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The Executive is invited to concider the attached report and propose
any further actions.

                    Report on the use of SNA

                            in Austria

                 Document Number GSNW-EARN-00

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PREFACE

This report summarizes the current state of SNA use and expertise
within the Austrian Academic Community. It gives a short glance at the
SNA network and the systems and software in use.

Also included is a description of the regulations and recommendations
on the
choice of network resources and the use of a common parameter set.

Copyright (1989): Guenther Schmittner, EDV-Zentrum, Johannes Kepler
University
Linz.

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HISTORY

As there was only a small number of IBM or compatible systems (only
three sites, namely IMC Vienna, WU Vienna and JKU Linz) some years
ago, the use of SNA was only local. When two major universities in
Vienna switched over to VM (running on IBMs or PCMs) three years ago,
things dramatically changed. Soon after the initial setup of the
systems and the linkage of them into EARN, the installation of VM/VTAM
(and other SNA products) took place at every IBM site (system). Soon
after the first tests an Austrian X-domain network was designed and
implemented in November 1987. The current network consists of 26
hosts, 9 NCPs and 72 links (channel and PTT) between them and has a
total of 3 gateway links into other large SNA networks, one of them
being the recently announced IBM user network (Dial IBM).

The network is expected to grow slowly (because of saturation) but
steadily, especially in the sense of establishing other X-network
links.

THE NATIONAL BACKBONE

MAJOR SYSTEMS

As mentioned earlier the current network has 26 SNA-hosts, being

      11 VM systems

       4 MVS systems

      11 VSE systems

located at 9 sites. The SNA backbone is formed by 6 VM systems and 1
MVS system each of them also being an Austrian EARN node. The speed of
the links is at least 9.6kB and there are parallel links as well (both
forming the same or different transmission groups). A change to 64kB
links is currently done.

Note: Remote CTCA is also used in one place.

TECHNICAL DETAILS

Soon after the initial plan to form a coherent SNA network within

Austria, we made a strong effort to harmonize and guide the things to happen. Under the leadership of myself we created a common set of parameters and agreed on conventions about the use of resource names (see "SNA conventions and regulations" on page 5). We also centralized management of routing table generation and sub-area allocation. Since about a year we are using LISTSERV for administration of the various SNA definition files (VTAMLST) and network documentation. Every local SNA expert can store and retrieve definition files which has lead to improved network availability and management.

Every site is trying to keep its SNA software on an up-to-date level. Today we are running at least VTAM V3, NCP V3 and SSP V3. Each of the SNA backbone nodes is running NetView, all of them talking to the others.

Almost every 6 months a global update of the routing tables is   done.   This relatively long period of time requires careful planning for future hosts, controllers and links. This is done by myself using the IBM product RTG (Routing Table Generator, Pgm. No. 5668-815). The suggested routes (by RTG) are corrected by hand and in a second run RTG generates the PATH statements for every host and NCP (sub-area). In my opinion it is not possible to manage the routes for a large SNA network without appropriate software support, especially when you have a lot of alternate routes. There is overall satisfaction with routes generated in this way.

We have additional assumptions and requirements for route selection, especially in the sense of class of service. We decided to give interactive sessions higher priority than NJE traffic sessions (e.g. RSCS-RSCS or RSCS-JES2). SSCP-SSCP sessions always run at top priority. At distinct points in the network we are routing NJE traffic and interactive traffic over different physical paths (where possible), thus using higher speed links (>9.6kB) for terminal sessions.

Experience has shown that equal priority of interactive and NJE traffic leads to unacceptable response times for the terminal user. Despite that regulation, there currently is no backlog of NJE traffic somewhere in the Austrian SNA network. This is because of two reasons:

    Interactive sessions are not used very much

    Link speed is too slow (although at least 9.6kB)

    Interactive sessions don't generate enough traffic over long periods of time, so that NJE would be influenced

    A large number of the links (except one bottleneck) is not yet

saturated.

For differentiation between these types of sessions, specific VR numbers are assigned:

    VR0 is used for the general (default) route

    VR1 is used for NJE traffic only routes (if alternate route available)

    VR2 is used for interactive traffic only routes (if alternate route available)

    VR3-VR7 used for additional alternate routes

Note: RTG is able to deal with these assumptions and generates appropriate ERs.

This approach simplifies the definition of a commonly usable COS-Table.

CONNECTION TO THE INTERNATIONAL SNA BACKBONE

CURRENT STATE AND PLANS

Currently Austria is not connected to the international SNA backbone. This merely has political reasons, for CERN was not yet willing to run SNA on the link from Geneva to Linz. On the Austrian side of the link (my site) everything is prepared and ready to connect (in fact a dummy SNI-Gateway has been generated by myself).

JKU Linz (AEARN) is planning to upgrade the line to CERN to 64kB and to share bandwidth between various applications (conventional EARN NJE, OSI-Migration using G-Box connection, HEPNET and SNA) using bandsplitting. Austria is very interested to connect to the international SNA backbone and to share all the administrative work and coordination that is needed.

Nevertheless I must state clearly, that Austria is not willing to change any of its conventions or regulations for local resources in favor of any future international recommendations, though the Austrian international backbone node (e.g. AEARN) will honor any such recommendation and would be able to support it through alias name translation (full function through NetView).

Note: These recommendations (or directives) will very likely regulate application names and CDRMs only, which is quite easy to support.

GATEWAY TO YUGOSLAVIA

The link to Yugoslavia is running SNA since the very start. This has a simple reason:

Yugoslavia cannot provide BSC because they are lacking the necessary hard and software to run EP in their communications controller. In addition the Yugoslavian EARN node is also part of a national SNA network.

On this premises (and because most of the Yugoslavian hosts are running back-level software) the only solution for connecting Yugoslavia was to create a SNI-Gateway (GW-NCP) at AEARN, which is running very satisfactory (apart from line problems). The link is monitored using NetView. X-network sessions including the RSCS-JES2 NJE session between AEARN and YUBGSS21 are working quite well.

Yugoslavia has followed Austrian conventions and regulations for naming SNA resources, as far as the EARN node is concerned (YUBGSS21).

SNA CONVENTIONS AND REGULATIONS

Coordination of the whole network is done using LISTSERV. SNA definition files are stored at LISTSERV@AWIIMC11 and a special list "AT-SNA" is used for discussion and distribution of urgent information.

In regular intervals meetings are held to provide for further network development.

GENERAL CONVENTIONS

As mentioned earlier, a common set of naming conventions and regulations has been developed. In particular, the following applies to every SNA element in the Austrian SNA network:

SUB-AREAS

Every site is assigned a pool of subarea numbers.

At the time of network design, a maximum subarea number of 63 was chosen to allow enough NAUs per subarea. Today there is still no higher number but could be used, because every subarea supports ENA.

Site Subareas

```
    UNI  01-09
    IEZ  10-19
    IMC  20-29
    JKU  30-39
    WUW  40-49
```

Figure 1. Subarea pools

STANDARDS FOR SNA-MAJOR/MINOR-NODENAMES

     ss   Subarea number

        arbitrary - value selected by local SNA expert

```
    Name        Macro               Use

    $AUSTRIA    VBUILD TYPE=CDRM    List of CDRMs
    Ass$....    VBUILD TYPE=APPL    Application Major Node
    Ass.....    APPL ACB=        Application Minor Node
    Bss.....    LU LOCADDR=         LU 6.2
    Css.....    PU PUTYPE=          PU
            CLUSTER CUTYPE=         Cluster
    Dss.....    PATH                Path Definitions
    Gss.....    GROUP LNCTL=CTCA    Group
            GROUP LNCTL=NCP
            GROUP LNCTL=SDLC
            GROUP LNCTL=BSC
    Hss.....    LBUILD              Local nonSNA Major Node
            VBUILD TYPE=LOCAL Local SNA Major Node
    Iss.....    VBUILD TYPE=CA      CTCA
    Jss.....    VBUILD ADJSSCP      List of adjacent SSCPs
    Lss.....    LINE ADDRESS=       Line
    MssAT...    CDRM SUBAREA=       CDRM-Name
    Nss.....    BUILD NEWNAME=      NCP-Major Node
    Pss.....    LU LOCADDR=         Printer
            TERMINAL TERM=          Printer
            LOCAL CUADDR=           Printer
    Rss.....    VBUILD TYPE=CDRSC   CDRSC
    Sss.....    SERVICE ORDER=      Service Order Table
    Tss.....    LU LOCADDR=         Terminal (Screen)
            TERMINAL TERM=          Terminal (Screen)
            LOCAL CUADDR=           Terminal (Screen)
    Uss.....                    private
    Vss.....                    Virtual Resources
```

```
      Wss.....    VBUILD TYPE=SWNET   Switched Network
      Xss.....                 X.25
      YssAT...    HOSTPU Startparm    NetView
      Zss.....                 private
      @ss.....                 Local Definitions
                      (i.e. dynamic reconfiguration)
```

