

Using the System Management Facility (SMF)

This chapter provides samples of SMF record formats. It includes these sections:

- Overview
Briefly describes the Cisco IOS for S/390 SMF records.
- Standard MVS SMF Record Header
Sample of the standard MVS record header.
- Standard Cisco IOS for S/390 SMF Record Header
Tables for descriptor, product, task identification, and user identification sections.
- Server Application Event Records
Tables for descriptor, common data, Subtype 20, and Subtype 21 data sections.
- Access Method and Protocol Layer Event Records
Table describing the SMF subtype 150 (OpenEdition—UNIX System Services—socket endpoint close), 151 (IUCV Endpoint close), and 152 (Assembler API Endpoint close).
- Interval Records
Tables describing Driver Statistics (Subtype 100) and Virtual Storage Statistics (Subtype 80).
- SMF Report Writer Program
Example of JCL to generate reports for the various SMF records written by Cisco IOS for S/390.

Overview

Cisco IOS for S/390 generates SMF records in accordance with the record formats provided in IBM publication *GC28-1030*. The Cisco IOS for S/390 SMF record is variable length but begins with the MVS SMF record header and the Cisco IOS for S/390 SMF record header. The Cisco IOS for S/390 SMF record header is the anchor block used to determine which other sections are present.

On the Cisco IOS for S/390 software tape, there is a sample of the JCL to dump Cisco IOS for S/390 SMF records from dump data sets. In the MAC library, the SMFRECS macro maps the SMF records.

Cisco IOS for S/390 SMF recording is specified by the SMF statement in member IJTCFGxx described in the *Cisco IOS for S/390 Customization Guide*.

Standard MVS SMF Record Header

Table 3-1 provides a sample of the standard MVS record header.

Table 3-1 Sample Standard MVS Record Header

Offsets		Field	Length	Format	Source	Description
0	0	SMFACLEN	2	Binary	Internal	Record length
2	2	SMFACSEG	2	Binary	Internal	Segment descriptor
4	4	SMFACFLG	1	Binary	SVC 83	Header flag byte
5	5	SMFACRTY	1	Binary	Internal	Record type
6	6	SMFACTME	4	Binary	SVC 83	Time, in hundredths of a second, that the record was moved to the SMF buffer
10	A	SMFACDTE	4	Packed	SVC 83	Date record was moved to SMF buffer, in the form 00YYDDF, where F is the sign byte
14	E	SMFACSID	4	EBCDIC	SMCASID	System ID (taken from the SID parameter)

Standard Cisco IOS for S/390 SMF Record Header

This section provides samples of standard Cisco IOS for S/390 SMF record headers. The record headers include Descriptor and Product sections:

Descriptor

Table 3-2 contains the descriptor section of the SMF header:

Table 3-2 Descriptor Section of the SMF Header

Offsets		Field	Length	Format	Source	Description
18	12	SMFACNOD	2	Binary	Internal	Number of descriptors in this section
20	14	SMFACPOF	4	Binary	Internal	Offset to product section
24	18	SMFACPLN	2	Binary	Internal	Length of product section
26	1A	SMFACPNO	2	Binary	Internal	Number of product sections
28	1C	SMFACTOF	4	Binary	Internal	Offset to task information section
32	20	SMFACTLN	2	Binary	Internal	Length of task information section
34	22	SMFACTNO	2	Binary	Internal	Number of task information sections
36	24	SMFACUOF	4	Binary	Internal	Offset to user identification section
40	28	SMFACULN	2	Binary	Internal	Length of user identification section
42	2A	SMFACUNO	2	Binary	Internal	Number of user identification sections
44	2C	SMFACDOF	4	Binary	Internal	Offset to data section
48	30	SMFACDLN	2	Binary	Internal	Length of data section
50	32	SMFACDNO	2	Binary	Internal	Number of data sections

Product

Table 3-3 contains the product section of the SMF header:

Table 3-3 Product Section of the SMF Header

Offsets		Field	Length	Format	Source	Description
0	0	SMFACTYP	2	Binary	Internal	Subtype identification
2	2	SMFACRVN	2	EBCDIC	Internal	Record version number – 02
4	4	SMFACNAM	8	EBCDIC	Internal	Product name
12	C	SMFACVER	2	EBCDIC	Internal	Cisco IOS for S/390 version number
14	E	SMFACACB	8	EBCDIC	APPCFGxx	Cisco IOS for S/390 ACB name
22	16	SMFACJBN	8	EBCDIC	Internal	Jobname of Cisco IOS for S/390 job
30	1	SMFACJBI	8	EBCDIC	Internal	JES job ID of Cisco IOS for S/390 job
38	26	SMFACASI	2	Binary	Internal	Address space ID of Cisco IOS for S/390 job
40	28	SMFACSSI	4	EBCDIC	Internal	Subsystem ID of Cisco IOS for S/390 job

Server Application Event Records

Task Identification Section

Table 3-4 contains the task identification section (pseudo-task data) of the Cisco IOS for S/390 SMF header:

Table 3-4 Task Identification Section of the SMF Header

Offsets	Field	Length	Format	Source	Description
0 0	SMFACPGM	8	EBCDIC	PTAPGM	Program name

User Identification Section

Table 3-5 contains the user identification section (AC#U data) of the Cisco IOS for S/390 SMF header:

Table 3-5 User Identification Section of the SMF Header

Offsets	Field	Length	Format	Source	Description
0 0	SMFACUID	8	EBCDIC	SECUID	RACF (or other external security system) user ID
8 8	SMFACGID	8	EBCDIC	SECGRP	RACF (or other external security system) group ID
16 10	SMFACACT	144		AC#UACCT	Accounting information

The following is the format of the SMFACACT field:

- First byte of field contains the number (binary) of accounting fields.
- Following bytes contain accounting fields, where each entry for an accounting field contains a one byte length field, followed by the field.

