of the MAP. Check firmware counters.

# Basic index DDUSOUT

## Section

TERMNALS

## Description

Disk drive unit system outage

## Definition

The unavailability of disk drive units because of system actions.

## Measurement list

DDUSOUT uses the sum of DDU measurement DDUSBUSY.

## Normalizer

DDUSOUT is normalized per working disk drive unit per unit time.

## Diagnostics

Verify OM group DDU (DDUSBUSY). Check IOD subsystem logs DDU202 and DDU204. Diagnose the disk drive units at DDU level of the MAP.

# Basic index DDUMOUT

## Section

TERMNALS

## Description

Disk drive unit manual outage

## Definition

The unavailability of disk drive units because of manual actions.

## Measurement list

DDUMOUT uses the sum of DDU measurement DDUMBUSY.

## Normalizer

DDUMOUT is normalized per working disk drive unit per unit time.

## Diagnostics

Verify OM group DDU (DDUMBUSY) and ensure that these results agree with manual maintenance being performed on DDUs.

# Aggregate index CONSOLPF

## Section

TERMNALS

## Description

Console performance

## Definition

The summary of the maintenance performance of MAP positions, line printers, and similar console devices attached to the switch.

## Diagnostics

IOD subsystem logs may give more details. Work with console devices at the CARD level of the MAP.

## Basic index CSLERR

### Section

TERMNALS

### Description

Console device errors

### Definition

The rate of occurrence of errors in the operation of a console device.

### Measurement list

CSLERR uses measurement CSL CSLERR.

### Normalizer

CSLERR is normalized per working console device per unit time.

### Diagnostics

Verify OM group CSL (CSLERR). IOD system logs IOD120, IOD306, IOD310, IOD311, IOGA101, and IOGA105 may give more details. Work with console devices at the CARD level of the MAP. Check cabling and devices. Check software datafill trouble.

# Basic index CSLSOUT

## Section

TERMNALS

## Description

Console device system outage

## Definition

The unit unavailability of console devices because of system actions.

## Measurement list

CSLSOUT uses the sum of CSL measurement CSLSBU.

## Normalizer

CSLSOUT is normalized per working console device per unit time.

## Diagnostics

Verify OM group CS (CSLSBU). IOD subsystem logs IOD303, IOD304, and IOD312 may give more details. Work with console devices at the CARD level of the MAP. Check datafill and hardware for faults.

# Basic index CSLMOUT

## Section

TERMNALS

## Description

Console device manual outage

## Definition

The unit unavailability of console devices because of manual actions.

## Measurement list

CSLMOUT uses the sum of CSL measurement CSLMBU.

## Normalizer

CSLMOUT is normalized per working console device per unit time.

## Diagnostics

Verify OM group CS (CSLMBU) and ensure that these results agree with manual maintenance being performed.

# Aggregate index SRVCCTPF

## Section

TERMNALS

## Description

Service circuit performance

## Definition

The summary of the performance of the various classes of service circuit used in call processing.

## Diagnostics

To isolate poor results, check the indices that make up SRVCCTPF.

# Aggregate index CONFPERF

## Section

TERMNALS

## Description

Conference performance

## Definition

The summary of the maintenance performance of three-port and six-port conference circuits.

## Diagnostics

To isolate the source of poor results, check the indices that make up CONFPERF.

# Basic index CNF3PERF

## Section

TERMNALS

## Description

Three-port conference performance

## Definition

The CNF3PERF index measures the unavailability of three-port conference circuits regardless of cause. The SPMS indices have been calibrated to take into account Automatic Trunk Testing (ATT) and system audits.

## Measurement list

CNF3PERF uses the sum of CF3P measurements CNFSBU, CNFMBU, CNFSBUT, and CNFMBUT.

## Normalizer

CNF3PERF is normalized per working conference circuit per unit time.

## Diagnostics

Check OM group CF3P measurements CNFSBU and CNFMBU to determine if three-port conference circuits are manual busy or system busy. Check log TRK106.

# Basic index CNF6PERF

## Section

TERMNALS

## Description

Six-port conference performance

## Definition

The unavailability of six-port conference circuits.

## Measurement list

CNF6PERF uses the sum of CF6P measurements CF6SBU and CF6MBU.

## Normalizer

CNF6PERF is normalized per working conference circuit per unit time.

## Diagnostics

Check OM group CF6P measurements CF6SBU and CF6MBU to determine if six-port conference circuits are manual busy or system busy. Also check whether log TRK106 indicates a system-busy condition.

# Basic index ANNSTNPF

## Section

TERMNALS

## Description

Announcement and tone performance

## Definition

The unavailability of announcements and special tones.

## Measurement list

ANNSTNPF uses the sum of ANN measurements ANNSBU and ANNMBU summed over all announcement types, plus the sum of STN measurements STNSBU and STNMBU summed over all special tone types.

## Normalizer

ANNSTNPF is normalized per unit per unit time. By definition of the underlying measurements, the number of units is the sum of the number of working announcement tracks, plus the number of working special tone circuits.

## Diagnostics

Check the availability of special tone and announcement circuits. Check the OMs ANNSBU and ANNMBU in the OM group ANN. Check the OMs STNMBU in the OM group STN, as well as (ANNOVFL) STNOVFL. Check log TRK106.

# Basic index ESUPPERF

## Section

TERMNALS

## Description

Echo suppressor performance

## Definition

The unavailability of digital echo-suppressor circuits.

DMS-100G Switch does not contribute to or provide an equivalent of OM group ESUP.

## Measurement list

ESUPPERF uses the sum of ESUP measurements DESSBU and DESMBU.

## Normalizer

ESUPPERF is normalized per working echo-suppressor circuit per unit time.

## Diagnostics

Review the provisioning of digital echo suppressions. Consult the OM group ESUP measurement DESOVFL for more precise location of the source of the overflows. Also check ATB100 logs.

# Basic index RCVRPERF

## Section

TERMNALS

## Description

Receiver performance

## Definition

The unavailability of receiver circuits.

## Measurement list

RCVRPERF uses the sum of RCVR measurements RCVSBU and RCVMBU, totalled over all receiver kinds.

## Normalizer

RCVRPERF is normalized per working receiver circuit per unit time.

## Diagnostics

The indication is that one or several receivers are either system busy or manual busy. Check OM group RCVR measurements RCVSBU and RCVMBU to determine how many receivers are busied out. Check logs PM105 and PM183. Check RCVR alarm level to ensure that audits run. Check the TTP STAT menu to find out which receivers are out of service.

# Basic index SPECSVPF

## Section

TERMNALS

## Description

Special service performance

## Definition

The unavailability of special service circuits. These include Digitone outpulsers, R2 inter-register signaling circuits, and service-observing circuits.

DMS-100G Switch does not contribute to or provide an equivalent of OM group SVCT

## Measurement list

SPECSVPF uses the sum of SVCT measurements SVCSBU and SVCMBU, totalled over all special service circuit types.

## Normalizer

SPECSVPF is normalized per working circuit per unit time.

## Diagnostics

The indication is that one or several special service circuit types are either system busy or manual busy. Check OM group SVCT measurements SVCSBU and SVCMBU to determine which special service circuit types are busied out. Check TRK106 logs.

# Aggregate index OPPOSPF

## Section

TERMNALS

## Description

Operator position performance

## Definition

The summary of the maintenance performance of operator positions and associated data circuits.

## Diagnostics

To isolate the location of poor results, check the indices that make up OPPOSPF.

# Aggregate index TOPSPERF

## Section

TERMNALS

## Description

Traffic operator position performance

## Definition

The summary of the maintenance performance of TOPS positions and associated data circuits.

## Diagnostics

To isolate the location of poor results, check the indices that make up TOPSPERF.

# Basic index TPOSFLT

## Section

TERMNALS

## Description

TOPS position fault

## Definition

The failure rate of TOPS positions with their associated trunks and digital modems.

## Measurement list

TPOSFLT uses the sum of TOPSMTCE measurements POSDF, POSTRKDF, and POSDMDF.

## Normalizer

TPOSFLT is normalized per working position per unit time.

## Diagnostics

TOPS positions or associated trunks and digital modems are failing. Check OM group TOPSMTCE registers POSDF, POSTRKDF, and POSDMDF to pinpoint failure source. Check logs TOPS100, TOPS101, TOPS105, TOPS106, and TRK106.

# Basic index TPOSOUT

## Section

TERMNALS

## Description

TOPS position outage

## Definition

The unavailability of TOPS positions.

## Measurement list

TPOSOUT uses measurement TOPSUSE POSMTCE.

## Normalizer

POSOUT is normalized per working position per unit time.

## Diagnostics

TOPS positions were maintenance busy. Verify OM group TOPSUSE (POSMTCE).

# Basic index VIRTCFL

## Section

TERMNALS

## Description

Virtual circuit fault

## Definition

The data transmission performance of the virtual circuits associated with TOPS operator centralization.

## Measurement list

VIRTCFL uses measurement TOPSVC VCFL.

## Normalizer

VIRTCFL is normalized per attempt to send a message on a virtual circuit. The number of attempts is given by the sum of TOPSVC measurements VCFL and VCNMSG.

## Diagnostics

The virtual circuits associated with the TOPS OC position are failing to send messages correctly. Verify OM group TOPSVC (VCFL). Check log TOPS106.

# Basic index CPOSPERF

## Section

TERMNALS

## Description

Centralized automatic message accounting position performance

## Definition

The unavailability of CAMA ONI/RONI positions in non-TOPS offices.

## Measurement list

CPOSPERF uses the sum of ONI measurements ONISBU and ONIMBU.

## Normalizer

CPOSPERF is normalized per working position per unit time.

## Diagnostics

A CAMA ONI/RONI position in a non-TOPS office is either manual busy or system busy. Verify OM group ONI (ONISBU and ONIMBU).

# Aggregate index AOSSPERF

## Section

TERMNALS

## Description

Auxiliary operator services system (AOSS) performance

## Definition

The summary of the maintenance performance of AOSS positions.

## Diagnostics

Review procedures for monitoring and clearing AOSS position troubles.

# Basic index AOSSPFLT

## Section

TERMNALS

## Description

Auxiliary operator services system (AOSS) position fault

## Definition

The failure rate of AOSS positions.

## Measurement list

AOSSPFLT uses measurement AOSS AOSSDF.

## Normalizer

AOSSPFLT is normalized per working position per unit time.

## Diagnostics

Verify OM group AOSS (AOSSDF). Review procedures for monitoring and clearing AOSS position troubles. Analysis of system logs AOSS100, AOSS101, AOSS102, and AOSS103 may give more detail.

# Basic index AOSSPOUT

## Section

TERMNALS

## Description

Auxiliary operator services system (AOSS) position outage

## Definition

The unavailability of AOSS positions.

## Measurement list

AOSSPOUT uses measurement AOSS AOSSOD.

## Normalizer

AOSSPOUT is normalized per working position per unit time.

## Diagnostics

Verify OM group AOSS (AOSSOD). Review procedures for monitoring and clearing AOSS position troubles.

# Aggregate index ATTCONPF

## Section

TERMNALS

## Description

Attendant console performance

## Definition

The summary of attendant console performance.