   Figure 2. Conventions for resource names

COS-TABLE AND BIND-VALUES

The COS-Table is defined according to the VRs chosen (see "Technical
details" on page 2 for additional information). The COS-Table consists
of only 3 specific entries and a default one:

```
ISTSDCOS COSTAB
ISTVTCOS COS     VR=((2,2),(0,2),(1,2),(4,2),(3,2),(5,2),(6,2),(7,2))
INTERACT COS     VR=((2,1),(0,1),(1,1),(4,1),(3,1),(5,1),(6,1),(7,1))
BATCH    COS     VR=((1,0),(0,0),(3,0),(4,0),(5,0),(6,0),(7,0))
  COS        VR=((2,1),(0,1),(1,1),(4,1),(3,1),(5,1),(6,1),(7,1))
  COSEND
  END
```

For NJE sessions default values from RSCS sample logmode table are
used. RSCS buffer size used is 1KB.

OTHER SNA PARAMETERS

Other parameters to consider are

     IOBUF (mind NJE buffer size)

     UNITSZ

     MAXBFRU

     MAXDATA (mind NCP storage)

which should be chosen appropriate and can influence response time
very seriously.

SNA/X.25 APPLICATIONS

NPSI

NPSI is available at every major node and is used for various

applications including OSI appls like X.400.

XI AND NSF

XI and its corequisite is available at selected nodes and is
    currently undertesting.

STX

STX (SNA to X.25) is a program product for emulating VT100 and similar
terminals on a 3270 to connect to (public) X.25 networks. It is
running at ALIJKU21 (MVS system).

CURRENT PLANS AND TRENDS

STATISTICS

In order to collect SNA traffic statistics and support extended
network monitoring I consider installing the IBM product NPM (Network
Performance Monitor, Pgm. No. 5665-333) at AEARN (ALIJKU21). I hope
this will be done this summer, provided I get money for it.

NATIONAL X.25 NETWORK

Austria is planning to set up a national backbone ring consisting of
private leased lines, which will run X.25. Every site will install an
X.25 switch with 64kB links between. This network will form the base
of ACONET (Academic Network of Austria) which is supposed to integrate
current Austrian network traffic for EARN, UNA, EUNET, HEPNET a.o.

So most likely, SNA will run on top of X.25 in a couple of months.

TCP/IP

LANs are emerging rapidly in today's world of Austrian academic
communities. There might be TCP/IP connections over SNA in near
future.

EXPERIENCE WITH SNA IN AUSTRIA

Overall experience with SNA is good (if not excellent). I will try to show some pros and cons:

Good:

    Monitoring is done using NetView.
    Every major site runs NetView, NetView-NetView sessions allow for session statistics and problem determination.

    Ability for NADs to have interactive access to other nodes
    increase   availability of EARN links in case RSCS fails. Remote support   for installation and maintenance is possible.

    Virtual links and ROUTE statements are used for RSCS. This provides extended capabilities in case a virtual link fails.

    NJE performance is good (full duplex). Traffic can be controlled.

    Users are happy with additional services (interactive sessions).

Bad:

    Local SNA expert is needed. Things can go wrong if not proper defined.

    SNA is not a ready-to-run product. It is not easy to maintain.

    Network is difficult to control and problems are hard to isolate and analyze without additional tools like NetView.

                              Belgium

                          June, 1989

>- A description of the situation of their national SNA backbone

For this moment there is an SNA line between the two most heavyly used nodes of the Belgium EARN (Univ Leuven and Univ Brussels:BLEKUL21-BBRNSF11) (SNI between 2 networks) A number of BSC lines (using Pass Thruogh VM) are connected to these two nodes and are using this SNA line for interactive applications. Besides this line,a lot of other SNA lines are used for other applications between a number of universities and other institutions (e.g. for using the library system DOBIS-LIBIS)

>- A description of the situation of their connection to the
international SNA backbone

Our university will use the IBM supercomputing EASI network.One of th
ese days a line from Leuven to Montpellier will be available.We will
use this line for the international EARN-traffic.The Belgium
international entry point will be moved from Brussels to Leuven.This
line will be used with SNA protocols.

> - If in their country any convention exists about:
> - application and LU names
> - SSCPNAMEs, SSCPIDs, NETIDs and HOSTPUs
> - parameter values (in particular, usage of COS tables and NJE BIND
>   parameters)
> and who is the coordinator of these conventions and activities
>   if he/she exists

NAMES (in effect from july 3rd 1989)

NETID   BEKUL000
                 --=====---
                 | | |
                 | | +- 3 positions free inside institution
                 | +---- 3 positions : institution ID
                 +------- 2 positions ISO country code

In Leuven we have (today) 4 subarea's with the following names:

HOSTPU	VTAM01	VTAM02	VTAM03	VTAM04
HOSTSA	01	02	03	04
SSCPID	01	02	03	04
SSCPNAME	BEKUL01	BEKUL02	BEKUL03	BEKUL04
CDRM	BEKUL01	BEKUL02	BEKUL03	BEKUL04

COSTABLE

No generally accepted rules

MODETABLE

No generally accepted rules

APPLICATIONS

Naming of Applications is of the form :
(Remark: only 2 positions for intitution left)

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```
          BEKUsxxx

WERE    s   = SA number
        xxx = Application Identification

JES2 APPLICATION for VTAM

BEKU1JS2 APPL  AUTH=(ACQ,VPACE),EAS=60,ACBNAME=JES2,VPACING=10,
*
            MODETAB=VTMODTAB,DLOGMOD=JES2PACE
```

>- A description of any SNA/X.25 application (if it exists)
    not yet used
>- The trend that the country would probably follow about these
> topics in the next years
    Also in the context of the supercomputing project,a number of
lines   of the Belgium EARN backbone will probably be upgraded with
a number   of SNA lines; some of them using 64K lines.
>- Any important technical remarks about the experience done
> (performances, dangerous situations to be avoided, etc.)
    For this moment,we are using a lot of SNA lines between different
institutions and different computers. The implementation of SNA is
very stable and in satisfaction of the users.

                                        Switzerland

                                        June, 1989

The following contains the details of the CERN SNI connections to
outside institutes. It is in this format so it can be printed easily
and is not the most aesthetic presentation. Some points should be
noted:

1) At present we are not using SSCP re-routing either to route traffic
inside CHCRNX00 nor to gain access to hosts with which an SSCP-SSCP
session does not exist.

2) CHCRNX00 is an internal backbone connecting collaborating sites at
present and does not represent a Swiss of French official backbone.

3) The only official EARN connection is to Montpellier which is
connected into the Montpellier backbone.

4) Existing collaboration lines will be moved from the 3725 to the
3745 controller in due course.