FTP Server Records (Subtypes 20 - 22)

Descriptor

Table 3-6 shows the descriptor section of the FTP server record header:

Table 3-6 Descriptor Section of the FTP Server Record Header

Offsets	Field	Length	Format	Source	Description
0 0		2	Binary	Internal	Reserved
2 2	FTPDNOD	2	Binary	Internal	Number of descriptors in this section
4 4	FTPDCSOF	4	Binary	Internal	Offset to FTP server common data section
8 8	FTPDCSLN	2	Binary	Internal	Length of FTP server common data section
10 A	FTPDCSNO	2	Binary	Internal	Number of FTP server common data sections
12 C	FTPDDTOF	4	Binary	Internal	Offset to FTP server data transfer completion data section
16 10	FTPDDTLN	2	Binary	Internal	Length of FTP server data transfer completion data sections
18 12	FTPDDTNO	2	Binary	Internal	Number of FTP server data transfer completion data sections

Common Data

Table 3-7 shows the common data section of the FTP server record header:

Table 3-7 Common Data Section of the FTP Server Record Header

Offsets	Field	Length	Format	Source	Description
0 0	FTPCRHST	4	Binary	CACCRHST	Remote host Internet address for control connection
4 4	FTPCLHST	4	Binary	CACCLHST	Local host Internet address for control connection
8 8	FTPCRPR	2	Binary	CACCRSCK	Remote host TCP port number for control connection
10 A	FTPCLPRT	2	Binary	CACCLSCK	Local host TCP port number for control connection

FTP Data Transfer Completion/End of Volume (Subtype 20/Subtype 22) Data Section

The Subtype 20 record is written by the FTP server at the end of a data transfer.

The Subtype 22 record is written at end-of-volume during a data transfer of a multi-volume data set. Its layout is identical to that of the Subtype 20 record.

Table 3-7 provides a sample of the Subtype 20/Subtype 22 data section:

Table 3-8 Sample Subtype 20/Subtype 22 Data Section

Offsets	Field	Length	Format	Source	Description	
0	0	F20DTTY	1	Binary	CAFLGA1	Type of data transfer operation: 1 = NLST (data set name list without details) 2 = LIST (data set name list with details) 8 = RETR (retrieve) 16 = APPE (append) 32 = STOR (store)
1	1		1	Binary	Internal	Reserved
2	2	F20TYPE	1	Binary	CATYPE	Data type (from FTP TYPE command): 0 = ASCII 4 = EBCDIC 8 = Binary 16 = local byte
3	3	F20FORM	1	Binary	CAFORM	Format control (from FTP TYPE A or E command): 0 = None 4 = Telnet 8 = ASA CC
4	4	F20STRUA	1	Binary	CASTRU	Data structure (from FTP STRU command): 0 = File 4 = Record
5	5	F20MODE	1	Binary	CAMODE	Transmission mode (from FTP MODE command): 0 = Stream 4 = Block 8 = Compressed
6	6	F20DSN	44	EBCDIC	CAPADSN	Dataset name: RETR APPE STOR Or path name: NLST LIST
50	32	F20MEM	8	EBCDIC	CAPAMEM	Member name
58	3A	F20DSSN	6	EBCDIC	CAPADSSN	Data set serial number (the first or only volser for the data set)

Table 3-8 Sample Subtype 20/Subtype 22 Data Section (Continued)

Offsets	Field	Length	Format	Source	Description	
58	3A	F20VOL	6	EBCDIC	CAPADSSN	Same as F20DSSN. (This field kept for compatibility)
64	40	F20DDNM	8	EBCDIC	CADDNAME	DD name
72	48	F20RHST	4	Binary	CADTRHST	Remote host Internet address for data connection
76	4C	F20LHSTA	4	Binary	CADTLHST	Local host Internet address for data connection
80	50	F20RPRT	2	Binary	CADTRSCK	Remote host TCP port number for data connection
82	52	F20LPRT	2	Binary	CADTLSCK	Local host TCP port number for data connection
84	54	F20STRT	4	Binary	CATIME	Time, in hundredths of a second, that data transfer started
88	58	F20DURA	4	Binary	CATIME+4	Elapsed time, in hundredths of a second, for data transfer operation
92	5C	F20MSG	2	Binary	CAREPFTP	Last FTP reply number
94	5E	F20SBMSG	2	Binary	CAREPSUB	Sub-reply number for last FTP reply
96	60	F20DAIR	4	Binary	CADAIR	PDYNAL reason code: SVC 99 reason code if RETR, APPE, or STOR SUPERLOCATE reason code if NLST or LIST
100	64	F20DARC	1	Binary	CADARC	PDYNAL return code: SVC 99 return code if RETR, APPE, or STOR SUPERLOCATE return code if NLST or LIST
101	65		3	Binary	Internal	Reserved
104	67	F20DSKB	4	Binary	CABYTES	Number of disk bytes read or written
108	6C	F20NETB	4	Binary	CALBYTES	Number of network bytes sent or received
112	70	F20RECT	4	Binary	CATRUNC	Number of records truncated
116	74	F20RECP	4	Binary	CAPADDS	Number of records padded
120	78	F20RECF	4	Binary	CAFOLDS	Number of records folded
124	7C	F20RECS	4	Binary	CASUSP	Number of records suspected
128	80	F20RSTM	4	Binary	CARSTMKS	Number of restart markers sent or received
132	84	F20RSTI	4	Binary	CARSTIGN	Number of restart markers ignored
136	88	F20AERR	4	Binary	CA#TERR	API composite return code
140	8C	F20EXPD	7	EBCDIC	CAPAEXPD	Expiration date
147	93	F20RETP	2	Binary	CAPARETP	Retention period
149	95	F20VOLI	6	EBCDIC	CACRVOL	Volume serial number. (For subtype 22 records, this is the volume at EOV; for subtype 20 records, this is the last volume for the data set.)
155	9B	F20VLSQ	2	Binary	CACRVLSQ	Volume sequence number. (For subtype 22 records, this is the sequence number of the volume at EOV; for subtype 20 records this is the number of volumes for the data set.)
155	9B	F20NVOL	2	Binary	CACRVLSQ	Same as F20VLSQ