## Diagnostics

Review procedures for monitoring and clearing attendant console troubles.

# Basic index ATTCNERR

## Section

TERMNALS

## Description

Attendant console errors

## Definition

The per-call error rate of attendant consoles.

## Measurement list

ATTCNERR uses measurements ACSYSTR ACDMFL, ACCF3PFL, and ACERR.

## Normalizer

ATTCNERR is normalized per total call attempt.

## Diagnostics

Check logs IBN101 and IBN104.

## Basic index ATTCNFLT

### Section

TERMNALS

### Description

Attendant console fault

### Definition

The failure rate of attendant consoles.

### Measurement list

ATTCNFLT uses measurement ACSYSTR ACFLT.

### Normalizer

ATTCNFLT is normalized per working attendant console per unit time.

### Diagnostics

Check log IBN102.

# Aggregate index AOPSPERF

## Section

TERMNALS

## Description

Automated operator system (AOPS) performance

## Definition

The summary of the maintenance performance of certain automated operator feature components which make up AABS (automated alternate billing system), ADACC (automatic directory assistance call completion), and ADAS (automatic directory assistance services).

## Diagnostics

To isolate the location of poor results, check the indices which make up AOPSPERF.

# Basic index VSNFLT

## Section

TERMNALS

## Description

Voice service node fault

## Definition

The failure rate of voice service node (VSN) applications such as AABS (automated alternate billing system) and ADAS (automatic directory assistance services).

## Measurement list

VSNFLT is calculated from the accumulation of the sum of VSNCOM measurements VSNIDFL, VSNNOVL, VSNIVFL, VSNDABT, VSNVABA, and VSNVABT.

## Normalizer

VSNFLT is normalized per VSN call attempt. The number of attempts is provided by the measurement VSNATT in VSNCOM.

## Diagnostics

The VSN is flagging errors with its call attempts. Check OM group VSNCOM registers VSNIDFL, VSNNOVL, VSNIVFL, VSNDABT, VSNVABA, and VSNVABT to pinpoint failure source.

## OM groups

VSNCOM

# Basic index VSNLKFLT

## Section

TERMNALS

## Description

Voice service node link fault

## Definition

Monitors the performance of application messaging between the voice service node (VSN) and the DMS switch. It is used in applications such as AABS (automated alternate billing system) and ADAS (automatic directory assistance services).

## Measurement list

VSNLKFLT is calculated from the accumulation of the sum of VSNLINK measurements VMSGFAIL, VNCALLFL, NOCIDNCM, and NOCIDCP.

## Normalizer

VSNLKFLT is normalized per VSN message sent. The number of messages sent is provided by the measurement VMSGSNT in VSNLINK.

## Diagnostics

Check OM group VSNLINK registers VMSGFAIL, VNCALLFL, NOCIDNCM, and NOCIDCP to pinpoint the failure source.

## OM groups

VSNLINK

# Basic index VPSCFLT

## Section

TERMNALS

## Description

Voice processing service circuits fault

## Definition

Monitors the performance of all voice processing platform (VPP) service circuits used in applications such as ADAS (automatic directory assistance services).

## Measurement list

VPSCFLT is calculated from the accumulation of the sum of VPSC measurements VPSCMIS and VPSCFLT.

## Normalizer

VPSCFLT is normalized by the number of service circuits which have been allocated on the VPP. This number is provided by the measurement VPSCSZR in VPSC.

## Diagnostics

Check OM group VPSC registers VPSCMIC and VPSCFLT to determine whether there has been a service affecting fault or if there are session mismatches.

## OM groups

VPSC

# Basic index APUFLT

## Section

TERMNALS

## Description

Application processing unit fault

## Definition

Monitors the performance for advanced services which use APU-based call processing engines (CPE) in applications such as ADAS (automatic directory assistance services).

## Measurement list

APUFLT is calculated from the accumulation of the sum of AASV measurements AASVFL and AASVSFL.

## Normalizer

APUFLT is normalized by the number of calls processed. This number is provided by the measurement AASVALOC in AASV.

## Diagnostics

Check OM group AASV registers AASVFL and AASVSFL to pinpoint the failure source. If ADAS is affected, check OM group ADASDSGN registers SDVPUERR, UNKNMSG, and DSCRDMSG for additional detail.

## OM groups

AASV

# Basic Index DAMSGFLT

## Section

TERMNALS

## Description

Directory assistance message fault

## Definition

Monitors the performance of the attempts to send messages from the DMS central control (CC) to the directory assistance system (DAS).

## Measurement list

DAMSGFLT is calculated from the accumulation of the DALINK measurement MSGSNDFL.

## Normalizer

DAMSGFLT is normalized by the number of attempts made to send a message from the DMS central control (CC) to the directory assistance system (DAS) during a directory assistance call. This value is given by the measurement MSGSENT in DALINK.

## Diagnostics

Check OM group DALINK register MSGSNDFL.

## OM groups

DALINK

# Basic index ARUFLT

## Section

TERMNALS

## Description

Audio response unit fault

## Definition

Monitors the performance for all ARUs which provide service for applications such as ADACC (automatic directory assistance call completion).

## Measurement list

ARUFLT is calculated from the accumulation of the sum of TOPSARU measurements DAARUAF and INTARUAF.

## Normalizer

ARUFLT is normalized by the sum of each attempt made to release a directory assistance call to an ARU announcement and each attempt made to intercept a call to an ARU announcement. These numbers are provided by the measurements DATOARU and INTTOARU in TOPSARU.

## Diagnostics

Check OM group TOPSARU registers DAARUAF and INTARUAF to pinpoint the failure source.

## OM groups

TOPSARU

# Basic index ARUDAAV

## Section

TERMNALS

## Description

Audio response unit directory assistance availability

## Definition

Monitors the ARU availability for directory assistance calls.

## Measurement list

ARUDAAV is calculated from the accumulation of the measurements INTARUUN and DAARUUN in TOPSARU.

## Normalizer

ARUDAAV is normalized by the sum of each attempt made to release a directory assistance call to an ARU announcement and each attempt made to intercept a call to an ARU announcement. These numbers are provided by the measurements DATOARU and INTTOARU in TOPSARU.

## Diagnostics

Check OM group TOPSARU registers DAARUUN and INTARUUN to pinpoint the failure source.

## Associated logs

Check for DAS103 logs which always occur when there is no ARU available for directory assistance calls.

## OM groups

TOPSARU

# Aggregate index SLMPERF

## Section

TERMNALS

## Description

System load module (SLM) performance

## Definition

The summary of the maintenance performance of system load modules.

## Diagnostics

Check the SLMPERF basic indices SLMFAULT, SLMSOUT, and SLMMOUT for low values.

# Basic index SLMFAULT

## Section

TERMNALS

## Description

System load module (SLM) fault

## Definition

The number of faults detected in the SLM card.

## Measurement list

SLMFAULT uses measurement SLMFLT of OM group SLM.

## Normalizer

SLMFAULT is normalized per working SLM unit per unit time.

## Diagnostics

Check OM group SLM, register SLMFAULT. Check logs SLM403 and SLM404 for more details.

# Basic index SLMSOUT

## Section

TERMNALS

## Description

System load module (SLM) system outage

## Definition

The unavailability, caused by system action (system busy or C-side busy), of the primary SLM.

## Measurement list

SLMSOUT uses measurement SLMSBSU of OM group SLM.

## Normalizer

SLMSOUT is normalized per working SLM unit per unit time.

## Diagnostics

Check OM group SLM, register SLMSBSU. Check logs SLM401, SLM402, and SLM403 for more details.

# Basic index SLMMOUT

## Section

TERMNALS

## Description

System load module (SLM) manual outage

## Definition

The unavailability of the primary SLM, caused by manual action.

## Measurement list

SLMMOUT uses measurement SLMMBSU of OM group SLM.

## Normalizer

SLMMOUT is normalized per working SLM unit per unit time.

## Diagnostics

Check OM group SLM, register SLMMBSU. Check logs SLM401, SLM402, and SLM403 for more details.

# Aggregate index LINEPERF

## Section

TERMNALS

## Description

Line performance

## Definition

The summary of the maintenance performance of lines as individual circuits.

## Diagnostics

Review line maintenance procedures to ensure early recognition of faults and minimal line outage.

## Basic index LINEFLT

### Section

TERMNALS

### Description

Line fault (subscriber loops)

### Definition

The failure rate of subscriber loops.

### Measurement list

LINEFLT uses measurement PMTYP PMTCCTOP, summed over LM, RCT, RCU, RCS, LCM, ESA, ISLM, ILCM, and ELM PM types.

### Normalizer

LINEFLT is normalized per working line per unit time.

### Diagnostics

Verify OM group RMTYP (PMTCCTOP) to indicate bad PMs. Run ALT for cable trouble. Review line maintenance procedures to ensure early recognition of faults and minimal line outage. The focused maintenance for lines and trunks can be used for trouble-shooting. Check the count of SIG-TEST DIAG failures with logs ALT100 through ALT107.

# Basic index LINEOUT

## Section

TERMNALS

## Description

Line outage

## Definition

The unavailability of individual line circuits.

DMS-100G Switch does not contribute to or provide an equivalent of OM group SYSPERF

## Measurement list

LINEOUT uses measurement SYSPERF LINCCTBU. This excludes outage in the LM-busy state; for example, because of PM or drawer outage.

## Normalizer

LINEOUT is normalized per working line per unit time.

## Diagnostics

Verify OM group SYSPERF (LINCCTBU). Review line maintenance procedures to ensure early recognition of faults and minimal line outage. Reference focused maintenance if available.

## Aggregate index TRKPERF

### Section

TERMNALS

### Description

Trunk performance

### Definition

The summary of the maintenance performance of trunks.

### Diagnostics

Check indices TMPERF, XPMPERF, DCMPERF, and CARRPERF to see if the outage was caused by PM or carrier facility failure. Such an outage is also counted in SYSPERF TKPCBU. Use DS1CARR DS1SBU and DS1MBU (or PCMCARR CARRSYSB and CARRMANB in International offices) to locate specific carrier systems that may be responsible for the outage. Check TRK MBU and SBU to see which groups are most heavily affected. Where individual circuit problems are indicated, review trunk maintenance procedures for monitoring and clearing of trunk troubles. Enhanced Maintenance For Lines And Trunks provides an analysis of TRK log messages that may point to problem trunks.

# Basic index TRKFLT

## Section

TERMNALS

## Description

Trunk fault

## Definition

The failure rate of trunks outside plant.

DMS-100G Switch does not contribute to or provide an equivalent of OM group PMTYP, measurement PMTCCTOP.

## Measurement list

TRKFLT uses measurement PMTYP PMTCCTOP, summed over DTC, IDTC, LTC, RCC, ILTC, ADTC, PDTC, TM2, TM4, TM8, ATM, T8A, TMA, PTM, DCM, DCM250 and DCMT PM types.

## Normalizer

TRKFLT is normalized per working trunk per unit time.