```
* Other subareas in null net:
*  6 = L3 NETID=CHCRN51
*  8 = SACLAY  NETID=CISI
* 10 = OPAL    NETID=CHCRN50
* 14 = ETH     NETID=CHETHZ00
* 18 = IN2P3   NETID=FRIN200
* 11 = reserved NETID=reserved
* 25 = UNIVGE  NETID=CHUGNET
* 30 = CINECA  NETID=CINECA
* 32 = ?  NETID= ?
* 34 = ?  NETID= ?
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+


                      Connection to CINECA (Bologne)


                            Netid=CHCRN00


                  ---------      ---------
CDRM=CHCRN20      |  CEARN  |    | CERNVM  |  CDRM=CHCRN10
RSCS=CHCRNRCE     |         |    |         |    RSCS=CHCRNRA
  LOCID=CEARN     |  sa=20  |    |  sa=10  |    LOCID=CERNVM
                  ---------      ---------     VM=CHCRNVA
                  |          |          |
CDRM=             |          |          | CDRM= CICDRM
  CDRDYN=         |          |      CDRDYN= YES
  CDRSC =         |          |      CDRSC = OPT
                  |          |          |
CDRM=             |          |      | CDRM=
  CDRDYN=         |          |      CDRDYN=
  CDRSC =         |          |      CDRSC =
                  |          |
                  |          |
    PCCU MAXDATA=8352       -----------   |
                         | |
                 -------------
                 | NCP=NCP31    |
                 |          |
                 |   sa=31   |
                 -------------
                       | ADDRESS= (24,     )
                       | PU      = P31024A
                       | TGN     = 1
                       | NRZI    = YES
                       | DUPLEX  = FULL
                       | SPEED   = 64000
========================================|======
```

```
Null NETID = CHCRNX00                      |
MAXSUBA    = 63                            |
COSTAB=ISTSDCOS                            |
                             |
NCP Subarea = 31                           |
ELEMENT 1 = CHCRN10                        |
ELEMENT 2 = CHCRN20                        |
PATH = DESTSUB=                            |
ER0  = (30,1,20000,30000,40000,45000) |
VR0=0 ,VR1=0 ,VR2=                         |
                             |
ELEMENT 1 = CICDRM                         |
ELEMENT 2 = ?                              |
ELEMENT 3 = ?                              |
NCP Subarea = 30                           |
========================================|=======
                   ---------
                   |   |
NETID =  CINECA         |  NCP        |
PU    = CINCP12         |       |
                   ---------

RSCS LOCID= ICINECA3
RSCS APPL=  ICINECA3      CDRM=CHCRN10      CDRM=CHCRN20
RSCS LOGMODE=RSCSLOW1      CDRDYN=YES        CDRDYN=NO
     COSTAB =ISTSDCOS      CDRSC =OPY        CDRSC =REQ

Other Applications: VM= CICMS
            SnaLink=CITCPIP


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+

                     Connection to OPAL

                      Netid=CHCRN00


          ---------   ---------
CDRM=CHCRN20     | CEARN |  | CERNVM |  CDRM=CHCRN10
RSCS=CHCRNRCE     |     |  |     |    RSCS=CHCRNRA
  LOCID=CEARN     | sa=20 |  | sa=10 |    LOCID=CERNVM
          ---------   ---------     VM=CHCRNVA
           |   |    |
CDRM=             |     | CDRM=UTOPVMA
  CDRDYN=        |     | CDRDYN=YES
  CDRSC =        |     | CDRSN =OPT
           |     |
CDRM=             |      | CDRM=UTOPVMB




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```

```
   CDRDYN=          |            |      CDRDYN=YES
   CDRSC =          |            |      CDRSN =OPT
                    |            |
                    |            |
   PCCU MAXDATA=8352      ------------   |
                           | |
                     -------------
                     | NCP=NCP21   |
                     |             |
                     |    sa=21    |
                     -------------
                          | ADDRESS= (44,FULL)
                          | LINE   = L21044
                          | PU     = P21044A
                          | TGN    = 1
                          | NRZI   = YES
                          | DUPLEX = FULL
                          | SPEED  = 64000
   ====================================|======
   Null NETID = CHCRNX00               |
   MAXSUBA    = 63                     |
   COSTAB=ISTSDCOS                     |
                                       |
   NCP Subarea = 21                    |
   ELEMENT 1 = CHCRN10                 |
   ELEMENT 2 = CHCRN20                 |
   PATH = DESTSUB=10                   |
   ER0  = (10,1,20000,30000,40000,45000) |
   VR0=0 ,VR1=0 ,VR2=(not used)        |
                                       |
   ELEMENT 1 = UTOPVMA                 |
   ELEMENT 2 = UTOPVMB                 |
   ELEMENT 3 =                         |
   NCP Subarea = 10                    |
   ====================================|======
                        ---------
                        |       |
   NETID = CHCRN50      | NCP   |
   PU    = PU300048     |       |
                        ---------

   RSCS LOCID= UTOPVM
   RSCS APPL=  UTOPRSCS      CDRM=CHCRN10      CDRM=CHCRN20
   RSCS LOGMODE=RSCSLOW1      CDRDYN=YES        CDRDYN=
       COSTAB =ISTSDCOS       CDRSC =OPT        CDRSC =

   Other Applications: UTOPVMA (VMA) UTOPVMB (VMB)
```

```
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

                          Connection to SACLAY

                            Netid=CHCRN00


                  ---------     ---------
CDRM=CHCRN20      |  CEARN  |   | CERNVM |   CDRM=CHCRN10
RSCS=CHCRNRCE     |         |   |        |        RSCS=CHCRNRA
   LOCID=CEARN    | sa=20   |   |  sa=10 |       LOCID=CERNVM
                  ---------     ---------       VM=CHCRNVA
                      |           |
CDRM=                 |           |  CDRM=S14
  CDRDYN=             |           |  CDRDYN=YES
  CDRSC =             |           |  CDRSN =OPT
                      |           |
CDRM=                 |           |  CDRM=
  CDRDYN=             |           |  CDRDYN=
  CDRSC =             |           |  CDRSN =
                      |           |
                      |           |
    PCCU MAXDATA=8352       ------------   |
                             | |
                    -------------
                    | NCP=NCP21   |
                    |       |
                    |     sa=21   |
                    -------------
                        | ADDRESS= (66,FULL) (67,FULL)
                        | LINE   = L21066    L21067
                        | PU     = P21066A   P21067A
                        | TGN    = 1
                        | NRZI   = YES
                        | DUPLEX = FULL
                        | SPEED  = 2x19200
=======================================|======
Null NETID = CHCRNX00                   |
MAXSUBA    = 63                         |
COSTAB=ISTSDCOS                         |
                               |
NCP Subarea = 21                        |
ELEMENT 1 = CHCRN10                     |
ELEMENT 2 = CHCRN20                     |
PATH = DESTSUB=8                        |
ER0  = (8 ,1,20000,30000,40000,45000) |
VR0=0 ,VR1=0 ,VR2=(not used)           |
                               |
ELEMENT 1 = S14                         |
```

```
ELEMENT 2 =                        |
ELEMENT 3 =                        |
NCP Subarea = 8                    |
=====================================|=======
                    ---------
                    |     |
NETID = CISI        |  NCP     |
PU     =            |     |
                    ---------

RSCS LOCID=HEP
RSCS APPL=RSCSS14    CDRM=CHCRN10     CDRM=CHCRN20
RSCS LOGMODE=RSCSLOW1     CDRDYN=YES      CDRDYN=
     COSTAB =ISTSDCOS     CDRSC =OPT      CDRSC =


Other Applications: VMS14 (VM)


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+

                              Connection to ETH

                              Netid=CHCRN00

            ---------     ---------
CDRM=CHCRN20      |  CEARN  |   |  CERNVM  |  CDRM=CHCRN10
RSCS=CHCRNRCE     |      |   |      |      RSCS=CHCRNRA
  LOCID=CEARN     |  sa=20 |   |  sa=10 |    LOCID=CERNVM
            ---------     ---------     VM=CHCRNVA
            |         |
CDRM=            |         |  CDRM=CHETHZ15
  CDRDYN=        |         |  CDRDYN=YES
  CDRSC =        |         |  CDRSN =OPT
                 |         |
CDRM=            |         |  CDRM=
  CDRDYN=        |         |  CDRDYN=
  CDRSC =        |         |  CDRSN =
                 |         |
                 |         |
    PCCU MAXDATA=8352     ------------   |
                     |  |
                 -------------
                 | NCP=NCP21    |
                 |         |
                 |    sa=21    |
                 -------------
                    | ADDRESS= (4,FULL)
```