Table 3-8 **Sample Subtype 20/Subtype 22 Data Section (Continued)**

Offsets		Field	Length	Format	Source	Description
157	9D	F20DACL	30	Character	CAPADACL	SMS Data class
187	BB	F20STCL	30	Character	CAPASTCL	SMS Storage class
217	D9	F20MGCL	30	Character	CAPAMGCL	SMS Management class

Note The subtype 20 and subtype 22 records have identical formats. The totals fields in the subtype 22 EOVS records (for example, F20DURA—elapsed time—and F20DSKB—disk bytes written) are calculated from the beginning of the data transfer (not the beginning of processing for the volume).

FTP Data Set Modification (Subtype 21) Data Section

The subtype 21 record is written by the FTP server when a request to modify a data set (other than a data transfer) is completed. This includes the rename, delete, and make directory (MKD) commands.

Table 3-9 provides a sample of the Subtype 21 data section:

Table 3-9 Sample Subtype 21 Data Section

Offsets	Field	Length	Format	Source	Description	
0	0	F21DMTY	1	Binary	CAFLGS1	Data set modification type 16 = MKD (make directory) 64 = DELE (delete) 128 = RENM/RNTO (rename)
1	1		1	Binary	Internal	Reserved
2	2	F21DDNM	8	EBCDIC	CADDNAME	DD name
10	A	F21FDSN	44	EBCDIC	CAPADSN	Rename from or delete data set name
54	36	F21FMEM	8	EBCDIC	CAPAMEM	Rename from or delete member name
62	3E	F21DSSN	6	EBCDIC	CAPADSSN	Data set serial number (the first or only volser for the data set)
62	3E	F21VOL	6	EBCDIC	CAPADSSN	Same as F21DSSN (this field kept for compatibility)
68	44	F21TDSN	44	EBCDIC	CAPADSN	Rename to data set name
112	70	F21TMEM	8	EBCDIC	CAPAMEM	Rename to member name
120	78	F21MSG	2	Binary	CAREPFTP	Last FTP reply number
122	7A	F21SBMSG	2	Binary	CAREPSUB	Sub-reply number for last FTP reply
124	7C	F21DAIR	4	Binary	CADAIR	PDYNAL reason code
128	80	F21DARC	1	Binary	CADARC	PDYNAL return code
130	82	F21NVOL	2	Binary	CAPANVOL	Number of volumes
132	84	F21VOLS	8-2040	Structure		Beginning of the volume section (This section is not present for data sets residing on a single volume)

For each volume of a multi-volume data set, there is an eight-byte section with the format shown in Table 3-10:

Table 3-10 Sample Data Section for a Volume in a Multi-Volume Data Set

Offsets	Field	Length	Format	Source	Description	
0	0	2	Binary		Reserved	
2	2	F21VOLI	6	EBCDIC	CAPAVOLS	Volume serial number

Telnet Server Record (Subtype 23) Data Section

The SMF subtype 23 record is written by the telnet server upon termination of a session with a VTAM session partner. Several subtype 23 records may be written for a single telnet session. The subtype 23 record contains a User and a Task section. These are identical in format with the User and Task sections for the FTP records (20-22).

**Table 3-11 SMF Record Subtype 23 User Identification Section:
(Identical with the subtype 20-22 User Identification Section)
SMF Record Subtype 23 Task Identification Section:
(Identical with the subtype 20-22 Task Identification Section)
SMF Record Subtype 23 Data section:**

Offset	Length	Label	Source	Description
00		S23DATA		Data section
00	04	S23LIPA	TCCLINET	Local host IP address
04	04	S23RIPA	TCCRINET	Remote host IP address
08	02	S23RPOR	TCCLINET	Local host port
0A	02	S23RPOR	TCCRINET	Remote host port
0C	08			Reserved
14	08	S23SLU	LURQLUN	SLU name
1C	08			reserved
24	08	S23PLU	VCBPART	PLU name
2C	04	S23STIME	TIME macro	Session start time, in hundredths of a second since midnight
30	04	S23SDATE	TIME macro	Session start date, in form 0cyydddF, where: c = century indicator (0=19, 1=20) yy = decimal year within century ddd = decimal julian day
34	04	S23TTIME	TIME macro	Session termination time
38	04	S23TDATE	TIME macro	Session termination date
3C	04	S23DURA		Session duration, in hundredths of a second
40	04	S23CLIN	internal	Number of bytes received from Telnet client
44	04	S23CLOU	internal	Number of bytes transmitted to Telnet client
48	04	S23VTIN	internal	Number of bytes received from VTAM application
4C	04	S23VTOU	internal	Number of bytes sent to VTAM application
50	01	S23TTYPL	TCTTYPEL	Length of terminal type field
51	28	S23TTYPE	TCCTTYPE	Terminal type negotiated with Telnet client
79	08	S23LMODE	VCBPART	Logmode
	81			Length of Subtype 23 data section

Access Method and Protocol Layer Event Records

Address Method User Identification Section

The SMF subtype 150 (OpenEdition—UNIX System Services—socket endpoint close), 151 (IUCV Endpoint close), and 152 (Assembler API Endpoint close) are written when a Socket API endpoint is closed. They contain statistics on Access Method calls for the socket.