## Diagnostics

Verify OM group PMTYP (PMTCCTOP) to indicate bad PMs and DS1CARR for carrier (CXR) trouble. Run ATT for plant or PM trouble. Review trunk maintenance procedures for monitoring and clearing of trunk troubles. Focused maintenance for lines and trunks provide an analysis of TRK log messages that may point to problem trunks. Also check the count of SIG_TEST DIAGN failures.

# Basic index INTRKSOU

## Section

TERMNALS

## Description

Incoming trunk system outage

## Definition

The average fraction of equivalent one-way incoming trunks is unable to give access to the switch because of an outage in the peripherals on which the trunks terminate, failures in the facilities carrying the trunks, or failures of individual trunks.

DMS-100G Switch does not contribute to or provide an equivalent of OM group TRK, measurement SBU.

## Measurement list

The measurement used for INTRKSOU is the sum of maintenance-busy usage (TRK SBU) over all incoming and two-way trunk groups. System-busy usage for incoming trunks is given twice the weight of usage for two-way trunks. This creates a measurement of equivalent one-way incoming trunk outage.

## Normalizer

INTRKSOU is normalized per working equivalent one-way incoming trunk per unit time. In calculating the number of working equivalent one-way incoming trunks, one-way incoming trunks are given twice the weight of two-way trunks.

## Diagnostics

Verify OM groups to determine which trunking PM type (XPM, TM, DCM) is not available. Use TRK, SBU to locate the specific trunk groups affected. Use DS1CARR, DS1SBU (or PCMCARR, CARRSYSB in International offices) to locate specific carrier systems. Check logs TRK106 and TRK109.

# Basic index INTRKMOU

## Section

TERMNALS

## Description

Incoming trunk manual outage

## Definition

The average fraction of equivalent one-way incoming trunks is unable to give access to the switch because of a manual outage.

DMS-100G Switch does not contribute to or provide an equivalent of OM group TRK, measurement MBU

## Measurement list

The measurement used for INTRKMOU is the sum of maintenance-busy usage (TRK MBU) over all incoming and two-way trunk groups. Maintenance-busy usage for incoming trunks is given twice the weight of usage for two-way trunks. This creates a measurement of equivalent one-way incoming trunk outage.

## Normalizer

INTRKMOU is normalized per working equivalent one-way incoming trunk per unit time. In calculating the number of working equivalent one-way incoming trunks, one-way incoming trunks are given twice the weight of two-way trunks.

## Diagnostics

Verify OM groups to determine which trunking PM type (XPM, TM, or DCM) is not available. Use TRK, MBU to locate the specific trunk groups affected. Use DS1CARR, DS1MBU (or PCMCARR, CARRMANB in International offices) to locate specific carrier systems. These results should agree with manual maintenance being performed.

# Basic index OGTRKSOU

## Section

TERMNALS

## Description

Outgoing trunk system outage

## Definition

The average fraction of equivalent one-way outgoing trunks is unable to give access to the switch because of an outage in the peripherals on which the trunks terminate, failures in the facilities carrying the trunks, or failures of individual trunks.

DMS-100G Switch does not contribute to or provide an equivalent of OM group TRK, measurement SBU.

## Measurement list

The measurement used for OGTRKSOU is the sum of maintenance-busy usage (TRK SBU) over all outgoing and two-way trunk groups. System-busy usage for outgoing trunks is given twice the weight of usage for two-way trunks. This creates a measurement of equivalent one-way outgoing trunk outage.

## Normalizer

OGTRKSOU is normalized per working equivalent one-way outgoing trunk per unit time. In calculating the number of working equivalent one-way outgoing trunks, one-way outgoing trunks are given twice the weight of two-way trunks.

## Diagnostics

Verify OM group TRK (SBU). Review trunk maintenance procedures for monitoring and clearing of trunk troubles. Focused maintenance for lines and trunks provides an analysis of TRK log messages that may point to problem trunks. Also check logs TRK106 and TRK109 and check for carrier (CXR), cable, or PM trouble.

# Basic index OGTRKMOU

## Section

TERMNALS

## Description

Outgoing trunk manual outage

## Definition

The average fraction of equivalent one-way outgoing trunks is unable to give access to the switch because of a manual outage.

DMS-100G Switch does not contribute to or provide an equivalent of OM group TRK, measurement MBU

## Measurement list

The measurement used for OGTRKMOU is the sum of maintenance-busy usage (TRK MBU) over all outgoing and two-way trunk groups. Maintenance-busy usage for outgoing trunks is given twice the weight of usage for two-way trunks. This creates a measurement of equivalent one-way outgoing trunk outage.

## Normalizer

OGTRKMOU is normalized per working equivalent one-way outgoing trunk per unit time. In calculating the number of working equivalent one-way outgoing trunks, one-way outgoing trunks are given twice the weight of two-way trunks.

## Diagnostics

Verify OM group TRK (MBU) and ensure that these results agree with manual maintenance being performed.

# Basic index C7TRKCFL

## Section

TERMNALS

## Description

CCS7 ISUP trunk connection failure

## Definition

C7TRKCFL monitors the failure to make ISDN user part (ISUP) end-to-end connections due to one or more of the following reasons:

- switching equipment connection
- circuit availability
- incomplete address
- temporary failures
- continuity check request (CCR) test failures

## Measurement list

C7TRKCFL is the sum of ISUPCONN measurements ISCONUCE, ISCONUCC, ISCONUCF, ISCONCOT, and ISCONUCA.

## Normalizer

C7TRKCFL is normalized by the number of initial address messages (IAM) sent. The measurements ISMSGOUT and ISMSGOT2 of OM group ISUPUSAG are indexed by key IAM.

## Diagnostics

Verify OM group ISUPUSAG, registers ISCONUCE, ISCONUCC, ISCONUCA, ISCONUCF, and ISCONCOT. See logs C7UP106 and C7UP105 for the reason of an incomplete address, and log C7UP107.

# Aggregate index CARRPERF

## Section

TERMNALS

## Description

Carrier performance

## Definition

The summary of the maintenance performance of digital trunk carrier facilities.

## Diagnostics

Determine the carrier system causing unfavorable results by review of the results in OM group DS1CARR (PCMCARR in International offices). Check at the CARRIER level of the MAP to determine if the troubles are in the office or the outside plant.

# Basic index CARRERR

## Section

TERMNALS

## Description

Carrier error

## Definition

The error rates on digital carriers connecting to other switches. These include trunk carriers and timing links.

DMS-100G Switch does not contribute to or provide an equivalent of OM group DS1CARR

## Measurement list

CARRERR uses the sum of DS1CARR measurements DS1BER, DS1LOF, and DS1SLP. In International offices, this index uses the sum of PCMCARR measurements LLFAERR, LLMAERR, RFAIERR, RMAIERR, AISERR, BERERR, SLIPERR, SIGLERR, CRC4ERR, AIS16ERR, LLCMAERR, and CREERR.

## Normalizer

CARRERR is normalized per working digital carrier link per unit time.

## Diagnostics

Check OM group DS1CARR measurements DS1BER, DS1LOF, and DS1RCGA. Also check logs PM110 and PM112 when the maintenance or out-of-service threshold has been exceeded. Check the DS1CARR menu for carrier (CXR) trouble.

# Basic index CARRFLT

## Section

TERMNALS

## Description

Carrier fault

## Definition

The failure rates on digital carriers connecting to other switches. These include trunk carriers and timing links.

DMS-100G Switch does not contribute to or provide an equivalent of OM group DS1CARR.

## Measurement list

CARRFLT uses the sum of DS1CARR measurements DS1AIS, DS1LCGA and DS1RCGA. In International offices, this index uses the sum of PCMCARR measurements LLFAFLT, LLMAFLT, RFAIFLT, RMAIFLT, AISFLT, BERFLT, SLIPFLT, SIGLFLT, CRC4FLT, AIS16FLT, LLCMAFLT, and CREFLT.

## Normalizer

CARRFLT is normalized per working carrier link per unit time.

## Diagnostics

Check OM group DS1CARR measurements DS1LCGA and DS1RCGA. Also check logs PM109 and TRK109.

# Basic index CARRSOUT

## Section

TERMNALS

## Description

Carrier system outage

## Definition

The unit unavailability of digital-trunk and timing-carrier links to other switches.

DMS-100G Switch does not contribute to or provide an equivalent of OM group DS1CARR.

## Measurement list

CARRSOUT uses the sum of DS1CARR measurement DS1SBU. In International offices, this index uses the sum of PCMCARR measurement CARRSYSB.

## Normalizer

CARRSOUT is normalized per working inter-switch carrier link per unit time.

## Diagnostics

Verify OM group DS1CARR (DS1SBU or PCMCARR, CARRSYSB). Further information may be obtained from logs PM105, PM109, PM182, and TRK109.

# Basic index CARRMOUT

## Section

TERMNALS

## Description

Carrier manual outage

## Definition

The unit unavailability of digital trunk and timing carrier links to other switches.

DMS-100G Switch does not contribute to or provide an equivalent of OM group DS1CARR.

## Measurement list

CARRMOUT uses the sum of DS1CARR measurement DS1MBU. In International offices, this index uses the sum of PCMCARR measurement CARRMANB.

## Normalizer

CARRMOUT is normalized per working inter-switch carrier link per unit time.

## Diagnostics

Verify OM group DS1CARR (DS1SBU or PCMCARR, and CARRMANB).

# Aggregate index C7RTPERF

## Section

TERMNALS

## Description

CCS7 route performance

## Definition

C7RTPERF provides information on route availablity, route grade of service, routeset availability, and routeset congestion.

## Diagnostics

None

# Aggregate index C7ROUTE

## Section

TERMNALS

## Description

CCS7 route

## Definition

C7ROUTE provides information on the route grade of service and on the availability of the route.

## Diagnostics

None

# Basic index C7RTDEGR

## Section

TERMNALS

## Description

CCS7 degraded route service

## Definition

C7RTDEGR measures the number of messages that the CCS7 network cannot deliver to the destination through this route.

## Measurement list

C7RTDEGR is the C7ROUTE measurement C7FRCRER and its extension register C72FRCRE.

## Normalizer

C7RTDEGR is normalized by the number of CCS7 routes per unit time.

## Diagnostics

Verify OM group C7ROUTE, registers C7FTFP, C7FRCRER, and C7TFC3. See logs CCS167 and CCS168 for more information.

# Basic index C7RTOUT

## Section

TERMNALS

## Description

CCS7 route outage

## Definition

C7RTOUT monitors the availability of the CCS7 route. The system-busy and manual-busy route states are considered unavailable.

## Measurement list

C7RTOUT uses measurement C7RTUNAU from OM group C7ROUTE and measurement C7RTUNU from OM group C7ROUTE2.

## Normalizer

C7RTOUT is normalized by the number of working CCS7 routes per unit time.

## Diagnostics

Verify OM group C7ROUTE, registers C7RTUNAU and C7TFP.

# Aggregate index C7RTSET

## Section

TERMNALS

## Description

CCS7 routeset

## Definition

C7RTSET monitors the performance of the CCS7 routeset. This index provides information on the availability and congestion level of the routeset.

## Diagnostics

None

# Basic index C7RTSTCO

## Section

TERMNALS

## Description

CCS7 routeset congestion

## Definition

C7RTSTCO measures routeset congestion. Only partial traffic capability is measured because only messages of certain priority can be routed.