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```
                                      | LINE   = L21004
                                      | PU     = P21004A
                                      | TGN    = 1
                                      | NRZI   = YES
                                      | DUPLEX = FULL
                                      | SPEED  = 64000
        ====================================|======
Null NETID = CHCRNX00                       |
MAXSUBA     = 63                            |
COSTAB=ISTSDCOS                             |
                                            |
NCP Subarea = 21                            |
ELEMENT 1 = CHCRN10                         |
ELEMENT 2 = CHCRN20                         |
PATH = DESTSUB=14                           |
ER0  = (14,1,20000,30000,40000,45000) |
VR0=0 ,VR1=0 ,VR2=(Not used)                |
                                            |
ELEMENT 1 = CHETHZ15                        |
ELEMENT 2 =                                 |
ELEMENT 3 =                                 |
NCP Subarea = 14                            |
        ====================================|=======
                        ---------
                        |       |
NETID = CHETHZ00        |  NCP  |
PU      =               |       |
                        ---------

RSCS LOCID=CZHETH1A
RSCS APPL=EZ5APRSC   CDRM=CHCRN10      CDRM=CHCRN20
RSCS LOGMODE=RSCSLOW1      CDRDYN=YES       CDRDYN=
     COSTAB =ISTSDCOS      CDRSC =OPT       CDRSC =

Other Applications: EZ5APVM (VM)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++

                         Connection to UNIV GE

                           Netid=CHCRN00


             ---------   ---------
CDRM=CHCRN20     |  CEARN  |   |  CERNVM  |  CDRM=CHCRN10
RSCS=CHCRNRCE    |        |   |          |       RSCS=CHCRNRA
   LOCID=CEARN   |  sa=20 |   |  sa=10  |     LOCID=CERNVM
             ---------   ---------   VM=CHCRNVA
```

```
             |              |
CDRM=CHUGCDRM       |              |   CDRM=CHUGCDRM
  CDRDYN=NO         |              |     CDRDYN=YES
  CDRSC =REQ        |              |     CDRSN =OPT
             |              |
CDRM=               |              |   CDRM=
  CDRDYN=           |              |   CDRDYN=
  CDRSC =           |              |   CDRSN =
             |              |
             |              |
    PCCU MAXDATA=8352       ------------   |
                          | |
                    -------------
                    | NCP=NCP21   |
                    |             |
                    |     sa=21   |
                    -------------
                            | ADDRESS= (80,FULL)
                            | LINE   = L21080
                            | PU     = P21080A
                            | TGN    = 1
                            | NRZI   = YES
                            | DUPLEX = FULL
                            | SPEED  = 64000
========================================|======
Null NETID = CHCRNX00                   |
MAXSUBA    = 63                         |
COSTAB=ISTSDCOS                         |
                                        |
NCP Subarea = 21                        |
ELEMENT 1 = CHCRN10                     |
ELEMENT 2 = CHCRN20                     |
PATH = DESTSUB=20                       |

ER0  = (20,1,20000,30000,40000,45000) |
VR0=0 ,VR1=0 ,VR2=(not used)          |
                                        |
ELEMENT 1 = CHUGCDRM                    |
ELEMENT 2 =                             |
ELEMENT 3 =                             |
NCP Subarea = 25                        |
========================================|======
                    ---------
                    |     |
NETID = CHUGNET       | NCP     |
PU    = CHUGPU1       |     |
                    ---------
```

```
RSCS LOCID=CGEUGE11
RSCS APPL=CHUGRSCS    CDRM=CHCRN10      CDRM=CHCRN20
RSCS LOGMODE=RSCSLOW1        CDRDYN=YES        CDRDYN=NO
     COSTAB =ISTSDCOS        CDRSC =OPT        CDRSC =REQ


Other Applications: CHUGVM


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++

                              Connection to L3

                            Netid=CHCRN00


              ---------   ---------
CDRM=CHCRN20          | CEARN   |  | CERNVM  |  CDRM=CHCRN10
RSCS=CHCRNRCE         |         |  |         |    RSCS=CHCRNRA
   LOCID=CEARN        |  sa=20  |  |  sa=10  |    LOCID=CERNVM
              ---------   ---------    VM=CHCRNVA
                 |           |
CDRM=                |           |  CDRM=CHCRNL3
   CDRDYN=           |           |  CDRDYN=YES
   CDRSC =           |           |  CDRSN =OPT
                     |           |
CDRM=                |           |  CDRM=
   CDRDYN=           |           |  CDRDYN=
   CDRSC =           |           |  CDRSN =
                     |           |
                     |           |
     PCCU MAXDATA=8352    ------------   |
                         | |
                 -------------
                 | NCP=NCP21   |
                 |        |
                 |    sa=21    |
                 -------------
                         | ADDRESS= (84,FULL)
                         | LINE   = L21084
                         | PU     = P21084A
                         | TGN    = 1
                         | NRZI   = YES
                         | DUPLEX = FULL
                         | SPEED  = 64000
=======================================|======
Null NETID = CHCRNX00                   |
MAXSUBA     = 63                |
COSTAB=ISTSDCOS                 |
                          |


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```

```
NCP Subarea = 21                      |
ELEMENT 1 = CHCRN10                    |
ELEMENT 2 = CHCRN20                    |
PATH = DESTSUB=6                       |
ER0  = (6 ,1,20000,30000,40000,45000) |
VR0=0 ,VR1=0 ,VR2=(not used)          |
                                  |
ELEMENT 1 = CDRM05                    |
ELEMENT 2 =                           |
ELEMENT 3 =                           |
NCP Subarea = 6                       |
=====================================|======
                    ---------
                    |       |
NETID = CHCRN51     |   NCP     |
PU      =           |       |
                    ---------


RSCS LOCID=LEPICS
RSCS APPL=CHCRNLRA    CDRM=CHCRN10      CDRM=CHCRN20
RSCS LOGMODE=RSCSLOW1      CDRDYN=YES       CDRDYN=
     COSTAB =ISTSDCOS      CDRSC =OPT       CDRSC =

Other Applications: CHCRNLVA (VM)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

                  Connection to LYON IN2P3


                     Netid=CHCRN00


          ---------     ---------
CDRM=         |     |   |   | CERNVM  | CDRM=CHCRN10
RSCS=         |     |   |   |     | RSCS=CHCRNRA
  LOCID=   |    |   | sa=10 |   LOCID=CERNVM
          ---------     ---------    VM=CHCRNVA
            |      |
CDRM=           |         | CDRM= FRIN201
  CDRDYN=       |         | CDRDYN= YES
  CDRSC =       |         | CDRSN = OPT
                |         |
CDRM=           |         | CDRM=
  CDRDYN=       |         | CDRDYN=
  CDRSC =       |         | CDRSN =
                |      |
   PCCU MAXDATA=8352      ------------   |
                    | |
              -------------


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```

```
                                 | NCP=NCP31    |
                                 |         |
                                 |     sa=31    |
                              -------------
                                 | ADDRESS= (00,FULL) (   ,FULL)
                                 | PU      = P31000A
                                 | TGN     = 1
                                 | NRZI    = YES
                                 | DUPLEX  = FULL
                                 | SPEED   = 2x19.2 (one used
=======================================|======          initially)
Null NETID = CHCRNX00                  |
MAXSUBA     = 63                       |
COSTAB=ISTSDCOS                        |
                                       |
NCP Subarea = 31                       |
ELEMENT 1 = CHCRN10                    |
ELEMENT 2 = CHCRN20                    |
PATH = DESTSUB=18                      |
ER0  = (18,1,20000,30000,40000,45000) |
VR0=0 ,VR1=0 ,VR2=(not used)           |
                                       |
ELEMENT 1 = FRIN201                    |
ELEMENT 2 =                            |
ELEMENT 3 =                            |
NCP Subarea = 18                       |
=======================================|=======
                         ---------
                          |     |
NETID =  FRIN200          | NCP       |
PU    =  ??               |     |
                         ---------

RSCS LOCID= FRCPN11
RSCS APPL=  ??          CDRM=CHCRN10      CDRM=CHCRN20
RSCS LOGMODE=RSCSLOW1       CDRDYN= YES        CDRDYN=
     COSTAB =ISTSDCOS       CDRSC = OPT        CDRSC =