Table 3-12 SMF Record Subtype 150/151/152 User Identification Section:

Offset	Length	Label	Source	Description
00		SMFPUSER		User section
00	08	SMFPJOB	ATCBJOB	Job Name of User
08	08	SMFPSTEP	ATCBSTEP	Step Name of User
10	08	SMFPPROC	ATCBPROC	Procedure Name of User
18	04	SMFPTCB	ATCBTCB	TCB Address of User
1C	04	SMFPSEPM	Internal	SEPM Address of User
1C	04	SMFPINOD	SEPMINOD	Address of OE/PFS INODE (redefines S10SEPM).
20	02	SMFPASID	ATCBASID	ASID of User
	22	SMFPULEN		Length of User Identification Section

Access Method Endpoint Close Records (Subtypes 150 - 152)

This section describes data sections for the access method endpoint close records. These are the following:

- Subtype 150, OpenEdition (UNIX System Services) Endpoint Close
- Subtype 151, IUCV Endpoint Close
- Subtype 152, Assembler API Endpoint Close.

OpenEdition (UNIX System Services) Endpoint Close (Subtype 150) Data Section

Table 3-13 Record Subtype 150 - OpenEdition Endpoint Close

Offset	Length	Label	Source	Description
00	64	S150DATA		SMF subtype 15 - OpenEdition Endpoint Close
00	01	S150SOPR	SEPMSOPR	Socket Protocol (mapped by SMFPSOPR): X'00' SMFPPIP = IP (RAW default) X'01' SMFPPICM = ICMP (RAW) X'06' SMFPPTCP = TCP X'11' SMFPPUDP = UDP X'59' SMFPPOSP = OSPF (RAW) X'FF' = SMFPPRAW (RAW)
01	01	S150TYPE	SEPMTYPE	Access method type (mapped by SMFPTYPE): X'00' SMFPTYOE = OpenEdition X'01' SMFPTYIU = IUCV X'02' SMFPTYAA = Assembler API
02	02			Reserved
04	04	S150CONO	SEPMUNIQ	Connection Number
08	04	S150LIPA	SEPMLHST	Local IP Address
0C	04	S150RIPA	SEPMRHST	Remote IP Address (TCP and UDP only)
10	02	S150LPOR	SEPMLPOR	Local Port Number (TCP and UDP only)
12	02	S150RPOR	SEPMPOR	Remote Port Number (TCP and UDP only)
14	04	S150COSO	SEPMCOSO	Number of OpenEdition Socket Calls (1)
18	04	S150COAC	SEPMCOAC	Number of OpenEdition Accept Calls (2)
1C	04	S150COBD	SEPMCOBD	Number of OpenEdition Bind Calls (3)
20	04	S150COCL	SEPMCOCL	Number of OpenEdition Close Calls (4)
24	04	S150COCO	SEPMCOCO	Number of OpenEdition Connect Calls (5)
28	04	S150COGN	SEPMCOGN	Number of OpenEdition GetPeerName Calls (6)
2C	04	S150COGO	SEPMCOGO	Number of OpenEdition GetSockOpt Calls (7)
30	04	S150COSS	SEPMCOSS	Number of OpenEdition SetSockOpt Calls (8)
34	04	S150COIO	SEPMCOIO	Number of OpenEdition IOctl Calls (9)
38	04	S150COLI	SEPMCOLI	Number of OpenEdition Listen Calls (10)
3C	04	S150CORD	SEPMCORD	Number of OpenEdition Read Calls (11)
40	04	S150COWR	SEPMCOWR	Number of OpenEdition Write Calls (12)

Table 3-13 Record Subtype 150 - OpenEdition Endpoint Close (Continued)

Offset	Length	Label	Source	Description
44	04	S150COVR	SEPMCOVR	Number of OpenEdition ReadV Calls (13)
48	04	S150COVW	SEPMCOVW	Number of OpenEdition WriteV Calls (14)
4C	04	S150CORE	SEPMCORE	Number of OpenEdition Recv Calls (15)
50	04	S150COSE	SEPMCOSE	Number of OpenEdition Send Calls (16)
54	04	S150COFR	SEPMCOFR	Number of OpenEdition RecvFrom Calls (17)
58	04	S150COST	SEPMCOST	Number of OpenEdition SendTo Calls (18)
5C	04	S150CORM	SEPMCORM	Number of OpenEdition RecvMsg Calls (19)
60	04	S150COSM	SEPMCOSM	Number of OpenEdition SendMsg Calls (20)
64	04	S150COSL	SEPMCOSL	Number of OpenEdition Select Calls (21)
68	04	S150COSN	SEPMCOSN	Number of OpenEdition SetPeerName Calls (22)
6C	04	S150COSH	SEPMCOSH	Number of OpenEdition Shutdown Calls (23)
70	04	S150COGH	SEPMCOGH	Number of OpenEdition GetHost Calls (24)
74	04	S150COSB	SEPMCOSB	Number of OpenEdition BatchSelect Calls (25)
	78	S150DLEN		Length of Subtype 15 record