## Measurement list

C7RTSTCO uses measurement C7RSCNGU of OM group C7RTESET.

## Normalizer

C7RTSTCO is normalized by the number of working CCS7 routes per unit time.

## Diagnostics

Verfiy OM group C7RTESET, registers C7RSCNGU, C7TFCO, C7FC1, C7TFC2, and C7TFC3.

# Basic index C7RTSTOU

## Section

TERMNALS

## Description

CCS7 routeset outage

## Definition

C7RTSTOU monitors the availability (the system or manual busy) states of the CCS7 routeset.

## Measurement list

C7RTSTOU uses measurement C7RSUNAU of OM group C7RTESET.

## Normalizer

C7RTSTOU is normalized by the number of working CCS7 routes per unit time.

## Diagnostics

Verify OM group C7RTESET, registers C7RTESET and C7TFP. Check for CCS154 and CCS168 logs.

# SPMS PROVRES index descriptions

The following chapter provides index descriptions for the PROVRES branch of SPMS. The provisionable resources index (PROVRES) summarizes the performance of traffic provisionable resources for both hardware and software within the switch. The high level PROVRES index has five main branches, the call processing resources index (CPRES), the feature software register utilization index (FTRQRES), the extension blocks index (EXTBLKS), the service circuit resources index (SRVCTRES), and the speech link status index (CHANRES).

## Where to find an index

This chapter provides descriptions for each aggregate and basic index that contributes to the PROVRES branch of SPMS.

The index descriptions are organized according to the DMS-100 hierarchy shown in Figure 3-1, SPMS structure for DMS-100. The indices shown in this figure supply information for an NT40 switch. Because many of the indices that pertain to an NT40 switch also pertain to a SuperNode switch and an enhanced network (ENET), the DMS-100 indices are not individually identified by switch type.

The index descriptions specifically provided for a SuperNode switch are identified as SuperNode components. These indices cannot function on an NT40 switch. See Figure 3-2, SPMS structure for SuperNode, for the index hierarchy that applies to a SuperNode switch.

The ENET indices are identified like the SuperNode indices. See Figure 3-3, SPMS structure for ENET, for the index hierarchy that applies to ENET.

See the index for an alphabetical list of all the indices.

## How the indices are presented

This chapter contains aggregate and basic index descriptions for the PROVRES branch of SPMS.

The following headings appear in each description of an aggregate index:

- section

- description
- definition
- diagnostics

The information under these headings explains:

- the section below the PROVRES branch to which the index belongs
- the expansion of the index name
- the function and purpose of the index
- the steps required to locate the switch problem

The following headings appear in each description of a basic index:

- section
- description
- definition
- measurement list
- normalizer
- diagnostics

The information under these headings explains:

- the section below the PROVRES branch to which the index belongs
- the expansion of the index name
- the function and purpose of the index
- the combination of indices that contribute to the index in question based on a mathematical calculation performed by SPMS
- the appropriate weighting factors applied to an index based on OMS, and the frequency and importance of the index being examined
- the steps required to locate the switch problem

# Aggregate PROVRES

## Section

The provisional resources (PROVRES) index is a top level office performance (OFCPERF) index. The provisionable resources index derives data from the call processing resources (CPRES), feature software register utilization (FTRQRES), extension blocks (EXTBLKS), service circuit resources (SRVCTRES), and speech link status (CHANRES) indices.

## Description

Provisionable resources

## Definition

The PROVRES composite index monitors traffic sensitive resources for high occupancy or overflows. It is a summary of the traffic status of traffic-engineered components of the switch.

## Diagnostics

Track unfavorable results down the tree to the most detailed level. If more information is needed, refer to results in the OM groups from which the basic indices are derived. Review provisioning of the components responsible for the unfavorable results.

# Aggregate index CPRES

## Section

CPRES

## Description

Call processing resources

## Definition

The summary of the level of utilization of the CC and of key call processing software registers: call condense blocks (CCBOVFL), call processing letters (CPLOVFL), outgoing buffers (OUTBOVFL), multiblocks (MULTBOVF), wake-up blocks (WAKEOVFL), and call processes themselves (CPMAXBSY).

## Diagnostics

Review provisioning of the components responsible for unfavorable results. To avoid problems in the first place, monitor the peak usage registers in CP2 against provisioned quantities to detect the approach of excessive levels of utilization (example: above 90%).

# Basic index CCOCCUP

## Section

CPRES

## Description

Call process real-time use

## Definition

The proportion of time during which call processing is using all of the real time available to it.

## Measurement list

CCOCCUP uses measurement CP2 CPWORKU.

## Normalizer

CCOCCUP is normalized per unit time.

## Diagnostics

Check the available real time of the DMS by verifying OM group CP2 (CPWORKU). Check for unusual load of calling patterns. Check OM MACHACT for overflow.

# Basic index CCBOVFL

## Section

CPRES

## Description

Call condense blocks overflow

## Definition

The overflow rate of call condense blocks.

## Measurement list

CCBOVFL uses measurement CP CCBOVFL.

## Normalizer

CCBOVFL is normalized by the sum of CP CCBSZ (with extension register CCBSZ2) and CCBOVFL. In GSF the content of CP.CCBSZ dose not indicate the number of originating calls.

## Diagnostics

Check CC real-time occupancy or the provisioning of call-processing call condense blocks. Verify OM group CP (CCBOVFL). Check OM group CP2 for overflow.

# Basic index CPMAXBSY

## Section

CPRES

## Description

Call process maximum busy

## Definition

The proportion of calls forcibly released during processing because all call processes are busy.

DMS-100G Switch does not contribute to or provide an equivalent of:

- OM group CP, measurement WAITDENY
- OM group OFZ, measurements NIN, and NIN2

## Measurement list

CPMAXBSY uses measurement CP WAITDENY.

## Normalizer

CPMAXBSY is normalized per total call attempt.

## Diagnostics

Check CC real-time occupancy or the availability of call-processing resources. Verify OM group CP (WAITDENY). Check OM group MACHACT register CPLEV. Check OM group CP for overflow.

# Basic index CPLOVFL

## Section

CPRES

## Description

Call process letter overflow

## Definition

The overflow rate of call process letters.

DMS-100G Switch does not impact this basic index due to the different call processing infrastructure.

## Measurement list

CPLOVFL uses the sum of CP measurements CPLOOVFL and CPLPOVFL. CPLPOVFL indicates a serious shortage, but CPLOOVFL does not.

## Normalizer

CPLOVFL is normalized by the sum of CP measurements CPLSZ (with extension register CPLSZ2), CPLOOVFL, and CPLPOVFL.

## Diagnostics

Check CC real-time occupancy or the provisioning of call-processing letters. Verify OM group CP (CPLOOVFL, CPLPOVFL) and associated logs OM2200 MINOR ALM and OM2200 MAJOR ALM. Check OM group CP2 for overflow.

# Basic index OUTBOVFL

## Section

CPRES

## Description

Outgoing buffers overflow

DMS-100G Switch does not impact this basic index due to the different call processing infrastructure.

## Definition

The overflow rate of outgoing buffers.

## Measurement list

OUTBOVFL uses measurement CP OUTBOVFL. CP2 OUTBHI is observed over the reporting period.

## Normalizer

OUTBOVFL is normalized by the sum of CP OUTBSZ plus OUTBOVFL.

## Diagnostics

Check CC real-time occupancy or the provisioning of call-processing outgoing buffers. Verify OM group CP (OUTBOVFL) and associated log OM2200. Check for hardware or software trouble.

# Basic index MULTBOVF

## Section

CPRES

## Description

Multi-block overflow

## Definition

The overflow rate of multi-blocks.

DMS-100G Switch does not impact this basic index due to the different call processing infrastructure.

## Measurement list

MULTBOVF uses measurement CP MULTOVFL.

## Normalizer

MULTBOVFL is normalized by the sum of CP MULTSZ plus MULTOVFL.

## Diagnostics

Check CC real-time occupancy or the provisioning of call-processing wake-up blocks. Verify OM group CP (WAKEOVFL) and associated log OM 2200 (MAJOR ALM). Check LINE138 report NOSR or NOSC.

# Basic index WAKEOVFL

## Section

CPRES

## Description

Wake-up block overflow

DMS-100G Switch does not impact this basic index due to the different call processing infrastructure.

## Definition

The overflow rate of wake-up blocks.

## Measurement list

WAKEOVFL uses measurement CP WAKEOVFL.

## Normalizer

WAKEOVFL is normalized by the sum of CP WAKESZ plus WAKEOVFL.

## Diagnostics

Check CC real-time occupancy or the provisioning of call-processing wake-up blocks. Verify OM group CP (WAKEOVFL) and associated log OM2200 (CRITICAL ALARM). Check LINE138 report NOSR or NOSC.

# Basic index ECCBOVFL

## Section

CPRES

## Description

Extended call condense block overflow

DMS-100G Switch does not impact this basic index due to the different call processing infrastructure.

## Definition

The overflow rate of extended call condense blocks.

## Measurement list

ECCBOVFL uses measurement CP2 ECCBOVFL.

## Normalizer

ECCBOVFL is normalized by the sum of CP2 ECCBSZ plus ECCBOVFL.

## Diagnostics

Check CC real-time occupancy or the provisioning of call-processing extended call condense blocks. Verify OM group CP2 (ECCBOVFL). Check log LINE138, NOSR or NOSC, and log TRK138.

# Aggregate index FIRQRES

## Section

FTRQRES

## Description

Feature software register utilization

## Definition

The summary of the level of utilization of various types of software registers associated with feature processing. Overflows of these registers may result in failure to serve attempts on features such as call forwarding and three-way calling.

## Measurement list

Each child index uses measurement FTRQ FTRQOVFL for its block type.

## Normalizer

Each child index is normalized by the sum of FTRQ FTRQSEIZ plus FTRQOVFL.

## Diagnostics

Review provisioning of the components responsible for unfavorable results. As a preventive measure, monitor peak usages as given by measurement FTRQ FTRQHI for the respective block types against provisioned quantities to detect excessive utilization levels (example: above 90%).

# Basic index FQAGOVFL

## Section

FTRQRES

## Description

Feature queue agent overflow

DMS-100G Switch dose not impact this basic index due to the different call processing infrastructure.

## Definition

The overflow rate of feature queue agent blocks.

## Measurement list

FQAGOVFL uses the measurementin OM group FTRQ, field FTRQOVFL, key 0.

## Normalizer

FQAGOVFL is normalized by the counts in OM group FTRQ, field FTRQSEIZ, key 0.

## Diagnostics

Verify OM group FTRQ (FTRQOVFL). Review provisioning of feature queue agent blocks. Check LINE138 and TRK138 (NOSC) logs.

# Basic index FQ0WOVFL

## Section

FTRQRES

## Description

Feature queue zero-word overflow

## Definition

The overflow rate of feature queue zero-word area blocks.  Note that as of BCS21, call processing makes no use of this block type.

DMS-100G Switch does not impact this basic index due to the different call processing infrastructure.