Other Applications: VM = FRCPN11

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

                    Connection to Montpellier

                      Netid=CHCRN00

            ---------     ---------
CDRM=CHCRN20       | CEARN |   | CERNVM  |  CDRM=CHCRN10
```

```
RSCS=CHCRNRCE        |       |       |       |        RSCS=CHCRNRA
  LOCID=CEARN        |   sa=20 |     |   sa=10 |      LOCID=CERNVM
                 ---------     ---------      VM=CHCRNVA
                     |             |
CDRM=KVSA01          |             |  CDRM=KVSA01
  CDRDYN=YES         |             |    CDRDYN=YES
  CDRSC =OPT         |             |    CDRSC =OPT
                 |       |
CDRM=                |             |  CDRM=
  CDRDYN=            |             |  CDRDYN=
  CDRSC =            |             |  CDRSN =
                     |             |
                     |             |
    PCCU MAXDATA=8352         ------------   |
                         | |
                     ---------
                     |NCP=NCP21|
                     |         |
                     |   sa=21 |
                     ---------
                           | ADDRESS= (0 ,FULL)
                           | LINE   = L21000
                           | PU     = P21000A
                           | TGN    = 1
                           | NRZI   = YES
                           | DUPLEX = FULL
                           | SPEED  = 64000
========================================|======
Null NETID = XINETC                 |
MAXSUBA    = 63                     |
COSTAB=ISTSDCOS                     |
                                    |
NCP Subarea = 21                    |
ELEMENT 1 = CHCRN10                 |
ELEMENT 2 = CHCRN20                 |
PATH = DESTSUB= 15                  |
ER0  = (15,1,20000,30000,40000,45000) |
VR0=0 ,VR1=0 ,VR2=(not used)        |
                                    |
ELEMENT 1 = KVSA01                  |
ELEMENT 2 =                         |
ELEMENT 3 =                         |
NCP Subarea = 15                    |
========================================|======
                     ---------
                     |       |
NETID = KICNU0               | NCP       |
PU     =                     |       |
```

```
                    ---------
RSCS LOCID=
RSCS APPL= KBNJE0     CDRM=CHCRN10       CDRM=CHCRN20
RSCS LOGMODE=RSCSLOW1         CDRDYN=NO          CDRDYN=NO
     COSTAB =ISTSDCOS         CDRSC =REQ         CDRSC =REQ

Other Applications:

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++

LOGMODE and COS tables

RSCSTAB  CSECT
RSCSTAB  MODETAB
RSCSLOW1 MODEENT  LOGMODE=RSCSLOW1,FMPROF=X'03',TSPROF=X'03',
X
             PRIPROT=X'72',SECPROT=X'72',COMPROT=X'4020',        X
             SSNDPAC=X'03',SRCVPAC=X'03',RUSIZES=X'C7C7',        X
             PSNDPAC=X'03',PSERVIC=X'000000000000000000000000',  X
             COS=LOW1
       MODEEND
       END


ISTSDCOS COSTAB
       COS   VR=((0,1),(1,1),(2,1),(3,1),(4,1),(5,1),(6,1))
HIGH1       COS   VR=((0,2),(1,2),(2,2),(3,2),(4,2),(5,2),(6,2))
MED1   COS   VR=((0,1),(1,1),(2,1),(3,1),(4,1),(5,1),(6,1))
LOW1   COS   VR=((0,0),(1,0),(2,0),(3,0),(4,0),(5,0),(6,0))
       COSEND
       END

IMPORTANT:

For this to be effective for RSCS you should specify VPACING=3 on the
RSCS APPL statement


THE SITUATION OF THE GERMAN NATIONAL SNA BACKBONE

                              June 30th, 1989


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```

In the sequel we will describe the details of how SNA/SNI is
implemented in the AGFnet, as the SNA/SNI service that is provided by
the AGFnet is used to carry the NJE traffic of the german EARN
backbone.

The AGFnet (AGF=Arbeitsgemeinschaft der Grossforschungseinrichtungen,
permanent task force of german federal research laboratories) connects
the national research centers and universities. This network was
planned in 1987 and created in 1988 in order to enhance the electronic
cooperation between all german federal research laboratories. Some non
AGF members have been part of the AGFnet from the very beginning.

The SNA service of the AGFnet is administered by several rather
independant groups called Teilnetze. Besides this vertical separation
of work it is intended to separate the work in a horizontal way:
Application groups are supposed to organize each major application of
the network services whenever there is a need to do this. Currently
only an NJE group has been established.

Each Teilnetz may consist of one or more SNA subnets. These subnets
are connected via SNI to one NULLNET called DEAGFNET. The 'back-to-
back' technique allows each subnet to define their VTAM parameter with
minimal respect to the definitions of the other networks. Only the
specification of the NULLNET has to be unique for all institutions
connected to the AGFnet via a gateway NCP. So each subnet gets access
to the AGFnet via at least one Gateway NCP and one Gateway SSCP.

The gateway NCPs are connected via leased lines (64KBit / 9.6KBit)
using SNA or X.25 protocols, or via DATEX-P (9.6 KBit) packet switched
lines using X.25 protocols, i.e. for important lines a DATEX-P X.25
permanent virtual circuit is used for backup.

SNA is only one of the services provided by the AGFnet. It is intended
to provide X.25 and IP services all over the AGFnet physical backbone.
Currently X.25 is provided in those areas that are connected via DATUS
X.25 PBXs. We are testing IBM's XI in a cooperation between IBM and
some AGF institutions.

At least the following applications are currently used within this
AGFnet:

    NJE (JESx, RSCS)

    3270 dialog (mainly for TSO and CMS)

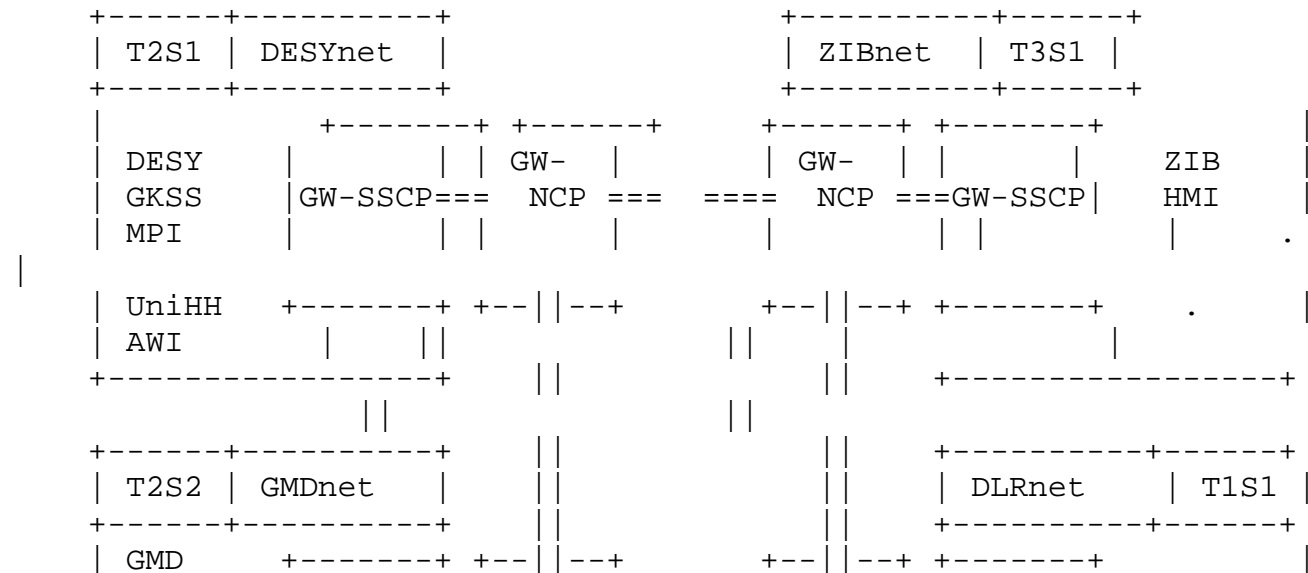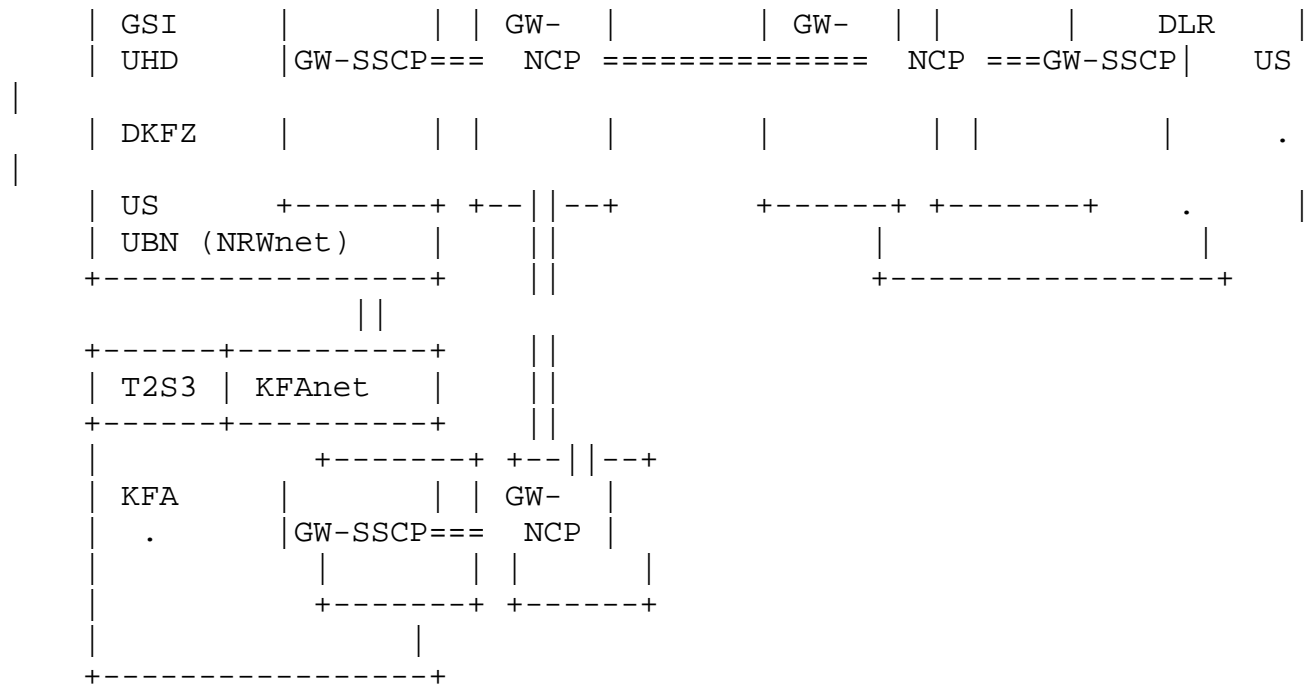X.400 Message Handling System