IUCV Endpoint Close (Subtype 151) Data Section

Table 3-14 SMF Subtype 151 - IUCV Endpoint Close

Offset	Length	Label	Source	Description
00	A8	S151DATA		SMF subtype 151 - IUCV Endpoint Close
00	01	S151SOPR	SEPMSOPR	Socket Protocol (mapped by SMFPSOPR): X'00' SMFPPIP = IP (RAW default) X'01' SMFPPICM = ICMP (RAW) X'06' SMFPPTCP = TCP X'11' SMFPPUDP = UDP X'59' SMFPPOSP = OSPF (RAW) X'FF' = SMFPPRAW (RAW)
01	01	S151TYPE	SEPMTYPE	Access method type (mapped by SMFPTYPE): X'00' SMFPTYOE = OpenEdition X'01' SMFPTYIU = IUCV X'02' SMFPTYAA = Assembler API
02	02			Reserved
04	04	S151CONO	SEPMUNIQ	Connection Number
08	04	S151LIPA	SEPMLHST	Local IP Address
0C	04	S151RIPA	SEPMRHST	Remote IP Address (TCP and UDP only)
10	02	S151LPOR	SEPMLPOR	Local Port Number (TCP and UDP only)
12	02	S151RPOR	SEPMRPOR	Remote Port Number (TCP and UDP only)
14	04	S151CIAC	SEPMCICAC	Number of IUCV Accept Calls (1)
18	04	S151CIBD	SEPMCIBD	Number of IUCV Bind Calls (2)
1C	04	S151CICL	SEPMCICL	Number of IUCV Close Calls (3)
20	04	S151CICO	SEPMCICO	Number of IUCV Connect Calls (4)
24	04	S151CIFC	SEPMCIFC	Number of IUCV Fcntl Calls (5)
28	04			Unused for IUCV (6)
2C	04	S151CIGH	SEPMCIGH	Number of IUCV GetHostID Calls (7)
30	04	S151CIGJ	SEPMCIGJ	Number of IUCV GetHostName Calls(8)
34	04	S151CIGN	SEPMCIGN	Number of IUCV GetPeerName Calls (9)
38	04	S151CIGM	SEPMCIGM	Number of IUCV GetSockName Calls (10)
3C	04	S151CIGO	SEPMCIGO	Number of IUCV GetSockOpt Calls (11)
40	04	S151CIIO	SEPMCIIO	Number of IUCV IOctl Calls (12)
44	04	S151CILI	SEPMCILI	Number of IUCV Listen Calls (13)
48	04	S151CIRD	SEPMCIRD	Number of IUCV Read Calls (14)
4C	04			Unused for IUCV (15)
50	04	S151CIRE	SEPMCIRE	Number of IUCV Recv Calls (16)
54	04			Unused for IUCV (17)
58	04			Unused for IUCV (18)
5C	04	S151CISL	SEPMCISL	Number of IUCV Select Calls (19)
60	04	S151CISE	SEPMCISE	Number of IUCV Send Calls (20)

Table 3-14 SMF Subtype 151 - IUCV Endpoint Close (Continued)

Offset	Length	Label	Source	Description
64	04			Unused for IUCV (21)
68	04	S151CIST	SEPMCIST	Number of IUCV SendTo Calls (22)
6C	04	S151CISS	SEPMCISS	Number of IUCV SetSockOpt Calls (23)
70	04	S151CISH	SEPMCISH	Number of IUCV Shutdown Calls (24)
74	04	S151CISO	SEPMCISO	Number of IUCV Socket Calls (25)
78	04	S151CIWR	SEPMCIWR	Number of IUCV Write Calls (26)
7C	04			Unused for IUCV (27)
80	04			Unused for IUCV (28)
84	04	S151CIER	SEPMCIER	Number of IUCV LastErrno Calls (29)
88	04	S151CIID	SEPMCIID	Number of IUCV GetClientID Calls (30)
8C	04	S151CIGV	SEPMCIGV	Number of IUCV GiveSocket Calls (31)
90	04	S151CITS	SEPMCITS	Number of IUCV TakeSocket Calls (32)
94	04			Unused for IUCV (33)
98	04			Unused for IUCV (34)
9C	04	S151CIGI	SEPMCIGI	Number of IUCV GetIBMSockOpt Calls (35)
A0	04	S151CISI	SEPMCISI	Number of IUCV SetIBMSockOpt Calls (36)
A4	04			Unused for IUCV (37)
A8	04			Unused for IUCV (38)
AC	04			Unused for IUCV (39)
B0	04			Unused for IUCV (40)
B4	04			Unused for IUCV (41)
B8	04	S151CICA	SEPMCICA	Number of IUCV Cancel Calls (42)
	BC	S151DLEN		Length of Subtype 16 record