## Measurement list

FTRQ0WOVFL uses the measurement in OM group FTRQ, field FTRQOVFL, keys 1 and 7.

## Normalizer

FTRQ0WOVFL is normalized by the counts in OM group FTRQSEIZ, keys 1 and 7.

## Diagnostics

Verify OM group FTRQ (FTRQOVFL).  Review provisioning of feature queue zero blocks.  Check LINE138 and TRK138 (NOSC and NOSR) logs.

# Basic index FQ2WOVFL

## Section

FTRQRES

## Description

Feature queue two-word overflow

DMS-100G Switch does not impact this basic index due to the different call processing infrastructure.

## Definition

The overflow rate of feature queue two-word area blocks.

## Measurement list

FQ2WOVFL uses the measurement in OM group FTRQ, field FTRQOVFL, keys 2 and 8.

## Normalizer

FQ2WOVFL is normalized by the counts in OM group FTRQSEIZ, keys 2 and 8.

## Diagnostics

Verify OM group FTRQ (FTRQOVFL). Review provisioning of feature queue two blocks. Check LINE138 and TRK138 (NOSC and NOSR) logs.

# Basic index FQ4WOVFL

## Section

FTRQRES

## Description

Feature queue four-word overflow

DMS-100G Switch does not impact this basic index due to the different call processing infrastructure.

## Definition

The overflow rate of feature queue four-word area blocks.

## Measurement list

FQ4WOVFL uses the measurement in OM group FTRQ, field FTRQOVFL, keys 3 and 9.

## Normalizer

FQ4WOVFL is normalized by the counts in OM group FTRQSEIZ, keys 3 and 9.

## Diagnostics

Verify OM group FTRQ (FTRQOVFL). Review provisioning of feature queue four blocks. Check LINE138 and TRK138 (NOSC and NOSR) logs.

# Basic index FQ8WOVFL

## Section

FTRQRES

## Description

Feature queue eight-word overflow

DMS-100G Switch does not impact this basic index due to the different call processing infrastructure.

## Definition

The overflow rate of feature queue eight-word area blocks.

## Measurement list

FQ8WOVFL uses the measurement in OM group FTRQ, field FTRQOVFL, keys 4 and 10.

## Normalizer

FQ8WOVFL is normalized by the counts in OM group FTRQSEIZ, keys 4 and 10.

## Diagnostics

Verify OM group FTRQ (FTRQOVFL). Review provisioning of feature queue eight blocks. Check LINE138 and TRK138 (NOSC and NOSR) logs.

# Basic index FQ16WOVFL

## Section

FTRQRES

## Description

Feature queue 16-word overflow

## Definition

The overflow rate of feature queue 16-word area blocks.

DMS-100G Switch does not impact this basic index due to the different call processing infrastructure.

## Measurement list

FQ16WOVLF uses the measurement in OM group FTRQ, field FTRQOVFL, keys 5 and 11.

## Normalizer

FQ16WOVLF is normalized by the counts in OM group FTRQSEIZ, keys 5 and 11.

## Diagnostics

Verify OM group FTRQ (FTRQOVFL). Review provisioning of feature queue 16 blocks. Check LINE138 and TRK138 (NOSC and NOSR) logs.

# Basic index FQ32WOVFL

## Section

FTRQRES

## Description

Feature queue 32-word overflow

## Definition

The overflow rate of feature queue 32-word area blocks.

DMS-100G Switch does not impact this basic index due to the different call processing infrastructure.

## Measurement list

FQ32WOVLF uses the measurement in OM group FTRQ, field FTRQOVFL, keys 6 and 12.

## Normalizer

FQ32WOVLF is normalized by the counts in OM group FTRQSEIZ, keys 6 and 12.

## Diagnostics

Verify OM group FTRQ (FTRQOVFL). Review provisioning of feature queue 16 blocks. Check LINE138 and TRK138 (NOSC and NOSR) logs.

# Aggregate index EXTBLKS

## Section

FTRQRES

## Description

Extension blocks

## Definition

The summary of the traffic status of extension blocks. EXTBLKS has been broken out into two groupings: extension blocks associated with feature-related call processing (FTREXT), and extension blocks associated with billing and call detail recording (BILLEXT). Under these two headings, an overflow index is provided for each extension block type.

## Measurement list

Each overflow index uses EXT EXTOVFL for that block type.

## Normalizer

Each overflow index is normalized by the sum of EXT EXTSEIZ and EXTOVFL for that block type.

## Diagnostics

Track unfavorable results down the tree to the responsible extension block type. Review provisioning of that type. As a preventive measure, monitor peak usage measurement EXT EXTHI for each block type against number provisioned, to detect excessive levels of utilization (example: over 90%).

# Aggregate index FTREXT

## Section

EXTBLKS

## Description

Feature extension

## Definition

The summary of the level of utilization of extension block types associated with feature processing. The basic indices contributing to FTREXT monitor overflow rate of extension blocks that carry data required by various call processing features. The correspondence between basic indices, extension block format codes, and the office parameters used to provision the quantities of the various blocks is presented in the following table.

## Diagnostics

None

**FTREXT contributors**

| Basic index | Extension block format codes | Office parameters |
|---|---|---|
| PERMXOVF | PERM | NUMPERMEXT* |
| CCISIXOV | CCIS_INWATS_BLOCK | #_OF_CCIS_INWATS_BLOCKS |
| TWCXOVFL | TWC_EXTENSION_BLOCK | NO_OF_TWC_EXT_BLKS* |
| MTXHOVFL | MTX_HANDOFF_BLOCK | HANDOFF_BLOCK_COUNT |
| CFWXOVFL | CFW_EXTENSION | CFW_EXT_BLOCKS* |
| CSDDPXOV | CSDDSPERM | NUMCSDDSPERMEXT |
| ROTLPXOV | ROTL_PRIMING_BLOCK | one per test port |
| CWTXOVFL | CUSTOM_CALLING_DATA | NO_OF_SC_EXT_BLKS* |
| IBNCQXOV | INBCQEXT | NUMIBNCQEXTBLK |
| CFDXOVFL | CFD_EXTENSION | CFD_EXT_BLOCKS |
| FTRCTLXO | FEATURE_CONTROL_DATA | NO_OF_FTR_CONTROL_BLOCKS |
| FTRDATXO | FEATURE_DATA | NO_OF_DATA_BLOCKS |
| SDPATCXO | SDPATC_EXTENSION | NUMSDPATCEXTBLK |

**—continued—**

## Aggregate index FTREXT (continued)

**FTREXT contributors** (continued)

| Basic index | Extension block format codes | Office parameters |
|---|---|---|
| LTDXOVFL | LTD_EXT_DATA | fixed at 20 |
| KSHUNTXO | KEY_SHORT_HUNT_EXT | KSHUNT_EXT_BLOCKS |
| NSCXOVFL | NSC_EXT_BLOCK | #_OF_NCS_EXT_BLK |
| DCRXOVFL | DCR_EXT_FC | NO_DCR_EXT_BLKS |
| REGNSEMO | REGNSEMA | NUM_REGNSEMA_EXT_BLOCKS |
| IBNIXOVF | IBN_INTL_XLA_EXT_BLOCK | NUM_IBN_IXLA_EXT_BLOCKS |
| LCOXOVFL | LCO_EXTENSION_BLOCK | NO_LOCAL_COIN_EXT_BLKS |
| NCSXOVFL | NCS_EXTENSION_BLK | NUMBER_NCS_EXTENSION_BLOCKS |
| CDIVXOVF | CDIV_EXTENSION | CDIV_EXT_BLOCKS |
| E800TCXO | E800_TCAP_EXT_BLK | NO_OF_TRANSACTION_IDS |
| ISUPMSXO | ISUP_EXTENSION_BLOCK | NUM_ISUP_EXT_BLKS |
| SP250XOV | SCRPAD_EXTEN_BLK | NUMBER_ECCB_SCRATCHPAD_AREAS |
| DMS250XO | MCCS_EXTEN_BLK | NUMECCBS |
| RDBXFMTO | RDB_EXT_FMT | NUM_RDB_EXTS |
| FTRXLAXO | FEATURE_XLA_DATA | NO_OF_FTR_XLA_BLKS |
| PCFCXOVF | POTS_CFZ_EXTENSION | CFZ_EXT_BLOCKS |
| ACCSTXOV | ACCS_TCAP_EXT_BLK | ACCS_MAX_QUERIES |
| HISCNTXO | HISTORY_CONTROL_DATA | NO_OF_HIS_CONTROL_BLKS |
| HISDXOVF | HISTORY_DATA | NO_OF_HIS_DATA_BLKS |
| PVNXOVFL | PVN_EXT_BLK | NO_OF_PVN_EXT_BLK |
| DPNSSXOV | DPNSS_EXTENSION_BLOCK | NUMBER_OF_DPNSS_EXT_BLOCKS |
| AUXXOVFL | AUX_EXTENSION_BLK | NUMBER_AUX_EXTENSION_BLOCKS |
| TCAPSXOV | TC_AP_SMALL_EXT_BLK | NO_OF_SMALL_EXT_BLKS |
| TCAPLXOV | TC_AP_LARGE_EXT_BLK | NO_OF_LARGE_EXT_BLKS |
| TCAPXLXO | TC_AP_XLARGE_EXT_BLK | NO_OF_XLARGE_EXT_BLKS |
| PVNTCAXO | PVN_TCAP_EXT_BLK | NO_OF_PVN_EXTBLK |
| ICTFRMXO | ICT_EXT_BLOCK | NUM_ICT_EXT_BLKS |

**—continued—**

## Aggregate index FTREXT (end)

**FTREXT contributors** (continued)

| Basic index | Extension block format codes | Office parameters |
|---|---|---|
| TCAPMXOV | TC_AP_MEDIUM_EXT_BLK | NO_OF_MEDIUM_EXT_BLKS |
| PVNTRMXO | PVN_TERM_EXT_BLK | NO_OF_PVN_TERM_EXTBLK |
| DMS250BO | DMS250_BBF_EXT_BLK | NO_OF_DMS250_BBF_EXT_BLK |
| TPBXXOVF | TPBX_EXTENSION | NUM_TPBX_EXT_BLKS |
| SCSXOVFL | SCS_EXTENSION | NUM_OF_SCS_EXTBLKS |

**—end—**

All of the office parameters in this list are found in table OFCENG.

# Aggregate index BILLEXT

## Section

EXTBLKS

## Description

Billing extension

## Definition

The summary of the level of utilization of extension block types used to contain billing data for various types of billing system.

## Diagnostics

Review provisioning of the block types responsible for unfavorable results. The basic indices contributing to BILLEXT monitor peak usage of extension blocks used to carry data required by various billing or call detail recording systems. The correspondence between basic indices, extension block format codes, and the office parameters used to provision the quantities of the various blocks is presented in table 7–2.