        X.29 PAD

        DFN file transfer/remote job entry

The following list mentions the institutions in Germany which are
connected to the AGFnet. (These institutions are not necessarily
members of the AGF task force.)

AWI   Alfred-Wegener-Institut f"ur Polar und Meeresforschung
DESY   Deutsches Elektronen-Synchrotron Hamburg
DKFZ   Deutsches Krebsforschungszentrum Heidelberg
DLR   Deutsche Forschungsanstalt f"ur Luft und Raumfahrt
Oberpfaffenhofen
GBF   Gesellschaft f"ur Biotechnologische Forschung
GMD   Gesellschaft f"ur Mathematik und Datenverarbeitung Bonn
GSF   Gesellschaft f"ur Strahlen und Umweltforschung
GKSS   Forschungszentrum Geesthacht
GSI   Gesellschaft f"ur Schwerionenforschung Darmstadt
HMI   Hahn-Meitner-Institut Berlin
IPP   Max-Plank-Institut f"ur Plasmaphysik
KFA   Kernforschungsanlage J"ulich
KFK   Kernforschungszentrum Karlsruhe
UBN   Universit"at Bonn
UHD   Universit"at Heidelberg
US   Universit"at Stuttgart
ZIB   Konrad-Zuse-Zentrum f"ur Informationstechnik Berlin

Today the german AGFnet (SNA backbone) has the following topology:

```
    +------+----------+                  +----------+------+
    | T2S1 | DESYnet  |                  | ZIBnet   | T3S1 |
    +------+----------+                  +----------+------+
    |         +-------+ +------+     +------+ +-------+            |
    | DESY    |       | | GW-  |     | GW-  | |       |    ZIB     |
    | GKSS    |GW-SSCP===  NCP ===  ====  NCP ===GW-SSCP|    HMI    |
    | MPI     |       | |      |     |      | |       |    |     .  |
|
    | UniHH   +-------+ +--||--+     +--||--+ +-------+    .     |
    | AWI     |      ||                  ||    |                |
    +----------------+     ||                  ||   +----------------+
             ||                  ||
    +------+----------+     ||                  ||   +----------+------+
    | T2S2 | GMDnet   |     ||                  ||   | DLRnet   | T1S1 |
    +------+----------+     ||                  ||   +----------+------+
    | GMD     +-------+ +--||--+     +--||--+ +-------+            |
```

```
  | GSI        |        | | GW-   |        | GW-  | |        |    DLR     |
  | UHD        |GW-SSCP===   NCP =============   NCP ===GW-SSCP|    US      |
|
  | DKFZ       |        | |       |        |       | |        |      .     |
|
  | US      +-------+ +--||--+        +------+ +-------+    .      |
  | UBN (NRWnet)    |    ||                |       |               |
  +----------------+    ||                     +----------------+
                  ||
  +-------+----------+    ||
  | T2S3 | KFAnet    |    ||
  +------+----------+    ||
  |            +-------+ +--||--+
  | KFA        |       | | GW-   |
  | .          |GW-SSCP===   NCP |
  |            |       | |       |
  |            +-------+ +------+
  |                 |
  +----------------+
```

THE SITUATION OF THE CONNECTION TO THE INTERNATIONAL EARN BACKBONE

One of the two international connections from Germany to EARN
countries is operated with SNA. This is the 64 KBit/sec SNA connection
between CNUSC Montpellier and GMD Bonn. (The other connection to Cern
is a 9.6kb BSC line).

The CNUSC line and a gateway NCP at GMD is part of the XINETC NULLNET
used to connect institutions in France, Italy and USA. In order to
minimize the impacts to national SNA networks it was successfully
attempted to connect the various national networks as is. No naming
conflict has been detected so far.

The NJE application used on the international SNA-link is operated in
the following way: GMD has direct NJE sessions with

    CNUSC Montpellier

    CUNY New York

    CNUCE Pisa

Because of the direct NJE sessions CNUSC Montpellier do not have to
store NJE-data temporarily for other nodes. This leads to a
significant reduction of system capacity requirements at Montpellier,
and coordination the NJE traffic between Germany and the USA or Italy
can be done on a bilateral base. Planned outages of the french-italian

or the french-US line have a direct effect to our spool systems at GMD.

In order to enhance SNA connectability we have   established SSCP-SSCP sessions between GMD Bonn and the foreign sites. Thus all indirect sessions between Germany and Italy and the USA are independant of the availability of the French host systems.

Furthermore two NJE systems at GMD Bonn are connected to all (national and international) SNA partners in order to have a backup possibility for the store and forward activity at GMD. (We use at GMD Bonn the store and forward technique for all international NJE traffic in order to gather statistical data for EARN.) DEARN is the major NJE node, and DBNGMD21 is used as a backup system.

CONVENTIONS AND RECOMMENDATIONS USED.