Assembler API Endpoint Close (Subtype 152) Data Section

Table 3-15 SMF Subtype 152 - API Endpoint Close

Offset	Length	Label	Source	Description
00		S152DATA		SMF subtype 152 - API Endpoint Close
00	01	S152SOPR	SEPMSOPR	Socket Protocol (mapped by SMFPSOPR): X'00' SMFPPIP = IP (RAW default) X'01' SMFPPICM = ICMP (RAW) X'06' SMFPPTCP = TCP X'11' SMFPPUDP = UDP X'59' SMFPPOSP = OSPF (RAW) X'FF' = SMFPPRAW (RAW)
01	01	S152TYPE	SEPMTYPE	Access method type (mapped by SMFPTYPE): X'00' SMFPTYOE = OpenEdition X'01' SMFPTYIU = IUCV X'02' SMFPTYAA = Assembler API
02	02			Reserved
04	04	S152CONO	SEPMUNIQ	Connection Number
08	04	S152LIPA	SEPMLHST	Local IP Address
0C	04	S152RIPA	SEPMRHST	Remote IP Address (TCP and UDP only)
10	02	S152LPOR	SEPMLPOR	Local Port Number (TCP and UDP only)
12	02	S152RPOR	SEPMRPOR	Remote Port Number (TCP and UDP only)
14	04	S152CAAC	SEPMCAAC	Number of API Taccept calls
18	04	S152CAAD	SEPMCAAD	Number of API Taddr calls
1C	04	S152CABD	SA52CABD	Number of API Tbind calls
20	04	S152CATC	SEPMCATC	Number of API Tclear calls
24	04	S152CACL	SEPMCACL	Number of API Tclose calls
28	04	S152CACF	SEPMCACF	Number of API Tconfirm calls
2C	04	S152CACO	SEPMCACO	Number of API Tconnect calls
30	04	S152CADI	SEPMCADI	Number of API Tdisconnect calls
34	04	S152CAIN	SEPMCAIN	Number of API Tinfo calls
38	04	S152CALI	S152CALI	Number of API Tlisten calls
3C	04	S152CAOP	SEPMCAOP	Number of API Topen calls
40	04	S152CAOT	SEPMCAOT	Number of API Toption calls
44	04	S152CARE	SEPMCARE	Number of API Trecv calls
48	04	S152CARR	SEPMCARR	Number of API Trecvrr calls
4C	04	C152CARF	SEPMCARF	Number of API Trecvfr calls
50	04	S152CARJ	SEPMCARJ	Number of API Treject calls
54	04	S152CARK	SEPMCARK	Number of API Trelack calls
58	04	S152CARL	SEPMCARL	Number of API Trelease calls
5C	04	S152CART	SEPMCART	Number of API Tretract calls
60	04	S152CASE	SEPMCASE	Number of API Tsend calls

Table 3-15 SMF Subtype 152 - API Endpoint Close (Continued)

Offset	Length	Label	Source	Description
64	04	S152CAST	SEPMCAST	Number of API Tsendto calls
68	04	S152CAUN	SEPMCAUN	Number of API Tunbind calls
6C	04	S152CAUS	SEPMCAUS	Number of API Tuser calls
70	14			Reserved
84	04	S152CACK	SEPMCACK	Number of API Tcheck calls
88	04	S152CAER	SEPMCAER	Number of API Terror calls
8C	04	S152CATE	SEPMCATE	Number of API Tstate calls
	90	S152DLEN		

Protocol Layer Events (Subtypes 110 - 123)

The SMF subtype 110-123 records are written to record certain protocol-related events, such as a bind or connect request. The format for each is identical, although the lengths vary. It contains a user and a data section.

Protocol Layer User Identification Section

The User Identification section identifies the application address space and task on whose behalf the event was completed.

**Table 3-16 SMF Record Subtype
110/111/112/113/114/115/116/117/118/119/120/121/122/123
User Identification Section:**

Offset	Length	Label	Source	Description
00		SMFPUSER		User section
00	08	SMFPJOB	ATCBJOB	Job Name of User
08	08	SMFPSTEP	ATCBSTEP	Step Name of User
10	08	SMFPPROC	ATCBPROC	Proc Name of User
18	04	SMFPTCB	ATCBTCB	TCB Address of User
1C	04	SMFPSEPM	Internal	SEPM Address of User
1C	04	SMFPINOD	SEPMINOD	Address of OE/PFS INODE (redefines S10SEPM).
20	02	SMFPASID	ATCBASID	ASID of User
	22	SMFPULEN		Length of User Identification Section

Protocol Layer Data Section

The Data section identifies the connection and provides connection statistics.

Table 3-17 SMF Record Subtype 110 through Subtype 123. Data Section

Offset	Length	Label	Source	Description
00		SMFPDATA		Data section - PROTOCOL record
00	01	SMFPSOPR	SEPMSOPR	Socket Protocol: X'00' SMFPPIP = IP (RAW default) X'01' SMFPPICM = ICMP (RAW) X'06' SMFPPTCP = TCP X'11' SMFPPUDP = UDP X'59' SMFPPOSP = OSPF (RAW) X'FF' = SMFPPRAW (RAW)
01	01	SMFPTYPE	SEPMTYPE	Access method type: X'00' SMFPTYOE = OpenEdition X'01' SMFPTYIU = IUCV X'02' SMFPTYAA = Assembler API
02	02			Reserved
04	04	SMFPCONO	SEPMUNIQ	Connection Number
	08	S120DLEN		Length of data section for Subtype 120
08	04	SMFPLIPA	SEPMLHST	Local IP Address
0C	04	SMFPRIPA	SEPMRHST	Remote IP Address (TCP and UDP only)
10	02	SMFPLPOR	SEPMLPOR	Local Port Number (TCP and UDP only)
	12	S114DLEN		Length of data section for Subtype 114
	12	S115DLEN		Length of data section for Subtype 115
	12	S116DLEN		Length of data section for Subtype 116
	12	S117DLEN		Length of data section for Subtype 117
12	02	SMFPRPOR	SEPMPOR	Remote Port Number (TCP and UDP only)
	14	S110DLEN		Length of data section for Subtype 110
	14	S111DLEN		Length of data section for Subtype 111
	14	S112DLEN		Length of data section for Subtype 112
	14	S118DLEN		Length of data section for Subtype 118
	14	S123DLEN		Length of data section for Subtype 123
	20	S124DLEN		Length of data section for Subtype 124
14	04	SMFPPKTI	SEPMPRECD	Packets In
18	04	SMFPPKTO	SEPMPSENT	Packets Out
1C	04	SMFPBYTI	SEPMPDATI	Bytes In
20	04	SMFPBYTO	SEPMPDATO	Bytes Out
24	04	SMFPCSER	SEPMPCSER	Checksum Errors
28	04	SMFPFMER	SEPMPFORM	Format Errors
2C	04	SMFPPKTD	SEPMPDRO	Packets Dropped