**BILLEXT contributors**

| Basic index | Extension block format codes | Office parameters |
|---|---|---|
| AOSSRUOV | AOSS_RU | AOSS_NUM_RECORDING_UNITS |
| NTRUOVFL | NT_RECORDING_UNIT | #_OF_NT_RECORDING_UNITS |
| TOPSRUOV | TOPSRO | TOPS_NUM_RU |
| CATRSRUO | CAMATOPS_RU | TOPS_NUM_CAMA_RU |
| SMDRRUOV | SMDR_RECORDING_UNIT | NO_OF_SMDR_REC_UNITS |
| AVCDRRUO | AVCDRU | AVCDR_RU_COUNT |
| BCRUOVFL | BC_RECORDING_UNIT | #_OF_BC_AMA_UNITS |
| BCLAMRUO | BC_LAMA_REC_UNIT | #_OF_BC_LAMA_REC_UNITS |
| NSGRUOVF | NSG_RECORDING_UNIT | NO_OF_REC_UNITS |
| CDR3RUOV | CDR300_RECORDING_UNIT | NUMBER_OF_CDR_UNITS |
| OESDRUOV | OESD_RECORD_UNIT | reserved for OESD offices |
| AVDSAROV | ASARU | DSA_RU_CNT |
| INTLROVF | INTL_RECORDING_UNIT | NUM_INTL_RECORDING_UNIT |

—continued—

# Aggregate index BILLEXT (end)

**BILLEXT contributors** (continued)

| Basic index | Extension block format codes | Office parameters |
|---|---|---|
| OCCROVFL | OOCRU | OOC_NUM_RU |
| ICAMAROV | ICAMA_RECORDING_UNIT | NUM_ICAMMA_RECORDING_UNITS |
| SORUOVFL | SO_RECORD_UNIT | KSAMA_NO_OFRU_FOR_SO |
| ITOPSROV | ITOPSRU | TOPS_NUM_RU |
| DMS250EX | EOPS_RECORDING_UNIT | NUM_OF_EOPS_REC_UNITS |
| CDRMTXOV | MTX_RECORDING_UNIT | MTX_CDR_RU_COUNT |
| RU250XOV | RU250_RECORDING_UNIT | NO_OF_DMS250_REC_UNITS |
| INTLCCMO | INTL_CCMTR_EXT_BLOCK | NO_OF_DMS250_REC_UNITS |

**—end—**

All of the office parameters in this list are found in table OFCENG.

# Aggregate index SRVCTRES

## Section

SRVCTRES

## Description

Service circuit resources

## Definition

The summary of the traffic status of service circuits.

## Diagnostics

Review provisioning of the circuits responsible for unfavorable results. Consult the underlying OM group for more precise location of the source of the overflows.

# Basic index ANNOVFL

## Section

SRVCTRES

## Description

Announcements overflow

## Definition

The number of failed attempts to connect to announcements, because the maximum permitted number of calls are already connected.

## Measurement list

ANNOVFL uses measurement ANN ANNOVFL, summed over all announcement types.

## Normalizer

ANNOVFL is normalized per attempt as given by measurement ANN ANNATT, summed over all announcement types.

## Diagnostics

To identify the overflowing announcement group, look at OM group ANN. Announcement group overflows may indicate problems elsewhere in the switch (example: bad translation datafill) that are causing an unusually large number of calls to route to announcement.

# Basic index STNOVFL

## Section

SRVCTRES

## Description

Special tones overflow

## Definition

The number of failed attempts to connect to special tones, because the maximum permitted number of calls are already connected.

DMS-100G Switch does not contribute to or provide an equivalent of OM group STN.

## Measurement list

STNOVFL uses measurement STN STNOVFL, summed over all special tone types.

## Normalizer

STNOVFL is normalized per attempt as given by measurement STN STNATT, summed over all special tone types.

## Diagnostics

To identify the special tone, look at OM group STN. Check LINE138 and TRK138 logs.

# Basic index UTROVFL

## Section

SRVCTRES

## Description

Universal tone receiver overflow

## Definition

The number of failed attempts to connect to UTRs, either because the UTR queue is full in a given PM, or because the call abandons while waiting for service.

## Measurement list

UTROVFL uses the sum of UTR measurements UTRQOVFL and UTRQABAN, summed over all PMs reporting UTR measurements.

## Normalizer

UTROVFL is normalized per attempt as given by the sum of UTR measurements UTRQOVFL, UTRQABAN, and UTRSZRS, summed over all PMs reporting UTR measurements.

## Diagnostics

Identify the PM with overloaded UTRs from OM group UTR. Consider whether the PM needs unloading. OM group PMOVLD may give information relevant to this decision. Check LINE138 and TRK138 (NOSC) logs.

# Basic index ESUPOVFL

## Section

SRVCTRES

## Description

Echo suppression overflow

## Definition

The number of failed attempts to connect to digital echo suppressors, because no idle circuit was available.

DMS-100G Switch does not contribute to or provide an equivalent of OM group ESUP.

## Measurement list

ESUPOVFL uses measurement ESUP DESOVFL.

## Normalizer

ESUPOVFL is normalized per attempt as given by the sum of ESUP measurements DESSZRS and DESOVFL.

## Diagnostics

Review provisioning of digital echo suppressions. Consult the OM group ESUP measurement DESOVFL for more precise location of the source of the overflows. Also check ATB100 logs.

# Basic index SPSVOVFL

## Section

SRVCTRES

## Description

Special service overflow

## Definition

The number of failed attempts to connect to DTMF senders, MFC R2 inter-register signaling circuits, and service observing circuits because no idle circuit was available.

DMS-100G Switch does not contribute to or provide an equivalent of OM group SVCT.

## Measurement list

SPSVOVFL uses measurement SVCT SVCQOVFL and SVCQABAN summed over all circuit types.

## Normalizer

SPSVOVFL is normalized per attempt as given by the sum of SVCT measurements SVCSZRS (with its extension register SVCSZ2), SVCQOVFL, and SVCQABAN, totalled over all circuit types.

## Diagnostics

Identify the overflowing special service circuit group from OM group SVCT. Check LINE138, TRK138, LINE108, and TRK182 logs.

# Aggregate index CONFRES

## Section

SRVCTRES

## Description

Conference resources

## Definition

The summary of the traffic status of three- and six-port conference circuits.

## Diagnostics

Review provisioning of the circuits responsible for unfavorable results.

# Basic index CONF3OVF

## Section

SRVCTRES

## Description

Three-port conference circuit overflow

## Definition

The rate of overflow of requests for three-port conference circuits.

## Measurement list

CONF3OVF uses measurement CF3P CNFOVFL. In TOPS offices, it uses the sum of CF3P measurements CNFOVFLT and TOPSOVFL.

## Normalizer

CONF3OVF is normalized by total attempts on three-port conference circuits. In non-TOPS offices, this is the sum of CF3P CNFSZRS, CNFQOVFL, and CNFQABAN. In TOPS offices, it is the sum of CNFSZRST, CNFQOVFT, CNFQABNT, and TOPSZRS.

## Diagnostics

Review provisioning of three-port conference circuits. Consult the OM group measurement CNFOVFL. Also check ATB100 logs. Check 3WC OMs for overflow and attempts.

# Basic index CONF6OVF

## Section

SRVCTRES

## Description

Six-port conference circuit overflow

## Definition

The rate of overflow of requests for six-port conference circuits.

## Measurement list

CONF6OVF uses the sum of CF6P measurement CF6OVFL.

## Normalizer

CONF6OVF is normalized by the sum of this measurement plus CF6SZRS.

## Diagnostics

Review provisioning of six-port conference circuits. Consult the OM group measurement CNOVFL. Also check ATB100 logs.

# Aggregate index RCVRES

## Section

SRVCTRES

## Description

Receiver resources

## Definition

The summary of the traffic status of all types of receivers. Aggregate index RCVRES is not applicable to DMS-100G switches.

## Diagnostics

Review provisioning of the circuits responsible for unfavorable results.

RCVMFOV, RCVRDGOV, RCVRATDO, RCVRCNOV, RCVRMCSO, RCVRCDCO, MF300OVF, and DGT300OV monitor those requests for MF, Digitone, audio tone detector, coin tone detector, mechanized calling card service, DMS-300 MF, and DMS-300 Digitone receivers respectively that overflow because no idle receiver of the given kind is available.

Each receiver overflow index uses measurement RCVR RCVOVFL for its respective receiver kind. Each receiver overflow index is normalized per attempt as calculated from the sum of RCVR measurements RCVSZRS (with its extension register RCVSZ2), RCVQOVFL, and RCVQABAN for its respective receiver kind.

## Basic index RVCRMFOV (continued)

### Section

RCVRES

### Description

MF receivers overflows

### Definition

The number of overflow attempts to connect a MF receiver.

### Measurement

RVCRMFOV uses measurement RCVR RCVOVFL for RCVRMF

### Normalizer

RCVRMFOV is normalized by the the sum of measurements RCVR RCVRQOVFL, RCVRAQBN, RCVRSZRS, and RCVSZ2. This is the total number of attempts to connect the MF receivers.

### Diagnostics

Review the provisioning of MF receivers.

Check the OM group, measurement RCVOVFL.

## Basic index RCVRDGOV (continued)

### Section

RCVRES

### Description

Digitone receiver overflows

### Definition

The number of overflow attempts to connect Digitone revivers.

### Measurement

RCVRDGOV uses measurement RCVR RCVOVFL for RCVRDGT.

### Normalizer

RCVRDGOV is normalized by the sum of measurements RCVR RCVRQOVFL, RCVRAQBN, RCVSZRS, and RCVSZ2. This is the total number of attempts to connect Digitone receivers.

### Diagnostics

Check the OM group measurment RCVOVFL.

## Section

RCVERS

## Description

Automatic tone detector overflows

## Definition

The number of overflow attempts to connect automatic tone detectors.

## Measurement

RCVRATDO uses measurement RCVR RCVROVFL for RCVRATD.

## Normalizer

RCVRATDO is normalized by the sum of measurements RCVR RCVRQOVFL, RCVRAQBN, RCVRSZRS, and RCVSZ2. This is the total number of attempts to connect the automatic tone detectors.

## Diagnostics

Review the provisioning of the automatic tone detectors.

Check the OM group measurement RCVOVFL.

## Basic index RCVRMCSO (continued)

### Section

RCVRES

### Description

MCCS receiver overflows

### Definition

The number of attempts to connect MCCS receivers.

### Measurement

RCVRMCSO uses measurement RCVR RCVOVFL for RCVRMCCS.

### Normalizer

RCVRMCSO is normalized by the sum of measurements RCVR RCVRQOVFL, RCVRAQBN, RCVSZRS, and RCVSZ2. This is the total number of attempts to connect the MCCS recrivers.

### Diagnostics

Review the provisioning of MCCS receivers.

Check the OM group measurement RCVOVFL.

## Basic index DGT300OV (continued)

### Section

RCVRES

### Description

DMS Digitone receiver overflows

### Definition

The number of overflow attempts to connect DMS-300 Digitone receivers.

### Measurement

DGT300OV uses measurement RCVR RCVOVFL for DGT300.

### Normalizer

DGT300OV is normalized by the sum of measurements RCVR RCVRQOVFL, RCVRAQBN, RCVSZRS, and RCVSZ2.

### Diagnostics

Review the provisioning of the DMS-300 Digitone receivers.

Check the OM group measurement RCVOVFL.