The AGFnet is divided into three adminstrational subnetworks (Teilnetze), many activities are internally organized. Each Teilnetz may consist of several SNA subnets. These subnets are connected via SNI to one NULLNET the AGFnet. There are some global conventions for the whole AGFnet as follows:

USED ABBREVOATOPMS

CC   Country Code = DE, ...

iii   abbreviation for the institution (SHARE Code or similar defined by the Teilnetz/subnet coordinator)

j   identification for differnt CPUs of the same institution (see below)

nnn   number with three digits

xxx   used freely by any institution

CONVENTIONS

VTAM/NCP parameters necessary to define the network

SSCPNAME CCiiisss with sss as SSCPID   (e.g. DEGMD230)

NETID   CCiiinnn (e.g. DEGMD000)

```
CDRM    name of CDRM must be equal SSCPNAME

SSCPID

        Teilnetz 1     100-199

        Teilnetz 2     200-299
        Teilnetz 3     300-399
        Each     Teilnetz  coordinator is responsible for the
distribution of the SSCPIDs within his Teilnetz

HOSTPU      CCiiixxx, xxx is for your own choice (Not necessary in VM
/           VTAM 3.1).

        HOSTPU must not equal SSCPNAME !

MAXDATA    4078. Value of the PCCU-Macro in the GW-NCP definition.  The
value  is determined by

        MAXDATA = (BFRSxTRANSFR)-18

        If  we  use  BFRS=128 (optimal) and transmit a 4K message
(TRANSFR=32) --> MAXDATA=4078


APPLICATIONS

The following specifications are only necessary for applications
available in the whole network. The names of such applications have to
be unique throughout the network.

1. Applications with dynamic ACB-name allocation. Only names with less
than 8 digits are valid.

     a) TSO     : Tiij        for  TCAS
            Tiijnnnn   for  TSO APPL definitions

            Example:   TGMD      for    TCAS
                  TGMD0000    for     TSO APPL definitions
                  ........
                       Because GMD has only one host
                       with TSO the 'D' was choosen
                       for 'j'.

     b) NCCF/
        NETVIEW  : NiiijPPT   for   NCCF/NetView PPO (primary program
                                    operator) Task
```

New discussions may be necessary for further applications using
such restrictions.

2. Other applications without any restrictions concerning their
namespace.

      a) CMS   : DEiiixxx

      b) NJE   : DEiiixxx
        (RSCS,
         JES2,
         JES3)

      c) IMS   : DEiiixxx

      d) CICS   : DEiiixxx

OTHER LU NAMES

Our naming recommendation for the other LU names is to use the
following scheme, where ever possible:

DEiiixxx DE Country Code, iii abbreviation for the institution, xxx
free

This leads to a namespace for each institution of about 40000 names.
This scheme is not enforced, we think that a naming convention in this
area is mainly a tool to solve name conflicts if they arise. In
practise most terminal LU names in Germany violate this
recommendations.

LOGON MODE TABLES/NAMES OF THE ENTRIES

The logon mode table name need not to be unique throughout the
network, because during session initiation via SNI the bitstream of
the logmode entry will be exchanged.

A part of this bitstream is the name of the COS table entry used to
choose the appropriate class of service. So the entry names of the COS
tables must be unique. For a migration purpose wie use today a
superset of all COS entries used in the connected networks.

COS TABLE

The following specifications for the COS table entries are used.

Prio 0   Batch user

Prio 1   Interactive User

Prio 2   SSCP sessions

We use currently the following COS-table :

```
*---------------------------------------------------------------------
*
*                                                *
*     COSTAB used within the AGFnet        Creation Date 88-01-28 *
*                                     Changed:       89-05-19 *
*                                                *
*---------------------------------------------------------------------
*
*     entries for AGFnet                                 *
*---------------------------------------------------------------------
*
*
ISTSDCOS COSTAB
ISTVTCOS COS     VR=((0,2),(1,2),(2,2),(3,2),(4,2),(5,2),(6,2),(7,2))
INTERACT COS     VR=((0,1),(1,1),(2,1),(3,1),(4,1),(5,1),(6,1),(7,1))
BATCH    COS     VR=((0,0),(1,0),(2,0),(3,0),(4,0),(5,0),(6,0),(7,0))
*---------------------------------------------------------------------
*
*     entries for XINETC  of Montpellier                    *
*---------------------------------------------------------------------
*
HIGH1    COS VR=((0,2),(1,2),(2,2),(3,2),(4,2),(5,2),(6,2),(7,2))
MEDIUM1  COS VR=((0,1),(1,1),(2,1),(3,1),(4,1),(5,1),(6,1),(7,1))
LOW1  COS VR=((0,0),(1,0),(2,0),(3,0),(4,0),(5,0),(6,0),(7,0))
*---------------------------------------------------------------------
*
         COS VR=((0,0),(0,1),(0,2),(1,0),(1,1),(1,2),(2,0),(2,1),(2,2X
            ),(3,0),(3,1),(3,2),(4,0),(4,1),(4,2),(5,0),(5,1),(5,2),X
            (6,0),(6,1),(6,2),(7,0),(7,1),(7,2))
       COSEND
          END
   *---------------------------------------------------------------------
*
   *     end-of-definitions                                  *
   *---------------------------------------------------------------------
```

*

DEFINITION OF THE AGF NULLNET

Because of performance degradation, we do not use the ALIAS name
translation facility of NetView. This is possible, because of the
unique COSTAB, unique LOGMODETAB entries, and unique LU-Names defined
above.

NETID   DEAGFNET

COSTAB   COSAGF

MAXDATA   4078

MAXSUBA   127 (important for pre-ENA connections)

NJE BIND PARAMETERS

Because of the different environments in several NJE hosts, concerning
storage utilization and capacity, it is difficult to determine a
recommendation for specific PACING values or other BIND parameters.

So each pair of NJE session partners has to think about their own
optimal values in relation to their environment and requirements.

The AGFNJE group is currently developping some recommendations in this
area to avoid unacceptable performance degradations through wrong
pacing values.

TECHNICAL REMARKS

Important technical remarks concerning SNI planning and specification
are mentioned in the following publications:

     Technical Bulletin
     SNA Network Interconnection
     SNI Planning and Design
     GG24-1630

     Technical Bulletin
     SNA Network Interconnection
     A Technical Overview
     GG22-9352

```
     Technical Bulletin
     SNA Network Interconnection
     SNI Examples and Data Flows
     GG24-1679

     SNA Network Interconnection
     Session Initiation Request Routing
     GG66-0258


German EARN country coordinator

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     Tel. +45 228 81996 50
     BITNET: MABOGEN at DEARN


EARNSNA coordinator

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     BITNET: GRZ061 at DBNGMD21


AGFNJE coordinator

     Peter Sylvester
     GMD Bonn
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     BITNET: GRZ027 at DBNGMD21

AGFnet coordinator

     Peter Wunderling
     GMD Bonn
     Riemenschneider Strasse 11
     5300 Bonn 1
```

West Germany
        Tel. +45 228 81996 46
        BITNET: GRZ017 at DBNGMD21

THE TREND OF THE GERMAN SNA BACKBONE IN THE NEXT YEARS:

In the next years there will be activities to increase the performance
and services we will provide to the connected institutions.

The german PTT in cooperation with the DFN will provide in a few
months a 64Kbit/X.25 science network. This science network can be used
as a additional X.25 network provider.

We plan to install XI

We plan to provide IP upon X.25 to all connected institutions

We will increase the link speed to 2Mbit/sec.

                                France

                                June, 1989

All this report is made from CNUSC experiences

EARN-FRANCE SNA BACKBONE

SNA national connections with the CNUSC:

FRMOP11   Montpellier
FRSUN12   Lyon
FRBDX11   Bordeaux
FRTLS12   Toulouse
FRMRS11   Marseille
FRCCUB11   Dijon

SNI national connections with the CNUSC:

FRORS13   Paris

INTERNATIONAL SNI CONNECTIONS

CUNYVM   U.S.

```
DBNGMD21   Germany
CEARNV2    CERN
ICNUCEVM   Italia
Leuven       Belgium   (in a near future)
```

CONVENTIONS

There is no national convention about LU, SSCP,... names but we have
a convention in the cross-domain of the CNUSC :

All the names of the network resources are Nriiicc :

N   is for the center (K for CNUSC, B for Bordeaux, M for
Marseille ....)

r   identify the resource type (A : Application major node, B :
Application minor node, D : PATH minor node, M : CDRM major
node, N : NCP major node, P: minor node PU, T : LU minor node
...)

iii   Identify a resource among resources of the same nature or
indicate the resource dependance in relation to a resource
hierarchically superior.

cc   is optional, is to complete if necessary the resource
identification.