Table 3-17 SMF Record Subtype 110 through Subtype 123. Data Section (Continued)

Offset	Length	Label	Source	Description
30	04	SMFPBYTD	SEPMDROP	Bytes Dropped
	30	S119DLEN		Length of data section for Subtype 119
	30	S121DLEN		Length of data section for Subtype 121
30	04	SMFPREXO	SEPMRECT	Retransmits Sent
34	04	SMFPACKI	SEPMACKI	Acks In
38	04	SMFPACKO	SEPMACKO	Acks Out
3C	02	SMFPMSS	SEPMTCMS	MSS In Effect (Outbound)
	3E	S113DLEN		Length of data section for Subtype 113
	3E	S122DLEN		Length of data section for Subtype 122
	3E	SMFPDLEN		Maximum length of PROTOCOL record

Interval Records

The periodic, interval-driven records are written every so often, based on the INTERVAL parameter of the SMF statement in member IJTFCGxx. The interval-driven records include subtypes 80 and 100. The INTERVAL parameter is described in the *Cisco IOS for S/390 Customization Guide*.

Driver Statistics (Subtype 100) Data Section

The SMF record subtype 100 is written periodically (governed by the INTERVAL parameter of the SMF statement in the IJTFCGxx configuration member) to record statistics for physical devices. It contains no Task or User Identification sections.

Table 3-18 SMF Record Subtype 100 (DRIVER) Data Section

Offset	Length	Label	Source	Description
00		S100DATA		Data portion of subtype 100 (DRIVER) record.
00	08	S100NAME	LNICNAME	Interface name
08	02	S100TYPE	SNLNTYPE	Interface type 6 S100ETHR - Ethernet 9 S100TKN - Token Ring 14 S100HYPR - Hyperchannel 15 S100FDDI - FDDI Ring 22 S100P2P - Point to Point (Claw) 24 S100LOOP - Loopback
0A	01	S100OSTA	SNLNOSTA	Operational status x'00' S100ODWN - Interface Down x'01' S100OUP - Interface Up x'02' S100OPOL - Interface is Polling x'03' S100ODED - Interface Appears Dead
0B	01	S100ASTA	SNLNASTA	Administrative status x'00' S100ADWN - Administratively down x'01' S100AUP - Administratively up
0C	04	S100SPED	SNLNSPED	Media Speed
10	04	S100NMTU	SNLNNMTU	Maximum Transmission Unit Size for network
14	02	S100HWLN	SNLNHWLN	Hardware Address Length
16	06	S100HWAD	SNLNHWAD	Hardware Address
1C	08	S100TIME	SNLNTIME	Time of Last status change
24	04	S100INBT	SNLNINBT	Count of inbound bytes
28	04	S100INUC	SNLNINUC	Count of inbound unicast packets
2C	04	S100INNU	SNLNINNU	Count of inbound non-unicast packets
30	04	S100INDS	SNLNINDS	Count of inbound packets discarded
34	04	S100INER	SNLNINER	Count of inbound error packets
38	04	S100INUN	SNLNINUN	Count of unknown protocol packets
3C	04	S100OUBY	SNLNOUBY	Count of outbound bytes
40	04	S100OUUC	SNLNOUUC	Count of outbound unicast packets

Table 3-18 SMF Record Subtype 100 (DRIVER) Data Section (Continued)

Offset	Length	Label	Source	Description
44	04	S100OUNU	SNLNOUNU	Count of outbound non-unicast packets
48	04	S100OUDS	SNLNOUDS	Count of outbound packets discarded
4C	04	S100OUER	SNLNOUER	Count of outbound error packets
50	04	S100OUPQ	SNLNOUPQ	Count of outbound packets queued
	54	S100DLEN		Length of subtype 05 record data portion

Virtual Storage Statistics (Subtype 80) Data Section

The SMF record subtype 80 is written periodically (governed by the INTERVAL parameter of the SMF statement in the IJTCFGxx configuration member) to record virtual storage manager statistics for subpools. It contains no Task or User Identification sections.

Table 3-19 SMF Record Subtype 80 (VSMSTATS) Data Section

Offset	Length	Label	Source	Description
00	04	S80SPOFF	Internal	Offset to subpool descriptor section
04	04	S80SPNUM	Internal	Number of subpool descriptor entries (256)
08	04	S80IPOFF	Internal	Offset to IFS pool descriptor section
0C	04	S80IPNUM	Internal	Number of IFS pool descriptor entries
10	04	S80PVT	VSMREGN	Address of start of private area region (<16m)
14	04	S80PVTSZ	VSMREGN	Size of private area region (<16m)
18	04	S80EPVT	VSMREGN	Address of start of extended private area region
1C	04	S80EPVTS	VSMREGN	Size of extended private area region
20	04	S80ALLO	VSMLIST	Total allocated in all private area subpools (<16m)
24	04	S80FREE	VSMLIST	Total free in all private area subpools (<16m)
28	04	S80USED	VSMLIST	Total used in all private area subpools (<16m)
2C	04	S80EALLO	VSMLIST	Total allocated in all private area subpools in extended region
30	04	S80EFREE	VSMLIST	Total free in all private area subpools in extended region
34	04	S80EUSED	VSMLIST	Total used in all private area subpools in extended region
38	04	S80TALLO	VSMLIST	Total allocated in all private area subpools
3C	04	S80TFREE	VSMLIST	Total free in all private area subpools
40	04	S80TUSED	VSMLIST	Total used in all private area subpools
44	04	S80RGSZ	VSMLIST	Total region size (<16m)
48	04	S80RGUN	VSMLIST	Total unallocated space (<16m)
4C	04	S80RGUS	VSMLIST	Total region used (<16m)
50	04	S80ERGSZ	VSMLIST	Total region size (>16m)
54	04	S80ERGUN	VSMLIST	Total unallocated space (>16m)
58	04	S80ERGUS	VSMLIST	Total region used (>16m)
5C	04	S80TRGSZ	VSMLIST	Total region size
60	04	S80TRGUN	VSMLIST	Total unallocated space
64	04	S80TRGUS	VSMLIST	Total region used