## Basic index MF300OVF (continued)

### Section

RCVRES

### Description

DMS-300 MF receiver overflows

### Definition

The number of overflow attempts to connect DMS-300 MF receivers.

### Measurement

DGT300OVF uses measurement RCVR RCVOVFL for MF300.

### Normalizer

DGT300OVF is normalized by the sum of measurements RCVR RCVRQOVFL, RCVRAQBN, RCVSZRS, and RCVSZ2.

### Diagnostics

Review the provisioning of the DMS-300 MF receivers.

Check the OM group measurement RCVOVFL.

## Section

RCVRES

## Description

CDC tone receiver overflows

## Definition

The number of overflow attempts to connect CDC tone receivers.

## Measurement

RCVRCDCO uses measurement RCVR RCVOVFL for RCVRCDC.

## Normalizer

RCVRCDCO is normalized by the sum of measurements RCVR RCVRQOVFL, RCVRAQBN, RCVSZRS, and RCVSZ2.

## Diagnostics

Review the provisioning of the CDC tone receivers.

Check the OM group measurement RCVOVFL.

# Aggregate index CHANRES

## Section

CHANRES

## Description

Speech link status

## Definition

The summary of the traffic status of speech links within the switch.

## Diagnostics

Examine the basic indices to locate the source of unfavorable results. Review the MTCEPERF indices under NMLNKPF and PMLNKPF to determine if blocking was associated with maintenance problems. If not, review traffic loading of the network or of the links from PMs serving lines.

# Basic index NETCHOVF

## Section

CHANRES

## Description

Network path overflow

## Definition

The proportion of blocked attempts to connect a network path to a line or trunk.

For DMS-100G Switch basic index NETCHOVF reflects line traffic only.

## Measurement list

NETCHOVF uses OFZ measurements OUTMFL and OUTRMFL plus TRMMFL less PM channel blockages TRMBLK. In International offices, NETCHOVF uses the sum of SOTS registers SOUTMFL, SOUTRMFL, and STRMMFL, less STRMBLK.

## Normalizer

NETCHOVF is normalized per attempt as given by the sum of OFZ OUTNWAT and OFZ TRMNWAT (with their respective extension registers OUTNWAT2 and TRMNWAT2). In International offices NETCHOVF is normalized by the sum of SOTS registers S0UTNWT and STRMNWT, and there respective extension registers SOUTNWAT2 and STRMNWAT2.

## Diagnostics

Verify OM group OFZ (OUTMFL, TRMMFL) and OM group TS against provisioning tables. Check whether blocking has come about because of maintenance conditions as monitored under the PM P-side link integrity index. Verify log NET130.

# Basic index LPMCHAN

## Section

CHANRES

## Description

Line/peripheral module connect attempts

## Definition

The proportion of attempts to connect a PM speech path to or from a line that is blocked. This index is a sort of average of the blocking rates measured by TRAFFIC indices ORGPMBLK and TRMPMBLK. Index LPMCHAN is applicable only to line traffic in DMS-100G switches.

## Measurement list

LPMCHAN uses OFZ measurement TRMBLK (or SOTS STRMBLK in International offices) plus the sum of LMD ORIGBLK over all line-controlling PMs.

## Normalizer

LPMCHAN is normalized per attempt as given by the sum of OFZ NORIG plus OFZ TRMNWAT with their respective extension registers NORIG2 and TRMNWAT2. In International offices, this index is normalized by the sum of OTS NORG and SOTS STRMNWT (with their respective extension registers).

## Diagnostics

Verify OM group OFZ (TRMBLK) and group LMD (ORIGBLK). Check whether blocking has come about because of maintenance conditions as monitored under the PM P-side integrity index. Check PMOVLD for overload conditions. Check log NET130.

# The relationships of OMs to SPMS

## Multiple tuple OM groups used in SPMS

Table 8-1 contains OM groups that are used to generate SPMS indices. Because they have multiple tuples, which can provide more detailed information than SPMS, their contents should be saved for reference for at least 18 hours, and preferably longer, when SPMS reveals a problem. The 18-hour period assumes that SPMS results will be examined in the morning, with the results available for the busy period of the previous day and on into the night just past. Such a retention period can be achieved by defining four daily accumulating classes, each covering a different 6-h period of the day, all containing the same OM groups. To ensure proper collection of OM data for SPMS, you should set up an SPMS class for OMs.

An alternative method of operation is to set up seven daytime classes, each collecting 24 hours of data for one day of the week. This provides the highly desirable advantage of a longer time perspective, at the cost of being unable to narrow problems down to a particular time of day.

Most of the measurements specified below typically have zero values in normal operation. Thus, if they are being output rather than simply held in memory, the zero-suppression feature yields a major saving in output volume.

**Table 8-1**
**OM group usage (multiple tuples)**

| OM group | Registers |
|---|---|
| ANN | ANNOVFL, ANNSBU, ANNMBU |
| APSYS | APCPUFLT, APMEMFLT, APMSMPXU, APPRTFLT, APSSMPXU, APSSYNC, APTRMISM |
| C7GTWSCR | MSUSCRER |

—continued—

**Table 8-1**
**OM group usage (multiple tuples)** (continued)

| OM group | Registers |
|---|---|
| C7LINK1 | C7LKFAIL, C7LKUNAU, C7NETCON, C7SLTFL, C7STALFL, C7TLALFL |
| C7LINK2 | C7MSUDC1, C7MSUDC2, C7MSUDC3, C7MSUDSC |
| C7LKSET | C7SUNAU |
| C7ROUTE | C7FRCRER, C7RTUNAU |
| C7RTESET | C7RSCNGU, C7RSUNAU |
| CMC or MS | All |
| DS1CARR or PCMCARR | All |
| DTSR | The sum of delay peg counts |
| EXT | EXTOVFL |
| FTRQ | FTRQOVFL |
| LMD | ORIGBLK, TERMBLK, PERCLFL |
| PMOVLD | PORGDENY, PTRMDENY |
| PMTYP | All (PM group should be used to get per-PM data) |
| PM1 | PM1ERR, PM1FLT, PM1MBU, PM1SBU |
| RCVR | RCVQOVFL, RCVSBU, RCVMBU |
| SITE | The sum of delay peg counts |
| SITE2 | The sum of delay peg counts |
| SLM | SLMFLT, SLMMBSU, SLMSBSU |
| STN | STNOVFL, STNMBU, STNSBU |
| SVCT | SVCQOVFL, SVCSBU, SVCMBU,SVCQABAN |
| TRK | INFAIL, OUTFAIL, DEFLDCA, NOVFLATB, SBU, MBU |
| TS | All |
| UTR | UTRQOVFL, UTRQABAN |

**—end—**

## Other OM groups used in SPMS

Table 8-2 contains OM groups that have just a single tuple. They offer little more detail than SPMS itself. It may still be worth retaining them in the same OM classes as the groups listed in table 8-1, to provide the additional perspective of absolute counts.

**Table 8- 2**
**OM group usage (single tuple)**

| OM group | Registers |
|---|---|
| ACSYSTR | ACDMFL, ACCF3PFL, ACERR, ACFLT (OM groups ACTRBL and ACTAKEDN should be used to get per-attendant console data). |
| AMA | AMAFREE, AMAROUTE |
| AOSS | AOSSQDEF, AOSSOD, AOSSDF |
| C7SCCP | C7RTFALL |
| CF3P | CNFOVFL(T), CNFSBU(T), CNFMBU(T) |
| CF6P | CF6OVFL, CF6SBU, CF6MBU, CF6QABAN |
| CP2 | CPWORKU. ECCBOVFL |
| CP | All (with usages being of least importance) |
| CPU or CM | All |
| CSL | All |
| DDU | All |
| ENETMAT | ENCDERR, ENCDFLT, ENCDISOU, ENCDPARU, ENMBCDU, ENMBPBU, ENPBERR, ENPBFLT, ENPBISOU, ENPBPARU, ENSBCDU, ENSBPBU |
| ENETPLNK | ENLKERR, ENLKFLT, ENLKISOU, ENLKPARU, ENMBLKU, ENSBU |
| ENETSYS | ENERR, ENFLT, ENISOU, ENMBU, ENPARU, ENSBU |
| ESUP | DESOVFL, DESSBU, DESMBU |
| ICONF | TWCOVRFL, SWCOVFL |
| ICWT | CWTOVFL |
| IFDL | HTLOVFL, WLNOVFL |
| IOC or EIOC | All |
| ISDD | DPATMPT, DTATMPT, MFATMPT, OTHATMPT |

**—continued—**

**Table 8- 2**
**OM group usage (single tuple)** (continued)

| OM group | Registers |
|---|---|
| ISUPCONN | ISCONCOT, ISCONUCA, ISCONUCC, ISCONUCE, ISCONUCF |
| LOGS | All |
| MTRPERF | All |
| MTU | All |
| NMC | All |
| OFZ or OTS | All (Failure counts especially. Call counts for base.) |
| OFZ2 or SOTS | All |
| ONI | ONISBU, ONIMBU |
| SYSPERF | All |
| TOPSMTCE | All |
| TOPSTRAF | TOPSTRK |
| TOPSUSE | POSTMTCE |
| TOPSVC | VCFL |
| TRMTCM | TCMATBS |
| TRMTCU | TCUORSS |
| TRMTRS | All |

**—end—**

# How SPMS index values are calculated

SPMS calculates switch performance by using two kinds of index: basic and aggregate.

## Basic indices

A basic index consists of an operational measurement (OM) and a weighting factor. The factor is a calculation that uses constants derived from field results for a broad sample of offices so that index results are relative to this sample. The calibration of the indices take into account Automatic Trunk Testing (ATT) and other routine system diagnostics.

## Aggregate indices

From basic indices, aggregate indices are calculated as a level higher up the hierarchy. Each aggregate index is a weighted average of its basic indices.

## Calculating basic indices

The calculation of each basic index uses three constants. The values of these constants are shown on SPMS output, in the columns headed R95 and R80. For example, the output for a particular index might appear as:

```
          L  WT   R95     R80

          -------------------------

..INDEX   B  30   27  6   216
```

In this example, the B and the data under the R95 and R80 headings indicate that INDEX is a basic index. The R95 value is 27, the scale factor is 1,000,000 (10 to the power 6) and the R80 value is 216.

SPMS starts the calculation by dividing the measured value by the normalizing factor and multiplying by the scale factor. The scale factor is used to make the normalized result a whole number rather than a fraction (example: errors per 10,000 calls rather than ten thousandths of an error per call). The scale factor is chosen to make the predicted result of scaling fall within the range from 26 to 255. The result is called the scaled normalized ratio, or R for short.