COS TABLES

```
HIGH1     COS VR=((0,2),(1,2),(2,2),(3,2),(4,2),(5,2),(6,2),(7,2))
MEDIUM1  COS VR=((0,1),(1,1),(2,1),(3,1),(4,1),(5,1),(6,1),(7,1))
LOW1     COS VR=((0,0),(1,0),(2,0),(3,0),(4,0),(5,0),(6,0),(7,0))
```

NJE PARAMETERS :

```
    NJE56K   MODEENT LOGMODE=NJE56K,FMPROF=X'03',TSPROF=X'03',
         PRIPROT=X'72',SECPROT=X'72',COMPROT=X'4020',
         SSNDPAC=X'3F',
         COS=LOW1
```

SNA/X25 APPLICATION

Videotext applications using NPSI and GTMOSI

TECHNICAL REMARKS ABOUT OUR EXPERIENCE

Important performance factors:

    In NCP, line windowsize (MODULO and MAXOUT).

    In MODETAB, Session Pacing (Not the virtual route pacing)
SSNDPAC.

    Buffer size.

All these parameters must be well define by the two sites.

THE SITUATION OF THE ITALIAN SNA BACKBONE

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More than 35 IBM computers belonging to Italian academic and research
institutions are able to communicate through a set of interconnected
SNA networks. This situation is rather recent because most
institutions have begun to use SNA only after the availability of
VM/VTAM. The only exception is ENEA (Ente Nazionale per le Energie
Alternative), where SNA has been used for many years, because most
computers run MVS.

Previously, most connections used BSC lines dedicated to PVM or NJE.
    In most cases, multiplexing modems were used for sharing the
bandwidth between the two applications.

The introduction of SNA has required a greater effort of coordination
between the various institutions, but nobody regrets the old times
because SNA has introduced:

    better performances and reliability,

    possibility to use X.25,

    availability of remote logon facilities to line mode terminals,

possibility to have NJE links between non-adjacent nodes.

When SNI has been introduced, the following targets have been estimated as being particularly desirable:

Separation of wide area routing from local area routing. In other words, a computing center must be allowed to install or remove hosts, communication controllers and channel to channel adapters without requiring a redefinition of PATHs on the whole network.

Possibility to define an application as belonging to a computing center, rather than to a particular host. In other words, a computing center must be free to move applications from one host to another, without requiring a redefinition of CDRSCs on the rest of the network.

Keeping PATH tables reasonably simple, while allowing a considerable set of alternate routes for network reliability.

Avoiding the intervention of a third computing center's host when initiating a session between LUs of different computing centers.

As a consequence, it was decided that each computing center having the necessary resources for generating a GW-SSCP and a GW-NCP was allowed to create its own SNA network. Presently not all computing centers are taking advantage of this decision because some "SNA islands", which are connected to the rest of Italy through a single point of contact, have preferred to preserve, at least initially, their old pre-SNI definitions. The following networks are examples of such "islands": CILEA, CINECA, ENET, IATINET.

If all wide area links were grouped in a single big null network, all computing centers would have their independence and could activate sessions with other centers without the intervention of third-party SSCPs. Unfortunately, the topology of wide area connections in Italy is so complex that it is almost impossible to find a set of Explicit Routes for exploiting them satisfactorily. Furthermore, by the end of 1989 the availability of the 2Mbps links of the GARR project will make the topology even more complex. Thus, it has been decided to place in the big null network (which has been named ARIETE) only a subset of the wide area links and to make this subset big enough to allow each non-null network to be adjacent to ARIETE. The lines excluded from ARIETE have been grouped in smaller null networks, that are adjacent to only some of the non-null networks. Thus, for each pair of LUs belonging to two different networks, there is always a path across ARIETE, but there can be also different paths through different networks. The path through ARIETE is not necessarily the optimal one

but the selection of the most convenient one is ensured by means of appropriate sequences of ADJCDRM and GWPATH statements.

The most used applications are NJE (JES2, RSCS, JNET), interactive services (mainly CMS, TSO and CICS), SIM3278 and SNALINK (IP over SNA). X400 is used only for the interoperability tests of the OSIRIDE Intertest program.

Most connections use 9.6Kbps lines. Some metropolitan connections (mostly in Milan) use 72Kbps lines. There is a 48Kbps line between CNUCE (Pisa) and CINECA (Bologna), which connects two X.25 switches. An X.25 PVC links the communication controllers of CNUCE and CINECA through the two switches. The window size of the X.25 PVC is 7 and its maximum packet size is 128. After having replaced the default values for VRPWSnn with more appropriate ones, the throughput of the link is approximately 80% that of a pure SDLC link.

CONNECTION TO THE INTERNATIONAL EARN BACKBONE.

The international link from CNUCE (Pisa) to CNUSC (Montpellier) is operated with SNA and is part of the XINETC null network.

There are SNANJE links from ICNUCEVM to FRMOP22, DBNGMD21 and DEARN. The international line will be used soon for connecting the Northern Telecom of CNUSC with the Dynatech CPX20 of CNUCE. The SNA link between the communication controllers of CNUCE and CNUSC will use a PVC through the two switches. If desirable, it will be possible to set up similar PVCs with other EARN nodes on the X.25 backbone.

CONVENTIONS.

Resource names.

A very simple naming convention is being used in Italy: each computing center is assigned a two-letter prefix. The two-letter prefix is used on all SSCPNAMEs, CDRMs, HOSTPUs and LUs (including terminals). Some names of NJE applications are an exception to this rule, because of a limitation of VRNA (no more used), which forced the NJE application name to be equal to the nodeid.

There is no convention for NETIDs.

Conventions for SSCPIDs.

Each non null network has been assigned a number 'nn' between 00 and 65. The SSCPID of a host with subarea number 'mmm' on network 'nn' is

'nnmmm'. Thus, the network number of TORO is 63, the subarea number of IP1CDRM on TORO is 63 and the SSCPID of IP1CDRM is 63016.

Logon Mode Entries.

There are no conventions for LOGMODEs used in sessions initiated by the secondary.

Conventions are necessary, however, for the LOGMODEs used by NJE, because NJE sessions are initiated by the primary. For this reason, all hosts (including MVS hosts) have installed a table named RSCSTAB, which contains all the entries of the standard RSCSTAB distributed with RSCS 2.2, plus a few further RSCSNJEx entries. RSCSNJEx entries differ from the standard RSCSNJE0 in the pacing values and in the COS parameter (blank in RSCSNJE0 and BATCH in the others).

For compatibility with FRMOP22, where RSCSNJE0 and the other RSCSNJEx are not defined, the VTAM of ICNUCEVM contains also the LOGMODE RSCSNJE, with pacing values equal to 6.

COS tables.

The COS table used on all Italian networks has the standard name ISTSDCOS.

It contains the following classes of service:

ISTVTCOS with priority 2,

INTERACT with priority 1,

NETOPER   with priority 1,

BATCH   with priority 0,

<blank>   with priority 0.

For compatibility with FRMOP22, the COSTAB of ICNUCEVM contains also the following classes of service:

HIGH1   with priority 2,

MEDIUM1   with priority 1,

LOW1   with priority 0.

All classes of service contain the list of all eight virtual routes ordered by route number.

Experience has shown that NJE must never be given a priority greater than 0, otherwise sessions with a lower priority can be blocked during the whole transmission of a file.

All logon mode entries used by interactive sessions contain the parameter COS=INTERACT.

FUTURE TRENDS.

SNA is just one of the network architectures used by the Italian research institutions. DECNET and TCP/IP are also widely used. In some cases lines are dedicated to a single protocol, in other cases line sharing is obtained through the use of band-splitting modems or X.25 switches. TCP/IP is used in native mode, over X.25, over DECNET (via Wollongong's D-Bridge) and over SNA (via IBM's SNALINK).

A new committee, which is named GARR (Gruppo Armonizzazione Reti per la Ricerca), is coordinating the creation of a 2Mbps backbone. The backbone is "supposed" to be operational by December 1989. Each node of the backbone will use time division multiplexers for creating logical circuits to be dedicated to SNA, DECNET, TCP/IP and X.25.

All sites that are not on the backbone will continue to use initially the present 9.6Kbps lines, but these will be replaced later by a peripheral network using 64Kbps lines. No decisions have been taken yet about the method that will be used for sharing the 64Kbps bandwidth between the various protocols, but X.25 seems to be the most appropriate solution.

Since SNA will not necessarily be the most used protocol on the network, probably XI will not be used for building the X.25 infrastructure. However, it is easy to foresee that XI will be installed on many sites, at least for improving the performance of OSI communications within local SNA islands.

Heading ID's

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