Table 3-19 SMF Record Subtype 80 (VSMSTATS) Data Section (Continued)

Offset	Length	Label	Source	Description
68	2868	S80SPLS	VSMLIST	Subpool descriptor area (described below)
2860	Varies	S80IFSPL	IPHD	IFS Pool descriptor section
	2800	S80LEN		Minimum length of subtype 80 record

The following table is a detailed description of the S80SPLS area described in the previous table (SMF Record Subtype 100 (DRIVER) Data Section). This area is repeated 256 times (once for each subpool):

Table 3-20 Detailed Description of S80SPLS Area

Offset	Length	Label	Source	Description
00	02	S80SPID	VSMLIST	Subpool id
02	02			Reserved
04	04	S80SPALO	VSMLIST	Total allocated in subpool (<16m)
08	04	S80SPFRE	VSMLIST	Total free in subpool (<16m)
0C	04	S80SPUSE	VSMLIST	Total used in subpool (<16m)
10	04	S80SPEAL	VSMLIST	Total allocated in subpool in extended region
14	04	S80SPEFR	VSMLIST	Total free in subpool in extended region
18	04	S80SPEUS	VSMLIST	Total used in subpool in extended region
1C	04	S80SPTAL	VSMLIST	Total allocated in subpool
20	04	S80SPTFR	VSMLIST	Total free in subpool
24	04	S80SPTUS	VSMLIST	Total used in subpool
	28	S80SPLEN		Length of subpool descriptor section

SMF Report Writer Program

The SMF Report Writer Program, T00SMFRW, generates several types of reports for the various SMF records written by Cisco IOS for S/390.

To execute the Report Writer, use the following JCL:

```
//SMFRW      EXEC   PGM=T00SMFRW
//STEPLIB    DD     DISP=SHR,DSN=TRGIND X.LINK
//SMFIN      DD     DISP=SHR,DSN=SMFDATA
//SYSPRINT   DD     SYSOUT=*
//SYSIN      DD     *
/*
```

- **SMFIN DD** - Defines the file holding the SMF records. This file can be created from the system SMF data sets using the IBM **IFASMFDP** utility
- **SYSPRINT DD** - Defines the file where the report will be written
- **SYSIN DD** - Defines the file which holds the Report Writer commands.

Commands

The following commands are recognized by the Report Writer:

RECORDTYPE = <i>record_type</i>	Defines the SMF record type used by Cisco IOS for S/390. Valid types are 128-255. Default: 130
DATE =[<i>date</i> (<i>start_date</i> - <i>end_date</i>)]	Defines the date or range of dates for which SMF records will be selected for the report. Format: <i>yyyymmdd</i> , where <i>yyyy</i> = year <i>ddd</i> = julian day of year Default: All dates
TIME =[<i>time</i> (<i>start_time</i> - <i>end_time</i>)]	Defines the time or range of times for which SMF records will be selected for the report. Format: <i>hh:mm:ss.th</i> , where <i>hh</i> = the hour <i>mm</i> = minutes <i>ss</i> = seconds <i>th</i> = tenths and hundredths of a second. Any precision not specified is assumed to be zero. For instance, 12:10 = 12:10:00.00. Default: All times
REPORT = <i>report_type</i>	Defines the report type to be written. Several REPORT commands can be included to combine reports. The report types are described in the following table.
LOCAL = <i>ip_address:port</i>	Limits the report to records matching the local IP address and port specified.
REMOTE = <i>ip_address:port</i>	Limits the report to records matching the remote IP address and port specified.
JOBNAME = <i>jobname</i>	Limits the report by the jobname of the Cisco IOS for S/390 job.

The report types in the following table can be specified on the REPORT= command:.

Table 3-21 Report Types

Report Type	Description	Record Subtypes
VSMSTATS	VSM statistics (totals)	80
VSMPOOLS	VSM Statistics by subpool	80
IFSPOOLS	IFS pool activity	80
DRIVER	Device driver statistics	100
PROTOCOL	Protocol-layer activity	110-124
TCP	TCP protocol activity	110-115,122-124
UDP	UDP protocol activity	110,117-119,111
RAW	RAW protocol activity	110,120-122
OE	OE Endpoint close	150
IUCV	IUCV Endpoint close	151
API	API Endpoint close	152
FTP	FTP activity	20-22
TELNET	Telnet activity	23
DUMP	Unformatted dump of records	All
ALL	All reports (except DUMP)	All

Note The **DUMP** report should not be combined with another report type.

Note The **LOCAL** and **REMOTE** commands apply to the protocol reports, the endpoint close reports, the FTP, and the Telnet reports. For FTP, the IP addresses and ports are applied to the control connection for data set modification records (21), and to the data connection for data transfer and EOVS (20,22). The IP address or port may be specified alone.

Example

```
LOCAL=138.42.220.120:13
REMOTE=138.42.220.85
LOCAL=:23
```