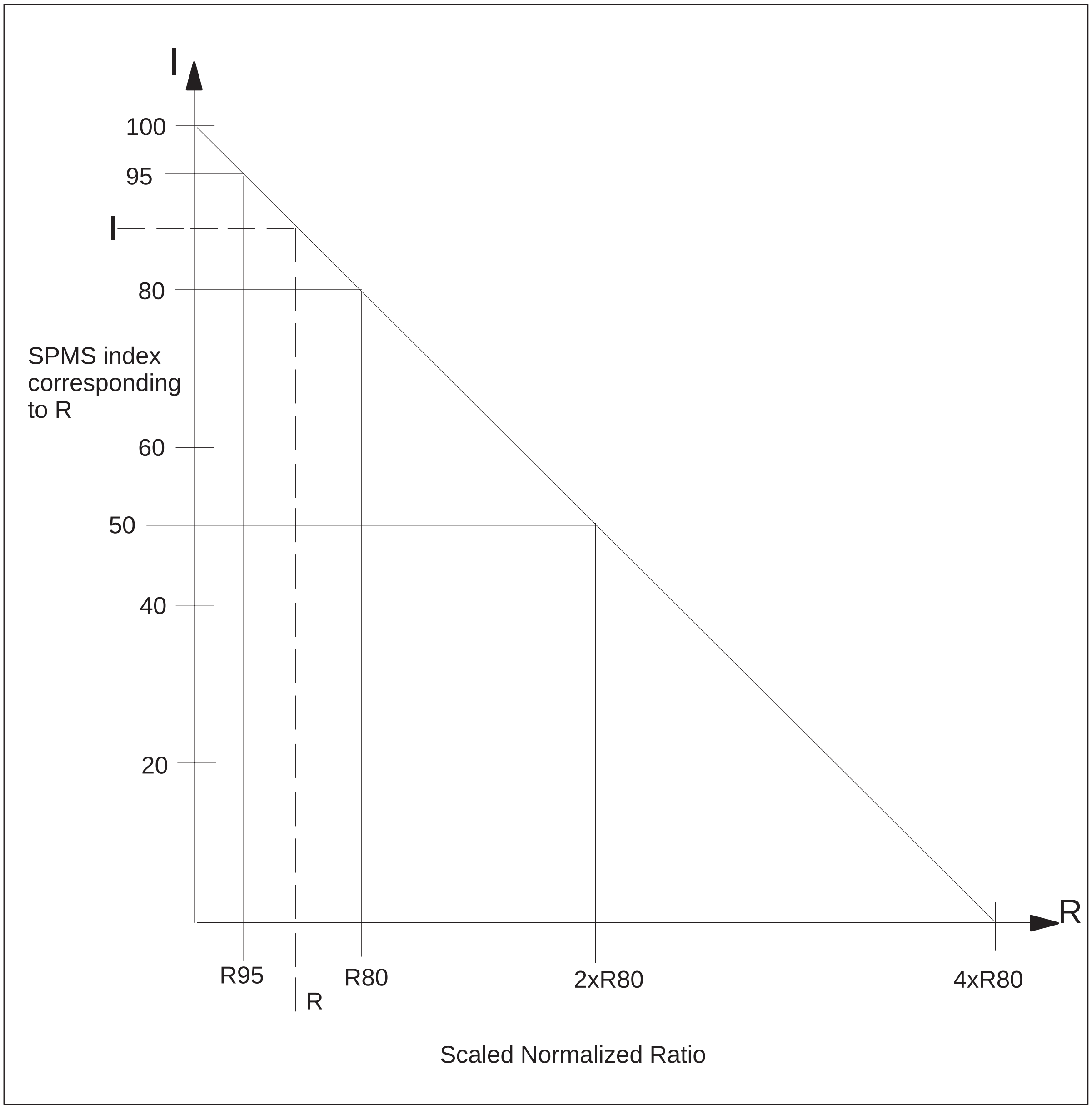
The value R is converted into an index with the help of a curve defined by five points. The curve consists of straight line segments joining these points. The points are as follows in table 9-1 and the curve in figure 9-1.

***Note:*** The SPMS R95 and R80 values may be changed at any BCS to represent the correct network performance as seen in the field.

**Table 9-1**
**Index points**

| R value | Index value | Field interpretation |
|---|---|---|
| 0 | 100 | Perfect result. |
| R95 | 95 | Average of daily R values not exceeding R80, observed in the SPMS calibration sample. |
| R80 | 80 | Only 1% of observed daily R values in the calibration sample were larger. |
| 2 x R80 | 50 | Indication of poor performance. |
| 4 x R80 | 0 | Serious deviation from the normal. Exact extent of deviation is not relevant. |

**Figure 9-1**
**Curve of R values**




## Calculating aggregate indices

Aggregate indices are summaries of their component basic indices. SPMS output gives the relative weight that is applied to each basic index under the heading WT. In the example shown above, the relative weight of index INDEX for the calculation of its aggregate is 30.

The weighted average is a fraction. The top of the fraction is equal to the sum of the basic index values multiplied by their weights. The bottom of the fraction is simply the sum of the weights alone.

In calculating an aggregate index, any basic index is ignored if it displays an NA instead of a numerical value. NA appears if the index is invalid in the switch (example: line-related indices in a toll switch), or if the normalizing factor is zero, indicating no activity on which to base an index for the given time period. The composition of aggregate indices thus varies from one switch to another, and to a much lesser extent, from one time period to another.

Regardless of this variation, the aggregate index remains a valid summary of the indices contributing to it. Operating companies using SPMS aggregate indices in administrative plans may wish to compare switches only with switches that show similar index composition (example: by grouping into POTS local, Centrex, toll/tandems, etc.).

# List of terms

### AOSS

*See* auxiliary operator services system.

### auxiliary operator services system (AOSS)

A service-related system in which operators provide subscribers with such services as directory assistance (local and long distance) and call intercept.

### CCS7

*See* Common Channel Signaling No. 7.

### Common Channel Signaling No. 7 (CCS7)

A digital, method-based network signaling standard defined by the CCITT that separates call signaling information from voice channels so that interoffice signaling is exchanged over a separate signaling link.

### Emergency Stand-Alone (ESA)

An emergency service feature that permits local calling within a remote line module or remote line concentrating module in the event of loss of communication with the host office.

### ENET

*See* enhanced network.

### enhanced network (ENET)

A channel-matrixed time switch that provides pulse code modulated voice and data connections between peripheral modules. The ENET also provides message paths to the DMS-bus.

### ESA

*See* Emergency Stand-Alone.

### failure rate

The rate per working unit per unit time at which persistent malfunctions of equipment occur. Failure rate is the reciprocal of mean time between failures (MTBF).

### integrated services line module (ISLM)

A line concentrating module that supports ISDN line cards. The ISLM works in association with the ISDN access controller.

### ISLM

*See* integrated services line module.

### LCM

*See* line concentrating module.

### LIM

*See* link interface module.

### line concentrating module (LCM)

A peripheral module that interfaces the line trunk controller or line group controller and up to 640 subscriber lines, using two to six DS30A links.

### line module (LM)

A peripheral module that provides speech and signaling interfaces for up to 640 subscriber lines. It consists of line drawers, a line module controller, and a frame supervisory panel.

### link interface module (LIM)

A peripheral module that controls messaging between link interface units (LIU) in a link peripheral processor (LPP). The LIM also controls messages between the LPP and the DMS-bus. An LIM consists of two local message switches (LMS) and two frame transport buses (F-bus). One LMS normally operates in a load sharing mode with the other LMS. This ensures LIM reliability in the event of an LMS failure because each LMS has adequate capacity to carry the full message load of an LPP. Each LMS uses a dedicated F-bus to communicate with the LIUs in the LPP.

### link interface unit (LIU)

A peripheral module that processes messages entering and leaving a link peripheral processor through an individual signaling data link.

**link peripheral processor (LPP)**

The DMS SuperNode equipment frame for DMS-STP that contains two types of peripheral modules: a LIM and an LIU. For DMS-STP applications, CCS7 link interface units 7 (LIU7) are used in the LPP.

**LIU**

*See* link interface unit.

**LM**

*See* line module.

**LPP**

*See* link peripheral processor.

**message transfer part (MTP)**

Provides a connectionless transport system for carrying CCS6, CCIS6, and CCS7 signaling messages between user locations or applications functions. MTP is a CCITT N7 protocol.

**MTP**

*See* message transfer part.

**OM**

*See* operational measurement.

**operational measurement (OM)**

The hardware and software resources of the DMS-100 Family systems that control the collection and display of measurements taken on an operating system. The OM subsystem organizes the measurement data and manages its transfer to displays and records. The OM data is used as a basis for maintenance, traffic, accounting, and provisioning decisions.

**peripheral module (PM)**

A generic term referring to all hardware modules of DMS-100 Family systems that provide interfaces with external line, trunk, or service facilities. A PM contains peripheral processors, which perform local routines, thus relieving the load on the central processing unit.

**PM**

*See* peripheral module.

**SCCP**

*See* signaling connection control part.

### signaling connection control part (SCCP)

A level of CCS7 layered protocol. It supports advanced services such as E800/SSP service and the Automatic Calling Card Service feature. The main functions of the SCCP include the transfer of signaling units with or without the use of a logical signaling connection and the provisioning of flexible global title translations for different applications.

### signaling terminal (ST)

The hardware that performs error checking, coding, and decoding of signaling messages. In common channel interoffice signaling and CCITT6, it consists of a signaling terminal controller, modem, and a modern interface card. In CCS7, the signaling terminal is a single card.

### signaling transfer point (STP)

A node in a CCS7 network that routes messages between nodes. STPs transfer messages between incoming and outgoing signaling trunks, but, with the exception of network management information, do not originate or terminate messages. STPs are deployed in pairs. If one STP fails, the mate takes over, ensuring that service continues without interruption.

### SOS

*See* support operating system.

### ST

*See* signaling terminal.

### STP

*See* signaling transfer point.

### support operating system (SOS)

The software that sets up the environment for loading and executing the application software in the DMS-100 Family system. SOS includes the nucleus, file system, command interpreter, and loader.

### TOPS

*See* traffic operator position system.

### total call attempts

The number of central controller call attempts on the office. This is the sum of total originating attempts and total incoming attempts as previously defined. This value can be found in the header of the report adjacent to TOTATT (K).

### total incoming attempts

The total number of call attempts on the office incoming from trunks or operator positions, from the point of view of the central controller (CC). This is the sum of:

- OFZ NIN (with NIN2)
- TOPSTRAF TOPSNIN (with TOPSNIN2)

minus

- TOPSCAN in TOPS offices

For international offices, this expression is replaced by the measurement OTS NINC (with NINC2).

### total originating attempts

The total number of call attempts on the office originating from lines, from the point of view of the central controller (CC). This is equal to measurement OFZ NORIG (with its overflow register NORIG2) in most offices and measurement OTS NORG (and NORG2) in international offices.

### traffic operator position system (TOPS)

A call processing system made up of a number of operator positions. Each operator position consists of a visual display unit (VDU), a controller, a keyboard, and a headset.

### unit time

The OM system slow-scan interval (100 seconds).

### unit unavailability

The total amount of time that equipment of a certain type is out of order. Expressed as total outage per working unit per unit time, unit unavailability is equal to failure rate multiplied by the mean time to repair (MTTR).

### working unit

A unit that is fully equipped and is not offline (installation busy).

# Index

## A



## B



## C

DMS-100 Family

# Switch Performance Monitoring System

Application Guide

Product Documentation—Dept 3423
Northern Telecom
P.O. Box 13010
RTP, NC  27709–3010
1-877-662-5669, Option 4 + 1

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